Poster Tour

Poster tour: Balance

ISPR8-0110

BALANCE FUNCTION IN CANCER SURVIVORS AND HEALTHY SUBJECTS
S. Morishita1, Y. Mitobe2, A. Tsubaki1, O. Aoki3, J. Fu4, H. Onishi1
1Niigata University of Health and Welfare, Institute for Human Movement and Medical Sciences, Niigata City, Japan
2Niigata University of Health and Welfare, Department of Nursing, Niigata, Japan
3Shijonawate Gakuen University, Faculty of Rehabilitation, Osaka, Japan
4University of Texas MD Anderson Cancer Center, Department of Palliative- Rehabilitation & Integrative Medicine, Houston, USA

Introduction/Background

Older adults who have survived cancer experience significantly more falls compared with healthy adult subjects. Adult cancer survivors who are not elderly may also have lower balance function than healthy adults.

Material and Method

We examined muscle strength and balance function among 19 cancer survivors and 14 healthy subjects. Muscle strength was assessed using hand-grip and knee extensor strength tests. Balance function was evaluated using the Timed Up and Go test (TUG), and body sway was tested using a force platform.

Results

No significant differences were found with respect to right and left grip strength or right and left knee-extension strength between the two groups. A significantly higher TUG time was observed in cancer survivors than in healthy subjects (p < 0.05). With eyes open, the area of the center of pressure was significantly larger in cancer survivors than in healthy subjects (p < 0.05). Similarly, the length per area was significantly lower both with eyes open and closed for cancer survivors than for healthy subjects (p < 0.05).

Conclusion

Cancer survivors should be evaluated for balance function as there is a potential for impairment. The findings of this study will be relevant in the context of planning for the prevention of falls for cancer survivors.

Keywords

balance function;cancer survivors;fall prevention

No conflict of interest
Poster Tour

Poster tour: Balance

ISPR8-0619
THE EFFICACY OF EXERCISES USING BALANCE EXERCISE ASSIST ROBOT FOR THE PATIENTS WITH CHRONIC MYELOPATHY
M. Yamaguchi1, N. Itoh2,3, D. Imoto3, S. Kubo1, N. Shimizu1, S. Oohashi2, K. Sawada3, K. Ishida3, A. Sagara3, Y. Mikami1,3, T. Kubo1,2,3
1University Hospital- Kyoto Prefectural University of Medicine, Department of Rehabilitation, Kyoto, Japan
2Graduate School of Medical Science-Kyoto Prefectural University of Medicine, Department of Advanced Rehabilitation medicine, Kyoto, Japan
3Graduate School of Medical Science-Kyoto Prefectural University of Medicine, Department of Rehabilitation medicine, Kyoto, Japan

Introduction/Background

Exercise with a Balance Exercise Assist Robot (BEAR ex.) is reportedly effective for improving dynamic balance and muscle strength of lower extremities of patients with central nervous system disorder and frailty. The aim of this study was to examine the effect of this training using the BEAR for chronic myelopathy with balance disorder.

Material and Method

This study was designed as a crossover trial. Participants were divided into group A and group B. The period is 4 weeks. Group A that is BEAR ex. 8 days in two weeks, then conducts conventional balance exercise (CON ex.) on 8 days in two weeks. Group B was in the reverse of the protocol of group A. Outcome measures: Berg balance scale (BBS), functional reach test (FRT), timed up and go test (TUG) and muscle strength of the lower extremities (hip flexion, knee extension, ankle dorsiflexion and plantar flexion) were assessed before and after of each exercise. After the exercise, each participant rated whether the exercises had been satisfied through a questionnaire. Comparison between changes before and after each exercise and changes in each exercise were used a paired t test. The level of significance was less than 5%.

Results

There were 18 participants(12 men, 6 women; age 71±9 years; duration of morbidity 14±13 years) who completed this study. Group A were 8 cases, Group B were 10 cases. FRT were increased with both exercise. BBS and muscle strength of hip flexion were increased with BEAR ex.. Changes in each exercise was no significant difference in all measurements. The satisfaction of each exercise was 15 cases preferred BEAR ex..

Conclusion

In chronic myelopathy with balance disorders, the BEAR ex. showed the same improvement of dynamic balance as CON ex.. Also it was excellent in maintaining motivation to practice.
Keywords

balance exercise assist robot;balance;myelopathy

Conflict of interest
Disclosure statement:
The department received a research grant and the Balance Exercise Assist Robot from Toyota Motor Corporation in this study.
Poster Tour

Poster tour: Balance

ISPR8-1098
THE EFFECT OF BALANCE EXERCISE ASSIST ROBOT (BEAR) TO PATIENT AFTER ALLOGENETIC HEMATOPOIETIC STEM CELL TRANSPLANTATION (ALLO-HSCT); PRELIMINARLY STUDY
K. Sota¹, T. Yamashita², T. Wakasugi¹, T. Harada¹, Y. Uchiyama², Y. Miyabe², N. Hasegawa², K. Kaida³, K. Ikegame³, N. Kodama², H. Ogawa³, K. Domen²
¹Hyogo College of Medicine Hospital, Rehabilitation, Nishinomiya, Japan
²Hyogo College of Medicine, Rehabilitation Medicine, Nishinomiya, Japan
³Hyogo College of Medicine, Hematology, Nishinomiya, Japan

Introduction/Background

Previous studies have shown that patients after allogeneic hematopoietic stem cell transplantation (allo-HSCT) frequently complicate balance dysfunction, with at least 50% experiencing one or more falls during hospitalization. We investigated the effect of Balance Exercise Assist Robot (BEAR) on patients after allo-HSCT, and the correlation between the effect of BEAR and the severity of balance dysfunction before intervention.

Material and Method

Fifteen patients, who were allowed to leave the sterile room after allo-HSCT during hospitalization, participated. Mini-Balance Evaluation Systems Test (mini-BESTest), grip power, knee extension strength, 10-m walk test, Timed Up and Go test (TUG), dual-task TUG, functional reach test, Berg balance scale, sub-items of the mini-BESTest, and single-leg standing time were evaluated before and after intervention using BEAR. The participants performed 15 BEAR sessions, 20 minutes per session. The difficulty level of training task was automatically adjusted for each participants by BEAR. We divided into two groups based on pre-intervention Mini-BESTest scores: less than 70% (low group) and 70% or more (high group) and analyzed. Statistical analyses were performed to compare the groups; p<0.05 indicated statistically significant differences. Informed consent was obtained from all participants before the intervention.

Results

There was no significant difference in pre- and post-intervention mini-BESTest in the low group (52.4±15.9 vs 70.8±18.5) and high group (86.9±12.0 vs 88.5±13.0). However, change between pre- and post-intervention scores in the low group was greater than the minimally important change of the mini-BESTest. Furthermore, significant improvement was observed between pre- and post-intervention scores for postural response (18.5±22.7 vs 51.9±32.8), a mini-BESTest sub-item, in the low group. The other pre- and post-intervention outcomes were not significantly different in either group.

Conclusion
BEAR was an effective and safe balance training, especially for postural response, in allo-HSCT patients with pre-intervention scores of less than 70% in the mini-BESTest.

Keywords

robotics; postural control; balance exercise

No conflict of interest
A NEW POSTURAL REHABILITATION METHOD FOR BRAIN-DAMAGED PATIENTS: THE MECHANICAL HORSE.

H. Baillet¹, R. Thouvarecq¹, E. Verin², C. Delpouve², N. Benguigui³, J. Komar¹, D. Leroy¹

¹CETAPS Laboratory, Sport Sciences, Mont Saint Aignan, France
²CRMPR Les Herbiers, Rehabilitation center, Bois-Guillaume, France
³CESAMS Laboratory, Sport Sciences, Caen, France

Introduction/Background

The mechanical horse was created in the 1990s. It oscillates in antero-posterior plan with several oscillation frequencies (from 12 [20%] to 150 osc.min⁻¹ [100%]). Early works investigating the use of mechanical horses in rehabilitation have shown a similar effect on posture compared to real hippotherapy. The aim of this study was to analyze the impact of a new rehabilitation protocol on the postural coordination of patients with brain-damaged.

Material and Method

20 brain-damaged patients were randomly assigned in 2 groups: control (G1)/horse (G2). Contrary to G1 (classic rehabilitation), G2 performed 24 rehabilitation sessions (different balance exercises and trunk mobilizations) on a moving mechanical horse. During pre and post-tests, patients were sitting on the horse, and were equipped with reflective markers continuously tracked (head, C2, C7, S1, horse) for a range of different oscillation frequencies (adapted to abilities of each patient). Through point coordinates of those five reflective markers, three angles between specific limb and the vertical axis were computed (head, trunk, horse). Discrete relative phase (ϕ) between patient oscillations and horse oscillations was then computed, characterizing the ϕHead-Horse and ϕTrunk-Horse coordinations (in-phase = 0°±20°, antiphase = 180°±20° or out-of-phase).

Results

For all patients, the ϕHead-Horse Coordination was in out-of-phase for every oscillation frequencies (e.g., G2, 40%: 110.2° in pre-, 125.8° in post-test). However, for the ϕTrunk-Horse coordination, G2 presented a shift of coordination pattern in post-test, reaching most quickly antiphase, as horseback riders. Finally, a reduction of the variability was observed in post-test for G2.

Conclusion

Our results suggest that the use of a mechanical horse allows positive effects on the posture in brain-damaged patients. Indeed, after 24 sessions, an increase in patients’ ability to control their activity during higher frequencies was observed. Moreover, the postural stability of patients was improved through the practice on the mechanical horse.

Keywords
Mechanical Horse; Postural Coordination; Brain-damaged patient

No conflict of interest
Poster Tour

Poster tour: Balance

ISPR8-1807
ROBOTIC EVALUATION OF FALL RISK IN OLDER PEOPLE: RESULTS ON TRUNK PARAMETERS IN STATIC AND DYNAMIC BALANCE CONDITIONS BY HUNOVA ROBOT.
V. Squeri¹, A. De Luca², A. Cella³, F. Vallone³, G. Sirit⁴, E. Zigoura⁴, A. Giorgeschii², E. Tavella³, M. Puntoni⁴, M. Avella³, V. Garofalo³, P. Aguzzoli³, L. De Michieli¹, J. Saglia¹, C.A. Sanfilippo¹, P. Alberto³

¹Istituto Italiano di Tecnologia- IIT, Rehab Technologies IIT INAIL Lab, Genoa, Italy
²University of Genoa, Dept. of Informatics- Bioengineering- Robotics and Systems Engineering, Genoa, Italy
³E.O. Galliera Hospital, Dept. Geriatric Care- Orthogeriatrics and Rehabilitation, Genoa, Italy
⁴E.O. Galliera Hospital, Scientific Coordination Unit, Genoa, Italy

Introduction/Background

Maintaining balance depends on the integration of sensory, proprioceptive and vestibular information to appropriately adjust movements responses to different postural conditions. hunova is a new robotic device developed and validated to perform functional evaluation and sensorimotor rehabilitation of lower limbs and trunk in static and dynamic environments. Aim of this study was to evaluate balance parameters in older subjects with different risk of fall.

Material and Method

100 subjects aged ≥65 years (mean age 77.17±6.49 SD years) were enrolled. According to the number of falls in the last 12 months, participants were allocated to low, medium or high risk of fall. Balance was evaluated by hunova in static, unstable and perturbing conditions, in both standing/seated positions and with open/closed eyes. Parameters were: sway area (SA), path length (PL), range of oscillations in anterior-posterior (OAP) and medio-lateral directions (OML) in both platform and trunk oscillations. Statistical analysis was carried out by means of Kruskal Wallis test on medians and Spearman correlation test.

Results

Older fallers had higher trunk PL both in unstable (fallers, median(IQR): 32.5 (23.35) vs non-faller 43.79(29.21) (deg), p<0.01) and moving (fallers 35.94(22.12) vs non-faller 45.27(31.29) (deg), p<0.05) platform in standing with open eyes condition. Trunk SA and OML were significantly different in subjects with different fall risk classes in perturbing conditions when seated with closed eyes. Trunk parameters in unstable and perturbing conditions showed also a strong and significative correlation with age (p<0.01).

Conclusion

hunova robot was able to detect physiological components involved in balance maintenance in older subjects with different fall risk. This evaluation could be crucial to prevent falls and to plan rehabilitation programs in older subjects at different risk of falls.
Keywords

fall risk; elderly; robotic evaluation

No conflict of interest
A COMPARATIVE STUDY ON THE EFFECTIVENESS OF STANDING BALANCE TRAINING IN A TEMPERATURE-CONTROLLED POOL VERSUS LAND FOR CHILDREN WITH CEREBRAL PALSY

D. Sharan¹, J.S. Rajkumar²
¹RECOUP, Orthopaedics and Rehabilitation, Bangalore, India
²RECOUP, Physiotherapy, Bangalore, India

Introduction/Background

Aquatic therapy in a temperature-controlled pool is an integral part of rehabilitation for children with cerebral palsy (CP) because of the unique properties of water. The aim of this study was to assess the effectiveness of standing balance training in a temperature-controlled pool versus land for children with CP after a type of single event multilevel surgery called Single Event Multilevel Lever Arm Restoration Anti Spasticity Surgery (SEMLARASS).

Material and Method

A prospective clinical trial was conducted in a single rehabilitation centre on 80 children with CP. The participants who fulfilled the eligibility criteria were randomly allocated into 2 groups: Experimental Group A (n=40; 18 boys, 22 girls) with mean age of 9.45 years and Control Group B (n=40; 20 boys, 20 girls) with mean age of 8.75 years. Participants in both the groups underwent a programmed set of static and dynamic standing balance training with group A in a temperature-controlled pool and group B in land for 1 hour per day for 6 days per week for 6 weeks. The therapy was performed by trained physiotherapists in land and in water. The primary tools used for measuring outcomes were Paediatric Balance Scale (PBS) and Timed Up and Go test (TUG). The data was collected at the end of 6 weeks and follow up data was collected after 1 month and 3 months.

Results

Significant differences were seen on all the outcomes in both the groups at the end of 6 weeks’ program in group A, PBS (p<0.001) and TUG (p<0.001), compared to group B. The observed progress was also maintained in the follow-ups after 1 month and 3 months.

Conclusion

This study demonstrated that the pre-programmed balance training in a temperature-controlled pool can be included in the post SEMLARASS rehabilitation program.

Keywords

balance; aquatic therapy; rehabilitation
No conflict of interest
ISPR8-1922
UNPREDICTABLE GAIT PERTURBATION TRAINING IMPROVES BALANCE AND GAIT ABILITIES MORE THAN GAIT TRAINING WITHOUT PERTURBATIONS IN INDIVIDUALS POST-STROKE

V. EsmaeiliMahani1, L. Bouyer2, D. Kairy3, A. Lamontagne4, J.O. Dyer5, C. Duclos6

1PhD Student- Rehabilitation School- Montréal University- Center for Interdisciplinary Research in Rehabilitation – Gingras-Lindsay Rehabilitation Institute of Montreal CRIR-IRGLM of CIUSSS of Centre-Sud-de-l’Ille-de-Montréal-, Faculty of Medicine, Montréal, Canada
2Faculty of Medicine- Université Laval, Department of Rehabilitation, Quebec City, Canada
3Rehabilitation School- Montreal University- Canada- Center for Interdisciplinary Research in Rehabilitation – Gingras-Lindsay Rehabilitation Institute of Montreal CRIR-IRGLM of CIUSSS of Centre-Sud-de-l’Ille-de-Montréal, Faculty of Medicine, Montreal, Canada
4School of Physical and Occupational Therapy- McGill University- and Interdisciplinary Rehabilitation Research Center CRIR- Jewish Rehabilitation Hospital JRH of Laval- Canada, School of Physical and Occupational Therapy, Montreal, Canada
5Rehabilitation School- Montreal University- Canada, Faculty of Medicine, Montreal, Canada
6Rehabilitation School- Montreal University- Canada- Center for Interdisciplinary Research in Rehabilitation – Gingras-Lindsay Rehabilitation Institute of Montreal CRIR-IRGLM of CIUSSS of Centre-Sud-de-l’Ille-de-Montréal-, Faculty of Medicine, Montreal, Canada

Introduction/Background

Balance perturbation training is a promising rehabilitation approach, but limited research is available on its effectiveness for balance post-stroke. The aim of this study was to compare the effects of training with and without unpredictable gait perturbations, on dynamic balance and gait abilities in individuals post-stroke.

Material and Method

Nineteen stroke individuals were assigned to two groups: perturbation training (PT) and no-perturbation training (nPT), and attended 9 training sessions over 3 weeks using a split-belt treadmill. For PT, perturbations were produced by changing the speed of one of the belts during stance phase every 8 to 16 steps. The intensity of the perturbations increased progressively between sessions according to participants’ tolerance. The duration of the training sessions in nPT, i.e. without perturbation, was matched with a PT subject with similar speed. The effects of the training programs on dynamic balance (Mini-BESTest), balance confidence (ABC Scale), gait speed (10-meter walk test (10MWT)), knee extensors strength (dynamometry), and reintegration into social activities (Reintegration to Normal Living Index (RNLI)) were evaluated and compared using ANOVAs and t-tests.

Results

MiniBESTest (+4.0 (±5.2) /28 points, p=0.005), ABC scale (+4.4% (±6.0), p=0.026), 10MWT at faster speed (+0.17 (±0.15) m/s, p=0.009), non-paretic knee extensors (+37.2 (±41.7) Nm,
p=0.056), and RNLI (-3.4 (±2.9) /11, p=0.04) increased significantly with PT, with no significant changes on 10MWT at self-selected speed (0.13 (±0.19) m/s, p=0.065) and maximum strength generation on the paretic side (+32.7 (±41.3) Nm, p=0.081). MiniBESTest, gait speed (self-selected and faster) and maximum knee extensors strength of paretic side in PT changed significantly in comparison to nPT which did not show any improvement.

Conclusion

Results support the clinical effectiveness of unpredictable gait perturbation training over walking on the treadmill in improving gait and dynamic balance after stroke. Impact on fall risk should be evaluated in a future clinical study.

Keywords

Stroke; Perturbation training; Gait and Balance

No conflict of interest
Introduction/Background

Parkinson’s disease (PD) often manifests as dysfunctional mobility, with freezing of gait being one of the most prominent signs. Individuals who freeze (freezers) often have a greater loss of independence compared to their non-freezing counterparts. Exercise interventions have shown some benefit in reducing freezing of gait frequency and severity. However, research still needs to establish what type of exercise and exercise delivery is most effective for freezers. Therefore, this study aimed to evaluate and compare the efficacy of home-based to therapist-supervised balance training on freezing of gait and gait parameters.

Material and Method

Based on a sample of convenience, 40 participants with mild to moderate Parkinson’s disease (Hoehn & Yahr stages I – III) were allocated to a therapist-supervised (n = 24, age 65.4 ± 8.3 years) or home-based group (n=16, age 64.9 ± 7.1 years). Within each group 50% of individuals reported experiencing freezing. Both groups followed 8 weeks of balance training; the Therapist-supervised (TS) group attended classes, and the Home-based (HB) group followed DVDs at home. Outcome measures included the instrumented Timed-Up-and-Go and the Activity-specific Balance confidence (ABC) scale.

Results

The freezers differed significantly from the non-freezers in both TS and HB groups at pre-test for gait variables (p < 0.03), including stride length, stride velocity and cadence, as well as self-perceived balance confidence (p < 0.05). The freezers in the TS group improved their gait variables over time and showed a strong tendency to improve ABC scores (p=0.061) over time.

Conclusion

The improvements in gait of the TS freezers shows that balance training with a therapist could be an essential tool to improve the independence and confidence of freezers. This study reiterates the differences between freezers and non-freezers, and shows the complexities a therapist should keep in mind when working with a heterogeneous group, such as PD individuals.

Keywords

Freezing of gait; Parkinson's disease; Balance training
No conflict of interest
Poster Tour

Poster tour: Balance

ISPR8-2287
CAN ACTIVITIES-SPECIFIC BALANCE CONFIDENCE SCORE AND NON-PARTICIPATION IN REHABILITATION PROGRAMS PREDICT OCCURRENCE OF FALLS IN PARKINSON’S DISEASE?

R. Prado Costa¹, D. Costa², C. Patrícia², M.J. Festas¹
¹Centro Hospitalar São João, Department of Physical and Rehabilitation Medicine, Porto, Portugal
²North Regional Health Administration, Santa Clara Family Health Unit, Vila do Conde, Portugal

Introduction/Background
Falls are common in Parkinson’s disease (PD) resulting in increased disability and morbidity. Rehabilitation strategies and modification of falling risk factors can improve outcomes in PD.

Our main aim was characterization of a PD population’s subset at primary care level (table 1 and 2) and study possible associations with occurrence of falls. Material and Method

This study is cross-sectional and retrospective. The sample comprised every patient of a family health unit with diagnosis of PD. Sociodemographic factors, medical history, participation on rehabilitation programs (RP), physical activity, active recreational activities, occurrence of falls in the last year, Activities-specific balance confidence (ABC) scale score, Barthel index score and potential risk factors for falls were obtained through questionnaire application by phone and complemented with clinical records. A binomial logistic regression was performed to ascertain the effect of some of those variables on the likelihood of falls occurrence.

Results

Thirty-four participants were elected, of which 14,7% were physically active, 52,9% performed recreational activities and 44,1% participated in a RP in the last year. Fifty four falls were reported in 18 patients in the last year. An ABC score cutoff of 55,0 to distinguish fallers from non-fallers was determined (sensibility 0,78 , specificity 0,81) (graph 1). A logistic regression model explained 72,6% of falls occurrence (p < 0,005, sensibility 0,83 , specificity 0,87) (table 3). Non-participation in RP had 33,2 times higher odds of falling occurrence in the last year.
Table 1: Characterization of our studied population

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean (1Standard deviation)</th>
<th>Min. – Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>77.0 ± 9.00</td>
<td>62 – 91</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)</td>
<td>27 ± 4.42</td>
<td>19.5 – 36.4</td>
</tr>
<tr>
<td>Comorbidities (N)</td>
<td>4.2 ± 1.74</td>
<td>1 – 7</td>
</tr>
<tr>
<td>Top 5: Arterial hypertension (85.3%), Dyslipidemia (57.6%), Osteoarticular disorder (61.0%), Obesity (44.1%) and Depressive disorder (35.1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year of diagnosis of PD (years)</td>
<td>5.3 ± 3.39</td>
<td>1 – 14</td>
</tr>
<tr>
<td>Antiparkinsonian drugs (N)</td>
<td>2.4 ± 0.77</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Barthel index score (out of 100)</td>
<td>80.8 ± 21.51</td>
<td>40 – 100</td>
</tr>
<tr>
<td>ABC scale score (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Fallers</td>
<td>37.5 ± 21.44</td>
<td>6.9 – 78.8</td>
</tr>
<tr>
<td>- Non-fallers</td>
<td>66.1 ± 21.24</td>
<td>15 – 93.1</td>
</tr>
<tr>
<td>Episodes of falls reported in the last year – 52.9% (N)</td>
<td>1.7 ± 3.06</td>
<td>1 – 12</td>
</tr>
<tr>
<td>Participation on Rehabilitation Program – 44.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Cycles – last year (N)</td>
<td>5.2 ± 3.87</td>
<td>1 – 11</td>
</tr>
<tr>
<td>- Sessions/cycle – last year (N)</td>
<td>17.5 ± 2.42</td>
<td>15 – 20</td>
</tr>
<tr>
<td>- Days since last session (excluding 9 patients still on course)</td>
<td>129.8 ± 54.00</td>
<td>30 – 195</td>
</tr>
<tr>
<td>- Total duration (years)</td>
<td>3.1 ± 3.49</td>
<td>1 – 12</td>
</tr>
</tbody>
</table>

Table 2: Home conditions, footwear and use of mobility aids.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>N</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Staircase</td>
<td>23</td>
<td>67.6</td>
</tr>
<tr>
<td>- Handrail</td>
<td>18</td>
<td>52.9</td>
</tr>
<tr>
<td>- Elevator</td>
<td>4</td>
<td>11.8</td>
</tr>
<tr>
<td>- Carpet (Individuals)</td>
<td>18</td>
<td>52.9</td>
</tr>
<tr>
<td>- Tile pavement</td>
<td>16</td>
<td>47.1</td>
</tr>
<tr>
<td>- Carpet pavement</td>
<td>5</td>
<td>14.7</td>
</tr>
<tr>
<td>- Wooden pavement</td>
<td>17</td>
<td>50</td>
</tr>
<tr>
<td>- Bathroom handrail</td>
<td>5</td>
<td>14.7</td>
</tr>
<tr>
<td>Footwear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Low or no heel</td>
<td>21</td>
<td>61.8</td>
</tr>
<tr>
<td>- Slippers</td>
<td>13</td>
<td>38.2</td>
</tr>
<tr>
<td>Mobility aids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- None</td>
<td>23</td>
<td>67.6</td>
</tr>
<tr>
<td>- At least one:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Walking stick</td>
<td>6</td>
<td>17.6</td>
</tr>
<tr>
<td>- Crutches</td>
<td>2</td>
<td>5.9</td>
</tr>
<tr>
<td>- Walking frame</td>
<td>3</td>
<td>8.8</td>
</tr>
</tbody>
</table>
Conclusion

It’s important to address and manage the fall risk at primary care level that requires a multidisiplinary approach. Lower ABC scores and non-participation on rehabilitation programs were associated with occurrence of falls in PD. The quantification of fall risk may be used for selection of PD patients which benefit the most from rehabilitation strategies.
Keywords

parkinson;Activities-specific Balance Confidence scale;rehabilitation

No conflict of interest
Introduction/Background

As a primary cause of postural and gait disorders, lateropulsion must be systematically assessed after stroke. The current gold standard presenting unsatisfactory metrological properties, we propose a new scale optimized through 4 methodological steps: 
1) Conception based on scientific rationale, a critical review of the literature, and local testing of feasibility and relevance of items retained (V0). 
2) Improvement and validation of the content through a Delphi process with a panel of international experts (V1). 
3) Monocentric study to adjust the SCALA construction (V2). 
4) Final multicentric validation (V3). Here we present the V1 of the SCAla for LAtropulsion (SCALA), obtained after 3 years of work.

Material and Method

The V0 locally conceived was submitted to a panel of 21 international experts having clinical and scientific background of lateropulsion. At each round, their degree of agreement/disagreement was analyzed on Likert scales from 1 to 9 for general procedure and each item (separately for instructions, procedure, scoring). In addition an in-depth analysis of comments served to guide improvements between rounds.

Results

Two rounds were needed to reach consensus, the 3rd one serving to finalize small adjustments in the instructions, and to get final approval. The final degree of agreement was high: median 8 [Q1=8 and Q3=9]/9. The SCALA V1 is a matrix comprising 4 components (spontaneous lateral tilt, self-initiated lateral pushing, resistance to passive lateral tilting, and unawareness of the lateropulsion) and 10 different postural tasks (sitting, transfers, standing, walking, in different postural and visual conditions). Items are scored with a four-grade scoring, except for one component where the score is binary. The total score ranges from 0 to 50 points.

Conclusion
Strong consensus and enthusiastic comments prejudges the success of this promising tool, designed to detect and evaluate contraversive and ipsiversive post-stroke lateropulsion, regardless its mechanisms.

Keywords

Lateropulsion; Stroke; SCALA

No conflict of interest
Poster Tour

Poster tour: Fatigue

ISPR8-2621

EFFECTIVENESS OF A SELF-MANAGEMENT INTERVENTION TO TEACH INDIVIDUALS MANAGEMENT OF POST-TRAUMATIC BRAIN INJURY FATIGUE

K. Raina

University of Toledo, School of Exercise and Rehabilitation Sciences, Toledo, USA

Introduction/Background

A significant proportion of individuals with traumatic brain injury (50% to 80%) experience persistent and significant fatigue that affects their daily life. The Maximizing Energy (MAX) intervention optimizes and individualizes occupational therapist delivered energy conservation education by using the problem-solving-therapy framework to teach individuals to self-manage their fatigue. Our objective was to test the efficacy of the MAX intervention compared to a health education attention control intervention for decreasing the impact of post-TBI fatigue.

Material and Method

In this randomized-controlled, single-blind clinical trial, 34 participants were randomized to experimental (n= 20) and control (n= 14) groups. Mean duration post-injury was 58 months. Both groups received two 1:1 sessions per week for 8 wk via web cameras. The modified Fatigue Impact Scale (mFIS) and Patient Reported Outcomes Measurement Information System (PROMIS) were administered to assess fatigue impact in everyday life at baseline (T1), intervention completion (T2), and 4 wk (T3) and 8 wk (T4) after intervention completion. We used two 2 (group) × 4 (time) repeated measures analyses of variance for mFIS and PROMIS Fatigue scale scores. We conducted post-hoc analyses using paired-samples t tests.

Results

There were no significant differences between the groups for demographic variables and baseline outcome scores. The Group × Time interaction was significant for mFIS scores (F[2, 32] = 3.9, p < .01) and PROMIS Fatigue scale scores (F[2, 32] = 4.7, p < .01). Post hoc tests revealed a significant difference in mFIS and PROMIS Fatigue scale T2, T3, and T4 scores compared to T1 scores for the experimental group and no differences between the times for the control group.

Conclusion

The MAX intervention has a sustained effect on fatigue impact up to 12 weeks after intervention. It is a promising self-management intervention to help individuals manage post-TBI fatigue.

Keywords

Traumatic brain injury; fatigue; intervention
No conflict of interest
**Introduction/Background**

Fatigue and fatigability are common problems in patients with multiple sclerosis (MS). The aim of this study was to explore the impact of a combined rehabilitation program on fatigue and on fatigability of knee extensor muscles in patients with MS.

**Material and Method**

23 patients with MS were included in this study. Knee extensor muscles strength and fatigability were assessed using an isokinetic ergometer and perceived fatigue was assessed with a self-reported fatigue scale (Modified fatigue impact scale) before and after the rehabilitation program. The combined rehabilitation program included sessions on balance and gait training; sessions of endurance and resistance training.

**Results**

After rehabilitation, fatigue decreased significantly, on the other hand, torque fatigability index increased. Strength at the beginning of the fatigability protocol increased but strength at the end of the fatigability protocol did not change.

**Conclusion**

Combined rehabilitation program increased strength and decreased fatigue. However torque fatigability index increased because the program enhanced strength at the beginning of the fatigability protocol but not at the end of the fatigability protocol.

**Keywords**
Fatigability; Fatigue; Rehabilitation

*No conflict of interest*
Poster Tour

Poster tour: Fatigue

ISPR8-0430
EFFECTS OF QUADRICEPS FATIGUE ON SPASTIC CO-CONTRACTIONS BETWEEN QUADRICEPS AND HAMSTRINGS AND GAIT IN STROKE PATIENTS: PRELIMINARY RESULTS
C. Duchossoy¹, H. Devanne², W. Daveluy¹, E. Allart¹
¹Lille University Hospital Centre, Neurorehabilitation Unit, Lille, France
²Lille University Hospital Centre, Clinical Neurophysiology Department, Lille, France

Introduction/Background

Spastic co-contraction is a frequent feature in stroke patients, but the influence of muscle fatigue is still misunderstood. We aimed at assessing the effect of an isokinetic induced quadriceps fatigue protocol on the co-contraction amount of knee extensors (rectus femoris (RF) and vasti lateralis and medialis (VL and VM)) during knee flexion in chronic post-stroke patients. We also assessed the effect of such a protocol on quadriceps spasticity and gait spatiotemporal parameters and endurance.

Material and Method

Seven hemiparectic patients presenting a stiff knee gait pattern and quadriceps spasticity were included. The isokinetic fatigue protocol consisted in alternately maximal isokinetic concentric knee extensions and passive knee flexions at respectively 60°/s and 30°/s until effective fatigue. We registered the co-contraction index (CCI) between RF, VL and VM on the one hand and the semi-tendinosous on the other hand during a maximal isometric knee flexion. The relative recruitment of semi-tendinosous was also assessed by the agonist recruitment index (ARI). We finally studied quadriceps spasticity (Tardieu scale), spatiotemporal gait parameters (GAITRITE walkway), maximal walking velocity (10-meters walk test), endurance (2-minutes walk test) and perceived exertion (Borg Rating Of Perceived Exertion).

Results

After the fatigue protocol, we recorded a downward trend of the co-contraction index (CCI) of RF, an upward trend of the CCI of the VL and VM, without any change of the ARI of the semi-tendinosous. Interestingly, we noticed a significant increase of gait endurance without modification of the perceived exertion, and also an improvement of several spatiotemporal gait parameters (particularly step length, single support on the paretic side).

Conclusion

It seems that quadriceps fatigue could tend to reduce the co-contraction amount of the RF with positive effects on gait performances in post-stroke patients. Those preliminary results must be confirmed by the ongoing study.

Keywords
stroke; spasticity; co-contraction

No conflict of interest
Introduction/Background

Fibromyalgia (FM) is a chronic disorder that is characterized by widespread pain and fatigue. Sleep disturbance, functional and affective disorders are common problems seen in this disease. The clinical symptoms of FM may play an important role in the exacerbation of fatigue. The aim of this study was to compare the fatigue in patients with FM and healthy controls; and to evaluate the relationship between fatigue and pain, sleep quality, disease severity, and emotional status in patients with FM.

Material and Method

Forty-six FM and 46 healthy controls were enrolled in the study. Pain by Visual Analogue Scale (VAS), disease activity by the Fibromyalgia Impact Questionnaire (FIQ), emotional status by Beck Depression Index (BDI) and Beck Anxiety Index (BAI), sleep quality by Pittsburgh Sleep Quality Index (PSQI) were evaluated in patients with FM. Fatigue by Multidimensional Assessment of Fatigue (MAF) was gathered in all participants. The FM patients were divided into groups: with depression (BDI≥10) and without depression, with anxiety (BAI≥10) and without anxiety.

Results

MAF scores were significantly high in patients with FM compared to healthy controls (p<0.001). When compared to the patients without anxiety, MAF scores were significantly increased in patients with anxiety (p<0.05). But, no statistically significant differences were detected between patients with depression and without depression for MAF scores (p>0.05). MAF scores were positive correlated with BDI, BAI, and FIQ scores (p<0.05) in patients with FM, whereas no statistically significant correlations were found between MAF scores and age, body mass index, pain VAS, PSQI scores (p>0.05).

Conclusion

Fatigue seems to be considerable problem in patients with FM when compared to healthy subjects. In patients with FM, fatigue was found to be associated with increased disease activity and impaired emotional status. Improvement of psychological status and reducing the impact of disease for FM patients may decrease their fatigue.
fibromyalgia; fatigue; sleep quality

No conflict of interest
Poster Tour

Poster tour: Fatigue

ISPR8-0702
SCREENING AND EVALUATION OF CHILD SPORTS FATIGUE (ABOUT 38 FOOTBALLERS)
S. Mahersi¹, H. Chaabouni¹, M. Sguir², H. Azzabi¹, W. Kessomtini²
¹Regional hospital of Gabes, Physical Medecine and rehabilitation, Gabes, Tunisia
²University Hospital Taher Sfar Mahdia Tunisia, Physical Medecine and Rehabilitation, Mahdia, Tunisia

Introduction/Background

The aim of our study is to detect, by the questionnaire of fatigue for sport child (QFES), the first signs of fatigue induced by training in young footballers.

Material and Method

Our study is prospective descriptive about thirty-eight young footballers aged between 13 and 14 years old, training between 8 and 10 hours a week, completed a validated Arabic version of the Fatigue Questionnaire (QFES) in November 2017. The statistical analysis used the Student's test and the Kruskal-wallis test to compare the quantitative variables with a significance test of 0.05.

Results

The average score of the QFES was 25.6. Seven children had a score ≥45/120 exceeding the fatigue threshold. The average score per item was 3.65. Throughout our series, the occurrence of fatigue was not influenced by age and the QFES score did not vary with body size. We found a statistically significant relationship between the mean QFES score and the presence of injuries within two months (p<0.05). We found that the experience of a disruptive event in the two weeks preceding data collection is associated with a higher QFES score.

Conclusion

The results obtained in this study assess the relevance of this questionnaire in evaluating sport induced fatigue. The regular administration of this questionnaire to sport child could participate in reducing of potential risks of a sport activity practiced in exhausting conditions.

Keywords

screening;fatigue;footballers

No conflict of interest
Poster Tour

Poster tour: Fatigue

ISPR8-0899

FATIGUE AND BREAST CANCER: EFFECT OF AN ADAPTED PHYSICAL ACTIVITY (APA)

N. Cazassus¹, E. Cugy²,³,⁴
¹UST Athléisme, Athlé Santé, Talence, France
²CH Arcachon, Physical Medecine & Rehabilitation, La Teste de Buch, France
³Bordeaux University, EA 4136 Handicap Activité Cognition Santé, Bordeaux, France
⁴CHU Bordeaux, Physical Medecine & Rehabilitation, Bordeaux, France

Introduction/Background

The consequences of breast cancer are important in a woman's life. Among the side effects associated with it, fatigue is the most reported symptom. It affects the majority of patients and may persist for months or even years after treatment. The origin of this fatigue is widely discussed and multiple factors interfere. A tired patient sees her quality of life altered and her abilities diminished. Many studies have shown the effectiveness of physical activity as a countermeasure and non-pharmacological treatment of fatigue.

We aim to evaluate the impact of an adapted physical activity program, developed according to AFSOS recommendations, on fatigue.

Material and Method

Patients aged ≤ 70 years, treated for breast cancer in a curative situation, and who started the program between October 2015 and June 2017 were included.

APA sessions were performed during adjunctive therapy: 60-minute sessions, 2-3 per week, based on Nordic walking. Data were collected at the start and approximately 6 months after the inclusion in the physical activity program. Fatigue was measured by the Multidimensional Fatigue Inventory (MIF-20) and EORTC-QLQ-C30 fatigue sub-scale.

Results

The results are available for 52 patients, aged 53.7 ± 9.1 years, and treated for breast cancer. The duration between two evaluations ranged from 124 to 252 days (avg: 191 ± 35.5 days). The initial MIF-20 is 57 ± 11.8 vs 39 ± 8.3 at the exit (p <0.0001). The improvement is visible on all components of the MIF-20. The EORTC-QLQ-C30 Fatigue subscale analysis ranged from 45.1 ± 22.7 to 21.6 ± 15.0 (p <0.0001).
Conclusion

In our observation, we observe a decrease in all fatigue scores, the most frequently reported symptom, with a return to the general population pattern.

Keywords
Physical activity; Fatigue; Breast cancer

No conflict of interest
THE EFFECTS OF SCAPULAR MUSCLE FATIGUE ON SCAPULAR SENSORIMOTOR SYSTEM

G. Luo1, Y. Shih1
1National Yang Ming University, Physical Therapy and Assistive Technology, Taipei, Taiwan R.O.C.

Introduction/Background

Muscle fatigue may affect scapular sensorimotor system severely because scapula is surrounded by lots of muscles, which not only provide proprioception but also control movements. However, the effects of scapular muscle fatigue on scapular joint position sense and kinematics are uncertain. The aims of this study are to investigate the effects of scapular muscle fatigue on scapular joint position sense and neuromuscular performances.

Material and Method

We recruited 30 healthy adults. They received the measurements of scapular joint position sense (reposition error), muscle power, and kinematics during scaption (arm elevation in scapular plane) along with muscle activation before and after a fatigue protocol. Our fatigue protocol used repeatedly holding at modified push-up plus position to exhaust scapular muscles including upper, lower trapezius, and serratus anterior. Post-measurements would start when participants finished all repetitions or could no longer do one more repetition. The repeated measured analysis of variance (ANOVA) used to assess the effects of fatigue on scapular reposition error, muscle power, kinematics, and muscle activation. The level of statistical significance was set at P < 0.05.

Results

All subjects fatigued by confirming the median frequency of either one of three muscles dropped more than 10% during the last repetition. Muscle power of upper trapezius and serratus anterior dropped statistically significantly. Although the reposition error did not change, muscle activation of serratus anterior increased (18.746% to 26.344%, p=0.006 in elevation; 15.217% to 27.406%, p=0.037 in protraction) during joint position sense measurements. In 120° scaption, scapula decreased posterior tilt (13.813° to 10.334°, p=0.000147); increased internal rotation (10.212° to 13.246°, p=0.004); increased upperward rotation (52.776° to 54.351°, p=0.005). Muscle activation of serratus anterior increased (65.914% to 84.611%, p= 0.002) in 90°~120° scaption.

Conclusion

Scapular muscles fatigued did not alter scapular joint position sense, but neuromuscular performances such as scapular kinematics and muscle activation of serratus anterior were changed.
Keywords

muscle fatigue; scapular joint position sense; scapular kinematics

No conflict of interest
Poster Tour

Poster tour: Fatigue

ISPR8-1745
FATIGUE ASSOCIATED FACTORS IN TUNISIAN PATIENTS WITH RHEUMATOID ARTHRITIS
H. Migoua1, T. Elhersi1, S. Boudkhane1, S. Hammami1, A. Jellad1, Z. Bensalah1
1University Hospital of Monastir, Physical Medicine and Rehabilitation, Monastir, Tunisia

Introduction/Background

The objective of this study was to evaluate fatigue in patients with rheumatoid arthritis (RA) and determine its associated factors.

Material and Method

This is a cross-sectional descriptive study, conducted between February and July 2017 on patients, with a confirmed diagnosis of Rheumatoid Arthritis followed at the Rheumatology department and the Physical Medicine and Rehabilitation department of the University Hospital of Monastir.

The variables analyzed were Socio-demographic, clinical, biological and functional with a fatigue assessment by the Visual Analogic Scale of Fatigue (VAS-F) and the multidimensional fatigue inventory (MFI-20), disease activity (DAS 28) and both synovial and articular index, functional capacity (Health Assessment Questionnaire HAQ) and anxiety and depression (Hospital anxiety and depression scale HAD).

Results

We collected one hundred patients with a mean age of 55.88 ± 10.5 years (25 to 84 years) with a female predominance (85 F/15 M). The disease was moderately active in 55% of cases.

The average of the VAS-F was 5.62 ± 1.5. Fatigue was present in all areas evaluated by the MFI20. Physical fatigue and general fatigue were the highest with an average of 12.59 and 13.43 respectively.

Fatigue was positively correlated with age, BMI, the disease activity, anxious and depressive disorders, higher sedimentation rate, functional capacity and the presence of radiological signs of joint destruction. We found also a positive association between fatigue and both professional status and joint deformities. However, there were no significant correlation between fatigue and therapeutic education.

Conclusion

Fatigue is a significant symptom experienced almost universally by patients with RA. Its associated factors are multiple. Professionals need to address it with some urgency.

Keywords

rheumatoid arthritis; fatigue
No conflict of interest
Poster Tour

Poster tour: Fatigue

ISPR8-1956

FATIGUE ASSESSMENT IN ULTRA-MARATHON RUNNERS VIA VERTICAL GROUND REACTION FORCE ANALYSIS

R. Halabi¹, M. Diab², R. El-Khatib², B. Moslem³, F. Guillet⁴, M. El Badaoui⁴

¹Rafik Hariri University, Electrical and Computer Engineering, Mechref, Lebanon
²Rafik Hariri University, Biomedical Engineering, Meshref, Lebanon
³Rafik Hariri University, Mechanical and Mechatronics Engineering, Mechref, Lebanon
⁴Unibversité de Lyon- Université Jean-Monnet, Laspi, Roanne, France

Introduction/Background

Vertical Ground Reaction Force (VGRF) is employed in assessing the level of fatigue in athletes. The main idea highlights the more tired the runner gets, modifications in the running style will occur through varying degree of inter-leg symmetry between right and left leg, time-domain feature variations, and in our case time-frequency domain variation like high frequency mean power.

Material and Method

VGRF from four corner-located pressure sensors underneath motorized treadmill was acquired. Ten ultra-marathon male runners participated.

Fig.1: Bi-legged VGRF

Short-Time Fourier Transform used to quantify the frequency-specific power. Our method compares the high frequency spectral power at the beginning of the 24-hour ultra-marathon and at the end, describing thereby the progression of fatigue.

Fatigue shown in the running pattern through sore muscles that are incapable to push the body as strongly which calls for an alternative biomechanical process to compensate for the lost power, and that is the impact during which the heel strikes the floor before the foot is parallel to the ground. This is quantified via assessment of the power of the signal in the high frequency domain i.e. impact power in function of time, which will normally increase monotonically with the progression of fatigue.

Results

Tracking the mean power, resulted from impact peak, shows monotonic increase of the mean high frequency power of 24.44±13.40 % with only one athlete with a nearly constant impact power. Thus, during heel strike the body biomechanically compensates for lost muscle power with higher stress on the heel, tibia and knee.

Conclusion

Our fatigue assessment technique, which requires relatively low computational cost and efficient real-time performance trackers, is based on a time-frequency feature that showed a promising and reliable metric that varies monotonically with the progression of fatigue.
Keywords

VGRF; Fatigue Assessment; Mean High Frequency Power

No conflict of interest
Dealing with Cancer-Related Fatigue (CRF) is the first unmet need reported by onco-haematological patients, and it's due to the disease and to treatment side effects. It is known that Physical Activity (PA) could be beneficial in CRF's management and that most patients need accurate information about consented PA and disease management. Furthermore several studies showed that Therapeutic Patient Education (TPE) Programs could help people with chronic illnesses to manage their conditions, but their application is still poor or not well structured.

Our aim is to structure a multidimensional rehabilitation program, combining PA and TPE, for onco-haematological patients to manage CRF and to evaluate its feasibility.

Material and Method

The program will be proposed to onco-haematological patients in Arcispedale Santa Maria Nuova in Reggio Emilia (Italy) from March 2017.

Sessions will be opened to patients with prognosis > 12 months, without health conditions preventing participation to rehabilitation program (cognitive impairment, severe depression, language barrier or other communication problems).

Results

The program will be composed by two kind of sessions:

- 6 weekly individual educational sessions to support and supervise patients in planning their home-based PA and to promote their empowerment through goal setting and Activity Diary
- 2 group sessions to inform patients on fatigue and other cancer related symptoms and PA as tool to manage them.

In addiction we will create leaflets to support them during the program.

Conclusion
We will describe the specific structure of sessions and leaflets and the feasibility early data collection.

**Keywords**

Fatigue Management; multidimensional rehabilitation program; Physical Activity

*No conflict of interest*
INDIVIDUALIZED EXERCISE AND TRAINING MODALITIES IN THE TREATMENT OF CANCER INDUCED FATIGUE ON COLON CANCER PATIENTS

E. Atabas

Oncosportcenter, Medical Staff, Bonn, Germany

Introduction/Background

Cancer-related fatigue is prevalent and disabling. Due to surgical interventions the majority of colon cancer patients develop fatigue and suffer extremely from life quality impairment.

Material and Method

15 Postsurgical colon cancer patients who had developed fatigue were enrolled in an individualized physical exercise program consisting of 40 minutes of resistance and 20 minutes of endurance training. Prior to the beginning of the program a sports medical examination was carried out by a PMR-Specialist. The primary outcome was clinically significant improvement in self-reported fatigue (FACT-Score and SF36-Score) and increase of muscle strength measured by isokinetic training machines.

Results

There were 15 patients enrolled, including 7 women with a mean age of 51 years and 8 men with a mean age of 54. Fatigue severity improved for 48% (p<0.002). Life quality showed 19% improvement (p<0.004). Muscle strength improved up to 29% (p<0.02) depending on the measured muscle group.

Conclusion

An individualized training program improves fatigue and functional outcomes for patients with colon cancer after oncologic treatment. Further studies on the topic of exercise interventions on stoma patients after colon cancer should be planned and carried out.

Keywords

coloncancer; exercise intervention; fatigue

No conflict of interest
Poster Tour

Poster tour: Fatigue

ISPR8-2309
DO FIBROMYALGIA, CHRONIC FATIGUE SYNDROME AND IDIOPATHIC INTRACRANIAL HYPERTENSION SHARE THE SAME PHYSIOPATHOLOGY?

M. Hulens\textsuperscript{1}, W. Dankaerts\textsuperscript{2}, I. Stalmans\textsuperscript{3}, F. Bruyninckx\textsuperscript{4}, G. Vansant\textsuperscript{5}, R. Rasschaert\textsuperscript{6}

\textsuperscript{1}KULeuven, Rehabilitation Sciences, Sint-Joris-Weert, Belgium
\textsuperscript{2}KULeuven, Rehabilitation Sciences, Leuven, Belgium
\textsuperscript{3}KULeuven, Department of Neurosciences- Ophthalmology Research Group-, Leuven, Belgium
\textsuperscript{4}University Hospitals UZ Leuven, Clinical Electromyography Laboratory, Leuven, Belgium
\textsuperscript{5}KULeuven, Department of Social and Primary Health Care- Public Health Nutrition, Leuven, Belgium
\textsuperscript{6}Sint-Jozefziekenhuis, Neurosurgery, Bornem, Belgium

Introduction/Background

Recently it was hypothesized that Fibromyalgia (FM) and Chronic Fatigue Syndrome (CFS) are cerebrospinal hypertension disorders. This hypothesis is supported by the finding of increased levels of the cerebrospinal pressure during lumbar puncture and a substantial improvement of fatigue and pain following the evacuation of cerebrospinal fluid in 70\% of the patients.

We postulate that FM, CFS and Idiopathic Intracranial Hypertension (IICH) share the same physiopathology and therefore present with similar symptoms, with IICH representing a sudden significant increase of cerebrospinal pressure, whereas FM and CFS represent chronic moderate intracranial hypertension. In FM and CFS the nerves are probably merely irritated, whereas in IICH the nerves are also damaged. The aim was to compare literature data on the symptoms and characteristic of these three conditions.
Material and Method

A literature review on PubMed, WebOfScience and Google Scholar was performed and the symptoms and characteristics of IICH, FM and CFS were compared.

Results

The results are displayed in the Table.

Conclusion

FM, CFS and IICH share very similar characteristics, such as headaches, cognitive impairment, cranial nerve involvement, peripheral nerve involvement symptoms, fatigue, urinary problems, female predominance, inheritance, etc... Therefore, these conditions might have the same underlying pathophysiology. Further cerebrospinal pressure monitoring studies are required in this population.
Keywords

fibromyalgia; chronic fatigue syndrome; Idiopathic intracranial hypertension

No conflict of interest
EFFECTS OF GALBANUM OIL ON PATIENTS WITH KNEE OSTEOARTHRITIS: A RANDOMIZED CONTROLLED CLINICAL TRIAL
Z. Emami Razavi¹, M. Karimi², M. Khamessi³
¹TUMS, Physical Medicine and Rehabilitation, Tehran, Iran
²TUMS, Traditional Medicine, Tehran, Iran
³IUMS, Physical Medicine and Rehabilitation, Tehran, Iran

Introduction/Background
Knee osteoarthritis is considered as a major public health issue causing chronic disability worldwide with the increasing number of aging people. Many sufferers with knee osteoarthritis are using complementary and alternative medicine including herbal drug, herbal patch, etc. This research aimed to compare the efficacy of galbanum oil in the management of knee osteoarthritis with diclofenac gel using parallel randomized controlled design.

Material and Method
In this randomized controlled trial (RCT), 32 patients with chronic knee pain due to osteoarthritis were randomly allocated into two equal groups. The intervention group received topical galbanum oil and control group received topical diclofenac gel. The drugs were given for 1 month, 3 times per day. Outcomes were assessed using Persian version of Western Ontario McMaster University Osteoarthritis Index (WOMAC) and visual analog scale (VAS).

Results
No statistically significant difference was observed between the topical galbanum oil and topical diclofenac gel regarding knee pain, morning stiffness and physical function over the 1- and 2-months follow-up period. It seems that using topical galbanum oil is clinically effective for patients suffering from knee osteoarthritis in order to decrease their pain, morning stiffness and limited function; its effect is comparable with topical diclofenac gel.

Conclusion
Considering lesser side effects of galbanum and its herbal base, it may be a better choice compared to topical diclofenac in management of the pain of knee osteoarthritis at least in short term.

Keywords

No conflict of interest
Introduction/Background

The aim of this study was to evaluate the effects of virtual reality games on knee pain, functional mobility and balance in patients with knee osteoarthritis.

Material and Method

Fifty patients who were complaining of knee pain, aged 40-70 years, and were diagnosed with Kellgren-Lawrence stage 2, 3, 4 idiopathic knee osteoarthritis were included. Patients were randomly assigned to two equal groups (n = 25) as the control and the study group. Age, sex, weight, height, duration of illness was recorded for all patients. In the bilateral two-way knee radiography; Kellgren-Lawrence score of the knee with the higher visual analog scale (VAS) pain score was recorded. Conventional physical therapy program, associated with knee osteoarthritis exercises, was applied routinely to all patients with knee osteoarthritis for three weeks. In the study group, all patients received virtual reality game-based exercise program by using a game console. In both groups, baseline and final values of VAS score, osteoarthritis index total score (WOMAC), and intra-community balance and mobility scale (CB&M) score of each patient were recorded. Mann-Whitney U and Independent Samples T tests were used for statistical analysis, and p value less than 0.05 was considered significant.

Results

In both groups, significant change in VAS, WOMAC osteoarthritis index, and CB&M score was observed (p<0.05). In the study group, VAS, WOMAC osteoarthritis index, and CB&M scores were significantly different than control group (p<0.05). The differences between baseline and final scores of VAS and WOMAC were significantly higher (p<0.05) in study group.

Conclusion

The results of the present study showed that virtual reality game-based exercise programs performed better results than conventional treatment program in patients with knee osteoarthritis.

Keywords
Game-based exercise; Knee osteoarthritis; Virtual reality

No conflict of interest
Poster Tour

Poster tour: Knee arthritis

ISPR8-0253
DIFFERENT TYPES OF EXERCISE RELIEVE PAIN SYMPTOMS OF KNEE OSTEOARTHRITIS BY MODULATING THE COGNITIVE CONTROL NETWORK
J. Tao¹, J. Liu², Y. Tu³, K. Hu¹, Y. Tu¹, M. Lin¹, X. Guanli¹, C. Shanjia¹, H. Jia¹, L. Weilin¹, W. Jinsong¹, X. Tianshen¹, L. Courtney³, P. Joel³, C. Lidian¹, K. Jian³
¹Fujian University of Traditional Chinese Medicine, College of Rehabilitation Medicine, Fuzhou, China
²Fujian University of Traditional Chinese Medicine, National- Local Joint Engineering Research Center of Rehabilitation Medicine Technology, Fuzhou, China
³Massachusetts General Hospital and Harvard Medical School, Department of Psychiatry, Boston, USA

Introduction/Background

Background and aims: Knee osteoarthritis (KOA) is a common degenerative joint disease with unsatisfactory treatment. Recently, non-pharmacological therapies, such as physical exercise and mind-body exercises, have received considerable attention for their implications in pain management in KOA. However, the mechanisms underlying the efficacy of different exercises on pain improvement remain unclear. In this study, we investigate the effect and underlying mechanisms of mind-body exercises (Tai Chi Chuan and Baduanjin) and physical exercise (stationary cycling) in patients with knee osteoarthritis (KOA).

Material and Method

Methods: 140 patients were randomized into Tai Chi Chuan, Baduanjin, stationary cycling, and health education control groups for 12 weeks. The Knee injury and Osteoarthritis Outcome Score (KOOS), resting-state functional connectivity (rsFC) of the cognitive control network (CCN), and blood markers (serum Protectin D1 (PD1) and brain derived neurotrophic factor (BDNF) levels) were measured at the beginning and end of the experiment. We also applied support vector machines regression to predict the effectiveness of different exercises on KOA patients based on rsFC of CCN.

Results

Results: We found 1) KOOS pain subscores and serum PD1 levels significantly increased in all three exercise groups compared to the control group, and there were no significant differences among the three exercise groups; 2) rsFC between the bilateral dorsal lateral prefrontal cortex (DLPFC) and bilateral supplementary motor area (SMA) and temporoparietal junction (TPJ) was significantly decreased in all exercise groups compared to control group, and the decreased DLPFC-SMA rsFC was significantly associated with improvements in knee pain and serum PD1 levels across all subjects at baseline; and 3) baseline DLPFC-SMA rsFC can significantly predict the effect of exercise on pain improvement in KOA patients.

Conclusion
**Conclusion:** Our findings demonstrate different exercises may achieve clinical improvements through shared pathways and highlight the potential of neuroimaging biomarkers for predicting the therapeutic effect of exercises on KOA pain.

**Keywords**

Knee osteoarthritis; exercise; cognitive control network

*No conflict of interest*
EFFECT OF UNLOADING TRACTION IN PATIENTS WITH KNEE OSTEOARTHRITIS

M.T.I. Khan

Rajshahi Medical College, Physical Medicine, Rajshahi, Bangladesh

Introduction/Background

Knee Osteoarthritis (OA) is the most common form of disability in comparatively elderly patient. Different modalities in physiotherapy have been shown to help improve clinical symptoms and functions of knee OA, Unloading knee traction is among those non-invasive therapies which can be applied as an adjunct to pharmacotherapy to treat osteoarthritis the patients with OA knee. To evaluate the effectiveness of unloading traction on patients with knee osteoarthritis.

Material and Method

A randomized prospective study was carried out in the department of Physical Medicine & Rehabilitation, Dhaka Medical College Hospital, Dhaka, Bangladesh from January 2010 to June 2010. Patients with OA knee by American College of Rheumatology Criteria were selected. Two intervention groups were compared. Group-A (40 patients) in these group patients to be treated with NSAID + Short Wave Diathermy + Activities of Daily Living. Patients of Group-B were given (40 patients) Knee unloading traction along with above treatment. The change between six weeks post therapeutic and baseline WOMAC (Western Ontario and Mc Master Universities) subscale and scores were calculated. Patients were followed up weekly for six weeks and in each visit, patients were assessed for pain, stiffness and physical function by WOMAC index.

Results

A total 80 patients with OA knee were included in this study. The mean age 49.72 ± 3.5 years. Male to female ratio 1.35:1. Comparison of mean pretreatment and 6th week post treatment WOMAC physical function subscale score in Group A (6.85±0.92 vs 2.15±0.92) showed significant improvement and in Group B (6.45±1.13 vs 1.15±0.92) which also shows significant improvement more than group A. The result was compared and student t-test was done to see the level of significance. Method was found significant after treatment (p<0.0001).

Conclusion

Unloading knee traction in patients with OA knee is beneficial.

Keywords

No conflict of interest
Poster Tour

Poster tour: Knee arthritis

ISPR8-0588
EFFECTIVENESS OF KINESIO TAPING IN SEVERE PAIN TREATMENT DUE TO KNEE OSTEOARTHRITIS. A RANDOMIZED DOUBLE BLINDED CONTROLLED TRIAL.

V. Donec1, R. Kubilius1
1Lithuanian University of Health Sciences, Rehabilitation, Kaunas, Lithuania

Introduction/Background

Severe pain in knee osteoarthritis (KO) leads to disability and decreased quality of life. Current pharmaceutical and non-pharmaceutical approaches have limited effectiveness, implying the need to look for more effective pain management means. Aim of the study: to evaluate effectiveness of kinesio taping in severe pain treatment due to KO.

Material and Method

A randomized double blinded controlled trial. 54 participants (mean age 69.7±8 years) with KO, indicating severe knee pain (≥7 points according the numeric pain rating scale (NPRS)), received either kinesio taping (KT) or nonspecific taping (NT) once a week for four weeks. Measured outcomes: changes in pain intensity according to NPRS, change in the usage of anti-inflammatory drugs, the subjective participant’s evaluation towards effectiveness of received tape applications for knee pain management and for improvement of ability to move at the end of intervention.

Results

Both taping techniques were found to be beneficial for pain alleviation (p<0.05), however, more (72%) of the participants in the KT group experienced clinically significant reduction of knee pain in comparison to the NT taping group (44.4%) (p<0.05). KT was also found to be more effective in alleviating knee pain while changing body positions (p<0.05). Neither of techniques was superior in alleviating nocturnal pain, pain during prolonged movement or at rest. Subjectively, more KT group participants (85%) indicated tapes to be effective in alleviating ability to move than from the NT group 56% (p<0.005). The usage of anti-inflammatory drugs was reduced for 46% of KT and for 31% of NT group participants (p=0.067)

Conclusion

Both taping techniques were found to be beneficial for severe pain management due to KO, however kinesio taping was found to be superior over non-specific taping in diminishing general knee pain and knee pain while changing body positions, also in subjectively perceived alleviation of ability to move among participants.

Keywords

knee osteoarthritis ; kinesio taping; knee pain
No conflict of interest
Introduction/Background

Knee osteoarthritis (KOA) is a common disease in middle-aged and elderly people. Pain is the chief complaint of symptomatic KOA and a leading cause of chronic disability, which is most often found in medial knees. The aim of this study is to evaluate the efficacy of pain relief and functional improvement in KOA patients treated with ultrasound-guided saphenous nerve block (SNB).

Material and Method

This is a 3-month retrospective case-controlled comparative study. 200 patients with medial knee pain owing to KOA that was unresponsive to 3-month long conservative treatments. 92 patients received SNB with 9mL of 1% of lidocaine and 1mL of 10mg triamcinolone acetonide (SNB group), and 108 continued conservative treatments (control group). The main outcome measure was visual analog scale (VAS) of the average knee pain level for the past one week. Secondary outcomes were the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), the timed up and go test, numbers of analgesic ingestion per day, and opioid consumption per day.

Results

During the 3-month follow-up, 86 patients in SNB group and 92 in control group were analyzed. There was no significant difference, with the exception of the duration of symptoms, between the 2 groups in age, sex, body mass index, and Kellgren- Lawrence grade. Repeated-measures analysis of variance and post hoc tests showed improvement of VAS (at month 1), WOMAC (at month 1), and opioid consumption per day (at month 1 and 2) in SNB group. No adverse events were reported.

Conclusion

This study looked into the possibility of SNB as an alternative treatment for medial knee pain owing to KOA. Although a palliative treatment, SNB can be an option for patients with refractory KOA who cannot take or are not responsive to analgesics. However, to prove the efficacy of SNB, further studies on prospective randomized controlled trials would be needed.

Keywords
osteoarthritis; nerve block; knee joint

No conflict of interest
Poster Tour

Poster tour: Knee arthritis

ISPR8-1408

CLINICAL PREDICTION RULE FOR PAIN RELIEF IN CONSERVATIVE TREATMENT OF PATIENTS WITH KNEE OSTEOARTHRITIS

R. Tanaka¹, J. Ozawa¹

¹Hiroshima International University, Department of Rehabilitation, Hiroshima, Japan

Introduction/Background

Pharmacological and physical therapy are an essential conservative treatment option for knee osteoarthritis (OA). However, a group of patients with knee OA does not have adequate pain relief through the conservative treatment. Knee OA patients who have unique pain-related affective and/or cognitive characteristics may not be able to obtain adequate pain relief with conservative treatment. Early detection of patients with inadequate pain relief from conservative treatment allows for alternative treatment options to be considered, such as cognitive behavioral therapy. Therefore, in this study, we developed clinical prediction rules (CPRs) to identify knee OA patients who will likely obtain adequate pain relief with conservative treatment.

Material and Method

Subject were patients with symptomatic knee OA (N = 88). The Numeric rating scale and the Knee Injury and Osteoarthritis Outcome Score scale were used to evaluate pain relief. Potential predictors for pain relief were depressive symptoms, self-efficacy, and pain catastrophizing. The classification and regression trees methodology was used to develop the CPR for predicting the presence or absence of pain relief at 1 and 3 months after the start of observation. The area under the receiver operating characteristic curve (AUC) was calculated to assess the accuracy of CPR developed.

Results

The CPR at 1 month after the start of observation included the information about pain intensity at baseline, positive affect, and disease duration. The AUC of this CPR was 0.793 (95% confidential interval, 0.687-0.898). The CPR at 3 months after the start of observation included pain catastrophizing and self-efficacy. The AUC of this CPR was 0.808 (95% confidential interval, 0.682-0.934).

Conclusion

Information on the disease duration of knee OA, the intensity of pain, pain-related affective and/or cognitive characteristics can be used for developing CPR to predict pain relief in patients with knee OA receiving conservative treatment.

Keywords

knee osteoarthritis; conservative treatment; clinical prediction rule
No conflict of interest
Poster Tour

Poster tour: Knee arthritis

ISPR8-1713
RELATIONSHIP BETWEEN METABOLIC SYNDROME AND KNEE OSTEOARTHRITIS
B.J. Lee¹, W. Kim², K.H. Choi²
¹College of Medicine- Seoul St. Mary's Hospital- The Catholic University of Korea, Rehabilitation Medicine, Seoul, Republic of Korea
²Asan Medical Center- University of Ulsan College of Medicine, Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background

Recent studies suggest that metabolic disorders that provoke systemic inflammation are associated with knee OA. However, most studies have only examined associations between single metabolic diseases and knee OA. This study investigated the effect of metabolic syndrome (MS) on development of knee OA.

Material and Method

Data were obtained from the 2010 to 2012 Korea National Health and Nutrition Examination Survey. Subjects with knee OA (≥Kellgren-Lawrence grade 2) and severe knee OA (≥Kellgren-Lawrence grade 3) were evaluated based on radiologic findings. Medical information, in accordance with MS, and demographic data were obtained from survey records. Multivariate regression analysis was performed to investigate the relationship between knee OA and MS, in addition to various demographic factors. Analyses were adjusted by age group (model 1), or by age group, education, smoking, alcohol consumption, and physical activity (model 2).

Results

In women, MS increased the risk of knee OA (odds ratio [OR]=1.644, p-value<0.001 and OR=1.608, p-value<0.001, respectively, for model 1 and 2) and severe knee OA (OR=1.593, p-value<0.001 and OR=1.559, p-value<0.001, respectively, for model 1 and 2). However, in men, knee OA and severe knee OA were not associated with MS. As the number of MS components increased, knee OA and severe knee OA generally increased in women. However, this trend was not definite in men.

Conclusion

MS affects the development of knee OA and severe knee OA in women. Additionally, dose-response relationships were observed between MS components and knee OA. However, these relationships were not definite in men.

Keywords

metabolic syndrome; osteoarthritis
No conflict of interest
Poster Tour

Poster tour: Knee arthritis

ISPR8-1904
THE ROLE OF PATIENT’S EDUCATION IN KNEE OSTEOARTHRITIS MANAGEMENT
W. Haj Hamad¹, M. Sghir¹, M. Maraoui¹, M. Guedria¹, S. Zrour², W. kessomtini³
¹university hospital of Mahdia, Rehabilitation Departement, Mahdia, Tunisia
²Fattouma Bourguiba hospital center, rhumatology, manastir, Tunisia

Introduction/Background

Therapeutic education is an integral part of the management of knee osteoarthritis (OA) to acquire or to maintain skills allowing patients to manage their lives better.

The aim of our study is to assess the contribution of therapeutic education in the management of knee osteoarthritis.

Material and Method

This is a randomized prospective study on patients with knee OA referred to the department of Physical Medicine and Rehabilitation of Mahdia from January 2016 to Mars 2017. Patients were divided into 3 groups. The first group G1 (32 patients) underwent physical rehabilitation, the second group G2 (30 patients) underwent therapeutic education and the third group G3 (31 patients) underwent therapeutic education and physical rehabilitation. Assessments were performed before and after intervention (1, 3 and 12 months). Evaluation parameters were: pain with the Visual Analog Scale (VAS), overall physical function with WOMAC score, disability with the Lequesne index, mobility of the knee joint, and the psychological profile with the HAD scale. Health-related quality of life was also assessed using the 36-Item Short Form Health Survey (SF-36).

Results

Ninety three patients diagnosed with knee OA were enrolled in this study. The mean age was 58 years old. At the beginning of the protocol, the 3 groups were homogeneous in terms of all the parameters studied. At the end of protocol, we noticed a decrease in pain and an improvement in joint mobility in the three groups with a better improvement in G3. The physical function, psychological profile and quality of life also improved after the end of the protocol in the three groups, especially G3. This improvement persisted at 3 months and at 1 year of follow up.

Conclusion

Our study showed the short and long-term interests of therapeutic education associated with rehabilitation in the treatment of knee osteoarthritis.

Keywords

knee osteoarthritis ; patient’s education
No conflict of interest
Poster Tour

Poster tour: Knee arthritis

ISPR8-2055

EFFECTS OF PROTEIN SUPPLEMENT IN COMBINATION WITH RESISTANCE TRAINING ON BODY COMPOSITION AND PHYSICAL FUNCTION IN MIDDLE AGED AND OLDER WOMEN WITH KNEE OSTEOARTHRITIS

C.D. Liao1, C.Y. Hsieh1,2

1Shuang Ho Hospital, Department of Physical Medicine and Rehabilitation, Taipei, Taiwan R.O.C.
2National Taipei University of Nursing and Health Sciences, Department of Exercise and Health Science, Taipei, Taiwan R.O.C.

Introduction/Background

Knee osteoarthritis (KOA) and age are both associated with an increased risk of lower lean muscle mass (i.e., sarcopenia) which may lead to physical difficulty or functional limitation. Protein supplement (PS) combined with resistance exercise training (RET) improves body composition and strength gains in elder individuals. It remains unclear whether PS augments lean mass and strength gains of older patient with KOA undergoing RET. The purpose of this study is to identify the effect of PS plus RET on body composition and physical function in older women with KOA.

Material and Method

Eligible female participants who are older than 55 years old and have a diagnosis of KOA are assigned to either experimental group (PS) or control group (placebo supplement). Both groups receive RET twice a week for a total of 12 weeks. Outcome measures includes analysis of body composition using bioelectrical impedance method, hand and leg strength, lower limb mobility (distance of functional forward reach, duration of single leg stance; timed sit-to-stand test, timed 10-m walk; timed up-and-go test, 30-sec timed chair rise), physical activity using International Physical Activity Questionnaire and the Western Ontario and McMaster Universities Osteoarthritis Index score. All measures are tested before (baseline) and after RET (posttest). Analysis of covariance is also performed, using the pretest measures of both groups as the covariates, to test differences in post-test between the two groups.

Results

16 patients in the experimental group (mean age 63.4±7.6y) and 16 in the control group (mean age 62.9±8.7y) completed the study. A statistically significant improvement of all measures was observed in both groups after intervention (all P < .05), and the experimental group exhibited a significantly superior improvement compared with the control group (P < .05).

Conclusion

Combing PS and RET exerted benefits on body composition, muscle strength, and physical capacity in older women with KOA.
Keywords

Protein supplementation;Resistance training;Osteoarthritis

No conflict of interest
Poster Tour

Poster tour: Physical activity

ISPR8-2579
THE EFFECT OF AEROBIC EXERCISE ON STROKE REHABILITATION
H.H. Gezer¹, O.Z. Karaahmet³, E. Gürcay², D. Dulgeroglu⁴, A. Cakci⁵
¹Marmara University Hospital - ,
²Dışkapı Yıldırım Beyazıt Training and Research Hospital,
Department of Physical Medicine and Rehabilitation, Ankara, Turkey
³Dışkapı Yıldırım Beyazıt Training and Research Hospital,
Department of Physical Medicine and Rehabilitation, Ankara, Turkey
⁴Dışkapı Yıldırım Beyazıt Training and Research Hospital,
Department of Physical Medicine and Rehabilitation, Ankara, Turkey
⁵Dışkapı Yıldırım Beyazıt Training and Research Hospital,
Department of Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background

Personnel aerobic exercise programme is the part of subacute stroke rehabilitation. Aim of this study was to investigate the impact of the aerobic exercise and conventional exercise programmes that we applied at the rehabilitation phase on the maximal aerobic capacities, depression levels, sleep quality , motor function and activity limitation parameters with subacute stroke patients.

Material and Method

Patients in the initial 6-month period after stroke who were hospitalized in the physical medicine and rehabilitation clinic were included in the study. The patients were divided into two groups. Group 1 was aerobic exercise group, and group 2 was conventional exercise group. Demographic and clinical features, complications, and medical histories of the patients were recorded. Brunnstrom, Modified Ashworth Scale (MAS), Functional Ambulation Scale (FAS), Nottingham Health Profile (NHP) Beck Depression Scale (BDS), Pittsburgh sleep quality index (PSQI), Six-minute walking test, Exercise Tolerance Test (ETT) and Functional Independence Measure (FIM) were applied to the patients on admission and discharge. In exercise test maximum oxygen uptake (Max Vo2) was evaluated. Patients in group 1 were in aerobic exercise programme in accordance with their aerobic capacity in addition to traditional rehabilitation programme and the patients in group 2 were only in traditional therapy .

Results

22 patients were in the aerobic exercise group and 20 patients were in the conventional exercise group. Significant differences were found in ETT changes in aerobic exercise group, comparison with conventional exercise group. (p<0.05) Significant differences were found in FIM, BDI, NHP and PSQI scores in both groups, but there was no difference between the
groups. Analysis of the parameters that could affect maximum VO2 that the only parameter is performance of regular aerobic exercise by the patient.

Conclusion

Inclusion of aerobic exercise programmes into the conventional physical treatment at an early period following the stroke contributes positively to the aerobic capacity.

Keywords

STROKE; AEROBIC EXERCISE; MAX VO2

No conflict of interest
Poster Tour

Poster tour: Physical activity

ISPR8-0087
STRUCTURED HOME-BASED EXERCISE PROGRAM TO IMPROVE ADL AND PARTICIPATION AMONG CHILDREN WITH CEREBRAL PALSY
A. Ahmad Fauzi¹, M. Mohammad Khayat¹, N. Haron², S.A. Mahmud², S. Sabirin¹
¹University of Malaya, Rehabilitation Medicine- Faculty of Medicine, Kuala Lumpur, Malaysia
²University of Malaya Medical Centre, Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background

Motor function, activities of daily living (ADL) and participation are of primary concerns of parents or caregivers with Cerebral Palsy (CP) children. This structured home-based exercise program (SHEP) was developed to offer a practical exercise program, which includes all components of exercise for both upper and lower limbs to improve the above functions.

Material and Method

Eleven children participated in this study (7 males and 4 females, mean age 10y 3mo, standard deviation (SD) 3y) with Gross Motor Function Classification System (GMFCS) I-III. The multiple baseline study design was used to measure SHEP effects on ADL with Pediatric Evaluation in Disability Inventory – Computer Adaptive Test (PEDI-CAT), children’s participation with Children’s Assessment of Participation and Enjoyment (CAPE) questionnaire and motor function (GMFM-66). An exercise logbook was given and OMNI-RPE scale was taught to caregiver and children to monitor exercise intensity. Outcome assessments were done at pre-intervention, intervention and post-intervention phases. The intervention with SHEP phase was done for eight weeks. Two assessments were done at one month and three months post-intervention. Comparison between means of each phases were analyzed using Repeated Measure (RM) ANOVA and Paired t-test when appropriate.

Results

SHEP improves ADL, PEDI-CAT (p=0.028, d=0.5) and participation at Where-domain, CAPE questionnaire (p=0.047, d=0.8) as well as motor function, GMFM-66 (p=0.04, d=0.14) during the intervention period.

Conclusion

SHEP is a practical and quick exercise intervention, which can be done at home to achieve short-term goal in improving motor function, activities of daily living and participation.

Keywords

home-based exercise ;cerebral palsy

Conflict of interest
Disclosure statement:
This research received funding grant from University Malaya Research Fund Assistance (BK029-2015) and is registered with the Australian New Zealand Clinical Trial Registry (ANZCTR), ACTRN12616001013459
Poster Tour

Poster tour: Physical activity

ISPR8-0462
A CROSS-SECTIONAL STUDY OF PHYSICAL ACTIVITY ON NON-DIALYSIS AND DIALYSIS DAYS: ASSOCIATION WITH PHYSICAL FUNCTIONING
S. Yamamoto¹, R. Matsuzawa², K. Yoneki¹, M. Harada¹, T. Watanabe¹, T. Shimoda¹, Y. Suzuki¹, Y. Matsunaga¹, K. Kaniya¹, A. Yoshida³, A. Matsunaga¹
¹Kitasato University, Graduate school of medical sciences, Sagamihara, Japan
²Kitasato University Hospital, Rehabilitation, Kanagawa, Japan
³Sagami Circulatory Organ Clinic, Hemodialysis Center, Kanagawa, Japan

Introduction/Background

Physical inactivity is associated with low levels of physical functioning and adverse outcomes in hemodialysis (HD) patients. However, only a few studies have examined physical activity (PA) on both non-HD and HD days. This study aimed to clarify the association between physical functioning and patients stratified by levels of PA on non-HD and HD days.

Material and Method

A total of 269 Japanese HD outpatients (mean age, 64.3 ± 11.6 years; 139 women) were enrolled in this study. Clinical characteristics, physical functioning (handgrip strength (HGS), leg strength (LS), maximum gait speed (MGS), and one-leg standing time (OLS)) and PA were collected and measured. PA was evaluated with an accelerometer as the number of steps per day for a consecutive 7-day period consisting of four non-HD days and three HD days. Patients were categorized into the following three PA groups by using each median value of PA for non-HD and HD days: (1) High/High group (high PA on both non-HD and HD days), (2) High/Low group (high PA on either non-HD or HD day), and (3) Low/Low group (low PA on both non-HD and HD days). Analysis of covariance was performed to assess associations between groups and physical functioning, with adjustments for age, sex, and body mass index.

Results

Low PA was associated with lower physical functioning (all, p trend <.001). Specifically, both the Low/Low group and High/Low group had significantly lower HGS, slower MGS, and poorer OLS compared to the High/High group, even after adjusting for covariates (Figure).

Conclusion
PA on both non-HD and HD days was associated with physical functioning, suggesting that PA

Keywords
hemodialysis; physical activity; physical functioning

No conflict of interest
Poster Tour

Poster tour: Physical activity

ISPR8-0490
DEVELOPMENT AND VALIDATION OF A QUESTIONNAIRE ASSESSING THE PERCEPTION OF PHYSICAL ACTIVITY (EPAP) IN KNEE OSTEOARTHRITIS PEOPLE
N. Coste¹, C. Gay¹, L. Gerbaud², C. Aucair², E. Coudeyre¹
¹Clermont-Ferrand University Hospital, Physical Medicine and Rehabilitation department- Clermont-Auvergne University, Clermont-Ferrand, France
²Clermont-Ferrand University Hospital, Public Health department, Clermont-Ferrand, France

Introduction/Background

Physical activity (PA) level of patients with knee osteoarthritis is lower than general population. International recommendations recommend a non-pharmacological intervention including self-management education program, weight loss and an adapted exercise program. However, there is no scale assessing the perception of PA in this population. Our purpose is to develop and validate a self-questionnaire assessing barriers and facilitators to practice regular PA in patients with knee osteoarthritis.

Material and Method

Semi-structured interviews identified 22 barriers and facilitators. We developed a 24 items questionnaire (evaluated by a 5-point Likert scale) completed by 548 patients with knee osteoarthritis. In addition to EPAP, patients completed 3 other questionnaires : KOFBeQ (assessing the fears and beliefs of knee osteoarthritis patients), WOMAC (assessing the severity of osteoarthritis) and IPAQ (assessing the level of physical activity). Reproducibility and sensitivity to change were evaluated by a second group of 142 patients included in a three weeks spa therapy resort.

Results

Seven items were removed after preliminary statistical analysis. Seventeen items were grouped into four dimensions (Barriers, Facilitators, Motivations, Beliefs). The internal consistency is good for Barriers, Facilitators and Motivations dimensions (Cronach’s α > 0.7) ; intermediate for Beliefs dimension (Cronach’s α = 0.64). EPAP was significantly correlated with KOFBeQ and WOMAC but not with IPAQ. Reproducibility was good for all dimensions with intraclass correlation coefficients higher than 0.60. Only « Beliefs » dimension showed a significant improvement between day 1 and month 3 after spa therapy resort.

Conclusion

EPAP questionnaire has good psychometric properties and can help to guide the management of patients with knee osteoarthritis. It can be used in research for the evaluation of the perception of physical activity.
Keywords

Physical activity; Knee osteoarthritis; Questionnaire validation

No conflict of interest
Poster Tour

Poster tour: Physical activity

ISPR8-0611
SHORT TERM AND LONG-TERM EFFECTS IN VASCULAR ENDOTHELIUM OF EXERCISE FOR PATIENTS WITH END STAGE RENAL DISEASE
M. Miura1, A. Hirayama1, Y. Hirayama2, A. Nishida1, K. Ishizuka1, H. Kinoshita1, O. Ito2, M. Kohzuki4
1 Tsukuba University of Technology, Department of Health, Tsukuba, Japan
2 Hirayama Hospital, the director of a hospital, Chiba, Japan
3 Tohoku Medical and Pharmaceutical University, Department of Internal Medicine and Rehabilitation- Faculty of Medicine, Sendai, Japan
4 Tohoku University Graduate School of Medicine, Department of Internal Medicine and Rehabilitation, Sendai, Japan

Introduction/Background

Endothelial dysfunction occurs in chronic kidney disease (CKD) and increases the risk for cardiovascular disease. The mechanisms of endothelial dysfunction seem to evolve throughout kidney disease progression. In the present study, we investigate short term and long-term effects of the vascular endothelium of intra-dialytic exercise for patients with end stage renal disease.

Material and Method

Total 15 of subjects, included seven patients (32–89 years) with CKD and eight healthy adults participated in this study. The subjects were exercised hand grip training for the 2weeks home-based training program consisted of 7 daily hand grip session of 12 minutes each at the Borg rating of perceived exertion (RPE) for 11-13. The primary outcome was peripheral endothelial function. Secondary outcomes were physical function and biochemical tests such as cholesterol, IL6 and TNF-alpha.

Results

After the first intervention as the short term effects, the patients in CKD group and healthy adults had significant improvement in peripheral endothelial function (p<0.05) from before the intervention, but not in grip strength. Conversely, 2weeks after the intervention as the long term effects, peripheral endothelial function and grip strength have been improved significantly only in CKD group (p<0.05).

Conclusion

In this study, the safety and efficacy of conventional hand grip training were confirmed without a sudden drop of blood pressure or any other side effects. Exercise training for hand grip is very convenient, has the potential to improve endothelial dysfunction. These results indicate that the exercise for hand grip training may improve the patient’s condition equally to the lower limb exercise.
Keywords

No conflict of interest
Poster Tour

Poster tour: Physical activity

ISPR8-1136
SHORT TERM EFFECT OF LOW INTENSITY FORCED AEROB EXERCISE ADDED TO CONVENTIONAL PHYSIOTHERAPY ON COGNITIVE FUNCTIONS AND FITNESS AFTER STROKE: A RANDOMIZED CONTROLLED PILOT STUDY

Z. Jenet\textsuperscript{1}, A. Nagy\textsuperscript{1}, N. Kovacs\textsuperscript{1}, J. Horvath\textsuperscript{1}

\textsuperscript{1}University of Debrecen Faculty of Medicine, Physical Medicine and Rehabilitation, Debrecen, Hungary

Introduction/Background

Emerging experimental and clinical findings suggest that aerobic forced exercise may potentially have positive benefits on cognitive functions. The purpose of our pilot study was to assess the effect of low intensity aerobic exercise on cognitive functions in individuals with chronic stroke.

Material and Method

Thirty-five chronic, ambulatory stroke patients aged between 33 and 76 years old completed the 4-week program, 90 min session/day in every workday. They were randomized into two groups: study group (SG, n=19, median age 59/40-76/ years and control group (CG, n=16 median age 62/33-69/) years. Both groups participated in conventional physiotherapy but only SG performed aerobic exercise training with bicycles (30 min/day). Exercise intensity progressed from 30 to 40% of heart rate reserve defined by ergospirometry. Functional Independence Measure (FIM-cognitive) and Wechsler Adult Intelligence Scale processing speed (symbol search, coding) and working memory (digit span forward, backward and sequencing) subtests were recorded at baseline and 4 weeks later. Maximum oxygen intake (VO$_{2\text{max}}$) was measured at baseline and 4 weeks later.

Results

Inside group analysis showed a significant improvement in both groups in cognitive-FIM (p=0.008). A significant change was not found in working memory (digit span) subtest (p=0.16) in either of the groups. In processing speed subtest (coding) a significant improvement was only measured in SG (p=0.003) while in a symbol search test an improvement was found in both groups (SG: p=0.041, CG: p=0.006). There were not inter-group differences in any subtest (all p=0.201) and in VO$_{2\text{max}}$ (p=0.8). Any significant improvement in VO$_{2\text{max}}$ was not found in either of the groups (p=0.7).

Conclusion

The results suggested that low intensity aerobic exercise training integrated into conventional stroke rehabilitation program had effects on the selected measures of cognitive functions, nevertheless the VO$_{2\text{max}}$ remained unchanged. Further studies are needed to get evidence with sufficient power.
Keywords
cognition; exercise; stroke

No conflict of interest
Poster Tour

Poster tour: Physical activity

ISPR8-1164

ESTIMATION OF EXERCISE INTENSITY USING HEART RATE DURING SLEEP

H. Matsuura¹, M. Mukaino¹, T. Ogasawasa², S. Hirano¹, Y. Aoshima³, T. Suzuki³, A. Inukai³, E. Hattori³, E. Saitoh¹

¹Fujita Health University school of medicine, Rehabilitation medicine 1, Nagoya, Japan
²NTT corporation, NTT device innovation center, Atsugi, Japan
³Fujita Health University hospital, department of medicine, Toyoake, Japan

Introduction/Background

Exercise intensity is essential for exercise prescription. The estimation by heart rate can indicate intensity, however, this measurement can have limited accuracy, especially for low intensity exercise. One reason for inaccuracy is that exercise intensity calculations are based on heart rate at awake rest, which can easily fluctuate. In this study, we examined the validity of exercise intensity estimates generated from heart rate monitoring during sleep, which could be more stable than conscious waking heart rates.

Material and Method

Fourteen healthy subjects participated to this study. VO₂ max was determined by a maximal treadmill test to volitional exhaustion using the Bruce protocol. Maximum heart rate was estimated using age. To estimate exercise intensity during low intensity exercise, subjects participated in a six-minute distance walk (6MD). Exercise intensity was calculated using percent VO₂ reserve (%VO₂R), percent VO₂ max (%VO₂max), and percent heart rate reserve based on heart rate during awake rest (HRR-a) and sleep (%HRR-s). To monitor heart rate at rest and during sleep, we employed a “smart clothing” system (hitoe® system).

Results

Both %HRR-a and %HRR-s were significantly correlated with %VO₂R and %VO₂ max. The correlation coefficient with %HRR-s tended to be higher than that of %HRR-a. The Bland-Altman plot showed systematic error in both %HRR-a and %HRR-s, with less error in %HRR-s.

Conclusion

Estimation of exercise intensity using heart rate during sleep may be easier and more accurate to monitor than waking heart rate, making it more feasible in clinical settings.

Keywords

exercise intensity; %HRR; heart rate during sleep

No conflict of interest
Impact of a Physical Activity Incentive Program on the Amount of Spontaneous Activity in Older People Living in an Independent Residence.

S. Mandigout\textsuperscript{1}, A. Grienenberger\textsuperscript{2}, A. Perrochon\textsuperscript{2}, J.C. Daviet\textsuperscript{2}

\textsuperscript{1}GEIST, HAVAE Laboratory, LIMOGES, France
\textsuperscript{2}Limoges University, HAVAE Laboratory, Limoges, France

Introduction/Background

The aim of our study is to evaluate the effects of a physical activity (PA) incentive program on the amount of spontaneous activity in older people living in an independent residence.

Material and Method

The recruitment of elderly people was performed in 3 independent residences in the city of Limoges, France. The inclusion criteria were: GIR greater than 4 and willingness to participate in the program. The program was offered to volunteer residents for a total duration of 14 weeks. The principle of this incentive program was based on the freedom to participate in group or individual sessions. It was also based on the recommendations of Ecclestone et al (2004). Before and after the program, we required for each subject to wear an actimeter (Armband Sensewear, Bodymedia) for 3 consecutive days to assess the number of steps and daily total energy expenditure (TEE) and to perform the Senior Fitness Test to assess the effects of the PA program on the physical abilities of the subjects.

Results

50 elderly people (10 men; 40 women; age 81.7±9.2 years) participated in the program. Amongst them, 42 completed all evaluations. The amount of spontaneous activity did not change between before and after the program (see Table). However, the time spent lying down has decreased significantly. Our results show an improvement in all parameters of the Senior Fitness Test.

<table>
<thead>
<tr>
<th></th>
<th>TEE(Kcal/day)</th>
<th>Step/day</th>
<th>Time lying down (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>1873±439</td>
<td>2427±2618</td>
<td>560±103</td>
</tr>
<tr>
<td>After</td>
<td>1895±498</td>
<td>2549±2530</td>
<td>525±124*</td>
</tr>
</tbody>
</table>

Conclusion

Our study shows that a PA incentive program does not induce a change in the amount of spontaneous activity of seniors living in an independent residence. Besides the fact that our
subjects did not observe the PA recommendations, the program did not increase social participation either, despite an improvement in their physical abilities.

**Keywords**

Physical Activity; Spontaneous Activity; Older

*No conflict of interest*
Poster Tour

Poster tour: Physical activity

ISPR8-1318
PRELIMINARY REPORT ON THE PATIENT MOTIVATION AND ADHERENCE TO EXERCISE RECOMMENDATIONS – THE IMPORTANCE OF MEDICAL COMMUNICATION IN THE REHABILITATION PROCESS DURING AND AFTER HOSPITALIZATION

S. Krukowska¹, K. Koszela², M. Woldanska-Okonska²

¹Department of Foreign Languages- University of Lodz- Poland,
Department of Rehabilitation and Physical Medicine- Medical University of Lodz- Poland, Lodz, Poland
²Medical University of Lodz- Poland, Department of Rehabilitation and Physical Medicine, Lodz, Poland

Introduction/Background

Medical communication plays very important role in rehabilitation process. It can support or hinder treatment, especially when we have to deal with patients with depression or low self-esteem. The right communication methods tell of professionalism of medical staff and result in success in therapy.

The aim of the presentation is to show the research on medical communication in the rehabilitation process of patients during and after their hospitalization. We analyze and assess:

• Communication methods used by doctors, nurses and physiotherapists;

• Specific needs of patients due to their diseases and psychophysical condition (we examine patients: after various accidents, with neurological or musculoskeletal diseases, terminally ill, with good or bad prognosis, with or without depression etc.);

• If patients understand their own condition and what can help them to recover;

• Motivation and adherence to exercise recommendations during and after hospitalization;

• How medical staff supports the patients in their specific condition.

Material and Method

The research has been conducted in a group of 150 adult patients without cognitive disorders, by using original questionnaires, Rehabilitation Causality Orientation Scale, Self-Regulation Questionnaire for Rehabilitation, Depression Anxiety Stress Scales, The Laitinen Modified Questionnaire Indicators of Pain and The Visual-Analogue Scale. The results were statistically analyzed.

Results

Patients are highly motivated to undertake rehabilitation during hospitalization. Their motivation gets lower with time afterwards, although, they understand that adherence to exercise recommendations would help them to recover. Patients feel safe in medical staff’s presence, despite of some communication problems.
Conclusion

Effective communication methods are very important in the rehabilitation process. They play a great role in motivating and realizing of the patients' will. On the basis of the research will be created proper communication patterns for medical staff, which will have a positive effect on rehabilitation process and will improve the quality of patients' life, as well as satisfaction of medical staff at work.

Keywords

rehabilitation; motivation; medical communication

No conflict of interest
Impairment in Autonomic Nervous System (ANS) is common in post-stroke patients. Heart Rate Variability (HRV) is non-invasive method to quantify the ANS function. Physical Activity (PA) is associated with favorable indices of sympatho-vagal balance in all population. However, the response of PA on HRV parameters in post-stroke patients remains unknown. The aim of the study was to evaluate the effect of a PA incitation and education program on the HRV parameters.

### Material and Method

We analyzed short-term HRV parameters in supine and orthostatic position with 56 post-stroke patients in subacute phase recovery (Mean ± SD; Age: 59.9 ± 13.3 years; Stroke delay: 80.5 ± 44.8 days). Participants were classified into one of the following groups, PA incitation and education program (n=30; Group-A) and traditional follow-up (n=26; Group-B). Time (Mean RR, RMSSD), frequency domain (HF, LF,) and nonlinear parameters (SD1) were measured at baseline (T0) and after 6 months (T1) in both groups.

### Results

<table>
<thead>
<tr>
<th>HRV-Parameter</th>
<th>Supine position</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Groupe-A</td>
<td>Groupe-A</td>
<td>Groupe-B</td>
<td>Groupe-B</td>
</tr>
<tr>
<td>Mean RR(ms)</td>
<td>931 ± 144</td>
<td>914.5 ± 120</td>
<td>891.7 ± 163</td>
<td>879.8 ± 178</td>
</tr>
<tr>
<td>RMSSD(ms)</td>
<td>19.3 ± 12.1</td>
<td>20.9 ± 13.1</td>
<td>24.7 ± 14.4</td>
<td>19.5 ± 11.3</td>
</tr>
<tr>
<td>HF (n.u)</td>
<td>36.4 ± 13.3</td>
<td>40 ± 17.2</td>
<td>41.6 ± 22.3</td>
<td>40.8 ± 22.4</td>
</tr>
<tr>
<td>LF (n.u)</td>
<td>63.3 ± 13.5</td>
<td>59.8 ± 17.8</td>
<td>58 ± 22.5</td>
<td>58.7 ± 22.8</td>
</tr>
<tr>
<td>SD1</td>
<td>13.6 ± 9.14</td>
<td>14.8 ± 9.4</td>
<td>17.1 ± 10.4</td>
<td>13.8 ± 7.7</td>
</tr>
</tbody>
</table>

### Conclusion

No significant effects of time, group or interaction were found. However, HF tend to increase and RMMSD did not decrease in group-A. Literature affirmed that cardiac autonomic dysfunction is represented by reduced HRV parameters (Yperzele et al.2015). PA incitation could be a good strategy to attenuate the reduction of HRV in subacute phase of stroke recovery. More studies are needed to know the effects of PA on the ANS regulation in stroke.
Keywords

Stroke;Physical Activity;HRV

No conflict of interest
Poster Tour

Poster tour: Scoliosis

ISPR8-0390
CORRELATION OF SCOLIOSIS MEASUREMENT: COBB ANGLE AND AXIAL TRUNK ROTATION BY SMARTPHONE APPLICATION

M. hong1, J.Y. Jeon1, W. Kim1
1Asan medical center, Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background

Scoliosis is defined as “a lateral deviation of the spine, minimum Cobb angle 10˚, with concordant vertebral rotation”. The standard technique for checking the angle of a spinal curve is measuring the Cobb angle and the scoliometer is used as the noninvasive screening tool for measuring the axial tone rotation (ATR). Recently, there are many smartphone applications that measuring the ATR angle. But, there are a few reports about correlation between Cobb angle and ATR.

The purpose of this study is to compare and assess the correlation of the values of the Cobb angles obtained from the radiographs and the smartphone measurements from the ATR angle.

Material and Method

iPhone® model 5S with iHandy® level application (iPhone®; Apple, Cupertino, CA) were used for this study. The iHandy level application is a free application from app store. The physiatrist placed the smartphone on the spine while the patient performed Adam’s forward bending test. Then, put the smartphone on the most remarkable hump site and measured the value of ATR. After completing measurements using by smartphone, the whole spine radiographs were obtained from each participant in orthostatic position. Cobb angle was determined by other physiatrist.

The smartphone and radiographic data were analyzed by using Spearman correlation coefficients with a level of significance of 5%, using SPSS 18.0 software.

Results

Total of sixteen people are participated who came down with scoliosis in medical check-ups; five men and eleven women. The average age is 22.8 years old, the mean height is 164.5cm
and the mean weight is 55kg.
The Cobb angles were compared with the peak ATR value. The correlation values were 0.837.

**Conclusion**

The trunk rotation deformity can be the essential expression of idiopathic scoliosis. Therefore, monitoring of the trunk distortion using smartphone-aided measurement can be helpful for early detection and proper management of scoliosis.

**Keywords**

idiopathic scoliosis; smartphone application

*No conflict of interest*
Poster Tour

Poster tour: Scoliosis

ISPR8-0881
EDUCATIONAL THERAPEUTIC PROGRAM (ETP) AND USE OF THE BRACE QUESTIONARY (BRQ) FOR ADOLESCENT IDIOPATHIC SCOLIOSIS (AIS) DURING ORTHOPAEDIC TREATMENT.
J.C. Bernard¹, C. Castan¹, L. Moisson¹, E. Chaleat-Valayer¹
¹Centre Médico-Chirurgical de Réadaptation des Massues Croix rouge française, Service MPR Enfants Adolescents, LYON Cedex 05, France

Introduction/Background

In the context of a chronic disease, the adolescent idiopathic scoliosis, we set up a Educational Therapeutic Program (ETP) for the patients from 12 to 15 years old in-brace teenagers. The aims of the PTE are to make the patient:
- maintain or obtain self-care abilities. For AIS, the in-brace autonomy…
- acquire abilities. For AIS, to understand the scoliosis evolution, the in-brace quality of life...
Another aim of the PTE is parents support.
The first goal is to evaluate the in-brace quality of life with the BrQ.
The second one is to explain the ETP features for AIS during the orthopaedic treatment.

Material and Method

- Specific team trained in 2013 and the new colleagues are regularly trained.
- The quality of life will be measured by the Brace Questionary for 264 patients with a total score divided in 8 domains.
- The educational therapy program will be evaluated by a qualitative evaluation

Results

The total score for the quality of life is 78.72%; the higher it is, the better the quality of life is.
At the end of the program, the children consider at 81% that the new knowledge and the acquired skills will allow them to have a better quality of life; 100% of their parents feel that they are more helpful to their children. **Conclusion**

The Brace Questionary (BrQ) is a self questionary and was validated in French in 2017 with a good reliability and validity. *Julie Deceuninck (Scoliosis 2017)*. The ETP is very useful for patients and their parents and allows a better understanding between the health care team, the patient and his parents for a hard treatment in period of growth. We notice no significant difference in each domain of the BrQ whether the patient follows the ETP or not.

**Keywords**

quality of life; educational therapy; scoliosis

*No conflict of interest*
Poster Tour

Poster tour: Scoliosis

ISPR8-0985
IDIOPATHIC SCOLIOSIS AND INTENSIVE REHABILITATION TREATMENT: COMPARISON OF 2 TYPES OF ELONGATION CURES
H. Quentin1, C. Pradeau2, A. Taquet3, I. Dujardin3, C. Vandermeren2, A. Thevenon4,5, J.F. Catanzariti2
1Lille 2, Medecine Physique et de Réadaptation, Lille, France
2Lille 2, Médecine Physique et de Réadaptation, Lille, France
3SSR Marc Sautelet, Médecine Physique et de Réadaptation, Lille, France
4Chu Swynghedauw Hospital, Médecine Physique et de Réadaptation, 59000 Lille, France
5URePSS Université Lille 2, Médecine Physique et de Réadaptation, 59000 Lille, France

Introduction/Background

Therapeutic management of idiopathic scoliosis is classically divided into rehabilitation, orthopedic and surgical treatment. Elongation cures are sometimes made to slow down the evolution, whose protocols remain very varied with a disputed effectiveness. At Pediatric SSR Marc Sautelet, they are composed of an association between orthopedic and physical therapy treatment. Two types of cure are performed: V1 and - more recent and better tolerated - V2. The aim is to compare the effectiveness of the two protocols with main hypothesis that V2 treatment isn't inferior to V1.

Material and Method

Two types of treatment are compared: the V1 (patient in strict decubitus 24/24, physiotherapy in supine, dynamic traction and brace derived from Milwaukee) and V2 (no decubitus, physiotherapy derived from Schroth methods, 3D autocorrection, Cheneau’s brace the day and derived from Milwaukee at night). The duration of cure is 4 weeks. X-rays are performed before
127 patients were included retrospectively between January 2011 and June 2017 (71 V2, 56 V1). There is no significant difference for age or sex. There is a significant improvement of the Cobb angle for the 2 types of cure (V1: -10.09°, V2: -5.68°), with a non-significant difference (lower bound of the IC: 1.49°).

**Table 1: population's characteristics**

<table>
<thead>
<tr>
<th>Item</th>
<th>V1 Cure</th>
<th>V2 Cure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sexe</td>
<td>51F (91.1%)</td>
<td>59F (83.1%)</td>
</tr>
<tr>
<td></td>
<td>5M (8.9%)</td>
<td>12M (16.9%)</td>
</tr>
<tr>
<td>Mean Age</td>
<td>14.04</td>
<td>14.32</td>
</tr>
<tr>
<td>Mean Cobb Angle</td>
<td>52°</td>
<td>43°</td>
</tr>
<tr>
<td>Angle before</td>
<td></td>
<td></td>
</tr>
<tr>
<td>treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Curvature</td>
<td>2.24</td>
<td>2.14</td>
</tr>
<tr>
<td>Risser</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple</td>
<td>12 (21.42%)</td>
<td>10 (14.08%)</td>
</tr>
<tr>
<td>Double</td>
<td>41 (73.21%)</td>
<td>45 (63%)</td>
</tr>
<tr>
<td>Triple</td>
<td>3 (5.35%)</td>
<td>16 (22.5%)</td>
</tr>
</tbody>
</table>

**Table 2: Main results**

<table>
<thead>
<tr>
<th>Item</th>
<th>V1 Cure</th>
<th>V2 Cure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Cobb Angle after Treatment</td>
<td>-10.09°</td>
<td>-5.68°</td>
</tr>
<tr>
<td>Cobb Angle Improvement</td>
<td>-10.09°</td>
<td>-5.68°</td>
</tr>
<tr>
<td>Numbers of subjects (percent)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improvement &gt; 5°</td>
<td>42/56 (75%)</td>
<td>35/71 (49.8%)</td>
</tr>
<tr>
<td>Stability</td>
<td>14/56 (25%)</td>
<td>30/71 (42.2%)</td>
</tr>
<tr>
<td>Aggravation &gt; 5°</td>
<td>0/56 (0%)</td>
<td>6/71 (8%)</td>
</tr>
</tbody>
</table>
Conclusion

There is an improvement in Cobb angle >5° in both cases. Moreover, performing a V2 (better tolerated) cure isn’t statistically less effective. Realization of a V2 cure can therefore be legitimately proposed considering the best tolerance.

Keywords

Idiopathic scoliosis; intensive rehabilitation; Cobb Angle

No conflict of interest
Introduction/Background

In the treatment of severe scoliosis, pre-surgical halo-gravity traction (HGT) achieves an increase in curve flexibility and in preoperative pulmonary function as well as a neurologic risk reduction following final surgery. Our aim was to describe the benefits and complications of HGT in adolescents with idiopathic scoliosis or secondary scoliosis while awaiting vertebral fusion.

Material and Method

A descriptive and retrospective study. Sixteen patients admitted to hospital and carrying a HGT between January 2014 and December 2017 were included. The main judgment criteria were the height gain, the final weight of traction, the decrease in the Cobb angle, the gain in the forced vital capacity (FVC) and the description of complications.

Results

There were eight teenagers with an idiopathic scoliosis aged-mean(SD) 12.1(1.9) years old, a height gain of 7.6(2.3) cm, a final weight of traction of 13.7(3.9) Kg corresponding to 37.2(7.5)% of body weight. Cobb angle mean(SD) of 97.5(8)° was reduced of 26.9(11.1)° at the end of traction. And a FVC gain mean(SD) of 12.4(8.8)%.

Likewise, eight adolescents with a secondary scoliosis aged-mean(SD) 12.8(1.2) years old, a height gain of 9.2(2.8) cm, a final weight of traction of 12.7(1.3) Kg corresponding to 38.9(11.6)% of body weight. Cobb angle mean(SD) of 100(13.8)° was reduced of 26.5(8.4)° at the end of traction. And a FVC gain mean(SD) of 7.1(9.7)%.

The most frequent complications in the group of idiopathic scoliosis (n=8) were neck pain (75%), headache (37.5%), pin pain (25%), visual disorders, thorax pain and pin infection (12.5%). In the group of secondary scoliosis (n=8), neck pain (100%), headache (62.5%), back pain (50%), pin pain and anxiety (25%), neurological disorders and pin infection (12.5%).

Conclusion
HGT was in general well tolerated and should be considered before vertebral fusion to improve spinal flexibility and respiratory function in idiopathic or secondary scoliosis.

**Keywords**

halo-gravity traction;idiopathic scoliosis in adolescents;secondary scoliosis in adolescents

*No conflict of interest*
ASSOCIATION BETWEEN IDIOPATHIC SCOLIOSIS AND BONE QUALITY

X. Zhou¹, Q. Du¹
¹Xin Hua Hospital affiliated to Shanghai Jiao Tong University School of Medicine, Rehabilitation, Shanghai, China

Introduction/Background

It is reported that adolescent idiopathic scoliosis patients have abnormal bone quality. However, the study of bone quality in idiopathic scoliosis (IS) patients is still sparse. The objective of this study was to determine whether an association exists between IS and bone quality in a school scoliosis screening program.

Material and Method

391 IS patients (263 girls/128 boys) and 282 healthy controls (185 girls/97 boys) from 6 to 19 years of age in a school scoliosis screening program were included. Quantitative ultrasound measurements were performed at the left distal 1/3 of the radius, and the standard method to estimate speed of sound was recorded. Z-score was then calculated. The z-score is defined as the difference between the raw score to be standardized and the mean difference divided by the standard deviation (a z-score less than or equal to -2.0 indicates low bone quality and a z-score greater than -2 indicates normal bone quality).

Results

The mean age of IS patients and healthy controls were (12.1 ± 3.2) and (10.7 ± 3.0) years old respectively. The mean Cobb angle of IS patients was 14.7° ± 4.9°. Of 391 IS patients, 101 (25.8%) had low bone quality. Of 282 healthy controls, 51 (18.1%) had low bone quality. There was significant association between IS and low bone quality (OR, 1.58; 95% CI, 1.08-2.30). After adjustment for age, gender and body mass index, a positive association was seen between IS and low bone quality (OR, 1.60; 95% CI, 1.08-2.37).

Conclusion

IS patients have a higher risk of low bone quality. It is recommended that bone quality should be monitored in IS patients.

Keywords

Idiopathic scoliosis; Bone quality; Quantitative ultrasound

No conflict of interest
Poster Tour

Poster tour: Scoliosis

ISPR8-1059
ASSOCIATION OF BODY MASS INDEX AND CURVE MAGNITUDE IN PATIENTS NEWLY DIAGNOSED WITH IDIOPATHIC SCOLIOSIS
Q. Du\textsuperscript{1}, Y. Niu\textsuperscript{2}, X. Zhou\textsuperscript{1}
\textsuperscript{1}Xin Hua Hospital affiliated to Shanghai Jiao Tong University School of Medicine, Rehabilitation, Shanghai, China
\textsuperscript{2}Shanghai University of Sport, Kinesiology, Shanghai, China

Introduction/Background

Low body weight is thought to be associated with scoliosis. However, the association of curve magnitude and body mass index (BMI) is still unclear. The objective of this study is to assess the correlation of body mass index (BMI) and curve magnitude in patients newly diagnosed with idiopathic scoliosis (IS).

Material and Method

1007 patients with diagnosis of IS were recruited in this cross-sectional study. Using Cobb angle of major curve to evaluate severity of scoliosis, and can be divided into: mild (10° ≤ Cobb angle < 20°), moderate severe (Cobb angle of 20° or higher). Measuring height (m) and weight (kg) was to calculate BMI.

Results

The mean age of these 1007 IS patients was 13.0 ± 2.8 years. The mean height and weight of these IS patients were 1.6 ± 0.1 meters and 45.0 ± 11.8 kg respectively. As to major curve, the mean value of these IS patients was 17.9±9.3°, and average BMI of these IS patients was 18.4±2.9 kg/m2. Among these patients, 242 (11.8%) cases were underweight, 646 (64.2%) cases were healthy weight, and 119 (24%) cases were overweight. The average Risser of these IS patients was 2.0 ± 1.8. BMI was positively correlated with scoliosis severity (P = 0.032, OR, 1.31; 95% CI, 1.02-1.68), while there was no correlation between BMI and Risser signs among these IS patients (P = 0.677, OR, 0.920; 95% CI, 0.621-1.363).

Conclusion

Among patients newly diagnosed with IS, scoliosis severity is positively associated with BMI, and patients with higher BMI may have a higher risk of moderate and severe idiopathic scoliosis, because overweight patients in early detection are more difficult to be found. To avoid the delayed detection and treatment of overweight and obese patients, the screening positive standard should be broadened moderately among overweight and obese patients in the idiopathic scoliosis screening program.

Keywords
body mass index; curve magnitude; idiopathic scoliosis

No conflict of interest
Poster Tour

Poster tour: Scoliosis

ISPR8-1317

DOES A SPECIFIC POSTUROGRAPHIC PROFILE EXIST IN ADOLESCENT IDIOPATHIC SCOLIOSIS?

T. Arbaoui¹, A. Chevutschi¹, F. Kedzierski², J. Guilbaud², M. Coget², J.F. Catanzariti²

¹Institut de Formation en Masso-Kinésithérapie du Nord de la France, 235 Avenue de la Recherche, Loos, France
²SSR pédiatrique Marc Sautelet, Nord, Villeneuve d’Ascq, France

Introduction/Background

The literature describes Orthostatic Postural Control (OPC) abnormalities in Adolescent Idiopathic Scoliosis (AIS). We aimed to search for a specific posturographic profile characteristic of the type of AIS, according to various criteria. A comprehensive review of the relevant literature has also been conducted.

Material and Method

This retrospective study involved 120 idiopathic scoliotic girls between 10 and 18 years old (mean age 14.2 ± 1.5 years; mean Cobb angle 32.3 ± 14.5°) from specialized consultations in our pediatric rehabilitation center. We searched for correlation between the patients’ radio-clinical parameters and posturographic profile. Their OPC has been assessed with computerized and standardized static posturography by means of a force platform (SATEL®) in upright barefoot stance with different sensory conditions (rigid surface with closed and open eyes, foam surface with open eyes). A flow review has been conducted using PubMed to find relevant articles published up to 2017.

Results

To compare our data, we divided the 120 girls into groups according to the Cobb angle (<30° versus >30°), frontal balance of the spine (<2cm versus >2cm shift), and convexity side of the main scoliotic curvature (left versus right). No correlation has been found between radio-clinical and stabilometric parameters. Over 30 studies selected in literature and reviewed, no consensus has been found in favor of a better or worse postural stability in AIS subjects as compared with other ones or with controls.

Conclusion

AIS does not result in a predictable response of postural control according to its type. Each idiopathic scoliotic patient adjusts his posture according to his own abilities. This is dependent on his genetic inheritance and on his internal models, progressively shaped throughout development by learning and sensorimotor interactions with his own body and environment. Rehabilitation can modify these internal models to guide these patients’ postural strategies for a better management of the spine balance.
Keywords

Adolescent Idiopathic Scoliosis; Posturography; Literature Review

No conflict of interest
Poster Tour

Poster tour: Scoliosis

ISPR8-1715

BRACE WEARING TIME IS THE STRONGEST PREDICTOR OF FINAL RESULTS: A REGRESSION MODEL IN 1457 HIGH RISK CONSECUTIVE ADOLESCENTS WITH IDIOPATHIC SCOLIOSIS

S. Donzelli¹, S. Negrini², F. Zaina³, F. Di Felice³
¹Italian Scientific Spine Institute, ISICO, Milano, Italy
²University of Brescia, Chair of Physical and Rehabilitation Medicine, Brescia BS, Italy
³Italian Scientific Spine Institute, isico, Milan, Italy

Introduction/Background

Current Guidelines propose PCA, but there are no large studies to check final results, and predict which patients will respond better. A personalised conservative approach (PCA) to Adolescents with Idiopathic Scoliosis (AIS) is based on different treatment protocols according to risk groups (11-20, 21-30, 31-40, 41-45). The aim of the present research is to develop a model to predict end results of a PCA in Adolescents with Idiopathic Scoliosis (AIS).

Material and Method

Design: retrospective observational study nested into a prospective database. Inclusion criteria: AIS, 11-45°, Risser 0-2, age 10-16, first consultation, no previous bracing, at end of observation (Risser 3, medical prescription). Treatments followed a personalised conservative approach (PCA) following the step-by-step theory (Negrini 2018): intensity increases with estimated risk factors. Outcomes: end Cobb angle <50° and <30° and no-progression. A backward selection regression modelling used to assess the effect of 7 covariates: age, BMI, ATR, TRACE (Trunk Aesthetic Clinical Evaluation) score, Risser and Cobb angle at baseline; referred brace wear (RBW) and risk groups according to which different PCA.

Results

1457 patients, 82.6% females, age 12.11±1.05. End<50° was predicted by BMI and RBW (0.21 and 0.10 probability respectively) while age, Cobb and ATR were statistically significant but weighting <0.005. End<30° is predicted by RBW (0.37), and Cobb (0.03), while age counts <0.0005. No-progression was predicted by RBW (0.33); Cobb, TRACE and ATR counted <0.02, and age <0.0002. Considering the 4 risk groups, end<30° and end<50° probability decreases with the groups (R2=0.3 and 0.04 respectively)

Conclusion

Time of brace wearing is the strongest predictor of final results whether a <50, <30 or stability outcomes are considered. Risk groups based on PCA are good predictors.

Keywords
scoliosis; brace; treatment outcome

No conflict of interest
Poster Tour

Poster tour: Scoliosis

ISPR8-2107
INVESTIGATING THE EFFECT OF THE ORTHOTIC TREATMENT ON SAGITTAL PLANE PELVIC PARAMETERS IN ADOLESCENTS WITH IDIOPATHIC SCOLIOSIS: LITERATURE REVIEW

M. Saeedi¹, T. Babaee²
¹MSc. student in Orthotics & Prosthetics- school of Rehabilitation Sciences- Iran University of Medical Sciences., Dept. of Orthotics & Prosthetics, Tehran, Iran
²PhD.- Assistant professor- School of Rehabilitation Sciences- Iran University of Medical sciences, Department of Orthotics and Prosthetics-, Tehran, Iran

Introduction/Background

Adolescent idiopathic scoliosis (AIS) is a three-dimensional deformity of the spine. Morphologic changes in AIS alter the orientation of the body in all three anatomic planes. These changes may alter the angular position of the spinopelvic and pelvic parameters. Cobb angle is the only key index used to predict the curve improvement of the patient with AIS wearing the corrective brace. The importance of the pelvic parameters is almost neglected, hence the study of these parameters as indexes in the other two planes can provide information about other aspects of brace treatments.

Material and Method

An Internet search for terms related to AIS, orthosis and brace treatments and sagittal pelvic parameters was performed in bibliographic databases. By summarizing the obtained publications, sagittal pelvic parameters and bracing treatments of AIS were described, and their information about their relation in sagittal plane with cobb angle in the coronal plane were reported.

Results

Pelvic Incidence (PI), Pelvic Tilt (PT) and Sacral Slope (SS) are the three main sagittal pelvic parameters. PI is specialized for each person but it is changed according to the age and spinopelvic deformities. Lumbar lordosis is related with sagittal pelvic parameters specially PI and SS. So, they can be used as sagittal plane indexes to predict the improvement procedure and treatments’ outcome.

Conclusion

Apparently there is a relationship between spino-pelvic parameters in the skeletal chain of body. Nevertheless, this relation is clear, there is not any index in the sagittal plane to refer to, and therapists are satisfied to the only index, cobb angle, in the coronal plane. So, introducing another index in another plane besides cobb angle in sagittal plane, considering the three dimensional aspect of AIS, can be very helpful to all the society which handling with.
Keywords

Adolescents with Idiopathic Scoliosis; Sagittal Plane Pelvic Parameters; Orthotic Treatment

No conflict of interest
Introduction/Background

The essential condition of the heart and lungs activity in the chest is represented by maintaining a more normal posture of the spine.

Thus we canalysed patients with Infantile Idiopathic Scoliosis with the help of the visual and proprioceptive sensors in Stabilometric therapy, following the correct posture, involving the evolution in the static of the center of gravity so that it is related to the supportive base at values as close as physiological ones.

Material and Method

We observed a group of 48 children aged between 7 and 12 years for a period of two years during which they did the scoliosis therapy at NTCNRC. They were evaluated at the beginning of the admission and at the end (2 weeks hospital admission). Patients evaluation was achieved by using an advanced assistive system following the spatio-temporal parameters and the following data were extracted: 1-ellipse area; 2-perimeter; 3-standard antero-posterior deviation; 4-standard medio-lateral deviation. The patients were asked to stand on a sensor pressure plate with a monitor in front of them. Postural isometric corrections were applied and, through the visual and proprioceptive sensors, they were able to track their activity and correct it as often as they noticed deviations.

Results

Referring to the Infantile Idiophatic Scoliosis we notice the following improvements:
- the ellipse area for 42 patients
- the perimeter for 29 patients
- the antero-posterior standard deviation 36 patients
- the medio-lateral standard deviation 35 patients

Conclusion

When the study was over we notice that the body perception improved for 45 patients but there was no change registered for 3 of them.
Keywords

stabilometry; proprioception; infantile idiopathic scoliosis

No conflict of interest
Poster Tour

Poster tour: Shock waves therapy

ISPR8-2676
EFFECTIVENESS OF SHOCK WAVE THERAPY ON TRICEPS SURAE SPASTICITY IN CHRONIC STROKE PATIENTS
G. Stoquart¹, O. Roland², S. Boulet³
¹Cliniques universitaires Saint-Luc, Physical and rehabilitation medicine, Woluwé-Saint-Lambert, Belgium
²Université catholique de Louvain, Faculté des sciences de la motricité, Louvain-la-Neuve, Belgium
³Université catholique de Louvain, Institut de Recherche Expérimentale et Clinique, Brussels, Belgium

Introduction/Background

Shock wave therapy (SWT) has shown some effectiveness in the spasticity treatment. However, few randomized controlled trials remained available, particularly in long-term spasticity, and the effect of a single session of treatment has poorly been assessed.

Material and Method

Sixteen adults with a long-term stroke (4.3±6 years post-stroke) and presenting a spasticity of the triceps surae were included. Patients were submitted to two sessions of shock wave therapy: one session (real-SWT) of 6000 real shocks (8Hz; 1.6 bar) applied on the triceps surae, and one session (sham-SWT) of 6000 sham shocks. Both sessions were separated by a one week interval, and allocated in a random order. Patients were assessed immediately before and after each session of SWT. Assessment was carried out by a blind assessor, and included the Modified Ashworth Scale (MAS) and the Tardieu scale (TS) of the triceps surae (assessed with knee flexed and knee extended), as well as a ten-meter walking test (10MWT).

Results

The MAS score (knee flexed) and the TS score (knee extended) improved significantly after real-SWT, but not after sham-SWT (p=0.007 and 0.01, respectively). The median improvement was 0.5[0;1] on the MAS and 1[0;2] on TS. However, the 10MWT remained unchanged.

Conclusion

A single session of shock wave therapy can be effective to improve spasticity, but not walking ability, in long-term spasticity. Larger studies are needed to confirm this hypothesis.

Keywords

Shock wave therapy; Spasticity; stroke

No conflict of interest
Poster Tour

Poster tour: Shock waves therapy

ISPR8-0140
TREATMENT OF SPASTICITY IN MULTIPLE SCLEROSIS: BOTULINUM TOXIN A INJECTION VERSUS RADIAL SHOCKWAVE THERAPY
A. Ammendolia¹, O. d'Esposito¹, M. Barletta¹, R. Dicorato¹, L. Fratto¹, M. Iocco¹
¹University of Catanzaro, of Medical and Surgical Sciences, Catanzaro, Italy

Introduction/Background

For treatment of Multiple Sclerosis (MS) spasticity, Interdisciplinary Working Group of Movement Disorder recommended use of botulinum toxin A (BTA) injection. Literature reported some experiences about use of radial shockwave therapy (RSWT). Aim was to compare therapeutic efficacy of these therapies in patients affected by MS.

Material and Method

We enrolled 32 patients. Inclusion criteria: Modified Ashworth Scale (MAS) from 1 to 2; Expanded Disability Status Scale (EDSS) from 5 to 7.5; no treatment for spasticity in the last 6 months or ongoing pharmacologic therapy; no cognitive deficiency. Patients were randomly divided in 2 groups: A (treated by ultrasound-guided TBA injections in calf muscles) and B (treated by 4 sessions of RSWT). All patients were evaluated before treatment (T0), 1 month (T1) and 3 months (T2) after the end of the treatments, using MAS, Tardieu Index (TI), and ROM measured by two-camera optoelectronic system and surface electromyography (sEMG) of treated muscles, in passive dorsal flexion and active plantar flexion (fig. 1).

Results
In both groups at T1 we observed: important reduction of MAS and TI score, improvement of ROM active and passive and decrease of tonic stretch reflex. At T2, there was a decrement of results for both therapies, but more statistically significant for RSWT (Fig. 2-3).

**Conclusion**

Both therapies are effective for treating spasticity in MS. BTA injections have prolonged effects. RSWT lost effect shortly after the end of the treatment, but are repeatable without side effects.

**Keywords**
spasticity;botulinum toxin injection;radial shockwave therapy

No conflict of interest
THE EFFECTS OF BOTULINUM TOxin TYPE A COMBINED WITH EXTRACORPOREAL SHOCK WAVE THERAPY ON TRICEPS SPASTICITY IN STROKE PATIENTS

H. Duan¹, Z. Li¹, F. Liu¹
¹First Hospital of Jilin University, physical medicine and rehabilitation, Changchun, China

Introduction/Background

To observe application of extracorporeal shock wave therapy in the treatment of triceps spasticity after stroke.

Material and Method

36 stroke patients with triceps spasticity were randomly divided into treatment group and control group according to the random number table method, 18 patients for each group. All patients accepted routine rehabilitation and BTX-A injection locally, the treatment group received extracorporeal shock wave therapy, The control group received pseudo-extracorporeal shock wave therapy. The modified Ashworth scale, joint passive activity, simplified Fugl-Meyer score and modified Barthel index were used before treatment, 2 weeks and 4 weeks after treatment, to assess ipsilateral triceps spasticity, passive ankle dorsal angle, lower limb motor function and activity of daily living of patients in two groups.

Results

There was no significant difference between the two groups before treatment (p > 0.05). There was significant difference after 2 weeks of treatment (p < 0.05). Between groups, the MAS score (2.15 ± 0.56) and PROM (44.37°±8.02) of the treatment group were significantly higher than those of the control group, the difference was statistically significant (p <0.05). While the FMA score (15.66 ± 7.32) and MBI score (37.58±9.04) of the treatment group had no significant difference with control group (p > 0.05), in which FMA score was (14.07 ± 6.55) and MBI score was (35.92 ± 8.50). 4 weeks after treatment, the MAS score, PROM, FMA score and MBI score were (1.41 ± 0.48), (56.92 ± 8.79), (23.48 ± 9.53) and (58.61±12.47) in the treatment group, (2.04 ± 0.51), (45.48 ± 7.86), (19.63 ± 8.24) and (45.39 ± 11.07) in the control group, there was significant difference between the two groups, the difference was statistically significant (p <0.05).

Conclusion

Botulinum toxin type A combined with extracorporeal shock wave can significantly relieve the triceps spasticity, improve the motor function and ability of daily living after stroke.

Keywords

botulinum toxin type A; extracorporeal shock wave therapy ;spasticity
No conflict of interest
Poster Tour

Poster tour: Shock waves therapy

ISPR8-0625

EFFICACY OF FOCUSED EXTRACORPOREAL SHOCKWAVE THERAPY IN PATIENTS WITH CHRONIC PELVIC PAIN SYNDROME – A RANDOMIZED CLINICAL TRIAL

S.M. Rayegani¹, D. Elyaspour¹, S.A. Raeis-sadat¹, F. Allameh², A. Javadi¹

¹Shahid Beheshti University of Medical Sciences, Physical Medicine and Rehabilitation Department and Research Center, Tehran, Iran
²Shahid Beheshti University of Medical Sciences, Department of Urology, Tehran, Iran

Introduction/Background

Chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS) is a nonspecific pelvic pain in the absence of signs of infection or other obvious local pathology for at least 3 of the past 6 months. The evidence for treatment is limited, and the aim of this study is to investigate the effect of extracorporeal shock wave therapy (ESWT) combined with pharmacotherapy in treatment of CP/CPPS.

Material and Method

The study was a randomized clinical trial with 31 patients suffering from CP/CPPS who were investigated in two groups: the intervention group (n=16) were treated with combination of an -blocker, an anti-inflammatory agent, a muscle relaxant and a short course of antibiotic in combination with 4 sessions of focused ESWT (a protocol of 3000 impulses, 0.25 mJ/mm² and 3 Hz of frequency); the control group (n=15) received the fore-mentioned pharmacotherapy and 4 sessions of sham-ESWT with the same protocol but with the probe being turned off. Follow up was performed 4 and 12 weeks following ESWT using Visual Analogue Scale (VAS), International index of Erectile function (IIEF) 5, NIH-Chronic Prostatitis Symptom Index (NIH-CPSI), International Prostate Symptom Score (IPSS) questionnaires. Post void residual (PVR) urine and maximum flow rate ($Q_{max}$) were also assessed in both groups.

Results

The patients mean age was 43.7 ±12.6 years. In both groups, the mean score of NIH-CPSI (total and sub-domains) and VAS showed statistically significant improvement after 4 and 12 weeks compared to the baseline. In the intervention group, IPSS score and $Q_{max}$ were also significantly improved. There was a significant improvement in NIH-CPSI and VAS scores in the intervention group as compared to the control group. $Q_{max}$, PVR and IIEF score were not statistically different between two groups.

Conclusion

ESWT in combination with pharmacotherapy could improve the treatment outcome in patients suffering from CP/CPPS.

Keywords
Chronic Pelvic Pain Syndrome; Extracorporeal Shock Wave Therapy

*No conflict of interest*
Introduction/Background

Plantar Fasciitis (PF) is the most common cause of painful heel. The etiology is multifactorial but usually involves inflammation and degeneration of the plantar fascia origin. Physical therapy interventions such as contrast bath, ultrasonography and iontophoresis help in resolution of symptoms. According to our current knowledge the efficacy paraffin bath therapy (PBT) is ambiguous. This prospective, randomized controlled study aims to compare the efficacy of PBT and extracorporeal shockwave therapy (ESWT in the treatment of plantar fasciitis.

Material and Method

Seventy patients were randomized into either the PBT (12 men, 23 women; mean age 39.12±7.15 years) or ESWT (14 men, 21 women; mean age 38.37±8.87 years) groups. Four patients in PBT group and five patients in ESWT group were lost to follow-up. Groups were similar regarding age, sex, and body mass index (all p>0.05). PBT group had paraffin bath therapy (5 times per week, for 3-week duration) for affected foot while ESWT was applied twice a week for three weeks. As outcome measures patients’ pain and functional status were evaluated with Visual Analog Scale (VAS), Heel Tenderness Index (HTI), Foot and Ankle Outcome Score (FAOS) and ultrasonographic thickness of the plantar fascia recorded. The study parameters were administered at baseline, immediately after treatment and after 12 weeks.

Results

Statistically significant improvement was observed in several studied parameters after the treatment and during the follow-up study in the both groups. The PBT significantly improved the VAS, HTI and FAOS but not in thickness of the plantar fascia. even in the long term.

Conclusion

Both PBT and ESWT treatments improved pain levels and function and quality of life in individuals with plantar fasciitis. But ESWT method was superior according to PBT in treating plantar fasciitis.

Keywords
Heel; Pain; Paraffin

No conflict of interest
Poster Tour

Poster tour: Shock waves therapy

ISPR8-0709
STUDY ON THE CORRELATION BETWEEN THE IMPACT DOSE OF EXTRACORPOREAL SHOCKWAVE AND THE CURATIVE EFFECT ON STAGE IV PRESSURE SORE BASED ON PRESSURE ULCER AREA

H. Duan¹, N. Li¹, Z. Li¹
¹First Hospital of Jilin University, physical medicine and rehabilitation, Changchun, China

Introduction/Background

Basing on the area of pressure ulcer analyses and studies the correlation between the impact dose of extracorporeal shockwave and the curative effect of stage IV pressure ulcer and its safety was studied.

Material and Method

Seventeen patients were randomized into two groups according to the random number table method, including 8 cases in traditional group and 9 cases in modified group. The pressure ulcers in both groups were treated by conventional radical debridement and alginate dressing. The two groups were treated every other day, three times a week, continuous for 12 weeks, at same time the two groups were treated with extracorporeal shockwave. The treatment parameters of traditional group were set at 2.0 ~ 3.0bar, 4 ~ 5Hz, the total number of pulses was (200 ~ 300) + 100 / cm² times, once a week, continuous for 12 weeks. The treatment parameters of the modified group were set at 2.0 ~ 3.0bar, 4 ~ 5Hz, the total number of pulses was 2000 times, once a week, continuous for 12 weeks. The degree of pressure ulcer healing was evaluated before treatment, 6,12 weeks after treatment by PUSH.

Results

After 6 weeks of treatment, the areas of pressure ulcer, exudation, wound tissue and total score in the modified group were better than the traditional group, and the difference was statistically significant (P < 0.05). After 12 weeks, the pressure ulcer area, exudation, wound tissue and total score in the modified group were better than the traditional group, the difference was statistically significant (P < 0.01). After 12 weeks, the healing rate in the modified group was 66.67% , which was significantly better than traditional group which was 25.00%.

Conclusion

Based on pressure sores area to determine the impact of extracorporeal shockwave dose, can significantly improve the curative efficacy of extracorporeal shockwave in the treatment of stage IV pressure ulcers.

Keywords
stage IV pressure ulcer; pressure ulcer area; extracorporeal shock wave

No conflict of interest
Poster Tour

Poster tour: Shock waves therapy

ISPR8-0939
RADICAL EXTRACORPOREAL SHOCK WAVE THERAPY CAN SHORTEN DURATION OF POST-STROKE SIMPLE HEMIPLEGIA ANTERIOR SHOULDER PAIN
H. Ying¹, Y. Weixin²
¹Suzhou Hospital Affiliated to Nanjing Medical University/ Suzhou Municipal Hospi, Department of Rehabilitation Medicine, Suzhou, China
²1st affiliated Hospital of Soochow University, Department of Rehabilitation Medicine, Suzhou, China

Introduction/Background

There has been a controversial outcome for the radical extracorporeal shock wave therapy(rESWT) in the treatment of post-stroke patients with hemiplegia shoulder pain. However, studies indicate the positive effect of rESWT for tendinopathy. Considering there be a comparable pathology between hemiplegia anterior shoulder pain(HaSP) and tendinopathy, our study aimed to investigate the clinical effect of rESWT for the post-stroke HaSP.

Material and Method

A total of 46 chronic stroke inpatients with simple HaSP were randomly divided into active(rESWT) and control groups. Bilateral X-ray, MRI, and Ultrasonography examinations of shoulder were conducted to exclude the pain induced by adhesive capsule, complex regional pain syndrome, degenerative joint disease, ect. Physical examination showed shoulder anterior region localized tenderness, and imaging exhibited inflammations and injuries of shoulder anterior region, i.e. coracoid, humeral lesser tuberosity, and long head of biceps tendon. The correct position and pendulum exercise of the affected extremity were taken as the routine therapy for two groups. rESWT treatment were administrated to the active group(n=23) once a week for 4 visits. Pain assessment(visual analogue scale, VAS) and passive range of motion(PROM) of shoulder flexion were all assessed before the first treatment, the next day
after each treatment, 4 weeks after the completion of 4 treatments.

**Results**

rESWT group has a significant improvement compared to the control group at the first day after the treatment (P<0.01), but the effect is decreasing. There is no significant difference of the improvement between two groups after the four times of the treatments completion. (p>0.05).
rESWT can reduce the pain severity of post-stroke HaSP and improve the shoulder function. Compared with the control group, the duration of the post-stroke HaSP can be shortened by rESWT.
Keywords

hemiplegic shoulder pain; Radical Extracorporeal Shock Wave

No conflict of interest
Poster Tour

Poster tour: Shock waves therapy

ISPR8-1187
RADIAL EXTRACORPOREAL SHOCK WAVE THERAPY FOR ADHESIVE CAPSULITIS OF THE SHOULDER: A PROSPECTIVE, RANDOMIZED, PLACEBO CONTROLLED, DOUBLE BLIND STUDY WITH SUBJECTIVE AND OBJECTIVE ENDPOINTS
A. Hussein1, C. Schmitz2, M. Ibrahim3
1Pharos University, Faculty of Physical Therapy, Alexandria, Egypt
2Ludwig-Maximilians-University of Munich, Chair of Neuroanatomy- Institute of Anatomy, Munich, Germany
3Health Check Medical Center, Physical and Rehabilitation Medicine, Brooklyn- NY, USA

Introduction/Background

This study tested the hypothesis that radial extracorporeal shock wave therapy (rESWT) is effective and safe in the treatment of adhesive capsulitis of the shoulder (adC-S).

Material and Method

One hundred and six patients (mean age, 55.8 years; range, 39-77) with pain and limitations in shoulder mobility due to adC-S lasting for averaged 11.6 months (range, 9-14) were randomly allocated to either rESWT (n= 53) (four sessions, one session per week, Swiss DolorClast [Electro Medical Systems S.A., Nyon, Switzerland], radial handpiece, 15-mm applicator, 2000 rESWT impulses per session, positive energy flux density 0.14 mJ/mm2, rESWT impulses applied at 8 Hz) or placebo Treatment (n=53). Patients completed the Visual Analog Scale (VAS) and the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire at baseline (BL) as well as at one month (M1), six months (M6) and twelve months (M12) after baseline. Moreover, passive and active abduction of the arm (pA and aA) as well as passive external rotation of the shoulder (pER) were measured at BL, M1, M6 and M12.

Results

All patients completed the final review at M12 and were included in the study. Mean pretreatment VAS scores, DASH scores and pA, aA and pER measurements for the rESWT and control groups were 6.3 and 6.3 (VAS), 73.5 and 72.5 (DASH), 98.2 and 99.3 degrees (pA), 65.8 and 68.8 degrees (aA), and 20.3 and 22.0 degrees (pER), respectively. Compared to placebo treatment rESWT resulted in statistically significantly reduced VAS score (by averaged 3.5 points) and statistically significantly improved DASH score (53.8 points), pA (63.9 degrees), aA (79.1 degrees) and pER (43.3 degrees) at all follow-up examinations.

Conclusion

rESWT as performed in the present study is an effective and safe treatment for adhesive capsulitis of the shoulder.

Keywords
Conflict of interest
Disclosure statement:
AH and MI declare that no competing financial interests exist. CS served (until December 2017) as a paid consultant for and received benefits from Electro Medical Systems (Nyon, Switzerland), the distributor of the Swiss DolorClast extracorporeal shock wave device. However, Electro Medical Systems had no any role in study design, data collection and analysis, decision to publish, or preparation of this abstract. No other potential conflicts of interest relevant to this article were reported.
Poster Tour

Poster tour: Shock waves therapy

**ISPR8-2339**

EXTRACORPOREAL SHOCKWAVE THERAPY FOR PAIN REDUCTION OF MUSCULOSKELETAL DISEASES: PREDICTORS AND RESPONDERS

A.T. Sugawara¹, M.D.C. Lima¹, C.B. Dias², M.S.C. Oliveira¹

¹Hospital do Servidor Público Estadual de São Paulo,
Physical and Rehabilitation Medicine Service, São Paulo, Brazil
²Hospital do Servidor Público Estadual de São Paulo, Clínica Médica, São Paulo, Brazil

Introduction/Background

Musculoskeletal disorders are a continuous challenge for the search for practical and viable treatment solutions that generate analgesia and well-being.

**Objectives**: To discover the predictors of the outcome of radial extracorporeal shockwave therapy (rESWT) on pain reduction of patients with musculoskeletal diseases and to identify the best responders of this therapy. **Design**: Short-term retrospective before-after trial. **Material and Method**

**Setting**: Outpatient facility of a Physical Medicine and Rehabilitation Service. **Participants**: 900 medical records of patients with musculoskeletal disorders (rotator cuff syndrome, De Quervain syndrome, trigger finger, lateral epicondylitis, pseudarthrosis, trochanteric bursitis, anserine syndrome, knee osteochondritis dissecans, patellofemoral syndrome, plantar fasciitis, Achilles tendinitis) who undertook rESWT for pain reduction. Patients younger than 18 years of age, with ongoing treatment at the time of the medical record selection, with other associated diseases, and whose information was unclear or incomplete in the medical records were not included. **Intervention**: Radial extracorporeal shockwave therapy, applied once a week for two weeks. **Main outcome measure**: Pain, assessed before and one week after the end of the intervention is the main outcome and was measured by Visual Analogue Scale (VAS). The participants' pathology, demographic data and pain at baseline were approached via multiple regression for the predictors and odds ratio for the responders.

**Results**

Pain was reduced in 63.4% (VAS = 2.90, CI95% 2.72-3.08). Higher levels of pain at baseline, higher frequencies of rESWT application, and knee diseases were the predictors of the treatment outcome ($\beta=-0.21$, $p<0.001$, $\beta=-0.88$, $p<0.001$, and $\beta=1.10$, $p=0.001$, respectively). Patients with shoulder diseases were the best responders to the rESWT (OR=1.91, CI95% 1.21 – 3.02).

**Conclusion**

There is strong evidence that rESWT is effective for reducing pain of patients with severe pain treated with higher application frequencies. Patients with knee diseases tend benefit less from rESWT, whereas those with shoulder diseases are the best responders this treatment.
Keywords

High-energy shock waves;therapeutics;musculoskeletal diseases

No conflict of interest
Poster Tour

Poster tour: Shock waves therapy

ISPR8-2425

EXTRACORPOREAL SHOCK WAVE THERAPY VERSUS LOW-LEVEL LASER THERAPY IN THE MANAGEMENT OF CHRONIC PLANTAR FASCIITIS

G.G. Elsehrawy¹, S.I. Nasef¹, M. S. Ibrahim², A. S Omar¹

¹Suez Canal University, physical medicine- rheumatology and rehabilitation, Ismaila, Egypt
²Suez Canal University, radiology, Ismaila, Egypt

Introduction/Background

Plantar heel pain is one of the most common pathologies of the foot, accounting for up to 15% of foot-related symptoms presenting to physicians. Plantar fasciitis is thought to be caused by biomechanical overuse from prolonged standing or running, thus creating microtears at the calcaneal enthesis. Some experts have deemed this condition “plantar fasciosis” implying that its etiology is a more chronic degenerative process versus acute inflammation.

Material and Method

Objective: to compare and evaluate the effectiveness of extracorporeal shock wave therapy and low-level laser therapy using diagnostic ultrasound in the Management of Chronic Plantar Fasciitis

Methods: a prospective, comparative clinical study was conducted. A total of 46 patients with a diagnosis of plantar fasciitis were divided randomly into 2 treatment groups: group 1 underwent 2 sessions of extracorporeal shock wave therapy (2050 shocks, 2.5bars) and group 2 underwent 6 sessions of low-level laser therapy (27 J/cm²; 830 nm). All patients were assessed using the visual analog scale, foot function index and ultrasound before and 1 month after treatment.

Results

Results: Significant improvement was measured using the mean visual analog scale, foot function index, thickness of the plantar fascia and echogenicity on ultrasound for both groups. Low-level laser therapy proved significantly superior to extracorporeal shock wave therapy in pain relief (p = 0.029), but no significant difference between both groups in foot function index improvement (p = 0.264). No statistical significant difference between both groups regarding improvement in US findings (p >0.05).

Conclusion

Conclusion: The treatment of plantar fasciitis with low-level laser therapy and extracorporeal shock wave therapy resulted in similar outcomes in pain improvement, functional outcomes and ultrasound findings. However, low-level laser therapy showed better response than extracorporeal shock wave therapy regarding pain improvement by visual analog scale.
Keywords

plantar fasciitis; extra corporeal shock wave; low level laser therapy

No conflict of interest
Poster Tour

Poster tour: Stroke: General

ISPR8-2594
INTER-HEMISPHERIC RIVALRY VERSUS COMPLETION: LESSONS FROM LINE BISECTION PERFORMANCE WITH THE RIGHT AND LEFT HANDS FOLLOWING CALLOSAL SECTION
C. serfaty¹, N. Soroker¹
¹Loewenstein Hospital - Rehabilitation Center, Neurological Rehabilitation, Raanana, Israel

Introduction/Background

Background and Aim: Unilateral hemispheric stroke disrupts the inter-hemispheric balance which is normally maintained by reciprocal inhibitory influences exerted by each hemisphere on the other. This leads to a state where the damaged hemisphere loses its capacity to support function, beyond the direct outcome of focal tissue loss, due to widespread physiological suppression by the overactive healthy hemisphere. This line of theorizing dominates the practice of tDCS and rTMS application in stroke rehabilitation, where reversal of the pathological balance is aimed using excitatory stimulation of the damaged hemisphere and/or inhibitory stimulation of the healthy hemisphere. We present here an examination of the ‘reciprocal inhibition’ concept in a patient with callosal section.

Material and Method

Method: GH (M/35) suffered from idiopathic epilepsy with major convulsions almost every day, despite intensive efforts to control disease activity pharmacologically. He was admitted for rehabilitation after a complete surgical section of the forebrain commissures, leaving him with marked apraxia and tactile anomia in the left hand, and with manifestations resembling left neglect dyslexia. Given the disconnection of each hemisphere from the other, performance of diagnostic tests for spatial neglect, by each hand, is assumed to reflect the net effect of the contralateral hemisphere, in the absence of inhibitory influences exerted by the ipsilateral hemisphere.

Results

Results: In representational-drawing and figure-copying tasks executed by the dominant right hand, GH manifested classical left-side neglect. Each of the two disconnected hemispheres demonstrated ipsilateral inattention in manual cancellation and line bisection tasks. Displacement of the subjective midpoint in line-bisection performance was greater in right-hand (left-hemisphere) performance.

Conclusion

Conclusion: As the post-operative MRI disclosed no extra-callosal damage, the left neglect pattern shown by the isolated left-hemisphere (right-hand) points to an important role of “completion” rather than “rivalry” in inter-hemispheric relationships, raising questions with regard to current practices of non-invasive brain stimulation in stroke rehabilitation.
Keywords

neglect;recovery;callosotomy

No conflict of interest
Introduction/Background

Only a few studies have investigated the occurrence and the determinants of falls after stroke based on variables assessed during the acute phase. In the effort to prevent falls after stroke, however, it is valuable to already during hospitalisation be able to predict the risk of falling after discharge. This study aimed to investigate the incidence and the determinants of self-reported falls the first year after discharge from a stroke unit after acute stroke.

Material and Method

In this prospective, longitudinal and observational sub study, a one-year follow up of the recently published FallsGOT, the primary endpoint was any fall during the first year after discharge from a stroke unit. Within four days after admission to a stroke unit, assessments of baseline variables were performed. At twelve months after discharge, data collection of self-reported falls was conducted using a standardized questionnaire. Of the consecutive sample of 504 patients with acute stroke, 435 individuals were eligible for follow-up at twelve months, of which 348 (80%) answered the questionnaire.

Results

Of the respondents, 140 (40%) experienced at least one fall during the first year after discharge from the stroke unit. In the multivariable analysis, impaired postural control as assessed with the Swedish modified version of Postural Assessment Scale for Stroke Patients (SwePASS) OR 3.90 (95% CI 2.06-7.41, p<0.0001) and use of a walking aid OR 2.91 (95% CI 1.75-4.83, p<0.0001) were statistically significantly associated with falling.

Conclusion

Postural control and use of a walking aid acute after stroke in a stroke unit predicted falls during the first year after discharge from a stroke unit.

Keywords
Accidental fall; Postural balance; Stroke

No conflict of interest
A PILOT STUDY ON THE IMMEDIATE AND LONG-TERM EFFECTS OF HYBRID THERAPY OF COMPUTER-BASED COGNITIVE TRAINING AND AEROBIC EXERCISE IN STROKE PATIENTS WITH COGNITIVE DECLINE

C.Y. Wu¹, T.T. Yeh², K.C. Chang³

¹Chang Gung University, Department of Occupational Therapy & Graduate Institute of Behavioral Sciences, Taoyuan City, Taiwan R.O.C.
²Chang Gung University, Department of Occupational Therapy and Graduate Institute of Behavioral Sciences, Taoyuan City, Taiwan R.O.C.
³Chang Gung Memorial Hospital, Department of Neurology, Kaohsiung city, Taiwan R.O.C.

Introduction/Background

While the salient physical disability after stroke has long been emphasized, post-stroke cognitive decline hindering motor and functional recovery is often ignored. This study evaluated the immediate and long-term effects of hybrid therapies of computer-based cognitive training and aerobic exercise in stroke patients with cognitive decline.

Material and Method

Stroke survivors with cognitive decline were separated into sequential (SEQ) and control groups (CON). Participants in the SEQ group (N=15) received 30-minute aerobic exercise followed by 30-minute computerized cognitive training; participants in the CON group (N=12) received 30-minute non-aerobic exercise (e.g., stretching and muscle strengthening) and 30-minute unstructured cognitive training (e.g., reading newspapers and playing board games). All participants received trainings for three days per week for 12 weeks. The cognitive function outcomes included Montreal Cognitive Assessment (MoCA) and Verbal Paired Associates and Word Lists subtests from the Wechsler Memory Scale-III (WMS-III). Health-related quality of life was measured by EQ5D. Outcome measures were administered at baseline, immediately after training (3rd month), and at 6-month follow-up (9th month).

Results

Preliminary results showed that the SEQ group showed greater improvement in MoCA, WMS-Verbal Pair and Word Lists at post-training than the CON group, but not the EQ5D. These effects remained or had less decrements 6 months post-training compared to the CON group.

Conclusion

Hybrid therapy of computer-based cognitive training and aerobic exercise training is favored to facilitate cognitive function in stroke survivors with cognitive decline. Our study demonstrates the potential benefit of this hybrid approach for long-term enhancement of cognition following stroke.
Keywords

Stroke; Cognitive decline; computer-based cognitive and aerobic exercise training

No conflict of interest
Introduction/Background

Exowalk is an exoskeletal walk-robotic device designed for over-ground walking exercise. It is developed for any patients with gait difficulty to do gait training by providing a proper walking pattern. Electromechanical-assisted gait training is known to be effective for acute and sub acute stroke patients by many meta-analysis. This study was conducted to assess the effects of electromechanical-assisted gait training with Exowalk on gait ability of chronic patients who had suffered from stroke at least for 3 months. We measure the leg muscle power, balance and gait velocity and capacity its effectiveness.

Material and Method

Design: Randomized controlled trial.

Setting: University rehabilitation hospital

Participants: Individuals with stroke who could stand alone with onset > 3month.Interventions: Participants were randomly assigned into two groups: the experimental group (n=20) by robot assisted gait training and the control group (n=21) by physical therapist assisted gait training and receive gait training sessions(30 minutes a day, 5 days a week) with Exowalk (experimental group) or with physical therapist (control group) for 4 weeks.

Main Outcome Measures: Functional ambulatory category (FAC) before and after gait training. Change of FAC was the primary outcome to evaluate the efficacy of robot assisted gait training. Changes of mobility, walking speed, walking capacity, daily activity and balance were secondary outcomes.

Results
Table 1. The changes of outcome measures between pre and post-training (0-2wk)

<table>
<thead>
<tr>
<th></th>
<th>Control Group (n=21)</th>
<th>Experimental group (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>FAC</td>
<td>3.71±1.41</td>
<td>4.05±1.35*</td>
</tr>
<tr>
<td>RMI</td>
<td>8.65±3.32</td>
<td>9.15±3.24*</td>
</tr>
<tr>
<td>10MWT</td>
<td>.34±.27</td>
<td>.38±.33</td>
</tr>
<tr>
<td>6MWT</td>
<td>107.45±88.20</td>
<td>127.84±93.05*</td>
</tr>
<tr>
<td>MI</td>
<td>53.00±16.04</td>
<td>55.29±18.22</td>
</tr>
<tr>
<td>BBS</td>
<td>33.81±14.65</td>
<td>35.86±14.57*</td>
</tr>
<tr>
<td>K-MBI</td>
<td>75.10±15.80</td>
<td>74.62±21.80</td>
</tr>
<tr>
<td>Proprioception</td>
<td>16.24±11.07</td>
<td>15.29±11.95</td>
</tr>
<tr>
<td>BIODEX(PEAK TQ/BW)</td>
<td>42.65±21.97</td>
<td>44.66±26.98</td>
</tr>
<tr>
<td>BIODEX(DEFECT)</td>
<td>49.72±24.53</td>
<td>39.09±46.49</td>
</tr>
<tr>
<td>BIODEX (AGON/AOGA RATIO)</td>
<td>51.81±37.05</td>
<td>40.51±26.98</td>
</tr>
<tr>
<td>Dynamic Balance</td>
<td>1.28±2.38</td>
<td>1.07±1.90*</td>
</tr>
</tbody>
</table>

Table 2. The changes of outcome measures between pre and post-training (0-2-4wk) in experimental group

<table>
<thead>
<tr>
<th></th>
<th>Experimental group (n=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
</tr>
<tr>
<td>FAC</td>
<td>3.50±1.55</td>
</tr>
<tr>
<td>RMI</td>
<td>7.79±4.80</td>
</tr>
<tr>
<td>10MWT</td>
<td>0.42±0.30</td>
</tr>
<tr>
<td>6MWT</td>
<td>117.71±101.26</td>
</tr>
<tr>
<td>MI</td>
<td>51.86±24.58</td>
</tr>
<tr>
<td>BBS</td>
<td>31.50±21.97</td>
</tr>
<tr>
<td>MBI</td>
<td>64.71±26.89</td>
</tr>
<tr>
<td>Proprioception</td>
<td>14.00±9.60</td>
</tr>
<tr>
<td>BIODEX(PEAK TQ/BW)</td>
<td>44.33±30.23</td>
</tr>
<tr>
<td>BIODEX(DEFECT)</td>
<td>54.91±23.37</td>
</tr>
<tr>
<td>BIODEX (AGON/AOGA RATIO)</td>
<td>64.02±98.52</td>
</tr>
<tr>
<td>Dynamic Balance</td>
<td>3.32±3.04</td>
</tr>
</tbody>
</table>

*P=0.05 between pre and post-training outcome measures

Figure 1. FAC
Figure 2. RMI
Figure 3. 10MWT
Figure 4. 6MWT
Figure 5 MI
Figure 6. BBS
Figure 7. MBI
Figure 8. Proprioception

Conclusion
No significant difference in baseline (p>0.05) Between pre and post-training of 0-2 weeks, the changes of outcome measures such as FAC, 6MWT, 10MWT, BBS, MBI in the experimental group were statistically significant. (P <.05) Linear improvement showed in FAC, 10MWT, 6MWT,MI and BBS (0-2-4 weeks) We try to analyzed the difference of two group 0-2-4 week. But the small number of patients to achieve 4 weeks (n=14) and it did not reach statistical significance. To verify comparison the improvement of two group 0-2-4 week, more number of patients is needed.

**Keywords**

exoskeleton device; gait; stroke

*No conflict of interest*
Poster Tour

Poster tour: Stroke: General

ISPR8-1207

USING FUNCTIONAL NEAR-INFRARED SPECTROSCOPY (FNIRS) IN THE ASSESSMENT OF COGNITIVE-MOTOR INTERFERENCE IN POST-STROKE PATIENTS

B. Tapie1,2, A. Perrochon2, M. Compagnat1,2, F. Dalmay3, O. Dupuy4, J.Y. Salle1,2, J.C. Daviet1,2

1 CHU de Limoges, Physical and rehabilitation medicine, Limoges, France
2 HAVAE, Limoges university, Limoges, France
3 UMR-S, Limoges university, Limoges, France
4 MOVE, Poitiers university, Poitiers, France

Introduction/Background

Pre-Frontal Cortex (PFC) activity during dual-task (DT) condition in stroke patients remains unclear. Functional near-infrared spectroscopy (fNIRS) is a functional neuroimaging technique for studying cortical activity. The purpose of this study was to evaluate the hemodynamic activity of the PFC in two DT conditions in post-stroke patients.

Material and Method

Stroke patients were instructed to perform a cognitive task (n-back test) while continuously walking. They were evaluated in DT low (n-1 back) and high (n-2 back) cognitive load. fNIRS recorded bilateral PFC activity and GAITRite measured gait parameters in these two DT conditions. Cognitive performance was evaluated by the number of answers, the number of correct answers and the error percentage. The main endpoint was the DT cost, and we compared the change in oxygenated hemoglobin (an indicator of the changes in PFC activation) between the DT high and DT low.

Results

Eleven stroke patients (8 men and 3 women; mean age, 64.2±19.5 years; range, 28-87 years) were included in the study. The DT cost was higher in DT n-2 (82.1%±15.6) compared with DT n-1 (61.2±38.6), p=0.007. There was no decline of spatiotemporal gait parameters with the increasing of cognitive load (p>0.05) and no difference for the number of answers in DT high versus low cognitive load (p>0.05). The number of correct answers was lower during DT high (3±2.4) versus DT low (7.8±3.6), p=0.0015 ; and the error percentage was higher during DT high (62.3±23.2) versus low condition (24.4±12.9), p=0.0001.

Conclusion

There was a greater increase bilateral PFC activity during DT high versus DT low. The increasing DT cost allowed to maintain spatiotemporal gait parameters in DT high and led to a degradation of the cognitive performance. During DT, PFC activation might prioritize gait performances in stroke patients when the cognitive load is high.

Keywords
cognitive motor interference; dual task; fNIRS

No conflict of interest
Introduction/Background

Stroke is the most common cause for physical disability and impairments to lower limb function remain one of its most debilitating symptom. Motor imagery (MI), as a safe, self-paced technique, has been shown to effectively facilitating the effects of motor practice. When combined with brain-computer interface (MI-BCI), it also demonstrates an improvement in stroke motor recovery. A feasibility trial was carried out to investigate the effect of MI-BCI neurofeedback in chronic hemiplegic lower limb rehabilitation. The neurophysiological correlates to clinical outcomes was also studied by using, transcranial magnetic stimulation (TMS).

Material and Method

Subjects (n=13) with more than 9 months post-stroke and Functional Ambulation Category 3-4 underwent 12 sessions of MI-BCI gait training, at a frequency of thrice a week. Subjects were instructed to perform a MI task whereby they imagined themselves walking properly with both legs. If the MI task is performed correctly as detected via electroencephalography acquisition, a pair of cartoon foot prints in the monitor will be activated to walk forward. Each MI-BCI session includes 160 MI trials with resting interval every 40 trials. Timed up-to-go test and 10 meter walk test, as well as the resting motor threshold measured by TMS were performed before, after and 6 weeks after MI-BCI gait training.

Results

It was shown that MI-BCI was safe and well tolerated by stroke subjects. Both walking speed and balance improved after MI-BCI gait training (Figure 1). This was in line with an increase in the corticospinal activity in the contralesional M1 motor cortex (Figure
Conclusion

MI-BCI could improve mobility in chronic stroke patients with residual mobility impairment. The study also suggested that the contralesional motor cortex is involved in the recovery of mobility.

Keywords

Stroke; Brain computer interface

No conflict of interest
Poster Tour

Poster tour: Stroke: General

ISPR8-1599

ASSESSMENT OF THE RELATIONSHIP BETWEEN OBSERVATIONAL WISCONSIN GAIT SCALE AND GAIT INDEXES SUCH AS GAIT DEVIATION INDEX AND GAIT VARIABILITY INDEX IN INDIVIDUALS AFTER STROKE

A. Guzik¹, M. Drużbicki¹, A. Wolan-Nieroda¹, P. Kiper², G. Przysada¹, K. Bazarnik-Mucha¹, M. Szczepanik¹, A. Kwolek¹

¹Institute of Physiotherapy, University of Rzeszow, Rzeszów, Poland
²Laboratory of Kinematics and Robotics, IRCCS San Camillo Hospital Foundation, Venice, Italy

Introduction/Background

There are no studies evaluating compatibility of visual gait assessment scales and Gait Deviation Index (GDI), Gait Variability Index (GVI) in individuals after stroke. The study was designed to compare results of the observational Wisconsin Gait Scale (WGS) and the global gait indexes such as GDI and GVI, constituting an objective method of assessing gait. The objective was to answer the question whether simple, inexpensive, easy to use, observational WGS may be an effective alternative for costly equipment-based analyses in assessing gait after stroke.

Material and Method

The study group comprised 50 participants who had experienced a stroke and were in a chronic phase of recovery, as well as 50 healthy individuals, without gait disorders. The subjects' gait was evaluated using the WGS, and the GDI and GVI values were acquired using a 3-dimensional gait analysis system. GDI was calculated based on kinematic parameters, while GVI was computed from spatiotemporal parameters.

Results

The study has shown statistically significant correlations between the parameters of GDI affected leg and WGS total score (R=-0.87), GVI affected leg and WGS total score (R=-0.93), GVI unaffected leg and WGS total score (R=-0.88), GVI affected/unaffected leg and the total score in the assessment of spatiotemporal parameters on the WGS (R=-0.81) as well as GDI affected leg and the total score in the assessment of kinematic parameters on the WGS (R=-0.85). All correlations were strong (0.7≤|R|<0.9) or very strong (0.9≤|R|<1).

Conclusion

There is a strong or very strong correlation of the GDI and GVI to the WGS scores. WGS is an excellent tool enabling qualitative assessment of gait abnormalities in individuals after a stroke, and providing results which correspond with the objective assessment of spatiotemporal and kinematic gait parameters, i.e. by means of global gait indexes. WGS should be applied in daily clinical practice.
Keywords

stroke;gait indexes ;Wisconsin Gait Scale

No conflict of interest
Introduction/Background

Music-supported Therapy (MST) has been developed as a tool in neurorehabilitation to restore hemiparesis of the upper extremity after a stroke based on the ability of music training to promote brain plasticity. However, the effects of MST have not been appropriately contrasted with conventional therapy. The aim of this trial was to test the effectiveness of adding MST to a standard rehabilitation program in subacute stroke patients.

Material and Method

A two-arm, parallel-group controlled trial was conducted where 40 patients in the first 6 months from the stroke onset were randomly allocated to conventional treatment (CT-group, n=20) or MST treatment (MST-group, n=20) in addition to the rehabilitation program. Before and after 4 weeks of treatment, patients were evaluated on four domains: motor functions, cognitive functions, mood and quality of life, and brain plasticity assessed with functional Magnetic Resonance Imaging (fMRI). A follow-up at 3 months was conducted to examine the evolution of the motor gains.

Results

Both groups significantly improved their motor function, and no differences between groups were found. The only difference between groups was observed in the language domain for quality of life. Importantly, an association was encountered between the capacity to experience pleasure from music activities and the motor improvement in the MST-group. A pattern of intrahemispheric reorganization in motor-related areas was observed in both groups, being more prominent in the MST-group.

Conclusion
MST as an add-on treatment showed no superiority to conventional therapies for motor recovery with a similar pattern of plastic changes. Importantly, patient's intrinsic motivation to engage in musical activities was associated to better motor improvement.

**Trial Registration**: NCT02208219

**Keywords**

Stroke; Music Therapy; Randomized Controlled Trial

*No conflict of interest*
EFFECTS OF VIRTUAL REALITY WITH ROBOT TRAINING ON THE GAIT OF SUBACUTE STROKE PATIENTS

Y. Mao¹, X. Wei², P. Chen³, L. Li¹, L. Chen¹, Z. Xu¹, D. Huang¹
¹The First Affiliated Hospital of Sun Yat-sen University, Rehabilitation Medicine, Guangzhou, China
²Sun Yat-sen University, Rehabilitation Therapy, Guangzhou, China
³The Hong Kong Polytechnic University, Rehabilitation Sciences, Hong Kong, Hong Kong S.A.R.

Introduction/Background

Ambulation is always one of the most significant issues for post-stroke patients as well as a formidable challenge. There was few study, to our best knowledge, focusing on the kinetic and kinematic changes resulting from training using robotic devices with virtual reality(VR) for subacute stroke patients. Thus, we analyzed the gait parameters of these patients at 1 week and 3 weeks after they suffered the disease.

Material and Method

20 patients were included in this single blind randomized control study. Patients were randomized to either a VR with robot group(n=10) or non-VR group(n=10). The training was performed on a robotic gait-training system with situational interaction. Subjects in VR group were trained 5 times a week for two weeks for approximately 30 minutes every time. Others were trained by traditional therapies.

Results

After the two-week training, the step time of patients in VR group significantly decreased(from 0.88±0.29 to 0.77±0.16), while the stride length average(from 0.72±0.26 to 0.81±0.25), step length average(from 0.36±0.12 to 0.42±0.10) and walking speed average(from 0.49±0.25 to 0.59±0.23) significantly increased(p<0.05). Subjects in VR group demonstrated an obviously larger improvement in the maximum hip moment and minimum ankle moment(p=0.028 and p=0.040 respectively) compared with those in non-VR group.

Conclusion

VR training with robot system could also be applied, as traditional therapy, in rehabilitation process of subacute stroke patients, especially in the improvement of step length and walking speed.

Keywords

Stroke; Virtual Reality; Gait
No conflict of interest
Clinical evidence suggests that early mobilization of patients with acute stroke improves activity of daily living (ADL). The purpose of this study was to compare the utility of the physiatrist and registered therapist operating acute rehabilitation (PROr) applied early or late after acute stroke.

**Material and Method**

This study was prospective cohort study, assessment design. Patients with acute stroke (n=227) admitted between June 2014 and April 2015 were divided into three groups based on the time of start of PROr: within 24 hours (VEM, n = 47), 24±48 hours (EM, n = 77), and more than 48 hours (OM, n = 103) from stroke onset. All groups were assessed for the number of deaths during hospitalization, and changes in the Glasgow Coma Scale (GCS), National Institute of Health Stroke Scale (NIHSS), and Functional Independence Measure (FIM) at hospital discharge. All patients were assessed by physiatrists, who evaluated the specific needs for rehabilitation, and then referred them to registered physical therapists and occupational therapists to provide early mobilization (longer than one hour per day per patient).

**Results**

The number of deaths encountered during the PROr period was 13 (out of 227, 5.7%), including 2 (4.3%) in the VEM group. GCS improved significantly during the hospital stay in all three groups, but the improvement on discharge was significantly better in the VEM group compared with the EM and OM groups. FIM improved significantly in the three groups, and the gains in total FIM and motor subscale were significantly greater in the VEM than the other groups.

**Conclusion**

PROr seems safe and beneficial rehabilitation to improve ADL in patients with acute stroke.

**Keywords**

Very early mobilization; Acute stroke; Functional Independence Measure
No conflict of interest
Poster Tour

Poster tour: Stroke: Upper limb

ISPR8-2576
WITHIN-SESSION EFFECTS OF SELECTED PHYSICAL REHABILITATION INTERVENTIONS FOR A DYSFUNCTIONAL ARM POST-STROKE ON ARM MOVEMENT AND MUSCLE FIRING PATTERNS
R. Lazaro
¹California State University Sacramento, Physical Therapy, Sacramento, USA

Introduction/Background

Upper extremity (UE) impairments and activity limitations are a common problem in individuals following a cerebrovascular accident (CVA). Eighty-five percent of individuals with CVA report UE functional limitations that are associated with decreased health-related quality of life. Occupational therapy (OT) and physical therapy (PT) approaches are typically aimed to treat impairments, activity limitations, and participation restrictions following a CVA. This study examines the effects of five therapeutic approaches on upper extremity (UE) movement and muscle activation patterns in persons with CVAs: (1) Proprioceptive Neuromuscular Facilitation (PNF); (2) Neurodevelopmental Treatment (NDT); (3) Functional Electrical Stimulation (FES); (4) Weight-bearing and (5) modified Constraint-Induced Movement Therapy (mCIMT).

Material and Method

This is a case report involving a 61-year-old male who underwent 30-minute intervention sessions for each approach stated above. Electromyography (EMG) and 3D motion capture data were collected pre and post intervention and at 30 minute follow-up. Data were analyzed for reaching a cup at waist level, maximum shoulder flexion, and moving cup to mouth as in drinking.

Results

No significant differences were seen for UE movements across all interventions for kinematic or EMG data. There appears to be a trend towards normal elbow movement following NMES, mCIMT and PNF and increased variability in shoulder flexion in mCIMT and NDT interventions. Weight bearing provided the least amount of evidence for improved kinematic motion. Improvement in elbow kinematics may indicate proximal stability following PNF, FES, and mCIMT allows for increased distal mobility at the elbow.

Conclusion

Some interventions produced trends that indicate better UE movement. Increased proximal stability may have caused better distal mobility as shown by improved elbow movement. Increased variability of shoulder flexion may indicate the participant learned different options to perform the same movement. Further research is needed to provide a more transparent understanding of the efficacy of interventions for individuals with hemiparesis following a CVA.
Keywords

stroke;paresis;rehabilitation

No conflict of interest
Poster Tour

Poster tour: Stroke: Upper limb

ISPR8-0460
THE EFFECT OF CORE STABILIZATION TRAINING COMBINED WITH VIRTUAL REALITY FOR TREATMENT OF THE UPPER LIMB FUNCTION IN STROKE
Z. Ming

1Xuzhou Central Hospital, Department of Rehabilitation Medicine, Jiangsu, China

Introduction/Background

To study the therapeutic effect of core stabilization training combined with virtual reality for treatment of the upper limb function in stroke.

Material and Method

Forty-six patients for hospitalization and outpatient treatment after stroke were randomly divided into a control and an experimental group. The two groups are all treated with physical therapy, Occupational therapy, physical agents therapy and virtual reality, and core stabilization training are adopted in the experimental group. After four weeks of treatment, range of motion (ROM), Fugl-Meyer Assessment Upper Extremity (FMA-UE), Fugl-Meyer Assessment balance subscale (FMA-B) and Modified Barthel Index (MBI) used for evaluation and comparison before and after treatment.

Results

Before treatment, the ROM, FMA-UE, FMA-B and MBI scores in the two groups had no statistical significance (P>0.05). But after four weeks of treatment, the two groups had a significant improvement in the four scores (P<0.05). What is more, patients in the experimental group improved significantly more than those in the control group. The difference between the two groups is statistically significant (P<0.05).

Conclusion

The core stabilization training combined with virtual reality can improve the upper limb activity range and balance function after stroke. At the same time it can obviously improve patients' upper extremity motor function and quality of life.

Keywords

stroke; core stabilization training; virtual reality

No conflict of interest
Poster Tour

Poster tour: Stroke: Upper limb

ISPR8-2703
COMPARING EFFECTS OF CONSTRAINT-INDUCED MOVEMENT THERAPY AND ROBOTIC THERAPY: RANDOMIZED CLINICAL TRIAL
T. Terranova¹, M. Simis¹, A. Santos¹, M. Imamura¹, F. Alfieri¹, F. Fregni², L. Battistella¹
¹University of Sao Paulo, Physical Medicine and Rehabilitation, Sao Paulo, Brazil
²Harvard Medical School, Physical Medicine and Rehabilitation, Boston, USA

Introduction/Background

Stroke is the one of the main causes of adult disability and up to 80% of the stroke survivors will develop upper extremity motor dysfunction. Currently, Constraint-Induced Movement Therapy (CIMT) and Robotic Therapy (RT) have high level of evidence for upper limb dysfunction treatment. However, to the best of our knowledge, there have been no studies comparing CIMT and RT on functionality and motor recovery of upper limb in stroke patients. Therefore, this study aims to compare RT and CIMT and understand their effects of on upper limb motor recovery and functionality of chronic stroke patients.

Material and Method

This is a parallel, single blinded, randomized (1:1) clinical trial. From May 2012 to May 2015, 51 patients, who fulfilled the eligibility criteria, were enrolled into one of treatment groups – CIMT or RT. The outcomes of upper limb function were measured by Wolf Motor Function Test (WMFT), Fugl-Meyer Assessment – Upper Limb (FMA-UL), Arm motor Ability Test (AMAT), Modified Ashworth Scale (MAS), Functional Independence Measure (FIM) and Stroke Impact Scale (SIS).

Results

Our results showed that both treatments are equally beneficial to chronic stroke patients, with no statistical difference between the groups for primary or secondary outcomes. From baseline, the mean improvement, standard deviation and p value are described in table 1. Additionally, patients kept the gains along the follow up visits, 3 and 12 months after treatment.

<table>
<thead>
<tr>
<th>Scale</th>
<th>CIMT Mean and SD</th>
<th>RT Mean and SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMFT</td>
<td>-0.19 (0.41)</td>
<td>-0.13 (0.27)</td>
<td>0.43</td>
</tr>
<tr>
<td>FMA-UL</td>
<td>4.55 (4.98)</td>
<td>2.72 (6.06)</td>
<td>0.19</td>
</tr>
</tbody>
</table>

Conclusion

CIMT and RT could be equally effective in improve upper limb function, motor recovery, functionality and quality of life in chronic stroke patients, even when compared 12 months after the end of treatment.
Keywords

Stroke; Constraint-Induced Movement Therapy (CIMT); Robotic Therapy (RT)

Conflict of interest
Disclosure statement:
Funding: This study was supported by USP NAP (Núcleos de Apoio a Pesquisa) University of São Paulo-Center for Advanced Studies in Rehabilitation-CEAR. ClinicalTrials.gov ID: NCT02700061
Introduction/Background

Only 5-20% of stroke survivors will regain full function of the upper limb (UL) with up to 60% still being impaired in the chronic phase. A plethora of outcome measures are used to assess UL function. However, they are often only a snap shot in time of the stroke survivor’s capability and do not always reflect the stroke survivor’s UL use in everyday real-world settings and contexts. The use of technologies has become a viable option for quantifying movements and activities during post-stroke rehabilitation in real-world contexts. This research compares the use of accelerometry with the ARAT over 96 hours with chronic stroke survivors and age matched controls.

Material and Method

30 chronic stroke survivors and 30 age matched controls wore an accelerometer on each wrist for 96 hours. Stroke survivors were also assessed using the ARAT and reported their functional ability. Data were analysed to compare affected UL v non-affected UL, stroke survivor movement v control, and hand dominance v non-dominance. Accelerometry data were compared with the stroke survivors’ functional capability.

Results

Findings suggest there is an association between the ARAT and accelerometry; the greater the capability score the higher the usage of the affected UL. Controls carry out more bi-lateral activities compared to the stroke survivors who tend to use each arm independently. However, despite full functional capability scores, stroke survivors still do not use their impaired UL compared to their non-affected UL. This is due to sensory loss or mistrust of their affected UL.

Conclusion

Compared to controls, chronic stroke survivors do not use their affected UL, nor do they carry out as much bi-lateral activity despite full capability. Accelerometry has the potential to measure UL movement and movement characteristics over long periods which can provide essential feedback for both clinicians and stroke survivors.

Keywords
Stroke;Technology;Upper-Limb

No conflict of interest
Introduction/Background

Recent studies showed that auditory feedback, sound and music can improve upper limb motor-recovery after stroke or Traumatic Brain Injury. However, the specific influence of different sound features and musical parameters has never been explored in this context. This study designed and tested different patterns of movement-sound coupling (sonification) that could stimulate arm movement during rehabilitation.

Material and Method

Five sonification patterns were developed through a participative design process. These included two basic sound parameters, two musical extracts and environmental sounds. Upper limb movement was recorded using three Inertial Measurements Units placed on each upper limb. Movement analysis, sound-movement coupling and sound synthesis were performed using Max/MSP software (Ircam). The experimental protocol included three steps. 1) An interview to evaluate the sound universe of individuals (French Psychomusical Appraisal) and Evaluation of Amusia (Montreal Battery). 2) Sonification of two tasks: functional gestures and elbow extension, compared with the same tasks without sound. The two sides were examined, the less affected first. The IMU data were used to quantify the kinematics of arm movement. 3) A semi-directive interview to provide detail on the participant’s subjective experience.

Results

At this stage, data has been obtained for 9 patients (stroke and TBI) and 7 healthy subjects. The subjective responses were positive, most of patients judged the sonification as interesting and stimulating. Most participants had a preference for environmental sound coupling. The observation of kinematic data showed large inter-individual differences and variable effects of sonification on movement amplitude, smoothness and velocity that varied between sides.

Conclusion

This study has established a novel sonification protocol which may be used to enhance and vary motor rehabilitation tasks. However, further analyses are needed, particularly on symmetry,
before concluding on a quantitative effect of sonification. In addition, we need to examine the relationships between quantitative data and participants’ subjective experience.

Keywords
Rehabilitation; Gesture sound coupling; Stroke/TBI

No conflict of interest
Poster Tour

Poster tour: Stroke: Upper limb

ISPR8-1415
EFFECTS OF ASYMMETRICAL RESISTANCE IMPOSED DURING REPEATED BILATERAL UPPER LIMB PUSHING MOVEMENTS ON BILATERAL COORDINATION POST-STROKE

J. Higgins\textsuperscript{2}, S. Nadeau\textsuperscript{1}, B. Emeraux\textsuperscript{3}, H. Akremi\textsuperscript{4}, R. Aissaoui\textsuperscript{5}

\textsuperscript{1}Université de Montréal- School of Rehabilitation, Centre de Recherche Interdisciplinaire en Réadaptation / Institut universitaire sur la réadaptation en déficience physique de Montréal, Montréal, Canada

\textsuperscript{2}Université de Montréal- School of Rehabilitation, Centre de Recherche Interdisciplinaire en Réadaptation / Institut universitaire sur la réadaptation en déficience physique de Montréal, Montréal, Canada

\textsuperscript{3}Université de Rouen-, UFR Sciences et Techniques, Rouen, France

\textsuperscript{4}Université de Montréal, School of Rehabilitation, Montréal, Canada

\textsuperscript{5}École de Technologie Supérieure, Laboratoire de recherche en Imagerie et Orthopédie / Centre de Recherche du Centre Hospitalier Universitaire de Montréal- Montréal, Montreal, Canada

Introduction/Background

Rehabilitation of the upper limb post-stroke represents a significant challenge with only 5% of severely affected individuals fully recovering function of their arm and hand. This study used a newly designed instrumented bimanual exerciser to assess the effects of an error augmentation (EA) protocol on upper limb bilateral coordination post-stroke.

Material and Method

Twenty participants, 10 individuals post-stroke (median age; time post-stroke 60.5 years; 4 months) able to hold a handle (median Chedoke hand 4/7) and 10 healthy controls, volunteered to participate. They were assessed on the bimanual exerciser using an EA protocol (baseline with symmetrical resisted movement at 30\% (1 min) and 15\% (1 min); adaptation with asymmetrical resistance (15\% and 30\%: 6 min) and post-adaptation at 15\% resistance (3 min). The effects of the EA protocol on bilateral synchronisation when initiating pushing movements were determined.

Results

Stroke and healthy participants took the same time to execute the baseline 15\% pushing task (median 0.8-1s). The movement amplitude for the non-paretic arm was greater than for the paretic one (34 vs 30 cm). Stroke participants produced a maximal symmetrical pushing force 25\% lower on the paretic side while healthy participants had symmetrical values (7\% difference). For both groups, the asymmetrical resistance (adaptation) modified the bilateral coordination with increasing onset delays between arms (median values: healthy: 6.4\% (55ms); Stroke:9.4\% (89ms)). The delays were reversed and differed from baseline at the beginning of the post-adaptation period (post-effects). The large between-subject variability prevented the detection of a difference between groups although the delays were greater overall in post-stroke participants during the adaptation period.
Conclusion

Preliminary findings suggest that the EA protocol could modify the timing between movements of the two arms during a bimanual task. Additional data is currently analysed to further understand the potential benefits of training patients with the bimanual exerciser on inter-limb coordination.

Keywords

Upper limb; Inter-limb coordination; Stroke

No conflict of interest
Introduction/Background

We quantitatively examined the motor imagery ability using bimanual circle-line coordination task (BCT) in stroke patients and clarified the relationship between motor imagery ability and motor function of hemiplegic upper limbs and amount of the use of paralyzed limbs.

Material and Method

Thirty-one stroke patients participated. Tasks included unimanual-line (UL) which involved drawing a straight line on the non-paralyzed side, and imagery circle-line (ICL) which involved drawing a straight line on the non-paralyzed side, during imagery drawing on the paralyzed side using a tablet PC. Each task was carried out in 3 sets of 12 seconds. Drawn linear trajectory was decomposed at every cycle and ovalization was calculated using the formula: Ovalization Index (OI)= Standard deviation of X axis / Standard deviation of Y axis×100(%). The value obtained by subtracting OI of UL from OI of ICL was defined as the ability of motor imagery (ImageOI). Fugl-Meyer motor assessment (FMA), amount of use (AOU), and quality of motion (QOM) of motor activity log (MAL) were the 3 variables used for cluster analysis. The explanation variable was ImageOI, parametric variables were AOU and QOM, and the objective variable was FMA, and mediation analysis was performed.

Results

Cluster 1 (FMA<26 points) and Cluster 2 (FMA>=26 points) were formed. In Cluster 2, significant single correlations were found between ImageOI and FMA, AOU, and QOM. When AOU and QOM were mediated between ImageOI and FMA, there was no significant direct correlation between ImageOI and FMA, and a significant indirect effect of AOU and QOM was observed (p<0.01, bootstrap method).

Conclusion

In stroke patients with moderate to mild movement disorder, the motor imagery ability directly affects the amount of use of hemiplegic upper limbs and their quality of motion in daily life. Moreover, it indirectly influences the motor functions via those parameters.

Keywords
stroke;motor function;motor imagery

No conflict of interest
Introduction/Background

Background and aims

Botulinum toxin type A (BoNT-A) is the recommended first-line treatment for regional spasticity affecting the upper limb in patients with stroke. Despite optimal treatment, BoNT-A injection might induce muscle weakness and might be associated with high cost and invasiveness. Recent studies have suggested that extracorporeal shock wave therapy (ESWT) is an effective method for the treatment of spasticity in stroke patients. The objective of this study was to investigate whether extracorporeal shock wave therapy is noninferior to botulinum toxin type A (BoNT-A) for the treatment of post-stroke upper limb spasticity.

Material and Method

42 patients with chronic stroke (28 men; mean age, 61.0 ± 10.6 years) were randomly assigned to receive either ESWT or BoNT-A. During the study period, all patients continued their regular rehabilitation. Assessments were performed at baseline and at one, four, and eight weeks after the intervention. The outcome was the change from baseline of the Modified Ashworth Scale (MAS) at the wrist flexors at week 4.

Results

The outcome in ESWT group (-0.80 ± 0.41) was similar to that in BoNT-A group (-0.90 ± 0.44), with the higher confidence limit (0.33) for the difference between groups within the pre-specified margin of 0.5, indicating noninferiority of ESWT to BoNT-A.

Conclusion

Our results suggest that ESWT is a noninferior treatment alternative to BoNT-A for post-stroke upper limb spasticity. Our results provide physicians with more options for the treatment of spasticity in patients with stroke.
Keywords

Spasticity ; Extracorporeal Shock Waves ; Botulinum Toxin

No conflict of interest
Poster Tour

Poster tour: Swallowing

ISPR8-2522
ELICITATION OF SWALLOWING REFLEX BY ESOPHAGEAL STIMULATION IN HEALTHY SUBJEC
TS –EVALUATION USING HIGH RESOLUTION MANOMETRY -Y. Aoyagi1, H. Taniguchi2, S. Imaeda3, M. Hirumuta4, H. Kagaya1, E. Saitoh1
1Fujita Health University - School of Medicine, Department of Rehabilitation Medicine, Toyoake, Japan
2Fujita Health University - School of Medicine, Department of Dentistry & Oral-Maxillofacial Surgery, Toyoake, Japan
3Fujita Health University Hospital, Faculty of Rehabilitation, Toyoake, Japan
4Fujita Health University Banbunntane Hospital, Faculty of Rehabilitation, Nagoya, Japan

Introduction/Background

The ultimate goal of this study is to develop a new therapeutic strategy that induce the swallowing reflex through esophageal stimulation for patients with dysphagia. In this study in healthy subjects, we aimed to verify whether the swallowing reflex can be evoked by peripheral esophageal stimulation and whether the response differ depending on the stimulated area and the volume or speed of stimulation.

Material and Method

Ten healthy individuals participated in this study. A catheter was inserted through the nose, and the tip was placed every 5 cm from the distal end of the upper esophageal sphincter (UES) to the upper, upper-middle, lower-middle, or lower esophageal region for injection. An intra-esophageal injection of 3 mL or 10 mL thickened water was administered. The injection rate was controlled at 3 mL/s or 10 mL/s. Latencies from the start of the injection to the onset of UES relaxation were compared regarding injection locations, amounts, and rates.

Results

Swallowing reflex occurred in 100%, 98%, 95%, and 55% within 30 seconds at the upper, upper-middle, lower-middle, or lower esophageal regions, respectively. Latency after the 10-mL injection was shorter than that for the 3-mL injection in all regions at an injection rate of 10 mL/sec (p < 0.01). There was a significant difference between injection amounts only in the upper region at an injection rate of 3 mL/sec. Although there was no difference between injection rates with the 3-mL injection (p > 0.05), a significant difference was observed between injection rates with the 10-mL injection (p < 0.01).

Conclusion

Esophageal stimulation by fluid injection can induce the swallowing reflex in healthy adults. Reflex latencies and esophageal movement can be changed by locations, amounts, and rates.
The most effective condition for inducing the swallowing reflex involved a larger fluid amount with a faster injection rate in the upper esophagus.

**Keywords**

Swallowing reflex; Esophageal stimulation; Dysphagia rehabilitation

*No conflict of interest*
Poster Tour

Poster tour: Swallowing

ISPR8-2577
EPIGLOTTIC KINEMATICS ALTERATIONS AND RISK OF LARYNGEAL PENETRATION-ASPIRATION.
A. Duarte1, J. Lopes de Almeida2, Ú. Martins³, C. Magro4, C. Lima², S. Araújo², N. Pereira², M. Coutinho², H. Marques²
¹Centro Hospitalar de São João, Physical Medicine and Rehabilitation, Porto, Portugal
²Centro de Reabilitação do Norte, Physical Medicine and Rehabilitation, Vila Nova de Gaia, Portugal
³Centro Hospitalar Entre Douro e Vouga, Physical Medicine and Rehabilitation, Santa Maria da Feira, Portugal
⁴Hospital Universitário de Santa Maria, Physical Medicine and Rehabilitation, Lisboa, Portugal

Introduction/Background

Epiglottic retroflexion seems to be an important mechanism of airway protection during swallowing. Although epiglottic dysfunction has been correlated with aspiration, the kinematics alterations underlying this condition remain unclear. Two distinct movements of epiglottic inversion were described in videofluoroscopic swallowing studies (VFSS). The first epiglottic movement brings the epiglottis to a horizontal position and the second consists of its full inversion.

Material and Method

Retrospective cohort study of 28 patients with post-stroke dysphagia admitted to our institution in 2017. Based on VFSS images, and in regard with the epiglottic mobility, two groups were assigned for comparison: one group with complete epiglottic inversion and other with partial inversion. Other parameters of VFSS were also compared.

Results

Of the 28 patients in the study, 68% were male (19) and 32% female (9). 28.6% of the patients had hemorrhagic stroke, 67.9% ischemic, and 3.5% ischemic stroke with hemorrhagic transformation. We found significant statistical correlation between epiglottic mechanics alterations and risk of laryngeal penetration (Fisher’s exact-test; p=0.036). Regarding other evaluated parameters, only the absence of the cough reflex was shown to statistically correlate with the risk of laryngeal penetration (Pearson’s chi-square; p=0.007).

Conclusion

The results suggest that epiglottis movement is an important mechanism to avoid penetration-aspiration. The absence of cough reflex in patients with laryngeal penetration (silent aspiration) emphasizes the importance of the VFSS. We are also of the opinion that this result may be related to the pre selection of patients with suspected silent aspiration. Further studies are needed to better understand the influence of these epiglottic movement alterations in the swallowing process.
Keywords

Stroke; Dysphagia; Epiglottic movement alterations

No conflict of interest
Poster Tour

Poster tour: Swallowing

ISPR8-2679

IMPROVE OF DYSPHAGIA WITH ELECTROESTIMULATION AFTER A STROKE

R. Andolz Linares¹, M.M. María Mercedes², B.A. Maria², R.A. Àngels², D.M. María José²

¹Health Sciences Research Institute of the “Germans Trias i Pujol”, Physical medicine and rehabilitation, BADALONA. BARCELONA, Spain
²Health Sciences Research Institute of the “Germans Trias i Pujol”, Physical medicine and rehabilitation, Badalona, Spain

Introduction/Background

Patients who have suffered a stroke may have dysphagia in more than 30% of cases. when the alteration is located in the bulbar area, since the neural control of swallowing is located at the bulbar level, where the centers responsible for processing the afferent sensory signals and programming the motor deglutory sequence are located this percentage increases. The goal of treatment is to obtain secure and sufficient oral intake for adequate hydration and nutrition. Treatment techniques are designed to change the physiology of swallowing. Neuromuscular electrical stimulation can also be performed as studies have shown that this treatment appears to help people with moderate dysphagia.

Material and Method

Clinical Observation: We present the case of a 44-year-old woman who suffered laterobulbar ischemic Ictus. The physical exam, showed dysarthria, facial paresis and limb dysmetry without motor deficit and severe alteration of swallowing. Fibroendoscopic studies were performed and oral diet was contraindicated thus enteral nutrition was required from the time of admission. Speech therapy plus the application of electrostimulation was initiated.

Results

After 4 months of treatment, enteral nutrition was removed and the patient was able to change to a complete oral diet.

Conclusion

Patients who are diagnosed of a bulbar stroke have a high percentage of swallowing dysfunction. Swallowing therapy with electrical stimulation may help clinical improvement of dysphagia.

Keywords

neurological dysphagia;posterior stroke;neuroestimulation

No conflict of interest
Poster Tour

Poster tour: Swallowing

ISPR8-0796
DYSPHAGIA SEVERITY BY SIDE OF LESION FOR ACUTE STROKE PATIENTS
S. Hota
1Kariya toyota General Hospital, rehabilitation, Kariya, Japan

Introduction/Background

This purpose of this study was to investigate the difference in dysphagia of stroke patients based on side of lesion.

Material and Method

164 stroke patients referred to our department from August to November 2017. 134 patients underwent bedside swallowing assessment; BSA. Out of 110 (right lesion (R): 46, left lesion (L): 64) unilateral supratentorial stroke patients, patients (R: 18, L: 26) with dysphagia were recruited. Median age was 79 years. The mean time from hospital admission to BSA was 4 days. BSA used Repetitive saliva swallowing test, Modified water swallowing test, and 30ml water swallowing test. Dysphagia severity was evaluated by Dysphagia Severity Scale; DSS. The following data was collected through the database: Stroke Impairment Assessment Set; SIAS (Items of Affected-side Motor Function), National Institutes of Health Stroke Scale; NIHSS, Functional Independence Measure; FIM. Statistical analyses were considered significant with p < 0.05.

Results

The average of initial SIAS score was R12/L9, and final was R14/L11. The average of initial NIHSS score was R12/L15, and final was R11/L14. The average of initial FIM score was R22/L24, and final was R58/L50. Approximately 5,28,28,39, and 0% of patients with R, and 11,31,31,23, and 4% of patients with L had pre-treatment DSS of 1 (Saliva aspiration), 2 (Food aspiration), 3 (Water aspiration), 4 (Occasional aspiration), 5 (oral problems), respectively. Post-treatment, 17,22,11,17,0,11, and 22% of patients with R, and 4,23,8,15,4,15, and 31% with L had DSS of 1,2,3,4,5,6 (Minimum problem), 7 (Normal). Approximately 61% patients with R and 69% patients with L relied on oral intake post-treatment.

Conclusion

There were not significant differences in dysphagia severity between patients with R and L. Future studies are necessary with large sample size to examine the difference for distribution of dysphagia severity scale.

Keywords
Dysphagia; stroke; acute

No conflict of interest
Introduction/Background

Evaluation of the swallowing ability by video nasal endoscopic examination of the swallow (VEES) and videofluorographic swallow study (VFSS) is recommended to safely resume oral intake after fasting patients with stroke. However, expert staff and special equipment are needed to perform these examinations. Furthermore, these are difficult to perform in patients who are not cooperative during examinations due to delirium or cognitive impairment. We sought to investigate the predictive factors of oral intake and create a model to estimate the swallowing function of patients with acute stroke.

Material and Method

We included 93 patients with first ever stroke, who underwent VEES or VFSS at our hospital between October 1, 2015 and October 31, 2017. Patients’ functional oral intake scale (FOIS) was recorded at the time of the procedures. A multiple linear regression analysis was performed using FOIS as a dependent variable. Independent variables were age, FIM motor, FIM cognition, Onodera’s prognostic nutritional index (O-PNI), speech intelligibility (SI), and Brunnstrom recovery stage for the arm (BRS-A), leg (BRS-L) and hand (BRS-H). The ethical committee of our hospital approved the study.

Results

An estimation model of FOIS using three factors (FIM motor, O-PNI, speech intelligibility) was derived by multiple linear regression analysis. The formula used for estimating FOIS ($Y_{FOIS}$) was $Y_{FOIS} = \exp ( .098 + .308 \times \text{FIM motor} + .304 \times \text{O-PNI} - .575 \times \text{SI}) - 1$. The multiple correlation coefficient was .76, and the adjusted R-square was .56.

Conclusion

The ability to perform activities of daily living, overall severity of speech function, and nutritional status before disease onset are effective ways to estimate swallowing function in patients with acute stroke.

Keywords

Acute stroke; Dysphagia; Estimation model
No conflict of interest
THE RELATIONSHIP BETWEEN DYSPHAGIA IN PATIENTS WITH SUPRATENTORIAL ACUTE SMALL SUBCORTICAL INFARCTS AND CEREBRAL WHITE MATTER LESIONS

N. Koga\textsuperscript{1}, T. Ishihara\textsuperscript{2}, T. Towata\textsuperscript{2}, M. Kodama\textsuperscript{1}, Y. Masakado\textsuperscript{1}

\textsuperscript{1}Tokai University School of Medicine, Department of Rehabilitation Medicine, 143- Shimokasuya- Isehara, Japan
\textsuperscript{2}Tokai University Hospital, Department of Rehabilitation, 143- Shimokasuya- Isehara, Japan

Introduction/Background

Dysphagia is commonly expected to occur in patients with severe stroke and large infarct size. However, to what extent dysphagia in acute penetrating branch infarction is still largely unknown. The aim of this study is to determine whether cerebral white matter (WM) lesions exert negative effects on swallowing function with acute small subcortical infarction.

Material and Method

We identified all inpatients with magnetic resonance imaging between October 2015 and September 2017. This study included 20 supratentorial acute small subcortical infarction patients (mean age, 76.6±11.9 years; 55% male) referred for dysphagia rehabilitation. They could communicate and had no sign of dysphagia before admission. Patients were excluded if their scans showed multiple acute subcortical infarcts, additional acute infarcts in other locations, or previous history of stroke. The patients were divided into the following two group by their final food form: the swallowing recover group and the unchanged group. The severity of WM lesions was using fluid-attenuated inversion recovery (FLAIR) magnetic resonance imaging and rated based on the Fazekas scale, which categorizes WM lesions into four grades. The scale divides the WM lesions into periventricular and deep white matter lesions. We statistically examined the relationship between presence of dysphagia and severity of WM lesions.

Results

Dysphagia is present in a quarter of patients with supratentorial acute small subcortical infarcts and has to be expected especially in those with severe WM lesions.
Conclusion

Many anatomic structures/pathways associated with swallowing function are located in subcortical regions and may not only be disrupted by small infarction but also by coexisting morphological damage such as cerebral WM lesions.

Keywords
dysphagia; supratentorial acute small subcortical infarcts; cerebral white matter lesions

No conflict of interest
Poster Tour

Poster tour: Swallowing

ISPR8-1149
FACTORS AFFECTING ASPIRATION IN CHEW-SWALLOW AND DISCRETE SWALLOW IN STROKE PATIENTS
E. Mizokoshi¹, H. Kagaya¹, Y. Aoyagi², S. Shibata¹, K. Onogi³, Y. Inamoto³, K. Pongpipatpaiboon⁴, E. Saitoh⁵
¹Fujita Health University, Department of Rehabilitation Medicine I- School of Medicine-, Toyoake, Japan
²Fujita Health University-, Department of Rehabililtation Medicine I- School of Medicine-, Toyoake, Japan
³Fujita Health University, Faculty of Rehabilitation- School of Health Sciences-, Toyoake, Japan
⁴King Chulalongkorn Memorial Hospital- Faculty of Medicine-, Department of Rehabilitation Medicine-, Bangkok, Thailand
⁵Fujita Health University, Department of Rehabilitation Medicine I - School of Medicine-, Toyoake, Japan

Introduction/Background

Dysphagia after stroke is common. Many authors postulated factors affecting aspiration in discrete swallow, but eating solids and liquids, like soups, is usual in daily meals. Chew-swallow is unique because the chewed solid food is transported to the pharynx (stage II transport) before swallow onset even in healthy subjects. The aim of this study was to compare the factors affecting aspiration both chew-swallow and discrete swallow in stroke patients.

Material and Method

One-hundred eighty-one stroke patients (average age 68) who swallowed both a two-phase mixture of 4 g of corned beef hash with 5 mL of thin liquid, and 10 mL of thin liquid during videofluoroscopic examination of swallowing (VF) were retrospectively evaluated. Oral, vallecular, and piriform sinus residue, hyoid elevation, laryngeal elevation, movement of epiglottis, mastication, bolus transition time, pharyngeal response time, and leading edge of bolus at swallow onset were evaluated by 2 physiatrists until consensus was reached from careful observation frame by frame. This study was approved by the institutional review board.

Results

The vallecular residue, reduced hyoid elevation, and inadequate mastication caused aspiration in chew-swallow. On the other hand, movement of epiglottis, leading edge of bolus at swallow onset, bolus transition time, pharyngeal response time, and initiation of laryngeal closure are associated in aspiration during discrete swallow. In addition, vallecular residue and reduced hyoid elevation were significant factors affecting aspiration in chew-swallow, while the movement of epiglottis and leading edge of bolus at swallow onset were selected in discrete swallow by multiple logistic regression analysis.

Conclusion
Factors affecting aspiration are different between chew-swallow and discrete swallow in stroke patients. We should check not only discrete swallow but chew-swallow during VF.

Keywords
dysphagia, ;videofluoroscopic examination of swallowing;chew-swallow

No conflict of interest
Poster Tour

Poster tour: Swallowing

ISPR8-1490
OUTCOME OF EDUCATIONAL WORKSHOP IN SWALLOWING REHABILITATION FOR NURSE
P. Wattanapan¹, C. Nantaraksa², S. Saentaweesook¹, D. Thipwong³
¹Faculty of Medicine- Khon Kaen University, Rehabilitation Medicine, Khon Kaen, Thailand
²Faculty of Medicine- Khon Kaen University, Srinagarind hospital, Khon Kaen, Thailand
³Somdejprasangkharach XVII hospital, Rehabilitation Medicine, Supanburi, Thailand

Introduction/Background

Swallowing problem is common in stroke survivors and aging. As imbalance healthcare professionals, swallowing rehabilitation in Thailand was approached as trans-disciplinary team. Some tasks of other health care professions has been shifting to nurses. Therefore the 2-day education program in swallowing rehabilitation was conducted to improve knowledge and skill for nurses. This study aimed to determine the knowledge of nurse in swallowing rehabilitation.

Material and Method

The 2-days workshop which consisted of basic physiology of swallowing, dysphagia screening test, compensatory technique and exercise, diet modification, chest physical therapy and oral health care for patient with dysphagia was conducted in 2 general hospitals located in Northern and Southern part of Thailand. All participants were asked to complete the test before and after attending workshop. The test was 20 True/False questions; 7 questions about dysphagia, 8 questions about aspiration prevention and 5 questions for swallowing rehabilitation. The passing level was 16 out of 20 scores.

Results

Of the 51 nurses who completed pre-test and post-test, 78% had more than 5 years’ experience. Of those participants, 60.8% worked at tertiary healthcare, 27.5% worked at primary healthcare and 11.8% worked at secondary healthcare. Only 27% passed the passing level on pre-test. There was significantly difference in pre-test and post-test scores (15.0 ± 2.4 and 16.9 ± 2.4; p < 0.001). Although 70% of participants could get more scores after workshop, only 53% passed the passing level.

Conclusion

Knowledge of swallowing rehabilitation among participants increased after the workshop. However, this study showed that only few days might not sufficient for empowerment, effective continuing educating program should be designed to increase quality of care.

Keywords

educating program;dysphagia;nurse
Conflict of interest
Disclosure statement:
This study was granted by Dysphagia Research Group, Khon Kaen University.
INTERPRETING SPATIAL DYSGRAPHIA AFTER STROKE: STRAIGHT AHEAD OR STRAIGHT ABOVE?
C. Jolly¹, C. Piscicelli¹,², L. Mathevon¹, C. Berenger¹, A. Chrispin¹, D. Pérennou¹,²
¹CHU Grenoble Alpes, Médecine Physique et Readaptation Neurologique, Grenoble, France
²Université Grenoble-Alpes, Laboratoire de Psychologie et Neurocognition LPNC, Grenoble, France

Introduction/Background
Spatial dysgraphia after a right hemisphere lesion, associates signs of spatial compression in relation to spatial neglect, and a tilted writing which remains to be explained. Here we present a case study suggesting that tilted writing is due to a tilted representation of the vertical.

Material and Method
JW, a 75 year-old patient who underwent a right parietal hemorrhage showed a pusher syndrome and a writing tilted 11.1° upwardly without other signs of spatial dysgraphia. We comprehensively assessed and followed most aspects of spatial cognition (spatial neglect, verticality perception) and handwriting, until nine months post-stroke. Examination of JW’s handwriting was performed by means of a graphic tablet quantifying writing orientation and speed, in the presence or not of spatial indexes, and after a transient modulation of verticality perception.

Results
In acute stage, spatial neglect was severe with predominant signs of body neglect. At three months, visual (VV) and postural (PV) perceptions of the vertical were tilted of 11°, counterclockwise. This transmodal tilt was similar both in direction and magnitude to the tilt found congruent on both features of writing: left-hand margin and lines. JW’s writing speed was found slower than a control subject in the blank paper condition (1.67 vs 0.82sec/letter; p<.001), and faster when writing on lines inclined 24° upwardly (1.11sec/letter; p<0.05). The transient modulation of verticality perception (PV= 0.5°) was performed by tilting the patient for 10 min at 30° to the right side, in the dark. This PV modulation reduced the writing tilt, measured 20 min later (6.2°; p=.001) and increased the writing speed (0.89sec/letter; p=.002). Nine months post-stroke, while spatial neglect had completely recovered, a congruent tilt both in verticality perception and writing persisted (5° and 8.8°, respectively).

Conclusion
After right hemisphere stroke, a tilted writing is likely a sign of a tilted verticality representation.

Keywords
Spatial dysgraphia; Verticality representation; Stroke

No conflict of interest
Poster Tour

Poster tour: Acupuncture

ISPR8-0389
EFFECTS OF COMBINATION TREATMENT WITH PULSED ELECTROMAGNETIC FIELDS AND ELECTROACUPUNCTURE ON OVARIECTOMY-INDUCED OSTEOPOROSIS IN RATS
Y. Liao¹, J. Zhou¹, J. Liu¹, G. Sun¹, H. Liu², S. Chen², Y. Qin², C. He²
¹The First Affiliated Hospital of University of South China, Rehabilitation Department, Hengyang, China
²Rehabilitation Key Laboratory of Sichuan Province, Department of Rehabilitation- West China Hospital- Sichuan University, Chengdu, China

Introduction/Background

To explore whether combination treatment with pulsed electromagnetic fields (PEMFs) and electroacupuncture (EA) have additive benefits on bone mineral density (BMD) and biomechanical properties in OVX rats.

Material and Method

Fifty 3-month old female Sprague–Dawley rats were assigned to one of five groups: sham-operated control (Sham), ovariectomy (OVX), ovariectomy with PEMFs treatment (PEMFs), ovariectomy with EA treatment (EA), and ovariectomy with PEMFs+EA treatment (PEMFs+EA). After 12-week treatments, bone mineral density, histomorphometric parameters, and bone biomechanical properties were examined.

Results

PEMFs, EA and combination treatment significantly increased BMD of the femur (P<0.01, P<0.05, P<0.01) compared to OVX group. There was no significant difference in the femur BMD among the five groups (P>0.05). PEMFs, EA and combination treatment significantly increased BMD of L5 vertebral body (P<0.01, P<0.01, P<0.01) compared to OVX group. What’s more, combination treatment with PEMFs and EA was more effective than PEMFs or EA alone for improving BMD in L5 vertebral body (P<0.05, P<0.05). The biomechanical three-point bending experiment showed that PEMFs and combination treatment significantly increased maximum load in the left femur compared to OVX group (P<0.05, P<0.05). There was no significant difference in maximum load of the left femur among the five groups (P>0.05). The compression test showed that PEMFs, EA and combination treatment significantly increased maximum load (P<0.01, P<0.01, P<0.01) and energy to failure (P<0.01, P<0.01, P<0.01) in L5 vertebral body compared to OVX group. What’s more, combination treatment was more effective than PEMFs or EA alone for improving maximum load (P<0.05, P<0.01) and energy to failure (P<0.01, P<0.01) in L5 vertebral body.

Conclusion

Combination treatment with PEMFs and EA have additive benefits on BMD and bone biomechanical properties in the lumbar vertebral body.
Keywords

Osteoporosis; Pulsed electromagnetic fields; Electroacupuncture

No conflict of interest
Poster Tour

Poster tour: Acupuncture

ISPR8-0391
ELECTROACUPUNCTURE AMELIORATES CARTILAGE DEGENERATION BY REGULATING AUTOPHAGY IN A RAT MODEL OF OSTEOARTHRITIS
J. Zhou1, Y. Liao1, Y. Liao1, G. Sun1, W. Feng1, X. Li1, J. Liu1, Y. Zeng1, Q. Wu1, G. Zhou1, L. Fu1
1The First Affiliated Hospital of University of South China, Department of Rehabilitation, Hengyang, China
2Hunan Polytechnic of Environment and Biology, Rehabilitation, Hengyang, China

Introduction/Background

We assessed the effects of Electroacupuncture (EA) on cartilage degeneration, and expression of matrix metalloproteinase-13 (MMP-13), LC3-II and Beclin 1, in an experimental rat model of osteoarthritis induced by anterior cruciate ligament transection (ACLT).

Material and Method

30 3-month-old male Sprague Dawley rats were randomly divided into the following three groups (n=10 each): sham operated group (Control group), ACLT without treatment (ACLT group), and ACLT with EA treatment (EA group). One week after ACLT, rats in the EA group received 12 weeks of EA treatment. We performed histological examination, enzyme-linked immunosorbent assay, quantitative real-time polymerase chain reaction, and west-blot to assess cartilage degeneration, serum C-terminal cross-linking telopeptide of type II collagen (CTX-II), mRNA expression of MMP-13 and protein expression of LC3-II and Beclin 1.

Results

Serum CTX-II in the EA group was significantly lower than that in the ACLT group at 9 and 13 weeks. Mankin scores in the EA group significantly lower than that in the ACLT group. mRNA expression of MMP-13 was significantly higher in the ACLT group than that in the Control group, while MMP-13 in the EA group was significantly lower than that in the ACLT group. Protein expression of LC3-II and Beclin 1 was significantly lower in the ACLT group than that in the Control group, while LC3-II and Beclin 1 in the EA group was significantly higher than that in the ACLT group.

Conclusion

Electroacupuncture may regulate the catabolic factor, MMP13, and inhibit cartilage degeneration, at least partially, by regulating autophagy.

Keywords

Osteoarthritis; Electroacupuncture; Autophagy

No conflict of interest
Poster Tour

Poster tour: Acupuncture

ISPR8-0458
SUMMARY OF CURATIVE EFFECT OF SCALP ACUPUNCTURE EXERCISE THERAPY ON SPASTIC CEREBRAL PALSY
G. Jing
Hospital, children rehabilitation, Huai’an, China

Introduction/Background

Cerebral Palsy (CP) refers to a group of disorders of movement and posture, causing activity limitation that is attributed to a non-progressive insult to the developing fetal or infant brain. CP is one of the most common causes of physical disability during childhood. In this report, we would like to summarize and analyze the curative effect of spastic cerebral palsy children treated by scalp acupuncture exercise therapy in the past, and provide a combination of traditional Chinese and western medicine for clinical advantage and provide a practical, feasible and effective rehabilitation treatment plan for cerebral palsy.

Material and Method

From 2013 to 2016 in our hospital children’s rehabilitation department outpatient rehabilitation treatment of cerebral palsy children were screened, and meeting the diagnosis of spastic cerebral palsy as the research object. Before and after treatment, the Gross Motor Function Measure-88 (GMFM-88) was used to evaluate gross motor function and Activities of Daily Living Scale (ADL) was used to evaluate activities of daily living. Among them, 29 cases were treated with routine rehabilitation training as control groups and 23 cases were treated with routine rehabilitation therapy combined with scalp acupuncture exercise therapy as the treatment groups. Comparative analysis of the two groups of children after treatment between groups and before and after the treatment of gross motor function and activities of daily living.

Results

The scores of GMFM and ADL in treatment and control groups were significantly higher than those before treatment (p<0.05). After treatment, GMFM and ADL scores in treatment groups were significantly higher than those in control groups (p<0.05).

Conclusion

Scalp acupuncture exercise therapy combined with routine rehabilitation therapy can significantly improve the gross motor function and activities of daily living of children with spastic cerebral palsy, which is significantly better than routine rehabilitation therapy.

Keywords

Scalp acupuncture exercise therapy; Spastic cerebral palsy
No conflict of interest
Poster Tour

Poster tour: Acupuncture

ISPR8-0785
EFFECT OF TRADITIONAL CHINESE MEDICINE COMBINED WITH ACUPUNCTURE AND MOXIBUSTION ON SPINAL NERVE ACTIVATES MUSCLE TECHNOLOGY ON ELDERLY PATIENTS' SLEEP QUALITY
G. Yuan¹, L. Rao², H. yang³
¹Ningxiang City People’s Hospital, Rehabilitation Medicine, Ningxiang, China
²Xiangya Boai Rehabilitation Hospital, Rehabilitation Department, Changsha, China
³Xiangya Boai Rehabilitation Hospital, Rehabilitation Department, Changsha, China

Introduction/Background

To observe the elderly with sleep disorders on the basis of traditional Chinese medicine and acupuncture treatment, the effect of adding Spinal nerve activates muscle technology (SAMT) on the psychological and sleep quality of patients.

Material and Method

A total of 69 elderly patients with sleep disorders were randomly divided into group A (traditional Chinese medicine treatment), group B (traditional Chinese medicine plus acupuncture treatment), group C (traditional Chinese medicine plus acupuncture plus SAMT), there were 23 cases in each group. The Hamilton Anxiety Scale (HAMA) score, Hamilton Depression Rating Scale (HAMD) score and Pittsburgh sleep quality index (PSQI) score for analysis.

Results

The HAMA score, HAMD score and PSQI score had no significant difference among the three groups before treatment ($P>0.05$). The difference of HAMA score, HAMD score and PSQI score between group A and group B was statistically significant ($P<0.05$) after 6 weeks of treatment. The differences of HAMA score, HAMD score and PSQI score in group C were significantly better than those before treatment ($P<0.01$).

Conclusion

The prescription of traditional Chinese medicine, acupuncture combined with SAMT has good clinical curative effect on mental health and sleep quality of elderly patients with insomnia, which are all worthy to be popularized.

Keywords

sleep quality; Spinal nerve activates muscle technology; acupuncture

No conflict of interest
Introduction/Background

To observe the effect of electro-acupuncture at Baihui (DU20) and Shenting (DU24) on learning-memory function in rats after cerebral ischemia-reperfusion and the possible mechanism.

Material and Method

A total of 42 male Sprague-Dawley rats were randomly divided into the sham group (n=12) and the operation group (n=30). The left middle cerebral arteries of the operation group were occluded with the modified Longa's methods for two hours and reperfused, and 24 qualified rats were randomly divided into the model group (n=12) and the electro-acupuncture group (n=12), and the latter accepted electro-acupuncture at Baihui and Shenting for 7 days. They were assessed with Longa's score two hours after modeling, and one, three, seven days after intervention. They were tested with Barnes maze since three days after intervention, once a day for five days. The expression of purinoceptor P2X7 in CA1 of the hippocampus were detected with immunofluorescence seven days after intervention, while the expression of interleukin-1β (IL-1β) and tumor necrosis factor-α (TNF-α) in CA1 were detected with enzyme-linked immunosorbent assay.

Results

Longa's score was improved in the electro-acupuncture group compared with that in the model group seven days after intervention (P<0.05); while the escape latency and the times entering the wrong hole increased in the model group compared with that in the sham group (P<0.001), and decreased in the electro-acupuncture group compared with that in the model group (P<0.001). The expression of P2X7, IL-1β and TNF-α increased in the model group compared with the sham operation group (P<0.001), and decreased in the electro-acupuncture group compared with that in the model group (P<0.05).

Conclusion

Electro-acupuncture at Baihui and Shenting can improve the learning-memory function in rats after cerebral ischemia-reperfusion, which may associate with inhibition of P2X7 to alleviate inflammation in hippocampus.

Keywords
cerebral ischemia-reperfusion; electro-acupuncture; purinoceptor

No conflict of interest
Poster Tour

Poster tour: Acupuncture

ISPR8-1472
KINEMATIC AND KINETIC EFFECT DURING STAIR DESCENDING IN KNEE OSTEOARTHRITIS TREATED WITH ELECTRO-ACUPUNCTURE

X. Wang¹, M. Hou², X. Xie³, J. Yu¹, X. Wang¹, X. Li¹
¹Fujian University of Traditional Chinese Medicine, College of Rehabilitation Medicine, Fuzhou, China
²Fujian University of Traditional Chinese Medicine, Fujian provincial rehabilitation industrial institution, Fuzhou, China
³Fujian University of Traditional Chinese Medicine, The affiliated 3rd People’s Hospital, Fuzhou, China

Introduction/Background

Acupuncture’s mechanism keeps unclear especially from biomechanical perspective though its effect on knee osteoarthritis (KOA) has been proved.

Material and Method

Seventeen KOA cases in electro-acupuncture (EA) group and 18 cases in minimal acupuncture (MA) have done gait analysis motion analysis during stair climbing before and after EA or MA treatment.

Results

1) Less pain and higher velocity of stairs descending (P<0.05) after EA treatment. 2) Second peak knee adduction angle (PKAA2) increased after EA treatment (P<0.05). 3) At first peak external knee adduction moment (PEKAM1) event after EA, knee adduction angle, vertical (Z-axis) ground reaction force (GRFZ), knee extensor torque and ankle eversor torque increased; hip external rotation angle decreased (P<0.05 or P<0.01). Same event after MA treatment, hip external rotation angle, lateral (X-axis) ground reaction force (GFRX), hip extensor and ankle internal rotators torque became lower (P<0.05 or P<0.01). 4) At PEKAM2 event after EA treatment, knee adduction angle increased; hip adductor, hip extensor and hip internal rotators torque decreased (P<0.05 or P<0.01). Same event after MA treatment, GRFX was higher; hip flexion angle, ankle internal rotator, hip extensor and hip internal rotator torque was lower (P<0.05 or P<0.01). 5) Hip flexion angle was smaller in EA than in MA at PEKAM2 and PKKAA2 events. Ankle eversor torque was higher in EA group than in MA group at PKKAA1 event (P<0.05 or P<0.01).

Conclusion

EA increased velocity of descending stairs, may improve loading capacity in hip, knee and ankle joints, indicating less compensatory strategy of lower limbs with less pain. MA showed different effect.
Keywords

Knee osteoarthritis; electro-acupuncture; gait analysis/stair descending

No conflict of interest
COMPARING THE IMPACT OF PLATELET RICH PLASMA INJECTION THERAPY AND ACUPUNCTURE IN THE TREATMENT OF KNEE OSTEOARTHRITIS

M. Holisaz¹
¹Baqiyatallah University of Medical Sciences, Physical medicine and rehabilitation, Tehran, Iran

Introduction/Background

The aim of this study is comparing the two methods of injecting platelet-rich plasma (PRP) and acupuncture, this study was carried out to compare the rate of symptom reduction (by valid indices) using two treatment methods in patients with osteoarthritis.

Material and Method

In this randomized clinical trial (RCT), patients with knee osteoarthritis (OA) (on the basis of American Rheumatology College criteria, clinical and radiographic findings) referred to physical medicine clinic of Bagyatollah Hospital in 2016 were considered as population of study. Sample size was 30 people for each group. Using table of random numbers and block method (1: 1), patients were divided into two groups: receiving PRP injection and treating through acupuncture. Before and after treatment Patients were visited by a physician not aware of treatments groups and in pain score (based on VAS criterion) and life quality were evaluated through Western Ontario and McMaster Universities Arthritis Index (WOMAC).

Results

The results showed that both PRP injection and acupuncture methods had significant effect in improving symptoms of pain, range of motion, and quality of life in them. Although the rate of change in the WOMAC index in the acupuncture group was slightly higher than that in PRP group, this difference was not statistically significant. In other words, two methods were almost equally effective in improving the patients’ health.

Conclusion

According to this result, based on the patient's condition, one of these two methods can be chosen for reducing osteoarthritis symptoms and in terms of the impact no one had preference over the other.

Keywords

Platelet-rich plasma;Acupuncture;Knee joint osteoarthritis

No conflict of interest
Poster Tour

Poster tour: Acupuncture

ISPR8-2125
EFFECT OF ACUPUNCTURE ON SEVERELY AFFECTED ARM-HAND MOTOR FUNCTION ON THE CHRONIC RECOVERY PHASE PATIENTS WITH POST-STROKE HEMIPLEGIA: A MULTICENTER RANDOMIZED PARALLEL CONTROLLED TRIAL

X. He¹, Q. Sun², C. Chen³
¹Taihe Hospital-The Affiliated Hospital of Fujian University of Traditional Chinese Medicine, Rehabilitation Center, Shiyan, China
²Fujian University of Traditional Chinese Medicine, Rehabilitation Medicine College, Fuzhou, China
³Taihe Hospital-Affiliated Hospital of Hubei University of Medicine, Neurological rehabilitation- Ward 3, Shiyan, China

Introduction/Background

Effect of conventional rehabilitation methods is still not satisfactory to the severely affected arm-hand motor function on the chronic recovery phase patients with post-stroke hemiplegia. Studies have demonstrated that acupuncture can improve arm-hand motor function in stroke patients. Quchi (LI11) and Waiguan (TB5) are most commonly used in the treatment of stroke. We hope to investigate the effects of the combined use of acupuncture and modern rehabilitation therapy, and identify the effects of acupuncture at Quchi and Waiguan on cortical excitability and plasticity.

Material and Method

This is a prospective multicenter randomized parallel controlled trial. 80 patients in Brunnstrom stages I-II randomized into conventional rehabilitation training group (n = 20), acupuncture with training group (n = 20), acupuncture priority training group (n = 20), and acupuncture delay group (n = 20). On the basis of basic treatment and conventional rehabilitation training, acupuncture will be performed 30 minutes at Quchi and Waiguan at the same time, before and after training, once a day for 30 minutes, for 6 weeks (5 days/week). Arm-hand motor function was measured before and 2-, 4-, 6- week after intervention using the Fugl–Meyer assessment, Wolf Motor Function Test, and Brunnstrom stage classification. Patients will undergo follow-up assessments for 3 months after the intervention.

Results

The acupuncture priority training group significantly improved Fugl–Meyer assessment flexor synergy (P<0.05), proximal upper extremity (P<0.05) and Brunnstrom stages classification (P<0.05) compared with other groups. There were differences at conventional rehabilitation training group and acupuncture delay group in Brunnstrom stages classification scores (P=0.044, P=0.037, respectively) were observed.

Conclusion
Acupuncture combined with rehabilitation therapy may improve arm-hand motor function post-stroke patients in the Brunnstrom stages I-II, especially starting rehabilitation therapy as soon as the needle removal when the acupuncture in the affected limbs.

**Keywords**

*No conflict of interest*
Stump pain is usually hard to cure. This pain is often beyond the efficiency of painkillers, so hard that some patients threaten to commit suicide in order to end it. We analyzed our experience of the efficiency of acupuncture for painful amputees suffering from their stumps.

**Material and Method**

Retrospective analysis of acupuncture sessions performed on painful amputees referred to our center for intractable pain. Pain was evaluated with Visual Analog Scale, before and after acupuncture sessions. We used a various number of needles per patient (1 to 10) and depth of puncture varies from 1 mm to few centimeters. The average duration of the acupuncture sessions was 30 minutes. Stumps were carefully analyzed in order to puncture the acupuncture needles in the damaged tissues (painful neuroma, muscular trigger point, painful scar) and in classical acupuncture points. The needles were carefully places to avoid the pain caused by a too fast and too deep puncture.

**Results**

Fifty painful amputees (34 men and 16 women) were included in our study. The cause of amputation was traumatic (n=45), arteritic (n=2), septic shock (n=2), tumoral (n=2). The level of amputation was transtibial (n=26), transfemoral (n=14), hands (n=3), forearms (n=2), arms (n=2), disarticulation of shoulder (n=2), foot (n=1). These intractable pains were relieved by successive acupuncture session in 80% of patients; among those, the mean VAS improved from 9 to 3/10.

**Conclusion**

Acupuncture seems to be particularly efficient for pathologic neuromas pains as for causalgias, muscles trigger points and algo-hallucinosis. After some sessions, acupuncture may alleviate for months or years the neuroma pain. Acupuncture is a cheap, easy and efficient antalgic therapy for neuroma pains, causalgias, muscular triggers points and algo-hallucinosis of amputated stumps. Further studies are needed to determine the best modalities of this therapy.

**Keywords**
acupuncture;amputation;pain

No conflict of interest
ISPR8-2210
EFFECTS OF CORE MUSCLE ACUPUNCTURE ON STANDING BALANCE FUNCTION OF CHILDREN WITH SPASTIC CEREBRAL PALSY
J. Zhang¹, S.Q. Chen¹, W.F. Ding², C.B. Gong², Y.Q. Le², D.E. Huang³
¹The Affiliated People’s Hospital of Fujian University of Traditional Chinese Med, Rehabilitation department, Fuzhou, China
²Fujian University of Traditional Chinese Medicine, Institute of acupuncture, Fuzhou, China
³Fuzhou General Hospital of Nanjin Military Command, TCM Physiotherapy, Fuzhou, China

Introduction/Background
To investigate the effects of core muscle acupuncture on the standing balance function of children with spastic cerebral palsy.

Material and Method
We select 30 cases of spastic cerebral palsy children with standing disequilibrium and divide randomly into two groups. Conventional rehabilitation training was adopted in the rehabilitation group, while core muscle acupuncture combined with the same rehabilitation in the rehabilitation group was adopted in the acupuncture group. In 6 months, the Pro-kin254 equilibrium training detector was utilized to detect the scores of the trunk control ability and those in standing position (region D) among the 88 items in the gross motor function measure (GMFM-88).

Results

① the center of pressure (COP) in the anterior-posterior and left-right directions, the average speeds of movement in the left-right directions, and the ellipse area formed by the shifting of the center of gravity in the acupuncture group were superior after treatment to those before treatment ($P<0.05$); The standard deviation of COP in the left-right direction, the average speed of movement in the left-right direction, and the swinging path length of the center of gravity in the rehabilitation group were all superior to those before treatment ($P<0.05$); In the rehabilitation group the difference in the average speed of movement in the anterior-posterior direction in the acupuncture group before and after treatment was better than that in the rehabilitation group ($P<0.05$). ②The GMFM-88 scores in standing position in both groups were better after treatment than those before treatment ($P<0.05$); and the differences in the GMFM-88 scores in standing position of prior and post treatment were higher in the acupuncture group than in the rehabilitation group ($P<0.05$).

Conclusion
Core muscle acupuncture could improve the standing balance function of children with spastic cerebral palsy.
Keywords
Core muscles; Acupuncture; Spastic cerebral palsy

Conflict of interest
Disclosure statement:
The project of the Chinese National Natural Science Fund (81273672)
Research project of Fujian Provincial Health Bureau of TCM (No.wzzh201303).
Poster tour: Animal models for research in PRM

ISPR8-0260
EXERCISE BRINGS BALANCE OF GLUCOSE METABOLISM TO BILATERAL MOTOR PATHWAYS IN CEREBRAL ISCHEMIC RAT: A PRELIMINARY STUDY USING MICROPET
B. Zhang1,2, C. Li2, W. Bao2, Y. Li2, S. Tian2, X. Qiu2, Y. Bai2
1TIRR Memorial Hermann, Physical Medicine and Rehabilitation, Houston, USA
2Huashan Hospital Fudan University, Department of Rehabilitation Medicine, Shanghai, China
3Huashan Hospital Fudan University, Department of Nuclear Medicine Center, Shanghai, China

Introduction/Background

In order to better understand how exercise affects motor pathway and improves motor functions after stroke, we evaluated the effects of exercise on the balance of glucose metabolism between hemispheres in cerebral ischemic rat model.

Material and Method

Adult male Sprague Dawley rats were divided into a sham-operated group (Sham group, n = 6), an ischemic group without exercise (Control group, n = 3), and an ischemic group treated with wheeling (Exercise group, n = 5). Cerebral ischemia was established using the middle cerebral artery occlusion (MCAO) procedure (Day 0). An exercise wheel was started from Day 3. The speed was set at 1 rpm, gradually increased to 4-5 rpm as tolerated, lasting 20min per day till Day 28. Micro PET/CT imaging with 18F-FDG was used to evaluate glucose metabolism of brain areas related to motor functions, including motor cortex, caudate putamen, midbrain and pars compacta, at Day 28. The results presented as standardized uptake values (SUV), then normalized with the SUV of the cerebellum. In order to compare the balance of glucose metabolism between hemispheres, we used the ratio of the left side over the right side in respective areas. One-way ANOVA or Kruskal-Wallis test were used for comparison. P < 0.05 indicated statistical significance.

Results

The average ratio in the sham group was largely close to 1, indicating natural balance of glucose metabolism between hemispheres (Table 1). There was significant imbalance of glucose metabolism in the motor pathways between hemispheres in the control group, with the glucose metabolisms on the left side being 50%-70% of the right side. However, these imbalances were milder in the exercise group, with the left being 70%-100% of the right, closer to the sham group (Figure 1).
Conclusion

Exercise may contribute to bring balance of glucose metabolism to bilateral motor pathway in cerebral ischemic rat.

Keywords

exercise;motor pathway;glucose metabolism

No conflict of interest
Poster Tour

Poster tour: Animal models for research in PRM

ISPR8-0477
EFFECT OF EXERCISE ON THE CELL DEATH AND AXONAL REGENERATION IN A RAT MODEL OF PERIPHERAL NERVE INJURY
N. Kuwabara¹, K. Nakamoto², Y. Shirose³, N. Kiso⁴, T. Kokubun⁵, K. Murata¹, N. Kanemura⁵
¹Saitama Prefectural University Graduate School, Rehabilitation, Koshigaya, Japan
²Shiraoka-Seikeigeka, Rehabilitation, Shiraoka, Japan
³Yokohama-rousai hospital, Rehabilitation, Yokohama, Japan
⁴Saitama-sekisinnkai hospital, Rehabilitation, Sayama, Japan
⁵Saitama Prefectural University, Physical Therapy, Koshigaya, Japan

Introduction/Background

Low intensity exercise following peripheral nerve injury promotes nerve regeneration, whereas high intensity exercise has a negative effect. Our study aimed to assess the influence of low intensity exercise on the expression of proteins related to cell death regulation and axonal regrowth.

Material and Method

The sciatic nerves of 10-week-old male Wistar rats were crushed, using iced clips. The animals were randomized into 3 groups: injured rats not subjected to exercise(SC group) to assess spontaneous recovery; injured rats subjected to exercise by disturbance stimulator (SCex group); non-injured rats(Sham group). The animals were sacrificed at 2 or 4 weeks after injury. Immunofluorescence against BDNF, NGF, GAP 43, and Caspase-3 was performed and the expression levels of each marker were calculated per unit area. Two-way ANOVA for multiple comparisons with Tukey’s test was used.

Results

BDNF expression was significantly increased in the SC group compared to the Sham group(p<0.05). NGF did not show any significant difference among the group in terms of treatment and time. GAP 43 expression was significantly decreased in the SC and SCex groups as compared to the Sham group(p<0.05), and 4 weeks was significantly increased(p<0.05). Caspase-3 expression showed an increasing trend in the SC group and increased significantly at 4 weeks(p<0.05).

Conclusion

The up-regulation of BDNF following NGF during nerve regeneration suggests that cell death is observed after nerve injury, but can be reduced by exercise. At later stages after injury, trophic factors protecting cells from death are down-regulated, possibly resulting in the increased cell death. GAP43 expression increased over time in the injured rats, indicating elongation of regenerating axons. In this study, we show that low intensity exercise reduces cell death in the injured nerve and promotes elongation of regenerating axons. Our future goal is to examine the potential effect of exercise on neural plasticity.
Keywords

peripheral nerve injury; nerve regeneration; exercise

No conflict of interest
Intervention/Background

The intensity of microcurrent therapy is important in the treatment of muscle damage. In one study, when an intensity of 100–500 μA was applied after muscle damage, the healing process, including amino acid transport, triphosphate generation, and protein synthesis, increased by 30–40% above the control level. On the contrary, when the intensity exceeded 1000 μA, these biostimulatory effects were reversed. Therefore, we aims to investigate the regenerative effect of microcurrent electric stimulation according to intensity on gastrocnemius (GCM) muscle atrophy in rabbits induced by cast immobilization.

Material and Method

Fifteen male New Zealand white rabbits were randomly allocated into 3 groups of 5 rabbits. Right GCM muscle was used for immobilization by cast for 2 weeks (IC). IC (group 1), IC and Microcurrent stimulation (MS: 25μA) for 2 weeks after CR (group 2), and IC and Microcurrent stimulation (MS: 5000μA) for 2 weeks after CR (group 3). Atrophic change of Rt. calf circumference, Compound muscle action potential (CMAP) of Rt. tibial nerve, thickness of Rt. GCM by ultrasound was calculated. Muscle composition of GCM muscle and cross sectional area (CSA) of muscle fibers was measured. Proliferating cell nuclear antigen (PCNA) and bromodeoxyuridine (BrdU) positive cell ratio was calculated as the number of BrdU positive cells per muscle fiber.

Results

Mean atrophic changes of Rt. calf circumference, amplitude of CMAP on Rt. tibial nerve, and Rt. medial and lateral GCM muscle thickness in group 2 was significantly lesser than those in group 1 and 3 (p < .05). Mean CSA of medial GCM type 1 muscle fibers and PCNA and BrdU ratio in group 2 were significantly greater than those in group 1 and group 3, respectively (p < .05).

Conclusion

The result shows that a low-intensity microcurrent promotes more effectively than high-intensity in regeneration of GCM type 1 muscle atrophy.

Keywords
No conflict of interest
Detrusor overactivity is a public health issue in patients with central neurological disorders, in particular spinal cord injury. Sheep are valuable animal models because the bladder and urethral pressure measures are similar to humans. Intrathecal botulinum toxin A (IT BoNT-A) injections have already proved efficacy on radicular pain, without motor nor postural adverse effect in rat and mice. But the possible effects on the urinary tract functioning are not yet known.

Aim: To evaluate the effect of an IT BoNT-A injection on sheep urodynamic parameters and to evaluate the potentially motor adverse effects.

Material and Method

Five 2-year old sheep were used in this experiment. After a familiarizing procedure, a first urodynamic exam was done at T0. A unique IT injection of BoNT-A (100 Units-Xeomin®) was done 3 weeks later. Cystomanometric parameters were again recorded 5 (T1) and 12 weeks (T2) after the IT injection. A control group of 7 sheep with no IT BoNT-A injection were used to compare the results.

Results

Maximum cystometric capacity (MCC) and post-void residual urine (PV RU) increased significantly in the group receiving IT BoNT-A at T1 (MCC at T0=35.0mL±16.4; MCC at T1=105.6mL±16.10; p<0.05) (PV RU at T0=2.8mL±4.1; PV RU at T1=93.5±12.6; p<0.01). Bladder contractions appeared during the filling phase between T1 and T2 in the IT BoNT-A group.

Conclusion

No motor problems induced by IT BoNT-A injection have been recorded. IT BoNT-A injections influence the urinary tract functioning, and particularly increase the bladder capacity at T1, but induce small bladder contractions at T1 and T2. If it is confirmed by larger studies, this result...
should be taken into consideration for further use of IT BoNT-A in patients with detrusor overactivity after a spinal cord injury.

**Keywords**

intrathecal botulinum toxin; urodynamic; sheep

*No conflict of interest*
Poster Tour

Poster tour: Animal models for research in PRM

ISPR8-0722
PATHOGENESIS AND MOLECULAR MECHANISM OF MUSCLE CONTRACTURE IN RAT SOLEUS MUSCLES
Y. Honda1,2, N. Tanaka1,3, Y. Kajiwara3, H. Kataoka2, J. Sakamoto3, J. Nakano3, M. Okita2
1Nagasaki University Hospital, Department of Rehabilitation, Nagasaki, Japan
2Nagasaki University Graduate School of Biomedical Sciences, Department of Locomotive Rehabilitation Science, Nagasaki, Japan
3Nagasaki University Graduate School of Biomedical Sciences, Department of Physical Therapy Science, Nagasaki, Japan

Introduction/Background

Joint contracture is caused by the alteration of soft tissue around joints, and muscle changes regarding immobilization is an important factor. However, the mechanism underlying muscle contracture remains unclear. Therefore, this study investigated changes in muscle extensibility and collagen expression, and examined the molecular mechanism underlying muscle contracture in the soleus muscles of immobilized rats.

Material and Method

Wistar rats were divided randomly into immobilization and control groups. In the immobilization group, both ankle joints were fixed in full plantar flexion with plaster casts for 1, 2, 4, 8, and 12 weeks. One soleus muscle was used for measurement of passive tension in extension (a parameter for muscle extensibility) and collagen contents (a parameter for muscle fibrosis). Other samples were examined for changes in fibrosis-related cells and molecules (macrophage, IL-1β, TGF-β1, HIF-1α, myofibroblast, type I and III collagen) using methods such as immunostaining and/or RT-PCR.

Results

The passive tension and collagen contents were significantly higher in the immobilization group than in the control group for all experimental time points. Additionally, a significant positive correlation was observed between the passive tension and collagen contents. Macrophage, IL-1β, TGF-β1, and type III collagen increased with immobilization for 1 week, but there were no changes after a long immobility period. Myofibroblast and type I collagen levels also increased with immobilization for 1 week and further increased after 4 weeks of immobilization. On the other hand, only HIF-1α increased after 4 weeks of immobilization.

Conclusion

The present study indicated that the decrease in muscle extensibility depended on collagen overexpression in immobilized rat soleus muscles. Additionally, in the early stages of immobilization, upregulation of IL-1β/TGF-β1 via macrophages might promote fibroblast differentiation that affects muscle contracture. The soleus muscle became hypoxic in the later
stages of immobilization, suggesting that hypoxia influences the progression of muscle contracture.

**Keywords**

muscle contracture; muscle extensibility; Fibrosis

*No conflict of interest*
MECHANISMS OF MACROPHAGES ACCUMULATION IN THE PROCESS OF IMMobilIZED-INDUCED MUSCLE CONTRACTURE IN Rats

N. Tanaka1,2, Y. Honda1,3, H. Kataoka3,4, J. Sakamoto2, J. Nakano2, M. Okita2

1Nagasaki University Hospital, Department of Rehabilitation, Nagasaki, Japan
2Nagasaki University Graduate School of Biomedical Sciences, Department of Physical Therapy Science, Nagasaki, Japan
3Nagasaki University Graduate School of Biomedical Sciences, Department of Locomotive Rehabilitation Science, Nagasaki, Japan
4Nagasaki Memorial hospital, Department of rehabilitation, Nagasaki, Japan

Introduction/Background

Skeletal muscle fibrosis is the main pathology of immobilized-induced muscle contracture. Our previous studies revealed that upregulation of interleukin-1β/transforming growth factor-β1 associated with macrophages accumulation was related to the development of skeletal muscle fibrosis. However, the mechanisms underlying the increase in the number of macrophages in the immobilized soleus muscle is unclear. In this study, we investigated the mechanisms of macrophages accumulation in the immobilized soleus muscle of rat ankle-joint contracture models.

Material and Method

Rats were divided into immobilization and control groups. In the immobilization group, both ankle joints of each rats were immobilized in full plantarflexion with plaster casts for 1 and 2 weeks. To assess alterations of macrophages, the number of CD11b-positive cells and the monocyte chemotactic protein (MCP)-1 mRNA expression were measured. Additionally, to assess alterations of the myocyte, the number of myonuclei and TUNEL-positive cells, cross-sectional area (CSA) of myofibers, and the myonuclear domain size were measured.

Results

Immobilization resulted in a significant increase in the number of CD11b-positive cells and the MCP-1 mRNA expression at 1 and 2 weeks. The number of myonuclei and the CSA of myofibers were significantly decreased in the immobilization group compared to the control group at 1 and 2 weeks. Only the CSA of myofibers significantly decreased, depending on the immobilization period. The myonuclear domain size was significantly lower in the immobilization group at 2 weeks compared to the control group. TUNEL-positive cells were significantly increased in the immobilization group compared to the control group at 1 and 2 weeks.

Conclusion

These results indicated that joint immobilization after 1 week induced macrophages accumulation and reduced the number of myonuclei associated with myocyte apoptosis, which caused a decrease in the CSA of myofibers. These changes suggest that
immobilized-induced muscle fiber atrophy following myocyte apoptosis induce macrophage accumulation.

**Keywords**

macrophage; muscle contracture; apoptosis

*No conflict of interest*
EFFECT OF HIF-1Α INHIBITORS FOR PREVENTING THE PROGRESS OF MUSCLE CONTRACTURE IN RAT SOLEUS MUSCLES

Y. Kajiwara¹, H. Kataoka², Y. Honda³, N. Tanaka¹, J. Sakamoto¹, J. Nakano¹, M. Okita²
¹Nagasaki University Graduate School of Biomedical Sciences, Department of Physical Therapy Science, Nagasaki, Japan
²Nagasaki University Graduate School of Biomedical Sciences, Department of Locomotive Rehabilitation Science, Nagasaki, Japan
³Nagasaki University Hospital, Department of Rehabilitation, Nagasaki, Japan

Introduction/Background

Immobilization-induced muscle fibrosis is important regarding the pathogenesis of muscle contracture, and the therapeutic target for this fibrotic lesion is unknown. On the other hand, hypoxia-inducible factor (HIF)-1α is expected to be a new therapeutic target for fibrotic disease in the viscera. Accordingly, preventing the negative alteration of HIF-1α may suppress the progress of immobilization-induced muscle fibrosis. Therefore, this study investigated the effect of the HIF-1α inhibitor for immobilization-induced muscle fibrosis in rat soleus muscles.

Material and Method

Wistar rats were randomly divided into control and experimental groups. In the experimental group, both ankle joints were fixed in full-plantar flexion with plaster casts for 4 weeks. Some rats in the experimental group were immobilized throughout the 4-week period (immobilization group), whereas other rats in the experimental group were treated with YC-1, an HIF-1α inhibitor (YC-1 group). Additionally, YC-1 (2 mg/mL/day) was administered to each rat for 4 weeks. Bilateral dorsiflexion range of motion (ROM) in the ankle joints was measured each week to evaluate muscle contracture. Moreover, hydroxyproline (a parameter for collagen contents) and protein levels of HIF-1α were determined via biochemical analysis.

Results

Dorsiflexion ROM was significantly smaller in both experimental groups than in the control group at each timepoint, whereas this parameter was significantly greater in the YC-1 group than in the immobilization group after 3 weeks. In addition, the hydroxyproline and HIF-1α protein were significantly greater in the immobilization and YC-1 groups than in the control group at 4 weeks. However, both expressions were significantly smaller in the YC-1 group than in the immobilization group at 4 weeks.

Conclusion

From these results, the HIF-1α inhibitor may prevent immobilization-induced muscle fibrosis leading to muscle contracture. We surmised that the HIF-1α inhibition is a new therapeutic target for muscle contracture in immobilized skeletal muscle.
Keywords

HIf-1α inhibitor; muscle contracture; fibrosis

No conflict of interest
THE INFLUENCE OF HIGH-INTENSITY INTERVAL TRAINING ON SPATIAL MEMORY ABILITY IN RATS.

H. Takahashi¹, T. Koga¹, K. Kobara¹
¹Kawasaki University of Medical Welfare, Department of Rehabilitation, Kurashiki, Japan

Introduction/Background

High-intensity interval training (HIIT) has been shown to enhance the expression of brain-derived neurotrophic factor. This study was aimed to clarify the influence of HIIT on spatial memory ability.

Material and Method

Eighteen male Sprague-Dawley rats were used in this study, and 9 rats were kept in a breeding room for 2 months (control). Remaining 9 rats were forced to run on a treadmill at a speed corresponding to 80% of the maximal speed for 2 min and then at a speed equal to 50% of its maximum for 3 min (HIIT). These trials repeated three consecutive times. HIIT performed three times a week for 2 months. After HIIT, a treadmill endurance test, which rats forced to run on the treadmill with a stepwise increase of speed, was conducted. Spatial memory ability for each rat was estimated using Morris water maze test, which were determined from the time to reach the hidden goal stage in the circular pool. Morris water maze test were conducted 4 times per a day for 4 days. After these tests, extensor digitorum longus muscle and soleus muscle were isolated, and weight per body weight (MW/BW) of each muscle was measured.

Results

No significant improvement was revealed in time for reaching goal using Morris water maze test between the control group and the HIIT group. Running time evaluated by a treadmill endurance test was significantly longer in the HIIT group (p<0.05). Significant increases were not detected in the MW/BW of extensor digitorum longus muscle by HIIT. The MW/BW of soleus muscle was significantly heavier in the HIIT group compared to the control group (p<0.05).

Conclusion

This study revealed that HIIT improved endurance capacity and increased soleus muscle weight per body weight, however, significant improvement of spatial memory ability could not be found out.

Keywords

High-intensity interval training; Morris water maze test; endurance capacity

No conflict of interest
Poster Tour

Poster tour: Animal models for research in PRM

ISPR8-1428
GENE EXPRESSIONS DYNAMICS IN NERVE REGENERATION AFTER ANTERIOR CRUCIATE LIGAMENT INJURY IN A RAT MODEL
N. Kanemura1, T. Kokubun1, Y. Morishita2, K. Murata1, Y. Shimahara1, A. Nakajima2, Y. Oka2, K. Takayanagi1
1Saitama Prefectural University, physical therapy, Koshigaya, Japan
2Saitama Prefectural University, Graduate School of Health and Social Services, Koshigaya-City, Japan

Introduction/Background
The anterior cruciate ligament injury make difficulties in daily activity of daily living and sports. Even when the knee joint is operated a ligament reconstruction after injury, some patients complain of joint instability. It is thought that the nerve existing there is damaged when the ACL is damaged, and the nerve function is deteriorated. The purpose of this study was to evaluate nerve regeneration after ACL injury.

Material and Method
Wistar male rats, aged 11 weeks, were randomly assigned to three groups, ACL transection (ACL-T; n=7), ACL transaction and controlling abnormal joint movement (CAJM: n=7), Sham op (Sham; n=7). ACLs were harvested at 4 weeks after surgery, evaluated PCR array analysis and the histologic sections using double immunofluorescence methods for primary antibodies Brain-derived neurotrophic factor (BDNF), neurofilament (NF). Secondary antibodies were used Dylight488 and Cy3.

Results
CAJM was above 2 folds more upregulated in 26 genes than in Sham, and below 2 folds downregulated in 15 genes. ACLT was above 2 folds more upregulated in 22 genes than in Sham, and below 2 folds downregulated in 21 genes. ACLT was above 2 folds more upregulated in 22 genes than in Sham, and below 2 folds downregulated in 21 genes. CAJM was above 2 folds more upregulated in 26 genes than in ACLT and below 2 folds downregulated in 17 genes in 4 weeks.

In CAJM, NF positive nerves including BDNF were observed in the synovium, ligamentous bone attachment area, and NF positive nerves not containing BDNF were also observed in the ligament surface layer.

Conclusion
We reported that joint reaction caused by stability read to heal the injured ACL. Normalization of abnormal joint movement increases the expression of the neural plastic factor, and decreases that of apoptosis factor. These findings might have important consequences for neural plasticity and regeneration in the neuromuscular system in the knee deficiency.

Keywords
No conflict of interest
ISPR8-1668
EFFECTS OF PHYSIOLOGICAL ISCHEMIC TRAINING ON POST-STROKE NEUROPROTECTION AND ANGIOGENESIS IN ADULT RATS
J. Ni¹, C. Mei¹, S. Yu², G. Shen¹, X. Lu³, J. Li⁴
¹The Affiliated Hospital of Nantong University, Department of Rehabilitation Medicine, Nantong, China
²The Affiliated Jiangning Hospital of Nanjing Medical University, Department of Rehabilitation Medicine, Nanjing, China
³The First Affiliated Hospital of Nanjing Medical University, Department of Rehabilitation Medicine, Nanjing, China
⁴Nanjing Medical University, Department of Rehabilitation Medicine, Nanjing, China

Introduction/Background

Objective: To examine potentially beneficial effects of physiological ischemic training (PIT) following stroke.

Material and Method

Methods: Three hundred and seventy-five adult male rats were subjected to 90-min transient middle cerebral artery occlusion (MCAO) and randomized into a PIT group and a non-PIT control group. A sham-operated group was used as negative control. After 1- and 2-weeks of PIT, brain infarct volume was measured by Triphenyl tetrazolium chloride (TTC) staining, and behavioral outcomes, presence of intact neurons, apoptosis, and cerebral edema were assessed with modified neurological severity score (mNSS), Nissl staining, TdT-mediated dUTP Nick-End Labeling (TUNEL) staining and cerebral water volume. The mRNA expression of vascular endothelial growth factor (VEGF) was assayed with RT-PCR and protein expression of VEGF was quantified with Western blot.

Results

Results: Cerebral infarction, neurological deficits and neuronal apoptosis were reduced significantly in the PIT groups, while the presence of neurons was increased in comparison with MCAO controls. Moreover, mRNA and protein expression of VEGF were enhanced after 1 and 2 weeks of PIT.

Conclusion

Conclusion: PIT may promote angiogenesis and neuroprotection during post-stroke rehabilitation and provide a novel strategy for rehabilitation of stroke patients.

Keywords

physiological ischemic training; middle cerebral artery occlusion; neuroprotection against stroke
No conflict of interest
Poster Tour

Poster tour: Animal models for research in PRM

ISPR8-2427
THE MACROSCOPIC AND MICROSCOPIC EFFECT OF LOW-FREQUENCY WHOLE-BODY VIBRATION AFTER CEREBRAL ISCHEMIA IN RATS
Y. Bao

Shanghai Ruijin Rehabilitation Hospital, Department of Rehabilitation Medicine, Shanghai, China

Introduction/Background

Whole body vibration (WBV) has been applied in stroke patients with uncertain effects on motor and sensory dysfunction, and its effects on neurogenesis have not been studied yet.

Material and Method

144 rats were used for experiments with 29 rats excluded due to early attrition, exclusion by rCBF criterion or death of ischemia in acute phase. Rats included were divided into 3 groups: WBV group (n = 50), control group (n = 50), and sham group (n = 15). To explore the effects of daily WBV on neurological behavior, brain structure, and neurogenesis after cerebral ischemia in rats for 4 weeks.

Results

Improvements in weight or comprehensive neurological deficits were not significantly different under WBV or control treatment, and the degrees of brain damage and the numbers of necrotic neurons in the ischemic cortex were similar in two groups. However, WBV markedly improved animals’ coordination from 14d to 28d (P < 0.05) and muscle strength of the upperlimbs at 21d and 28d (P < 0.05 & P < 0.001) compared with the control group. WBV promoted the increase in the number of bromodeoxyuridine-positive (BrdU+) cells at 3d (P < 0.05) and 14d (P < 0.001) and the number of BrdU+/nestin+cells at 14d (P < 0.01) after ischemia when compared to the control group. The numbers of BrdU+/NeuN+cells at 21d and 28d (P < 0.001) were enhanced by WBV treatment.

Conclusion

WBV significantly promoted the proliferation of astrocytes and their neural processes thickening after 14d. The expression levels of neural markers, such as doublecortin, microtubule-associated protein 2, and glial fibrillary acidic protein, were upregulated in the ipsi-lateral cortex at different time points. Low-frequency WBV showed inconspicuous improvements in behavioral performance and brain damage after cerebral ischemia, but showed the potential in improving coordination and muscle strength and promoted neurogenesis after long-term exposure.

Keywords

Stroke; Whole body vibration; Neurogenesis
No conflict of interest
Poster Tour

Poster tour: Geriatric falls

ISPR8-0850
THE EFFECT OF NURSES’ TRAINING ON SENSITIVITY OF FALL RISK PREDICTION (KYT: KIKEN YOCHI TRAINING)
A. Kobe1, N. Ikeda1, K. Kagechika2, T. Maeno3
1Kanazawa Medical University Hospital, Department of medical technology, Uchinada, Japan
2Kanazawa Medical University, Department of physical medicine and rehabilitation, Uchinada, Japan
3Kanazawa Medical University Hospital, Department of safety management room, Uchinada, Japan

Introduction/Background

The number of incidents of falls is high in the hospital or rehabilitation department. Kiken yochi training (KYT) stands for training to predict risk, and it is one of the widespread methods for increasing the sensitivity of risk prediction in medical practices and preventing medical accidents in Japan. However, it is not sufficiently clarified that KYT increases the sensitivity of risk prediction. The purpose of this study was to clarify the effect of KYT in improving the sensitivity of fall risk prediction.

Material and Method

In 2015, we evaluated 78 nurses among the first-year newcomers employed at our hospital. Each nurse examined a slide on the risk of falling before KYT, and then had the items of risk prediction enumerated. Furthermore, using the same procedure, the number of items related to fall risk immediately and one year after KYT was compared with that before intervention. The numbers of items related to fall risk before and after KYT were analyzed using one-way analysis of variance and multiple comparisons.

Results

The numbers of items related to fall risk immediately and one year after KYT were 4.4 ± 1.21 and 3.9 ± 1.1, respectively. The number of items after KYT was significantly higher than 3.2 ± 1.1 before intervention (p <0.01). Conversely, the number of items was significantly lower immediately after KYT than one year after the intervention (p < 0.05).

Conclusion

We believe that KYT increased the sensitivity of nurses to predict patients’ risk of falling. KYT also demonstrated a sustained effect on risk prediction after one year. Therefore, KYT is considered to be one of effective methods for enhancing risk sensitivity. Further studies are needed to verify whether KYT increases the sensitivity and sustainability of fall risk predictions to prevent medical accidents.

Keywords
KYT; risk prediction; fall

No conflict of interest
Poster Tour

Poster tour: Geriatric falls

ISPR8-1126
CAN SIDE PREDICT THE FALL AFTER DISCHARGE FOR THE PATIENTS AFTER SURGERY FOR PROXIMAL FEMORAL FRACTURE?
I. Kondo¹, K. Ito¹, E. Takano¹, N. Morioka¹, K. Sato¹, Y. Mizuno¹, N. Itoh¹
¹National Center for Geriatrics and Gerontology, Rehabilitation medicine, Obu, Japan

Introduction/Background

Standing balance test for imbalance and disequilibrium (SIDE) was developed as a predictive measure for the fall prevention of the patients in hospital. Excellent predictive validity of SIDE was defined with the patients who admitted to reminiscence rehabilitation ward. On the other hand, the prevention of fall after discharge for the patients with fracture is essential to avoid recurrence of fracture. In this study, we use SIDE to predict fall event after the discharge for the patients after the surgery for proximal femoral fracture.

Material and Method

Participants of this study were the patients who discharged and returned to home from reminiscence rehabilitation ward after the surgery for proximal femoral fracture during the period from April, 2014 to September 2016. They were 10 male and 35 female patients and their average age was 78.3 (SD: 8.9). We sent questionnaire about the fall event and recurrence of fracture. Multiple logistic regression analysis was performed with age, duration of admission, the result of Mini Mental State Examination, FIM, SIDE and comfortable gait velocity at discharge as the independent factor according to the fall event occurrence.

Results

The fall event was occurred for seven patients (15.6%). Two of them (4.4%) experienced recurrence of fracture at femoral neck and vertebral body. SIDE (p=0.049) and comfortable gait velocity (p=0.027) had the significant effect on fall event and their odds ratio and 90% confidential interval were 0.32 (0.11−0.99) and 1119.47 (2.18−574866.87), respectively.

Conclusion

In addition to comfortable gait velocity, SIDE was the significant factor to predict the fall event for the one year after discharge. Cutting point of comfortable gait velocity would be warranted to use it as predictive measure. Discreet selection of walking aids and modification of home environment are necessary for the patients with high fall risk detected by SIDE.

Keywords

Fall prevention; Predictive measure; SIDE
No conflict of interest
Poster Tour
Poster tour: Geriatric falls

ISPR8-1585
THE DIAGNOSTIC ACCURACY OF HIP ABDUCTOR STRENGTH IN THE FALL RISK OF OLDER PERSONS
S. Gafner1, C.H. Bastiaenen2, S. Ferrari3, G. Gold4, P. Terrier5, R. Hilfiker6, L. Allet7
1HES-SO/ University of Applied Sciences and Arts of Western Switzerland- Geneva, Physical Therapy, Carouge - Geneva, Switzerland
2Research Program Functioning and Rehabilitation- CAPHR I- Maastricht University- Maastricht, Epidemiology, Maastricht, The Netherlands
3University Hospitals and University of Geneva, Department of Internal Medicine Specialties, Geneva, Switzerland
4University Hospitals and University of Geneva, Department of Internal Medicine- Rehabilitation and Geriatrics, Geneva, Switzerland
5Clinique romande de réadaptation SUVACare, Departement of Research, Sion, Switzerland
6School of Health Sciences- HES -SO Valais- Wallis- University of Applied Sciences and Arts of Western Switzerland- Valais, Physiotherapy, Sion, Switzerland
7HES -SO University of Applied Sciences and Arts of Western Switzerland- Geneva, Physical Therapy, Geneva, Switzerland

Introduction/Background

Persons aged over 65 years have an increased risk of falling and falls often trigger serious consequences like independency loss and increased mortality. An early detection of persons at risk of falling and a well-targeted fall prevention is thus of great interest. Previous studies showed that hip abductor strength is the muscle groups among all hip muscles which is particularly related to the fall risk of older persons. Therefore we aimed to investigate the diagnostic accuracy of hip abductor strength by using history of falls as the external criterion.

Material and Method

Hip abductor maximum voluntary isometric strength (ABD MVIS) and rate of force generation (ABD RFG) were assessed with a dynamometer fixed to a custom made frame in 60 persons aged over 65 years. The diagnostic accuracy (sensitivity (sens), specificity (spec), positive predictive value (PPV), negative predictive value (NPV), positive and negative likelihood ratios (LR+, LR-)) was assessed at a clinically important 90% sensitivity level. Cut-off values were calculated.

Results

Hip ABD MVIS (Sens. 90.6%, Spec. 57.1%, PPV 70.7%, NPV 84.2%, LR+ 2.11, LR- 0.16, cut-off value ≤ 1.06 N/kg) shows a slightly higher diagnostic accuracy than hip ABD RFG (Sens. 90.6%, Spec. 46.4%, PPV 65.9%, NPV 81.3%, LR+ 1.69, LR- 0.20, cut-off ≤ 8.47 N/kg/s). The results indicate that hip abductor strength shows a comparable diagnostic accuracy as other fall risk or mobility assessment tools (e.g. timed up and go test and short physical performance battery).
Conclusion

Hip abductor strength shows a good diagnostic accuracy to discriminate between older fallers and non-fallers and therefore might be an interesting parameter for fall risk prediction and a targeted intervention program. This very promising parameter should further be investigated in prospective studies.

Keywords

diagnostic accuracy; hip abductor strength; older adult

No conflict of interest
Muscle performance in post-menopausal women at different risk of falling: a cross-sectional study

L. Stefano¹, A. de Sire¹, A. Moretti¹, R. Gimigliano¹, F. Gimigliano², G. Iolascon¹

¹University of Campania “Luigi Vanvitelli”, Department of Medical and Surgical Specialties and Dentistry- University of Campania “Luigi Vanvitelli”- Naples- Italy, Naples, Italy
²University of Campania “Luigi Vanvitelli”, Department of Mental and Physical Health and Preventive Medicine- University of Campania “Luigi Vanvitelli”- Naples- Italy, Naples, Italy

Introduction/Background

Falls are very common in older people and in post-menopausal osteoporotic women might lead to disability and hospitalization, with a significant health care burden. The relationship among the several risk factors for falls is still not well clarified. The aim of this study was to investigate muscle performance of post-menopausal women, according to their risk of falling.

Material and Method

In this cross-sectional multicentre study, we included post-menopausal women aged ≥55 years, referring to 10 Italian centers specialized in bone health. The cohort was stratified in three groups according to a fall screening test (FST): mild, moderate, and high risk of falling. We assessed the physical performance using the Unipedal Stance Test (UST) and the gait speed.

Results

According to the FST, 752 women, mean aged 71.6 ± 10.4 years, were divided into 3 groups: 365 (48.6%), 254 (33.8%), and 133 (17.6%) at mild, moderate and high risk of falling respectively. There were statistically significant differences among the 3 groups for both UST (15.70 ± 15.04 vs 8.39 ± 10.37 vs 3.17 ± 2.87; p<0.001) and gait speed (0.89 ± 0.34 vs 0.57 ± 0.38 vs 0.37 ± 0.20; p<0.001). We observed a significant negative correlation between FST and UST (ρ = - 0.527; p<0.001) and between FST and gait speed (ρ = - 0.575; p<0.001).

Conclusion

Our data suggest that the risk of falling is moderately correlated to the reduced muscle function and there is progressive worsening of muscle performance with the increase in the risk of falling.

Keywords

risk of falling; muscle performance; fall screening test
No conflict of interest
Poster Tour

Poster tour: Geriatric falls

ISPR8-1717
POSTUROGRAPHIC DETECTION INDEX OF FEAR OF FALLING IN ELDERLY – A LIMITS OF STABILITY STUDY- PILOT STUDY
J. Michalska¹, A. Kamieniarz¹, M. Pawłowski¹, W. Marszałek¹, M. Sowa¹, G. Juras¹, K. Słomka¹
¹The J. Kukuczka Academy of Physical Education, Human Motor Behavior, Katowice, Poland

Introduction/Background
Elderly people often use a smaller percentage of their base of support during maximal weight shifting, which leads to balance instability, that can lead to frequent falls and serious injuries. Even the most active people cannot reach theoretical limits of stability, therefore the need to investigate the functional BOS i.e. the real stability boundary and the factors that can affect this ability.

Aim: The new index of anterior stability limit (IASL) explaining the functional base of support (BOS) in sagittal plane (while participants voluntarily displace their COP in the front direction) that can assess fear and risk of falling.

Material and Method
Twenty five students of the University of the Third Age voluntarily participated in the study. The force plate measurements allowed to investigate functional limit of stability in addition to clinical tests (BBS, Duncan, TUG). The FES-I questionnaire was used to evaluate fear of falling. Additionally, the anthropometric parameters of the foot were measured. The IALS is proportion between range of COP displacement during maximum forward lean and distance from the ankle joint to the head of first metatarsal bone. The Pearson’s linear correlation between FES-I, BBS, Duncan test, TUG test and IASL was conducted.

Results
High negative correlation was observed between IASL and main scores of FES-I (r=-0,64, p<0,05) and also between IASL and TUG test (r=-0,76, p<0,05). Positive correlation was noticed between IASL and Duncan test (r=0,66, p<0,05), as well as BBS (r=0,6, p<0,05).

Conclusion
The use of IASL indicate that elderly people used on average 70% of their functional BOS. Use of smaller functional BOS determine increase the fear of falling. Lower values of IASL correlate with clinical test, which assess risk of falling. IASL has potential as screening tools for fear and risk of falls.
Keywords

postural control; fear and risk of falling; index of anterior stability limit

No conflict of interest
Poster Tour

Poster tour: Geriatric falls

ISPR8-2065

PREVALENCE OF FALLS AND ITS RELATION WITH QUADRICEPS MUSCLE STRENGTH IN THE ELDERLY SUBJECTS, A CROSS-SECTIONAL STUDY

Y. Javadian¹, A. Ahmidiahangar², M. Aminzadeh³, B. Heidari⁴, S. Hosseini⁵, M. Babaei⁵

¹Babol University of Medical Sciences, physiotherapy, Babol, Iran
²Babol University of Medical Sciences, Mobility Impairement Research Center, Babol, Iran
³Babol University of Medical Sciences, Internal Medicine, Babol, Iran
⁴Babol University of Medical Sciences, Social Medicine, Babol, Iran
⁵Babol University of Medical Sciences, Rheumatology, Babol, Iran

Introduction/Background

An important cause of bone fractures and a major health issue in the elderly people is falling. The aim of the study was to determine the association of quadriceps muscle strength (QMS) with falling and the prevalence of falls in the elderly subjects.

Material and Method

All participants of the Amirkola Cohort Study entered the study. Data regarding demographic characteristics, clinical and laboratory examinations were provided from the database. Occurrence of falls during the previous year was determined by interview and review of medical records. The QMS was determined by dynamometry method. The participants were classified according to QMS values to high, moderate and low groups (QMS values >30, 15-30, and <15 kg respectively). Prevalence of falls in moderate and low QMS groups was compared. Multiple logistic regression with calculation of odds ratio (OR) was used for association.

Results

A total 1028 patients and controls with respective mean age of 69.8±7.7 vs 67.9±7.7 years old (p=0.001) were analyzed and 178 (17.3%) patients experienced fall. Individuals with falls had higher age (p=0.001) and lower QMS value (p=0.001). After adjustment for all clinical and demographic variables the association of falls remained at significant levels only for QMS and age>70 years. Occurrence of fall was independently associated with QMS with a negative dose-response pattern of relationship. Compared with high QMS, prevalence of fall increased by 2.18 (95% CI, 1.22-3.42) in moderate group and by 3 (95% CI, 1.78-5.05) in low QMS group.

Conclusion

These findings indicate that occurrence of falls in older adults are negatively associated with QMS and positively with age>70 years. These issues suggest a beneficial effect for muscle strengthening exercise.

Keywords
Elderly people;Fall;Quadriceps muscle strength

No conflict of interest
HIP FRACTURE REHABILITATION FOR PEOPLE LIVING IN NURSING HOMES: RANDOMISED TRIAL

I. Cameron¹, S. Kurrle¹, M. Crotty²

¹John Walsh Centre for Rehabilitation Research- University of Sydney, Kolling Institute, St Leonards, Australia
²Flinders University, Faculty of Medicine, Adelaide, Australia

Introduction/Background

It is unclear whether team based rehabilitation will improve survival or recovery in people from nursing care facilities (NCFs) who frequently have dementia and substantial disability. The objective was to determine whether post-operative rehabilitation delivered in NCFs would improve quality of life and mobility compared to receiving usual care and to perform an economic evaluation of this intervention.

Material and Method

Randomised controlled trial in NCFs, in Adelaide South Australia. Participants were people aged 70 years and older who were recovering from hip fracture surgery and were walking (independently, with aids or with one person assistance) prior to hip fracture. They received either a 4-week rehabilitation program delivered by hospital outreach team, or usual care. Those assessing the outcomes were blinded to group assignment. The primary outcomes were mobility (Nursing Home Life-Space Diameter (NHLSD)) and quality of life (DEMQOL) at one month (30 days) and 12 months. The incremental costs per unit improvement in mobility (NHLSD) and the incremental costs per quality adjusted life year (QALY) gained were calculated.

Results

At one month, the treatment group had better mobility (NHLSD) (mean difference -2.4; 95% CI:-3.8,-0.9; p=0.0014), better quality of life (DEMQOL: mean difference -0.14; 95% CI:-0.26,-0.01; p=0.0363 and DEMQOL-Proxy: -0.09; 95% CI:-0.17,-0.02; p=0.017) and were more likely to be alive (log rank test p=0.048). At 12 months there were no differences between treatment and control groups.

Conclusion

The survival and functional benefits did not persist once the rehabilitation program ended. The case for funding home rehabilitation in NCFs is weak from a traditional health economic perspective.

Keywords
Proximal femoral fracture; Rehabilitation; Dementia

No conflict of interest
Poster Tour

Poster tour: Geriatric falls

ISPR8-2154
THE RELATIONSHIP BETWEEN SLEEP DURATION AND FALLS, MUSCLE MASS AND MORTALITY: A COHORT STUDY IN CHINESE, ELDERLY POPULATION
L. Fu¹,², Q. Guo¹,²
¹TEDA International Cardiovascular Hospital- Cardiovascular Clinical College of Ti, Department of Rehabilitation Medicine, Tianjin, China
²Tianjin Medical University, Department of Rehabilitation Medicine, Tianjin, China

Introduction/Background

Epidemiological studies report that more than half of people over the age of 65 years suffer from variable sleep problems. In this study, we conducted a cohort study to investigate the effects of sleep duration on muscle mass and function within a Chinese, community-dwelling elderly population.

Material and Method

Our study population consisted of residents living in the township central hospital of suburban Tianjin, China. We measured muscle strength and walk speed. We divided sleep duration into the following four groups: <7h, 7-8h, >8-9h, >9h.

Results

A total of 902 participants completed the 3-year follow up. We observed a U-shaped relationship between sleep duration and fall risk. Compared to the 7-8h group, the fall risk within the <7h group was 3.58(1.99, 5.24) times higher, and the fall risk within the >9h group was 2.23 (1.20,3.13) times higher. After adjustment, muscle mass declined by -6.82% (-11.27%, -3.83%) in the <7h group. The >9h group exhibited a mortality risk that was 3.46 (1.37, 6.23) times higher the normal sleep group (7-8h).

Conclusion

In summary, we observed a U-shaped relationship between sleep duration and falls. Short sleep duration have negative effect on muscle mass decline, and long sleepers have higher mortality within a Chinese, community-dwelling, elderly population.

Keywords

Muscle mass; Muscle function; Sleep

No conflict of interest
Poster Tour

Poster tour: Geriatric falls

ISPR8-2228
THE ADDED VALUE OF COMBINED FUNCTIONAL TESTS ON PREDICTING FUTURE FALLS IN CHINESE COMMUNITY-DWELLING ELDERLY
L. Wang1, Q. Guo2
1TEDA International Cardiovascular Hospital, Rehabilitation Medicine, Tianjin, China
2Tianjin Medical University, Department of Rehabilitation Medicine, Tianjin, China

Introduction/Background

Falls are one of the major causes of mortality and morbidity in older adults, which needs a practical fall risk assessment tool to predict future falls. Recent researches suggested various functional tests produce more power than a single test in many aspects. So we aimed to determine whether combined functional tests could increase predictive ability of future falls, especially recurrent-falls which may result in stronger adverse impacts.

Material and Method

This was a prospective cohort study (N=875) among residents of Hangu area of Tianjin, China, who were ≥60 years old. Falls were ascertained after one year. Meanwhile, sociodemographic information, medical history and physical performance data were also collected.

The Timed Up and Go Test (TUGT), walking speed (WS) and grip strength (GS) are more recommended as tests targeting on balance, mobility and muscle strength by many studies. Therefore we selected these three tests to clarify our hypothesis.

Results

The mean age was 67.1 years; 58.6% were women. According to ROC area, the cut-off point of TUGT, GS and WS of falls is 10.31s, 0.3742kg/kg and 0.9467m/s respectively. Therefore we defined good performance on the tests as “+”, and poor performance as “-” with the cut-off point. Towards any-falls, combination of “TUGT-,GS-,WS+” was most correlated with its occurrence, with odds ratio (OR) 2.197, 95% CI 1.204-4.009; Meanwhile, combined “TUGT-,WS+” (OR2.103, 1.367-3.235) and combined “TUGT-,GS+,WS-” (OR2.071, 1.124-3.814) were also more related to any-falls than a single test, like TUGT-(OR1.676,1.170-2.401). However, compared with a single test(TUGT-,OR2.192,1.225-3.922), only the combination of “TUGT-,GS-,WS-” (OR2.536, 1.025-6.272) was a more stronger predictor.

Conclusion

A simple tool using TUGT, GS and WS has better predictive power on future falls. Based on this result, individuals who show poor ability in TUGT and WS but have good grip strength ought to be more concerned about the high-risk of future falls, especially the likelihood of recurrent-falls.
Keywords

combined functional tests; falls; elderly

No conflict of interest
Poster Tour

Poster tour: Geriatric falls

ISPR8-2424
DEVELOPMENT AND VALIDATION OF A CONCEPTUALLY NOVEL PERFORMANCE-BASED BALANCE SCALE IN COMMUNITY-LIVING OLDER ADULTS
H. Chen1,2, J. Meiers3, E. Wang-Hsu3, K. Mitchell1, S. Smith1
1Drexel University, Physical Therapy and Rehabilitation Sciences, Philadelphia, USA
2Southwest Hospital - Army Medical University, Rehabilitation Medicine, Chongqing, China
3University of Pennsylvania Health System, Penn Care at Home, Philadelphia, USA

Introduction/Background

Balance testing is critical for identifying fall risk and initiating preventive strategies. However, current balance tests used with community-living older adults (CLOAs) are limited. Our purposes were to develop and validate a conceptually novel performance-based test to quantify balance ability in CLOAs that minimizes ceiling effects, decreases test time and demonstrates test-retest reliability, internal consistency, and convergent validity.

Material and Method

Phase 1: We developed a 26-item, dichotomously-scored preliminary Performance-based Balance Scale (PBS) by (1) using an expert panel to build the scale by adapting test items from existing balance measures and organizing them by difficulty into 5 postural stability domains, (2) pilot testing, and (3) post-test revising. Phase 2: We tested the preliminary PBS (N = 35; 60 - 91 y). Using Rasch dichotomous analysis, we created a non-fixed-item format and identified 2 items to serve as starting points for testing based on performance ability; thereby, eliminating the need to administer all items. Phase 3: We re-tested 32 of the same participants 4-8 weeks later using the non-fixed-item PBS. We confirmed the non-fixed format with Spearman's rho and a paired t-test between scores for all 26 items and scores for non-fixed-item PBS. Using Rasch analysis, we eliminated redundant items. Phase 4: We determined test-retest reliability, internal consistency, and convergent validity.

Results

Correlation between the 26-item and non-fixed-item scores was $r = .94$ and no difference was found between the 2 scores, $t (31) = -.32$ (95% CI: -.70 - .51), $p = .75$. After revising the preliminary PBS, 20 items were retained. This PBS showed excellent test-retest reliability with ICC(2,1) = .97, high internal consistency with Cronbach's $\alpha = .94$, and good convergent validity ($r = .71$) with the Short Physical Performance Battery.

Conclusion

The PBS is a valid, 5-domain clinical balance test for CLOAs. The non-fixed test format reduces test time.

Keywords
Balance Assessment; Older Adults; Falls

*No conflict of interest*
Introduction/Background

Conventional myoelectric hands need to detect muscle activities in stumps; therefore, they are not applicable in amputees with short stumps or with paralyzed limbs. We developed a novel electric upper limb prosthesis that functions without myoelectricity, based on the shape deformation of the amputated upper limb. This bioinstrument includes a bridge circuit and multiple amplifier circuits that are calibrated to amplify minute voltages from a skin sensor with multiple strain gauges placed on the soft and stretchy skin surface within a specified range of output voltages.

The aim of this study is to compare the novel electric upper limb prosthesis with a conventional myoelectric hand (Myoboy system with System Electric Hand DMC plus, Ottobock).

Material and Method

Eight healthy participants were enrolled in this study. Clinical evaluation of each hand was performed using the Simple Test for Evaluating Hand Function (STEF) and the Action Research Arm Test (ARAT). Additional tests based on activities of daily living, such as holding a ballpoint pen, grasping an eraser, holding a plastic bottle, and holding an umbrella, were also performed. Each hand was fixed to the participants’ forearm after placing sensors to detect myoelectricity or the shape deformation of the forearm.

Results
Performing the last 4 tasks of the STEF; that is, pinching small metallic circular disks, small wooden circular disks, small pins, and pieces of cloth – and the first task of ARAT; that is, grasping a big wooden block – was difficult with both prosthetic hands. The remaining tasks could be performed only with the novel prosthesis.

Conclusion

We developed a novel prosthetic hand with unique sensors to detect skin deformation that enables better grasping than that with conventional myoelectric hands. Additional tests on activities of daily living will be effective in evaluating the function of this prosthesis.

Keywords

user-oriented prosthesis; flexible sensor; skin deformation

No conflict of interest
EFFECT OF PERSONALIZED WRIST BRACE FOR WRIST PAIN WITH 3D SCANNING AND PRINTING TECHNIQUE: A PRELIMINARY, RANDOMIZED, CONTROLLED, OPEN-LABEL STUDY

S.J. Kim¹, S.J. Kim¹, Y.H. Cha¹, K.H. Lee¹, J.Y. Kwon¹

¹Samsung Medical Center- Sungkyunkwan university, Physical and Rehabilitation Medicine, Kangnamgu, Republic of Korea

Introduction/Background

Three-dimensional (3D) printer technology can produce the personalized brace with low cost and less time. 3D printing data files are also advantageous for production of individualized products at no extra cost, even when different designs are used in consecutive production runs. In addition, because the 3D printer is controlled by a computer, it can make objects in various forms and is easy to use, as compared to other manufacturing techniques.

The purpose of this study was to develop a personalized wrist brace using a 3D scanner and 3D printer for patients with wrist pain caused by overuse syndrome, and to evaluate the improvement of pain relief, work performance, and daily life satisfaction after wearing the brace.

Material and Method

Twenty patients with wrist pain were randomly assigned to control and experimental groups. The control group wore the cock-up splint and the experimental group wore 3D printed wrist brace for one week. Patient Rated Wrist Evaluation (PRWE), Jebsen Hand Function Test (JHFT), and Orthotics and Prosthetics User Survey (OPUS) were checked before and one week after the application.

Results

The PRWE showed significant pain relief in both groups. Two items of the 28 OPUS questions, 'Put toothpaste on brush and brush teeth' and 'Dial a touch tone phone', showed high satisfaction scores, with statistically significant difference in the experimental group (P=0.036 and 0.004).

Conclusion

3D printed wrist brace was superior to the cock-up splint in some items of the OPUS. Wrist pain was reduced in the group wearing the 3D printed wrist brace as well as the group wearing the cock-up splint, so 3D printed wrist brace could possibly play the same role as the cock-up splint.

Keywords

3D printing;3D scanning;wrist pain
Conflict of interest
Disclosure statement:
This work was supported by the ICT R&D program of MSIP/IIPT [Grant No. B0101-16-1081]
However, there is no commercial party related to this study.
Poster Tour

Poster tour: Innovation in prosthetics and orthotics

ISPR8-0379

REACTION TIME AND VISUAL FIELD ARE THE MOST RELEVANT FACTORS OF DRIVING ABILITY OF MOTORIZED MOBILITY SCOOTERS AFTER STROKE

F.L. Ku, W.C. Chen, T.W. Chen

1Kaohsiung Municipal Ta-Tung Hospital, Department of Rehabilitation, Kaohsiung City, Taiwan R.O.C.
2Kaohsiung Veterans General Hospital, Department of Traditional Chinese Medicine, Kaohsiung City, Taiwan R.O.C.

Introduction/Background

Maintaining active community mobility and community participation are important instrumental activities of daily living, and are issues that occupational therapists concern about. The use of motorized mobility scooters (MMS) has grown in older people and disabled people to improve active community mobility. However, traffic accidents related to MMS driving increase. How to judge whether patients can drive MMS safely or not becomes an important issue. The objective of this study was to investigate the related factors of MMS driving ability.

Material and Method

This study was a cross-sectional study to investigate the association between cognitive, visual, motor function and MMS driving performance. Inclusion criteria of subjects were diagnosis of stroke and Mini-Mental State Examination score ≥ 24. Cognition related measurements included Color Trails Test (CTT) and reaction time test. Visual function related measurements included visual acuity and visual field. Motor function related measurements included Jamar dynamometer and Box and Block Test. MMS driving performance was measured with Power Mobility Clinical Driving Assessment Tool (PMCDA).

Results

Thirty participants with stroke were recruited (age 63.8±13.4 years old). There were significant associations between CTT (rho=-.40, p=.03), reaction time (rho=-.66, p<.01), visual acuity (rho=.42, p=.02), visual field (rho=.63, p<.01), Jamar dynamometer (rho=.48, p=.01) and PMCDA. The stepwise multiple regression analyses found that reaction time (Beta=-.44, p=.01) and visual field (Beta=.37, p=.03) were the significant related factors of PMCDA (adjusted R2=.30).

Conclusion

There were various levels of association between cognitive, visual, motor function and MMS driving performance. Reaction time and visual field were the most relevant factors especially. The finding of this study could provide professionals an efficient method to determine MMS driving ability from cognitive and visual function of stroke patients.
Keywords

Motorized mobility scooters;Community mobility;Stroke

No conflict of interest
Introduction/Background

Despite technological advances upper limb prosthesis, myoelectric control requires a long learning process. The absence of sensory feedback is very likely to impinge the appropriation of the prosthesis. We explored a sensory substitution alternative with various configurations and settings for vibrotactile feedback and myoelectric parameters.

Material and Method

Six vibrators were placed on a line or circumferentially around the arm. Space intervals between vibrators were absolute (2cm) or proportional to the length or the circumference of the arm. Dispositions as longitudinal proportional and absolute, circular proportional and absolute were tested. Sixty, 100 and 140ms of duration and intensities of 62.5; 100; and 167mA were explored. Estimate location of the vibration, and perceived intensity between 0 (no feeling) to 3 (strong) were assessed.

EMGs from biceps and triceps were recorded during isometric contraction to control the elbow velocity of an avatar displayed on a screen. EMGs were filtered and normalized from maximal contraction. A threshold of minimum muscle activity and a gain of the velocity control were adjusted to allow fast an intuitive control.

Results

The circular proportional disposition elicited better discrimination results than the 3 others dispositions (p<0.05). Duration, intensity and disposition were all found to influence the success rate scores (3 ways ANOVA p<0.0001). Stimulations with small duration (60ms) were perceived as being produced with a lower level of intensity.

A threshold between 5 and 7.5% of the maximum force, and a velocity gain varying from 0.3 to 1.2 rad.s⁻¹ for a change in muscle contraction of 10% MVC were found to enable precise control of the avatar.

Conclusion

The circular proportional disposition of the vibrator is a well suited configuration for sensory substitution. Our next step will be to combine sensory feedback given by vibrator to the
myoelectric control. This sensory substitution could improve prosthesis control, and may attenuate phantom limb pain.

Keywords

sensory substitution; vibration; prosthetic

No conflict of interest
Poster Tour

Poster tour: Innovation in prosthetics and orthotics

ISPR8-0762
WE DESCRIBE THE DEVELOPMENT AND VALIDATION OF AN ONLINE WHEELCHAIR MAINTENANCE TRAINING PROGRAM (WMTP) FOR CLINICIANS THAT IS FREELY AVAILABLE FOR USE.
J. Pearlman¹, S. Munera²
¹University of Pittsburgh, Rehabilitation Science & Technology, Pittsburgh, USA
²University CES, Rehabilitation, Medellin, Colombia

Introduction/Background

It is well known that wheelchairs which are well maintained suffer breakdowns less frequently, and their users are less likely to be injured. But until recently, there was no widely known wheelchair maintenance training program. Our team recently developed the wheelchair maintenance training program (WMTP) that we used to train clinicians on how to train wheelchair users in an in-person format, but was difficult to scale due to the in-person nature of the training.

Material and Method

This manuscript presents the development of the online version of the WMTP program and compares learning results from the in-person and online program using the wheelchair maintenance training questionnaire (WMT-Q).

Results

The training program was well received and valued by participants all 22 participants. A significant increase in all scores after online training program was found: manual wheelchair open-ended questions, t(25) = -3.367, p<.05; power wheelchair open-ended questions, t(25) = -5.360, p<.05; multiple choice questions related to knowledge, t(25) = -6.368, p<.05; confidence, t(25) = -13.521, p<.05; and capacity, t(25) = -10.735, p<.05. There were no statistical difference in WMT-Q scores between individuals who participated in the in-person and online participants: knowledge: t(34)=.371 p=.185, capacity: t(34)=.540, p=.793.

Conclusion

Our results suggest that there was a similar trend of increased knowledge for participants in both training programs indicating that web-based training is a viable avenue for delivering maintenance training.

Keywords

wheelchair; online training; maintenance

No conflict of interest
COMPARISONS OF ROBOTIC ANKLE PROSTHESIS AND CONVENTIONAL PROSTHESIS IN BELOW KNEE AMPUTEE

S.K. Bok¹, S.Y. Ahn¹, H.S. Woo²
¹Chungnam National University Hospital, Daejeon-Chungcheong Regional Rehabilitation Center, Daejeon, Republic of Korea
²Korea Institute of Machinery and Materials, Robotics, Daejeon, Republic of Korea

Introduction/Background

Even though below knee amputees wear prosthesis, they show abnormal gait patterns and complain discomfort during everyday life. In this study we compared the gate pattern between robotic ankle-foot prosthesis and conventional prosthesis in patients with below knee amputation.

Material and Method

4 Patients with below knee amputation underwent gait analysis with wearing robotic prosthesis and conventional prosthesis. Our newly developed robotic ankle-foot prosthesis is based on a low weight unified actuator module. The low weight unified actuator module consists of a frameless BLDC (Brushless direct current) motor, hall sensors, a harmonic drive, and a torque sensor. The robotic ankle provides necessary torque for different walking speed and walking surfaces.

Gait analysis was done by VICON 3D motion analysis system (Oxford, England). Kinetics and kinematics data of cadence, speed, stride time, single-support time, stride length and step length during walking were assessed. Also rotational angle and moment of joint were assessed.

Results

In this study, wearing conventional prosthesis during walking, excessive gluteus maximus, tensor fascia lata activation was observed. However, wearing robotic ankle prosthesis, excessive hip abduction and external rotation was decreased. Also the weight shift between both side decreased due to increased trunk stability.

A robotic ankle-foot prosthesis is required to provide a high output power within a compact size as well as to change its stiffness as dictated by the quasi-static stiffness of an intact ankle. The light weight integrated actuator module sufficiently supplied the torque source function to further enhance propulsion during powered plantar flexion. The embedded controller also provided the linear and nonlinear spring behaviors during controlled plantar flexion and dorsiflexion.

Conclusion

As a result, robotic ankle prosthesis showed more normal gait pattern than conventional prosthesis. Robotic ankle prosthesis will be useful to improve quality of life in individuals with amputation. Further studies about robotic prosthesis is needed in rehabilitation medicine.
Keywords

robotic ankle prosthesis;below knee amputation;gait analysis

No conflict of interest
Poster Tour

Poster tour: Innovation in prosthetics and orthotics

ISPR8-1325

IMPROVEMENT IN GAIT PARAMETERS IN ADULTS WITH SPASTIC HEMIPARESIS DUE TO STROKE OR TRAUMATIC BRAIN USING WHEELEO CRUTCH

T. Deltombe1, M. Leeuwerck1, J. Jamart2, A. Frederick3, G. Dellicour3

1CHU UCL Namur site Godinne, Physical Medicine & Rehabilitation, Yvoir, Belgium
2CHU UCL Namur site Godinne, Biostatistics, Yvoir, Belgium
3Centre Hospitalier Neurologique William Lennox, Neuro Rehabilitation, Ottignies, Belgium

Introduction/Background

Patients with chronic hemiparesis following stroke or traumatic brain injury (TBI) often necessitate a quadripod crutch to improve the balance during gait. The quadripod crutch, by inducing a 3-step gait participates to an asymmetric and slow walking speed. This study aims to assess changes in gait parameters and balance in patients using a quadripod crutch with small wheels (Wheeleo) compared with a classical quadripod crutch.

Material and Method

Prospective, multicentre, randomised study comparing Wheeleo and quadripod crutch (NCT02279069). Thirty-two ambulatory adults with spastic hemiparesis following stroke or TBI necessitating a quadripod crutch for walking participated to the study. The walking speed (WS), the frequency of the 2-step gait, the physiological cost index (PCI) and the number of therapist interventions to control the balance during a 10-meter walking test (10mWT) and a 6-minutes walking test (6MWT) were assessed with a Wheeleo and a quadripod crutch at comfortable and maximal WS. The cadence (during a 10mWT) and the distance (during a 6MWT) were also monitored. The patient satisfaction was assessed by a VAS scale.

Results

When using a Wheeleo, improvements in WS, cadence, frequency of a 2-step gait, PCI and distance were observed at comfortable and maximal WS. The number of therapist interventions to control the balance remained unchanged.

Table 1. Changes at comfortable walking speed

<table>
<thead>
<tr>
<th></th>
<th>Quadripod Mean (SD)</th>
<th>Wheeleo Mean (SD)</th>
<th>Difference</th>
<th>%</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>10mWT WS (m/s)</td>
<td>0.39 (0.17)</td>
<td>0.46 (0.19)</td>
<td>+ 0.08 (0.12)</td>
<td>+27</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Cadence/min</td>
<td>66 (18)</td>
<td>74 (17)</td>
<td>+ 8 (13)</td>
<td>+17</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>2-step gait</td>
<td>22/32</td>
<td>29/32</td>
<td>+ 7</td>
<td></td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>PCI</td>
<td>1.00 (0.63)</td>
<td>0.65 (0.41)</td>
<td>- 0.35 (0.1)</td>
<td>- 27</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>PT contact</td>
<td>0.09 (0.50)</td>
<td>0.03 (0.18)</td>
<td></td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>6MWT WS (m/s)</td>
<td>0.41 (0.20)</td>
<td>0.51 (0.21)</td>
<td>+0.1 (0.09)</td>
<td>+ 30</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Distance (m)</td>
<td>2-step gait</td>
<td>PCI</td>
<td>PT contact</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
<td>-------------</td>
<td>--------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>147 (73)</td>
<td>24/32</td>
<td>1.48 (1.01)</td>
<td>0.75 (2.69)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>183 (77)</td>
<td>29/32</td>
<td>1.33 (0.76)</td>
<td>0.78 (1.74)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+ 36 (34)</td>
<td>+ 5</td>
<td>- 0.15 (0.17)</td>
<td>- 26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+ 30</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 0.001</td>
<td></td>
<td>NS</td>
<td>NS</td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion**

Improvements in WS, cadence, distance, 2-step gait, energy cost and patient satisfaction were achieved in hemiparetic adults using a Wheeleo crutch without additional fall risk.

**Keywords**

Technical aid; Crutch; Gait

*Conflict of interest*

*Disclosure statement:*

*Geoffroy Dellicour is the funder of Innorehab which will commercialized the Wheeleo crutch. The other co-authors have no potential conflict of interest to disclose*
Introduction/Background

An amputation leads to a permanent disability, brings a dramatic change in life and functioning of the individual. The use of prostheses is a critical factor in the reintegration of patients to most of their usual activities.

Objective: To evaluate the perception of functioning in lower limb amputee patients for any cause with low cost exoskeletal prostheses donated by a workshop of orthopedic devices in Medellin-Colombia between 2007-2016.

Material and Method

Methods: Cross-sectional study in patients with lower limb amputations during a period of 9 years, by phone survey created by Grupo de Rehabilitación en Salud - Universidad de Antioquia in the development of Clinical Practice Guideline Colombian on amputees. The survey includes questions related to time of daily use, walking with or without assistive devices and overall satisfaction with the use of the prostheses.

Results

Results: 3076 beneficiaries were in database, 247 people were located, 83% were on low-income population, 235 patients answered the survey, and 46% continued using the low-cost prosthesis (12 hours per day) donated by the Corporación Mahavir Kmina Artificial Limb Center (54 patients had amputation above the knee and 57 used assistive devices), 20% used another endoskeletal prostheses, 29% did not adapt to any, and 5% were amputated again. 54% of the amputations were due to medical causes and 46% due to traumatisms. Among the medical causes, 71% were due to neurovascular diseases and due to trauma - traffic accidents 61% (43% on motorcycles). Moreover, 67.5% were able to walk independently, 87% were able to perform normal daily activities and 64% complex activities. The user satisfaction index was 83%.

Conclusion
**Conclusions:** Functional perceptions of exoskeletal prostheses users attending by the Corporación Mahavir Kmina Artificial Limb Center have shown a high degree of independence, which improves their physical and emotional well-being. In summary the final perception of the treatment is multidimensional.

**Keywords**

exoskeletal prostheses; Functioning; Jaipur foot;

*No conflict of interest*
Poster Tour

Poster tour: Innovation in prosthetics and orthotics

ISPR8-1509
OPTIMIZED METHOD FOR SURFACE ELECTROMYOGRAPHY CLASSIFICATION REGARDING CHANNEL REDUCTION IN HAND PROSTHESIS: A PILOT STUDY
H. Yoo¹, H.J. Park¹, B. Lee¹
¹Gwangju Institute of Science and Technology GIST, Department of Biomedical Science and Engineering BMSE- Institute of Integrated TechnologyII T, Gwangju, Republic of Korea

Introduction/Background

Myoelectric hand prostheses use surface electromyography (sEMG). Although various studies about effective machine learning technique have been conducted, there are few studies regarding reducing the number of sEMG channels. In this study, we investigated how the number and location of channels affect the robustness of the classification accuracy in hand prosthesis.

Material and Method

Total 14 healthy subjects (12 male and 2 female, median age 26 years) were recruited in the study. We placed six sEMG channels targeting forearm muscles (targeting method); extensor carpi radialis (ECR), extensor digitorum communis (EDC), extensor carpi ulnaris (ECU), flexor carpi radialis (FCR), flexor digitorum superficialis (FDS), and flexor carpi ulnaris (FCU). Then, the participants were instructed to perform 14 hand movements as follows; thumb flexion/extension, index finger flexion/extension, middle finger flexion/extension, ring finger flexion/extension, little finger flexion/extension, hand open/close, and wrist flexion/extension. We recorded sEMG signal during each movement and classified the signal using support vector machine algorithm. Auto-regressive coefficients, discrete wavelet transform, root mean square, and time domain feature sets were used. Also, we compared the classification accuracy with the untarctargeting method, which is placing six uniformly spaced sEMG electrodes just below the elbow.

Results

No statistical differences were observed between targeting and untarctargeting method when using five or six channels. However, there were statistical differences between those methods when using less than five channels (p-value < 0.05). In targeting method, no statistical differences were shown between three to five sEMG channels, while a significant decline of accuracy was observed when reducing channels in untarctargeting method (Figure 1). Also, ECR muscle was found to be the most informative (Figure 2).
Conclusion

We found out that placing the electrodes on targeting muscles can classify EMG pattern more accurately, especially when reducing the number of channels. Also, we investigate optimal channel subset for sEMG classification.

Keywords

Prosthesis; Electromyography; Machine learning

No conflict of interest
Poster Tour

Poster tour: Innovation in prosthetics and orthotics

ISPR8-1522
VALIDATION OF AN HELICOIDAL VERSUS STANDARD ANKLE-FOOT ORTHOSIS FOR PATIENTS WITH UNILATERAL DROP FOOT
D. Gasq1, B. Acket2, B. Caussé3, N. Cantagrel4, E. Combe3, P. Cintas2, M.C. Arné-Bes2
1Inserm - Université Paul Sabatier, Toulouse NeurolImaging Center UMR 1214, Toulouse, France
2Hôpital Pierre-Paul Riquet- site de Purpan- CHU de Toulouse, Centre de référence des maladies neuromusculaires adultes- unité d’Explorations Neurophysiologiques- Département de Neurologie, Toulouse, France
3Hôpital Pierre-Paul Riquet- site de Purpan- CHU de Toulouse, Centre d’Evaluation et de Traitement de la Douleur- Service de Neurochirurgie, Toulouse, France

Introduction/Background

Patients with drop foot commonly use ankle-foot orthosis (AFO) as walking aid, but the impact on gait abilities of the orthosis design is still unclear. The aim was to compare gait abilities and satisfaction of patients with drop foot wearing an helicoidal AFO (hAFO) versus a standard AFO (sAFO) or no AFO (noAFO).

Material and Method

Twenty patients (12 females, age ranging from 29.5 to 79.4 years), with unilateral drop foot in relation with peripheral neurological deficit and myopathy (n=14 and n=6, respectively; duration of disease ranging from 4 to 558 months) were included in a randomized cross-over study.

Gait abilities were assessed with the 6-minute walk test (6MWT) and the Timed Up and Go (TUG) test in 3 conditions (noAFO, sAFO and hAFO) using identical shoes. The Quebec User Evaluation of Satisfaction with assistive Technology (QUEST) assessed the satisfaction while wearing sAFO and hAFO. Data were described with median±IQR. Friedman and Wilcoxon tests were used to compare 6MWT, TUG and QUEST between conditions.

Results

There was a positive effect of wearing an AFO on the 6MWT (Chi²=30.6, p<0.001): the improvement from the noAFO condition (336.5±110.3m) was 15% with sAFO (388.5±137.0m; p=0.079) and 32% with hAFO (443.5±91.0m; p<0.001), with a difference of 14% (p<0.001) between hAFO and sAFO. The TUG was also improved by wearing an AFO (Chi²=22.4, p<0.001): the improvement from the noAFO condition (10.75±3.36s) was 7% with sAFO (10.04±3.43s; p=0.334) and 21% with hAFO (8.48±2.89s; p<0.001), with a difference of 15% (p=0.002) between hAFO and sAFO. The QUEST scores (from 0 to 5) were higher for hAFO than sAFO for device (4.63±0.97 vs 3.25±1.04; p<0.001) and service (5±0.25 vs 4.63±1.25, p=0.037) subscales.

Conclusion
The use of hAFO for drop foot improves gait abilities in comparison with sAFO or noAFO, with a higher patient satisfaction.

**Keywords**

Foot orthoses; Drop Foot Gait; Walk Test

*Conflict of interest*
*Disclosure statement:*
*Funding source by InnovPulse*
Speech and language disorders are being widely discussed and identified as possible casual factors underlying developmental disabilities. As might be expected, children with Cerebral Palsy (CP) have an increased risk of language and speech disorders. Therefore, indicating the severity of limitation in language performance in daily life seems necessary. The present study aimed to explore syntactic delays in order to find the domain acquiring the least score among Persian-speaking children with spastic CP.

Material and Method

Ten Persian-speaking children with spastic CP (6 boys and 4 girls) aged 7 to 12 were recruited from special education school for children with physical and multiple disabilities and also mainstream education of public school across Shiraz. We used a standardized and norm-referenced test known as Test of Language Development (TOLD) to determine syntactic capacities of these children.

Results

With respect to raw scores of children with spastic CP in each task, mean of scores was taken into account as a predictor in this analysis. Based on one-way ANOVA procedure, our findings, for the first time confirmed that mean of Grammatical Understanding Scores (17.30) was lower than that of Grammatical Completion scores (17.60 ) and Sentence Imitation scores (18.90). These results demonstrated a deficit in syntactic ability hinting to a basic impairment as manifested in poorer recognizing present and past tense for different verbs.

Conclusion

Taken together, greater insight into the development of language and communication performance is needed. No study has specially addressed the issue of evaluating other Persian linguistic features of speech in different subtypes of CP. Future investigations should address this issue. Additionally, it is hoped that insight in language impairment of Persian-speaking children with spastic CP can be considered as a guideline to linguists and speech-language
therapist to use special intervention programs and know CP children limitations in language skills better.

Keywords

Cerebral Palsy; Language disorders; Linguistics

No conflict of interest
Poster Tour

Poster tour: Language: What's new?

ISPR8-0223

POST-TRAUMATIC COGNITIVE DEFICITS: WHETHER SPEECH TRAINING IMPROVE COGNITIVE FUNCTIONS?

E. Zubrickaya¹, E. Mozhejko¹, S. Prokopenko¹

¹Krasnoyarsk State Medical University, Department of Nervous Diseases, Krasnoyarsk, Russia

Introduction/Background

TBI is the leading cause of disability in the world due to the development of motor and cognitive disorders that occur in 70-100% depending on the extent of the injury. **Object:** to evaluate the results of rehabilitation capacities of the author computer program based on the application of functional training verbal domains of the brain to recovery cognitive deficits.

Material and Method

with the aim to study the problem of the cognitive impairment of post-traumatic genesis, 49 patients after TBI of moderate severity (20,4%) and after severe TBI (79,6%) were examined. Before and after the treatment all patients were examined with the help of neurological examination, neuropsychological examination using rating scales: Schulte’s table (TSh), the literal and categorical associations test; Mini-Mental-State-Examination (MMSE); Frontal-Assessment-Battery (FAB); Clock-Drawing-Test; Test "10 words"; Hospital-scale-of-anxiety-and-depression (HADS). Patients were randomized into two groups: I-control group (22 people) - the patients took the medication according to generally accepted standards of treatment; II-experimental group (27 people) - patients who in addition to treating of TBI, have the rehabilitation of cognitive impairments, using the author correction programs. The complex of programs was represented by 8 blocks of items, each of which is designed in accordace with exposure to a specific speech domain: motor, amnestic, acoustic-gnostic and semantic domains. Analysis of the results was performed using the method of non-parametric statistics for two independent groups (Mann-Whitney test) of package Statistica10.0.

Results

in experimental group (II) there was statistical advantage in recovery of cognitive functions scale (I-II-p*): MMSE (24[22;26]-26[24;28]-0.011*), FAB (14[13;16]-16[15;17]-0.003*), TSh (82[52;100]-56[40;70]-0.009*), "10 words" (6[5;8]-8 [6;9]-0.050*), "Categorical Association" (11[9;16]-15[12;18]-0.018*).

Conclusion

the obtained result indicates the presence of a regenerative effect on the gnostic, speech functions, mediated by the second functional unit of the brain and general activating effects on regulatory and neurodynamic processes of the brain, and can be recommended in complex rehabilitation treatment of TBI.
Keywords

posttraumatic cognitive impairments; cognitive rehabilitation; the computer stimulating programm

No conflict of interest
Poster Tour

Poster tour: Language: What's new?

ISPR8-1026
CAN AGE RELATED HEARING LOSS AFFECT LANGUAGE REHABILITATION IN APHASIC PATIENTS?
L. Medeiros¹, R. Dinis-Sousa¹, M. Martín¹, F. Faria¹
¹Centro de Medicina de Reabilitação de Alcoitão, Adult General Rehabilitation, Alcabideche, Portugal

Introduction/Background

Aphasia is a language disorder caused by left hemispheric lesion, compromising functional recovery. Age related hearing loss (ARHL) decreases understanding spoken language, and represents a major public health issue despite the little attention received, affecting around 30% of europeans by the age of 70 years. The populations most susceptible to hearing loss and to aphasia overlap and co-occurrence of both conditions can lead to compounded communication impairment.

Our goal was to review existing data about occurrence of ARHL in patients with aphasia, concerning language rehabilitation.

Material and Method

A search of PubMed database and selection of eligible studies was performed. We applied a combination of keywords including: age related hearing loss, aphasia, stroke, peripheral auditory system, hearing aids and language.

Results

A total of 94 studies were found, from which 19 met our selection criteria.

We found that the assessment of ARHL in aphasic patients remains underinvestigated. ARHL is a possible biomarker and modifiable risk factor for cognitive decline, and there is strong cross-sectional association between stroke and hearing loss.

Studies support that hearing evaluation should be performed in aphasic patients. Pure tone audiometry can be used as hearing screening in the post-acute phase, and a study showed that 72.82% of patients successfully underwent this test. Speech audiometry can be compromised, but the performance in this exam is largely determined by hearing loss rather than by aphasia, so clinicians should not hesitate to use this tool if patients are able to repeat single words. Conclusion

Therapeutic success in aphasia can be reduced by an existing ARHL, and hearing evaluation is justified in all patients. Despite the evidences, hearing screenings are being conducted only.
inconsistently with this population. There is a need to develop tools that are easily accessible and validated for aphasia. Moreover, the role of hearing aids in aphasic patients’ rehabilitation remains unclear.

Keywords
aphasia; age related hearing loss; language

No conflict of interest
Poster Tour

Poster tour: Language: What's new?

ISPR8-1343

PRELIMINARY REPORT ON THE MEDICAL LANGUAGE AS A FACTOR SUPPORTING OR HINDERING THE REHABILITATION PROCESS OF HOSPITALIZED PATIENTS

S. Krukowska¹, K. Koszela², M. Woldanska-Okonska²

¹Department of Foreign Languages- University of Lodz- Poland, Department of Rehabilitation and Physical Medicine- Medical University of Lodz- Poland, Lodz, Poland

²Medical University of Lodz- Poland, Department of Rehabilitation and Physical Medicine, Lodz, Poland

Introduction/Background

Medical communication in Poland is insufficiently tested and underestimated area. Right way of communication tells of professionalism of medical staff and results in success in therapy. How to talk to a patient and communicate good and bad news – these are skills that should be developed at every level of medical education.

The aim of the presentation is to show research on medical language during rehabilitation process. We focus on:

• Comparison of communication methods used by doctors, nurses and physiotherapists with patients during hospitalization;

• Analysis of medical language (general vocabulary, neologisms, words loan from foreign languages, specific phrases and words used in unusual way in context);

• Analysis and assessment of understanding of professional medical language by patients;

• Assessment of how medical staff understands colloquial vocabulary of patients;

• Recognizing areas where communication with patients does or doesn’t run smoothly;

• Finding optimal methods of doctor/nurse/physiotherapist – patient communication.

Material and Method

The research has been conducted in a group of 150 male and female patients (aged 18-80) without cognitive disorders, by using original questionnaires completed by the patients. They contain questions allowing medical language to be analysed as a factor supporting or hindering proper communication. For pain assessment was used The Laitinen Modified Questionnaire Indicators of Pain and The Visual-Analogue Scale. The results were statistically analyzed.

Results
The results show poor understanding of medical language in Polish patients. They feel confused by language or specific terms used by medical staff and are afraid of asking additional questions. On the other hand many doctors consider patients’ language to be confusing sometimes.

**Conclusion**

The improvement of communication skills is needed. On the basis of the research should be created communication patterns for medical staff, which should have a positive effect on rehabilitation process and improve the quality of patients’ life, as well as satisfaction of medical staff at work.

**Keywords**

medical language; medical communication; rehabilitation

*No conflict of interest*
Poster Tour

Poster tour: Language: What's new?

ISPR8-1535
RECOVERY OF LANGUAGE FUNCTION AND PROGNOSTIC FACTORS DURING THE FIRST YEAR AFTER ISCHEMIC STROKE
K. Kim

Samsung Medical Center- Sungkyunkwan University School of Medicine, Department of Physical and Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background

In this study, we investigated the language function recovery and influencing factors at 1 year after their first-ever ischemic stroke in patients with language disorders.

Material and Method

We analyzed the data of 235 patients with first-ever acute ischemic stroke in the left hemisphere who completed Korean version of Frenchay Aphasia Screening Test (K-FAST) at 7 days, 3 months, 6 months, and 1 year after stroke onset. Repeated measures ANOVA was used to investigate changes of language function among each time points. Subgroup analysis was performed according to the K-FAST score category at 7 days after onset. The Broca's area, Heschl's gyrus, and Wernicke's area were selected as the regions of interests (ROIs). Using the MRLcro® software, each patient's lesion volume and involvement of ROIs were examined in their diffusion-weighted images. Improvement of language function was assessed by a shifting of the K-FAST score category and the K-FAST score changes (delta K-FAST) from 7 days to 1 year after stroke onset. Multiple logistic regression analysis and multiple regression analysis were performed to investigate influencing factors for category shift and delta K-FAST, respectively.

Results

Significant differences were noticed in mean K-FAST scores between each assessment time points, however, secondary analysis revealed that these differences were contributed by initially severe K-FAST subgroup (p<0.05). Positive factors for the K-FAST category shift over time were female, alcohol consumption, and involvement of Heschl's gyrus, whereas negative factors were involvement of Wernicke's area and old age. Obesity and stroke lesion volume were positively related to higher delta K-FAST from 7 days to 1 year.

Conclusion

These results demonstrated that recovery of language function differently occurred according to the initial severity of language dysfunction. Patients who initially suffered from larger stroke lesion or patients who had involvement of Heschl's gyrus demonstrated better catch-up of language function over 1 year after their stroke onset.

Keywords
aphasia;prognosis;recovery

No conflict of interest
Poster Tour

Poster tour: Language: What’s new?

ISPR8-1923
EXPLORATORY STUDY OF LANGUAGE PRAGMATIC SKILLS IN RELAPSING-REMITTING MULTIPLE SCLEROSIS (RRMS): THE EXAMPLE OF THE COMPREHENSION OF INDIRECT REQUESTS.
F. Chapelain¹, V. Dardier², L.M.I. Gaïd³, L.S.B. Sandrine², N. - Benoît¹, E. Gilles³, V. Christophe.⁴, A. Philippe², G. - Philippe¹
¹Pôle MPR Saint-Helier, neurology, Rennes, France
²Bretagne Loire University - Rennes 2, Laboratory of Psychology: Cognition- Behaviour- Communication LP3C- EA 1285, Rennes, France
³Centre Hospitalier Universitaire, Neurology Department, Rennes, France
⁴Centre Hospitalier Universitaire, Neurology Department, Angers, France
⁵University of Angers, Laboratory of Psychology of the Pays de la Loire- PRES Lunam-, Angers, France

Introduction/Background

Along with the development of knowledge about cognitive abnormalities in MS, various clinical observations report neurobehavioural changes in this disease. However, there is a lack of research on social behaviour regulation skills.

The few studies conducted in this field investigated emotional processing and theory of mind skills. Results suggest impairment in both aspects and they closely follow the results achieved in others pathologies [1].

Although it is an essential component for our interaction regulation, the issue of social analysis of language or the pragmatic of language is very rarely addressed in MS.

Material and Method

Our aim is to conduct an exploratory study of 20 patients with RRMS single. This study focuses on assessment of pragmatic skills from a comprehension of indirect requests task and a corresponding metapragmatic knowledge expression (the ability to apprehend uses of language in context) task. These tests are based on previous research in brain-damaged patients [2].

The comprehension of indirect requests task consists of 12 standardized situations where two characters appear in everyday life situations. In each story, the speaker makes an indirect request and the patient has to choose the end of the story. Then, the patient has to choose the end of the story from three options (response to a multiple choice question). The metapragmatic knowledge assessment is performed by asking the patient to justify his or her reply.

Results
The results highlight difficulties in comprehension of indirect requests for RRMS patients depending on the complexity of the request. Patients suffer from the expression of meta-pragmatic knowledge impairments

**Conclusion**

Thus, these results tend to closely follow clinical observations made in patients in patients with right or with frontal brain damage who often show a partial comprehension of indirect utterances, with significant difficulties in expression of metapragmatic knowledge [2].

**Keywords**

multiple sclerosis; pragmatics

*No conflict of interest*
Poster Tour

Poster tour: Language: What's new?

ISPR8-2032
APHASIA FLOW – PERFECT TOOL FOR AN INITIAL APPROACH OF THE PATIENTS WITH LANGUAGE DISORDER
G.H. Leandro¹, S.E. Rego¹, V. Milet¹, J. Moreira¹, G. Lúcia¹, A. Reis¹, C. Martins¹, D. Martins¹, R. Lopes¹, R. Albuquerque¹
¹Centro Hospitalar Universitário do Algarve, Physical and Rehabilitation Medicine Department, Faro, Portugal

Introduction/Background

Language consists in the capacity of understanding and use of symbols, in particular verbal symbols, for the elaboration of thought and as a means of communication. It is a complex process that involves multiple structures of the dominant hemisphere, left hemisphere in 95% of right-handed individuals, and 70% of individuals left-handers. The areas of language include the primary cortical areas (visual and auditory cortex), specific associative cortical areas (area of Broca and Wernicke), among other areas of the frontal, parietal and temporal lobe.

Aphasia is a language disorder resulting from a brain lesion in that same hemisphere, affecting certain aspects of communication, such as the understanding of simple orders, naming of objects, repetition of words and the fluency of speech. Approximately 40% occurs after a stroke. There are, however, other etiologies.

Material and Method

With this study sought to develop a language evaluation that could be performed at the bedside of the patient. To do this, we have created the application Aphasia Flow (Android OS®), which, in its origins, consists of a flowchart built based on three cognitive abilities: fluency, comprehension and repetition. This flowchart allows eight combinations and, therefore, eight different diagnoses.

Results

Until this day, the application has a total of 130 installations and a very positive feedback from users

Conclusion

For an experienced professional, it is not expected any complication in the making of an accurate assessment of the language. However, we believe that the use of the application presented here can be useful for doctors/interns/other health professionals less trained in the matter, allowing them to make a more assertive and quick evaluation. The application is not intended to replace the opinion of medical specialist, nor provide a definitive diagnosis. What it intends to do is give the examiner a quick and dematerialized method for an initial approach to the patient.
Keywords

Language disorder;aphasia;mobile phone application

No conflict of interest
Poster Tour

Poster tour: Language: What's new?

ISPR8-2163
DEVELOPMENT OF AN ENGLISH-LANGUAGE VERSION OF A JAPANESE IPAD APPLICATION TO ENHANCE PERSON-CENTRED GOAL SETTING IN REHABILITATION

W.M. Levack1, K. Tomori2, K. Takahashi3
1University of Otago, Medicine, Wellington, New Zealand
2Tokyo University of Technology, Department of Occupational therapy - School of Health Science, Tokyo, Japan
3Kitasato University, Department of Occupational Therapy - School of Allied Health Science, Kanagawa, Japan

Introduction/Background

Person-centred goal setting is considered a core part of the rehabilitation process. However, barriers to patient involvement in goal selection exist, including: cognitive and communicative impairments; tendencies for rehabilitation professional to control and direct the goal selection process; and difficulties some patients have with identifying meaningful goals that are relevant to rehabilitation. The aim of this study was to develop an English-language version of a Japanese iPad application designed to facilitate share-decision making around goal setting in rehabilitation: Aid of Decision-making in Occupational Choice – English (ADOC-E). ADOC-E makes use of images and a structure process to facilitate goal setting discussions.

Material and Method

Phase 1: Delphi methods to reach consensus, with a group of 12 expert occupational therapists from four countries (UK, USA, Australia, and New Zealand) on the text and images in ADOC-E.
Phase 2: Testing correct recognition (unprompted and prompted) of images in ADOC-E by health service users (n=25; age 20-95 years; Mini-Mental State Exam 13-30) in inpatient rehabilitation and residential care.

Results

Four Delphi rounds were required to reach consensus with the expert occupational therapists on the content of ADOC-E, ending with 100 items covering daily activities that people do and social roles they participate in. Ninety-five percent (95/100) of ADOC-E items could each be correctly identified by over 80% of participants with either unprompted or prompted recognition. Images were less like to be correctly identified (and were more challenging to represent in a single image) if they focused on goals at the level of social participation.

Conclusion

While a few of the more abstract concepts in ADOC-E (related to complex social roles) were less likely to be correctly recognised by all participants, the text and images ADOC-E were deemed to be fit for purpose overall, and ready for future clinical testing.
Keywords

goal setting; person-centred care; digital technology

No conflict of interest
SPEECH PAIRED SENSORY FEEDBACKS ENHANCING THE PERCEPTION OF EMBODIMENT OF THE REFLECTION OF FACE

L. Ding¹, L. Li², S. Chen¹, J. Jia¹²

¹Huashan Hospital, Department of Rehabilitation Medicine, Shanghai, China
²Huashan Hospital Jing'an Branch, Department of Rehabilitation Medicine, Shanghai, China

Introduction/Background

Embodiment is recognized as a paramount determinant of efficiency of mirror therapy (MT) and virtual reality (VR) techniques, which is generally induced by visual and proprioceptive feedback. However, emphasis on the embodiment of extremities hindered the combining of sensory feedbacks, like auditory feedback. The goal of this study is to investigate the effect of speech paired auditory and visuo-proprioceptive feedback on embodiment of the reflection of face during MT.

Material and Method

Thirty-four participants were recruited and a customized camera-based MVF apparatus was employed to provide the mirror visual feedback (MVF). The experiment entailed three phases: rest (visual feedback), facial expression (viso-proprioceptive feedback) and enunciation (auditory and viso-proprioceptive feedback). Patients were required to imagine that the face in the screen was his/her own face during experiment. The embodiment was measured after each phase of the experiment using a 11-point Likert scale embodiment questionnaire which was categorized as symmetry, ownership, agency, and deafference.

Results

The Friedman test revealed that the symmetry, ownership, and agency were related to the sensory feedbacks (p < 0.001). The followed pairwise comparison demonstrated that embodiment was enhanced with the combining of sensory feedbacks; moreover, participants agreed more strongly with statements associated with symmetry, ownership, and agency when enunciating, comparing with rest or facial expression motions (all p < 0.05) (see Figure 1).
Conclusion

Sensory feedbacks play a crucial role of embodiment which might derive from the visual feedback. However, the combining of speech paired auditory and viso-proprioceptive feedback could significantly enhance embodiment, comparing with mere watching reflection or performing synchronised motions.

Keywords

Embodiment; Face; Sensory Feedback

No conflict of interest
Introduction/Background

The main objective of this research is to determine speech and language development progression in the first three years of life with children who were diagnosed with intracranial hemorrhage of the first and the second stage.

Material and Method

The sample includes 31 infants who were diagnosed with intracranial hemorrhage I / II and are the patients of Special Hospital for Cerebral Palsy and Developmental Neurology in Belgrade. These children came to our hospital with the established diagnosis (ultrasound) and they were referred for further monitoring of their psychomotor development. “A diagnostic kit for examination of capacities for speech, language, reading and writing” by authors (Posohova & Bjelica 2001) is the evaluation instrument that was used for testing these children.

Results

With children with intracranial hemorrhage, at 6.5% of the sample, parents argue that the child made no sounds until six months of age, it didn’t react to stimuli from the environment. The only way they communicated was through crying. More intensive manifestation of cooing these children was in the fifth and the sixth month, in 64.5% of the sample, while in 9.7% of children cooing appeared in the seventh and the eighth month.

Conclusion

We made a conclusion based on these facts that prelingual development in these children is delayed. Speech and language development delay was continued between the first and third year of life. It was manifested in the appearance of the first words, vocabulary and a quality of pronunciation. The most intensive leap in the field of speech and language development with these children occurred at the age of three, when they reached typical development framework.

Keywords
cerebral palsy, intracranial hemorrhage, speech

*No conflict of interest*
Poster Tour

Poster tour: PRM department organization

ISPR8-2648
EVALUATION OF A NURSING SWALLOWING ESTIMATION AS A TOLL FOR IDENTIFICATION OF SWALLOWING DISORDERS ON ADMISSION TO REHABILITATION FOLLOWING ACQUIRED BRAIN INJURY

1loewenstein hospital, Brain rehabilitation, raanana, Israel

Introduction/Background

With the objective of identifying swallowing disorders as early as possible following hospitalization following acquired brain injury (ABI) a nursing swallowing evaluation (NSE) was developed. The estimation includes a test of swallowing without food followed by cautious eating of different solid and fluid food textures. Patients in whom the NSE raises suspicion of a swallowing disorder are referred for a full speech language pathologist swallowing assessment (SLP-SA). The guideline for the nursing evaluation is that textures in doubt should be prohibited until SLP-SA.

Objective: To test the match between the NSE and the SLP-SA.

Material and Method

Data was collected retrospectively from files of patient admitted between 1st July 2016 and 1st July 2017 and diagnosed on admission, by NSE, with swallowing disorder. The results of these evaluations were compared to results of SLP-SA.

Results

311 patients without a naso-gastric tube/gastrostomy were admitted to the ward during this period. All underwent a NSE on admission. In 89 patients (28.6%) the estimation identified difficulty in swallowing of at least one texture, and the estimation was compared to SLP-SA. In 41.6% of patients there was a complete match between the two evaluations. In 48.3% NSE resulted in prohibiting doubtful textures later cleared by SLP-SA, as required by NSE guidelines. In 10 patients (11%) SLP-SA resulted in more severe prohibitions than NSE. These mismatches were for fifteen different texture tests, mostly soft solid 8/15 (72%) and thin fluid 3/11 (27%). In all other textures the uniformity was almost complete.

Conclusion

A NSE is an applicable tool. It provides a reliable first evaluation of swallowing in patients following ABI. Further nursing training is required regarding evaluation of soft solid and thin fluid swallowing.

Keywords
Brain Injury; Swallowing disorders; Nursing swallowing estimation

No conflict of interest
Poster Tour

Poster tour: PRM department organization

ISPR8-0266

USERS’ REQUIREMENTS EXPLORATION FOR INTEGRATING INFORMATION COMMUNICATION TECHNOLOGY IN REHABILITATION UNITS

H.W. Liang¹, H.G. Chen²

¹National Taiwan University College of Medicine and National Taiwan University Hospital Yunlin Branch, Department of Physical Medicine and Rehabilitation, Taipei, Taiwan R.O.C.
²National Taiwan University, Department of Business Administration, Taipei, Taiwan R.O.C.

Introduction/Background

The need for rehabilitation and long-term care is rising and more and more Information communication technology (ICT) is introduced into clinical practice. One of the key successful factors is to design a system which could meet the requirements and be accepted by the clinicians. However, these users’ requirements are not well explored. The aim of the current study is to explore the users’ requirement in rehabilitation units and assess the priority to integrate ICT into clinical service based on this requirement by a structured decision-making model.

Material and Method

Firstly, 11 senior members in the rehabilitation unit of a university hospital were interviewed to list the users’ pain points of current service process and possible approaches by ICT from the prospective of clinical workers. Furthermore, all the unmet needs were summarized into domains as the criteria to determine the preference for ICT or traditional rehabilitation among 33 senior members in 2 affiliated university hospitals by the analytic hierarchy process (AHP).

Results

Seven domains were summarized through the expertise’s interviews. According to the AHP analysis, assessment and recording (0.194) ranked first as the important consideration, followed by clinical alerts (0.186), implementation of rehabilitation (0.175), patient education (0.170), team communication (0.144), scheduled management (0.089) and finally localization of patients/workers (0.042). Different professional disciplines placed slightly different weights on these domains (Table). Besides, the subjects placed a higher preference on ICT than traditional practice on all the domains.

Table. The Individual preference weights among professional disciplines

<table>
<thead>
<tr>
<th></th>
<th>Patient education</th>
<th>Schedule management</th>
<th>Implementation of rehabilitation</th>
<th>Clinical alerts</th>
<th>Localization</th>
<th>Assessment/recordi</th>
<th>Team communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician¹</td>
<td>0.230</td>
<td>0.078</td>
<td>0.224</td>
<td>0.188</td>
<td>0.033</td>
<td>0.122</td>
<td>0.124</td>
</tr>
</tbody>
</table>
### Conclusion

The above findings documented preference weights on the needs to integrate ICT into clinical practice to improve the efficiency, safety and outcome.

### Keywords

information communication technology; analytic hierarchy process

_No conflict of interest_
Multidisciplinary meetings (MDM) are conducted weekly in the department of Rehabilitation Medicine (RMD), SGH. Manual MDM documentation by doctors in the managing team was noted to be incomplete in terms of estimated date of discharge (EDD) and team member’s input. We aim to improve the MDM documentation by including both the EDD and input from the various members of the RMD team from a baseline of 15% to 50% within 6 months.

Material and Method

Through means of case notes review, the baseline appropriate documentation rate of the MDM was noted to be 15%. A fishbone analysis was done (please see below). It was decided that the first intervention bundle would be to implement a standardized electronic template for MDM and demonstrating its use to the junior doctors every month. The second intervention bundle, which was implemented 3 months later, involved introducing a 2-page information on MDM documentation in the junior doctors’ orientation guide (soft copy) and a monthly demonstration to doctors doing the MDM documentation.
Results

After the first intervention bundle was implemented the appropriate documentation rate improved from 15% pre intervention to 87.5% post intervention.

After the second intervention bundle was implemented, the appropriate documentation rate was sustained above 50% at 89.7%. (Please refer to Figure below).

Conclusion

The implementation of a standardized Electronic Template for MDM documentation led to improvements in the rate of appropriate documentation of the MDM proceedings which was sustained with regular engagements with RMD doctors doing the MDM documentation.

Keywords

Electronic template; documentation

No conflict of interest
Poster Tour

Poster tour: PRM department organization

ISPR8-0375
STRATEGIES TO IMPROVE THE COMPLETENESS OF A SYSTEM OF SUBSTITUTE THERAPIST IN A REHABILITATION CENTER
F.L. Ku¹, C.P. Huang¹, C.C. Tsai¹, T.W. Chen¹
¹Kaohsiung Municipal Ta-Tung Hospital, Department of Rehabilitation, Kaohsiung City, Taiwan R.O.C.

Introduction/Background

In a rehabilitation center, every patient needs continuous rehabilitation to achieve optimal treatment effect. However, therapists need to take a rest whenever necessary. Therefore, a system of substitute therapist (SST) is required so that patients can acquire high quality of medical treatment service. Furthermore, the organization can operate normally. However, there is no sound SST. The completion rate of SST was 70.1% in April 2017. The objective of this project was to improve the completeness of SST.

Material and Method

This project applied the procedure of task achieving quality control (QC) story to develop strategies to solve the issue. The goal setting was to achieve 90% of completion rate of SST. We developed the strategies by brainstorming and literature reviewing. The proposed strategies included: (1) applying labor-saving treatment (robot-assisted therapy, circuit training, interaction group, self-training); (2) applying ISBAR (Introduction-Situation-Background-Assessment-Recommendation) for hand-off report; (3) implementing auditing system of original therapist and substitute therapist.

Results

The completion rate of SST was 93.3% after strategy one (July 2017), 94.4% after strategies one and two (August 2017), and 98.4% after strategies one, two and three (September 2017). Furthermore, the patient satisfaction increased form 3.9 points to 4.6 points (maximum is 5 points). All the three strategies were effective. Therefore, all the three strategies were adopted to formulate standard operation procedure (SOP) for SST.

Conclusion

This project successfully improved the completeness of SST through task achieving QC story. The three strategies were implemented in sequence. First, the strategy one was to increase number of patients that substitute therapist can treat simultaneously. Then, the strategy two was to improve handoff communication. Finally, the strategy three was to consolidate behavior change of therapists. The strategies proved to be capable of providing solutions for clinical problems.

Keywords
System of substitute therapist; Rehabilitation center; Quality control (QC) story

No conflict of interest
DEVELOPMENT OF A SELF-CHECKLIST FOR OCCUPATIONAL THERAPISTS TO SHARE INFORMATION WITH CARE WORKERS AT SPECIAL ELDERLY NURSING HOMES IN JAPAN

Y. Usami¹,², R. Kobayashi³
¹Tokyo Metropolitan University, Doctor Course- Department of Occupational Therapy- Graduate School of Human Health Sciences, Tokyo, Japan
²Teikyo Heisei University, Department of Occupational Therapy- Faculty of Health and Medical Science, Tokyo, Japan
³Tokyo Metropolitan University, Department of Occupational Therapy- Graduate School of Human Health Sciences, Tokyo, Japan

Introduction/Background

Collaboration between occupational therapists (OTs) and care workers (CWs) is important in special elderly nursing homes. Information sharing has been reported as the central element of such collaboration. The purpose of this research was to develop a self-checklist to evaluate how much OTs are involved in factors promoting information sharing when they communicate with CWs in special elderly nursing homes.

Material and Method

We conducted a 19 item questionnaire survey with 401 OTs working in special elderly nursing homes. Analysis of data was based on item response theory (IRT).

Results

Completed questionnaires were collected from 298 people (collection rate 74.3%). We set 223 as effective number of respondents (effective response rate 55.6%). The IRT result was 64 points when the test response function (TRF, θ) equaled 0. The discrimination parameter (a) was 0.980, the range was 0.599 to 1.197, and all discriminatory power values were 0.5 or more. The difficulty parameter was 0.346 for b₁, -1.275 for b₂, -2.538 for b₃, and all the difficulty parameters were within an absolute value of 4.0. The test information function (TIF, θ) value of -1.6 to -1.2 indicated the upper limit to be 5.6.

Conclusion

It is conceivable that the checklist is appropriate for scale configuration in all items. While the checklist has low measurement accuracy when administered to OTs with a high ability to promote information sharing, when implemented for OTs with moderate capacity, the measurement accuracy is sufficiently conceivable.
Keywords

Special elderly nursing home; Occupational therapy; Collaboration

No conflict of interest
Introduction/Background

Pain is a cause of suffering and deterioration of quality of life and one of the most frequent reasons for consultation in the elderly, resulting in increased prescription of analgesics with respect to young population. The use of analgesics in the elderly has not been widely described in our environment.

OBJECTIVES: To characterize the use of analgesics in patients older than 65 years, with non-oncologcal pain in a sample of patients admitted to a third level hospital. Describe the type of pain and its characteristics in those patients.

Material and Method

Descriptive, prospective study, a series of cases to describe the pain and analyze the use of analgesics in patients older than 65 years admitted to a third level hospital in August 2017, excluded those who were in the postoperative period, with a history of oncological pathology or with active cancer and those with a diagnosis of fibromyalgia. The data was collected on RedCap® platform; including clinical history data, functional tests, visual analog scale (VAS) and shortened McGill questionnaire (SF-MPQ).

Results

The use of opioids was not dependent on the patient's functional status (p=0.3214). The most frequently used descriptors within SF-MPQ were "throbbing", "hot-burning", "heavy", "aching" and "tiring-exhausting". There was no difference in the SF-MPQ indices between patients who received opioids and those who did not. No significant difference was found when comparing VAS scores in the group that received non-opioid Vs opioids (p=0.1904 and p=0.21, significance=0.05.

Conclusion

DISCUSSION: Pain management in a sample of elderly patients included both opioid and non-opioid medications, in all patients effective analgesia was evidenced with EVA and SF-MPQ. CONCLUSIONS: Pain in the elderly is a challenge in clinical practice. The importance of the use of multidimensional pain measurement instruments and multimodal management is highlighted.
No conflict of interest
INTTEGRATED GERIATRIC TEAM: PHYSIATRIST ROLE IN INDONESIA ACUTE WARD

M. Harini¹, S.A. Nuhonni¹, W. Aries¹
¹Cipto Mangunkusumo Hospital, Rehabilitasi Medik, Jakarta, Indonesia

Introduction/Background

Integrated geriatric team in Cipto Mangunkusumo Hospital mainly consists of gerontologist (internist), physiatrist and psychiatrist. We have acute ward and outpatient clinic. In acute ward, all patients are assessed by the team since first day of hospitalization. We work together in order to give safe clinical service for geriatric patients, so that they could cross over their acute/critical condition and maintain/improve their quality of life. In this study, we try to define physiatrist role in acute geriatric ward. This information could be reference in developing geriatric rehabilitation curriculum for PM&R residency and fellowship program.

Material and Method

This is a descriptive study; we review all geriatric patients that had been discussed in our routine team meeting. The meeting is held once a week; we discuss 1-2 selected patients. Our discussion concern is patient clinical and functional goal resulting recommendation related to diagnostic, medical or psychosocial intervention that suitable for the patients. We make summary about physiatrist expertise that documented in geriatric meeting report from 2015–2018, then classify them into main cores of acute geriatric problems.

Results

There are 66 patients reported along 2015-2018. Physiatrists describe and were asked about patient mobility and ambulation function (46%), also caregiver competency requirements (14%). It is used by the team for making realistic discharge planning. In some cases, physiatrists do basic examination related to bowel-bladder function (8%), swallowing function and communication function (8%); the teams then collaborate to conclude advanced diagnostic examination that may confirm the result.

Conclusion

Physiatrist play specific role in geriatric team in Indonesia especially in acute ward. Adjustment in residency and fellowship program should be proposed to meet competency required to work in interdisciplinary team.

Keywords

Integrated geriatric team; Geriatric rehabilitation; Acute ward rehabilitation

No conflict of interest
Introduction/Background

The therapeutic relationship may be critical to rehabilitation outcome. However, knowledge advance is hampered by existing measures, which were not designed for use in the rehabilitation context and fail to capture essential elements. Drawing on a conceptual framework developed through prior research, we aimed to develop a robust measure of therapeutic relationship, tailored to the rehabilitation context.

Material and Method

A measure development study drawing on steps proposed by Prior et al., 2011. We undertook a literature search to identify existing measures of therapeutic relationship. All items were extracted and mapped against our conceptual framework. We removed duplicate and conceptually incongruent items, and developed new items for aspects not already captured. We reworded items to ensure consistency in item scoring direction and language. A preliminary pool of 68 items were then piloted with rehabilitation clients using cognitive interviewing methods to determine their comprehensibility, acceptability, relevance and answerability. The research team met to examine the data and identified items for deletion or revision.

Results

Clients (n=13) were drawn from a diversity of contexts and included people with neurological (n=5), long-term chronic (n=4), and acute (n=4) conditions. We deleted 32 and reworded eight items in response to feedback. Reasons for deletion included overlap with other items (n=22), not relevant across populations/context (n=5), ambiguous (n=4), or too global (n=1).

Conclusion

A 36-item scale was derived aiming to measure therapeutic relationship in rehabilitation. This measure is now being pilot tested with a larger cohort of clients to further refine the measure using Rasch analysis.

Keywords

Therapeutic Relationship; Measurement; Rehabilitation processes
No conflict of interest
Poster Tour

Poster tour: PRM department organization

ISPR8-2452
CHANGING CLINICIAN BEHAVIOUR TO OPTIMISE REHABILITATION OUTCOME: AN IN-DEPTH EXAMINATION OF A KNOWLEDGE TRANSLATION PROCESS
N. Kayes¹, C. Cummins¹, S. Mudge¹, P. Larmer², D. Babbage³
¹Auckland University of Technology, Centre for Person Centred Research, Auckland, New Zealand
²Auckland University of Technology, School of Clinical Sciences, Auckland, New Zealand
³Auckland University of Technology, Centre for eHealth, Auckland, New Zealand

Introduction/Background

A long-standing knowledge transfer problem is the integration of adherence-promoting strategies into routine physiotherapy practice. Research promotes a combination of person-centred and targeted behaviour change techniques to optimise adherence. However, integration of these into routine physiotherapy practice has proven complex. We used this exemplar problem to examine the knowledge translation process in the context of an active, multi-component intervention.

Material and Method

Nine physiotherapists from two musculoskeletal physiotherapy clinics attended a one-day workshop, followed by a three-month knowledge brokerage period and online discussion. Data included semi-structured interviews with physiotherapists and knowledge brokers, monthly debriefing with knowledge brokers, their reflective journals, and online discussion. Data were analysed using conventional content analysis and Corbin & Strauss’s conditional matrix.

Results

Physiotherapists appeared to go through a complex, dynamic and multi-phased process; with each phase subject to a range of conditions and actions, and each representing a possible tipping point (or opportunity) for change: Making sense (e.g. contextualising knowledge, finding fit), Giving it a go (e.g. testing the waters, actively reflecting), and Putting it into practice (e.g. applying with ease, integrating into routine practice). Knowledge brokers were necessary but not sufficient for successful knowledge transfer.

Conclusion

These findings offer useful insight into strategies likely to be effective for supporting change in rehabilitation practice in a range of settings and contexts. Strategies aiming to support knowledge transfer need to be responsive to the dynamic nature of the process. Active, timely and targeted strategies tailored to specific tipping points may act as levers for change.

Keywords
Knowledge translation; Clinician behaviour; Implementation science

No conflict of interest
ABSTRACT NEED TO BE EDITED - INTEGRATED APPROACH TO REHABILITATION OF PEOPLE WITH PHYSICAL DISABILITIES IN NORTHERN PROVINCE OF SRI LANKA
A. Kulalingam
1General Hospital Vavuniya, Ministry of Health, Vavuniya, Sri Lanka

Background and Aims-
It is identified that in Sri Lanka 87 physical disable patients living per capita of 1000. According to 2015 survey report, 20000 physically disabled persons needed rehabilitation care service in Northern Province. There is only one public sector rehabilitation centre in Vavuniya district serving for entire Northern Province in Sri Lanka. Private sector for rehabilitation service is not yet developed because most of the patients with physical disabilities are living in very low socioeconomic status. The aim of this study on giving policy recommendation on integrating sectors on developing fair rehabilitation services for Northern Province and it will elicit the directions to find untapped resources into rehabilitation service development in Northern Province.

Methods-
This is a qualitative study, having convenient judgemental sampling techniques to include the stakeholders from public, private, non-profit sectors and patients with disability. All the interviews are based on open end questions and interviews are conducted by main researcher.

Results-
From this study 5 main thematic areas are identified as results. Those are; need on integration of sectors, need to have policy on handling integration, developing human resources into rehabilitation care, sustain rehabilitation care facilities by developing public sector within a time frame, gathering financial resources and advanced technologies into rehabilitation care services Northern Province of Sri Lanka.

Conclusions-
Integrated private(profit/non-profit) and public system is much more helpful for developing rehabilitation health care for war affected developing countries perspective. ventures for integration of sectors in rehabilitation services identified as infrastructure maintenance, infrastructure development investments, material supply and fleet management. It is recommended to integrate non-profit organizations than private profit services into war affected public rehabilitation care services.

Keywords
integrated approach;Northern Province of Sri Lanka;Rehabilitation service
No conflict of interest
Physician Awareness of Physical Medicine and Rehabilitation: A Cross-Sectional Study from Saudi Arabia

M.S. Benjadid

1Prince Sultan Military Medical City, Rehabilitation Medicine, Riyadh, Saudi Arabia

Introduction/Background

As the population within the Kingdom of Saudi Arabia (KSA) has increased and aged, disability has also risen. With increase demand for PM&R services and a concordant need for higher levels of awareness for PM&R in KSA. Most of the rehabilitation programs provide physical, occupational, speech and hearing therapy only. Limited research has been done on PM&R and physician awareness of PM&R in Saudi Arabia. In the current study, the objective was to ascertain the level of physician awareness of PM&R in KSA.

Material and Method

A cross-sectional study was conducted among 200 randomly selected physicians at the Prince Sultan Military Medical City, Riyadh, Saudi Arabia, from October 2016 to February 2017. A structured questionnaire was employed for data collection, included demographic criteria of the physicians and ranking in their medical licence and their general knowledge about PMR services.

Results

The 200 physicians involved in the study cohort showed a mean (±SD) age of 33± group; 82% of the physicians were residents, 13% were medical specialists (registrars and senior registrars) and 5% were consultants. The physician response to PM&R is shown. A total of 185 (92.5%) physicians reported being aware and/or heard about PM&R, while 40 (20%) responded that PM&R was identical to physical therapy. In all, 110 (55%) physicians had referred their patients to undergo PM&R treatment. 90% of the total physicians expressed that Saudi Arabia requires a greater supply of rehabilitation hospitals.

Conclusion

high level of awareness and satisfaction among Saudi physicians regarding PM&R services.

Keywords

Rehabilitation Medicine; Awareness; Saudi Arabia

No conflict of interest
COMMUNITY-BASED REHABILITATION FOR PEOPLE WITH DISABILITIES IN VIETNAM: TWO MODELS FOR ONE TARGET

V. Nguyen¹, T. Nguyen¹

¹Ministry of Labor- Invalids and Social Affairs, Institute of Labor and Social Affairs Training, Hanoi, Vietnam

Introduction/Background

This case study investigated two models of community-based rehabilitation for people with disabilities (CBR) in Vietnam. One model is carried out by Charity Association of Quang Tri province in central Vietnam. The other model is conducted by Center “For Tomorrow” in Ha Noi. The study aimed to find lessons for replicating and developing CBR models across the country. The study was conducted in late 2016 with three tasks: i) Gathering and synthesizing information on formation, development and operation of the two models; ii) Identifying advantages, disadvantages, successes and lessons learned from the two models; iii) Making recommendation for replication of the models.

Material and Method

Research methods used include desk review, focus-group discussion, in-depth interview, and observation. Reports, documents, and papers on the formation and development of the two models were gathered and reviewed. There were 8 focused-group discussion with leaders of the two models, with community leaders, and with head of clubs for PWDs in communities. A total of 30 visits with observations and in-depth interviews with PWDs and families, physicians, social workers, and volunteers of the two models were carried out. CBR guidelines of WHO/ILO/UNESCO were used as framework for analysis of the two models.

Results

Results from the research indicate that both CBR models have been implemented comprehensively and successfully, contributing to improvement of material and spiritual life of people with disabilities (PWD) and their families. Both models followed the CBR guidelines, fully integrated 5 elements – health, education, livelihood, empowerment, and social, in to their CBR programs.

Conclusion

Recommendations for replication of the two models include integrating vocational training and job promotion into rehabilitation, mobilizing community resources, mobilizing and selecting volunteers, and conducting communication to improve knowledge of PWDs and their families, and of communities on CBR, as well as on their roles in implementing CBR.

Keywords
community-based rehabilitation ;Empowerment;Social component

No conflict of interest
Introduction/Background

Functioning is the primary outcome of rehabilitation. Currently functioning outcomes are collected with a variety of assessment tools. Unless standards for reporting are in place, data derived from various assessment tools has only applicability within the individual clinical encounter, but cannot be aggregated across and within institutions, thus, lack comparability. Consequently, there is a need for a standardized reporting system to ensure that functioning information can be aggregated, compared, made available for decision-making and continuous improvement at individual, institutional and national levels. The aim is to develop and implement a standardized reporting system for national quality improvement in Swiss rehabilitation, accounting for different assessment tools used for functioning information.

Material and Method

We build upon existing data collected for Swiss national quality monitoring to derive a harmonized data set irrespective of the assessment tool used, based on a conceptually and psychometrically-sound system for standardized reporting of functioning outcomes. Change in functioning status within and across health condition groups, and its determinants, throughout the rehabilitation process will be identified. ICF linking rules, Rasch Measurement Theory and regression modelling will be used. The results will be presented to relevant stakeholders conducting Stakeholder Dialogues to develop strategies of how such a system can be implemented for quality improvement.

Results

30 Swiss rehabilitation clinics participate in the project using either the assessment tools FIM®, Barthel Index, or Health Assessment Questionnaire. First results will be available in April. This poster aims to outline the project – its background, methodology and clinical relevance.

Conclusion
First, this project recognizes the important role of functioning as primary health outcome in rehabilitation. Second, the standardized reporting system enables clinicians to maintain their existing data collection practice, while at the same time being able to aggregate and compare information. Third, this project builds upon a learning system, with emphasis on transparency and stakeholder engagement.

Keywords

Standardized Reporting; Quality Development; Functioning Information

Conflicts of interest
Disclosure statement:
This project is part of the Swiss National Science Foundation’s grant programme NRP74 “Smarter Health Care”
Poster Tour

Poster tour: PRM in national care organizations

ISPR8-0858
A NEW PHYSICAL AND COGNITIVE ACTIVITIES SCORE: THE SOFMER ACTIVITY SCORE (SAS). THE FEASIBILITY STUDY

M.D. Morard1, S. Gonzalez Monge1, P. Rippert2, S. Roche3, J.C. Bernard4, D. Lagauche5, C. Delvert1, J. Luauté6, S. Jacquin Courtois6, F. Caillet7, J. Di Marco6, F. Ghelfi10, S. Otmane2, P. Calmels5, R. Marjorie1, P.A. Joseph9, R. Ecochard3, G. Rode6, C. Vuillerot1

1Hospices Civils de Lyon- Hopital Femme Mère Enfant, Service de Rééducation pédiatrique - l’Escale, Bron, France
2Hospices Civils de Lyon, Pôle Information Médicale Évaluation Recherche, Lyon, France
3Hospices Civils de Lyon, Service de Biostatistique, Lyon, France
4Croix Rouge française, CMCR des Massues, Lyon, France
5Clinique Iris, Clinique Iris, Saint-Priest, France
6Hospices Civils de Lyon - Hôpital Henry-Gabrielle, Service de médecine physique et de réadaptation neurologique, Saint-Genis-Laval, France
7Hospices Civils de Lyon - Hôpital Henry-Gabrielle, Service de médecine physique et de réadaptation, Saint-Genis-Laval, France
8CHU de Saint Etienne - Hôpital Bellevue, Service de Médecine Physique et de Réadaptation, Saint-Etienne, France
9CHU de Bordeaux- Hôpital Saint-André et Pellegrin- Pôle Neurosciences cliniques, Service de Médecine physique et de réadaptation, Bordeaux, France
10Hospices civils de Lyon, Direction centrale des soins, Lyon

Introduction/Background

For hospitalizations in Rehabilitation Centers (RCs), the quantification of the health care givers’ activity is based on the variable dependency of the patients. The tools currently used to quantify it are not sufficiently precise. The stages of the construction of a new tool, the SAS scoring (SOFMER Activity Score), which allows for a better description of the level of activity of patients hospitalized in RCs, are presented, as is a feasibility study.

Material and Method

After a study group proposed the first version, the validity of the SAS scoring’s content was studied using the Delphi consensus method. The feasibility study was prospective and multi-site. Data related to the SAS scoring performed by a multidisciplinary team were collected and compared to a part of patients’ medico-administrative data related to dependency (AVQ scale).

Results

Eighty patients were included in the feasibility study. The average duration of the SAS scoring was 4.5 ± 3.3 min. For 97.5% of scorings, the participating professional judged that the SAS scoring was either compatible or fairly compatible with clinical practice. The internal structure of the SAS scale appears to be better than that of the AVQ scale, for which our study confirms a floor effect for all items.
Conclusion

The SAS score allows the measurement of the level of physical and cognitive activity of a patient hospitalized in RC. If the validation studies for the SAS scoring, which explore its reliability, its construct validity or criterion validity, confirm the tool's good metrological qualities, the SAS scoring will allow a better quantification of the care load.

Keywords

Activities of Daily Living; Rehabilitation Centers; Feasibility Study

No conflict of interest
Poster Tour

Poster tour: PRM in national care organizations

ISPR8-0906
THE DEVELOPMENT OF A SPECIFIC DATABASE FOR REHABILITATION CENTRES IN MADAGASCAR
I. Randriamampianina¹, A. Chamberlain²
¹Association De Medecine Physique Et De Readaptation De Madagascar Ampr Mada, Centre Hospitalier Universitaire D’appareillage De Madagascar, Antananarivo, Madagascar
²University Of Leeds, Rehabilitation Medicine, London, United Kingdom

Introduction/Background

The service provision of PRM was dramatically improved by the establishment of a trained cohort of PRM doctors in 2013 following training in 2011-2013 for a Diplome Universitaire and the immediate establishment of the Association of Physical and Rehabilitation Medicine of Madagascar (AMPR Madagascar). The Ministry of Health database then used was not helpful to the development and planning of rehabilitation services having little about disabilities and rehabilitation.

Material and Method

During training those doctors developed and refined a data base built on their knowledge of their patients. Data included demographic, diagnostic and treatment information. This database was then used systematically in all major Rehab centres where participants worked, nationwide. Data were then sent monthly to the author, the vice chair of AMPR, and the Ministry of Health, presented regularly at AMPR meetings and made available for the up-dating of the national Rehab plan for Madagascar.

Results

Initially in 2012, in the first month, 351 patients were seen in six centres, numbers increasing thereafter with 6148 persons being entered in 2014. Data for 2015 were incomplete.

By 2016 data collection was complete, 5373 patients being entered, 1568 of these referred by other hospital departments;51.2% were female, 46.8% were under the age of 15. The total numbers of patients seen yearly has increased substantially from 2012.

Five main diagnoses were common to all centres, for children: cerebral palsy, clubfoot, acute respiratory disease; for adult lumbo-sacral pain and hemiplegia.
Conclusion

The database has helped in the planning of rehabilitation services at national level where it is increasingly recognised that databases are of great importance for planning, surveillance and acquiring epidemiological data.

It has informed the regular national teaching of AMPR which now concentrates on major pathologies.

Keywords

database; rehabilitation; Madagascar

No conflict of interest
ACCESS CARE FOR PEOPLE WITH DISABILITIES: CREATION OF A DEDICATED CONSULTATION UNIT IN A PHYSICAL MEDICINE AND REHABILITATION CENTER

A. Gelis¹, M. Delcey¹, L. Burgel¹, I. Laffont²
¹Propara, Centre Mutualiste Neurologique, Montpellier, France
²University Center Lapeyronie, Physical Medicine and Rehabilitation, Montpellier, France

Introduction/Background

In France, many people with disabilities have difficulties with primary care access, particularly dental and gynecological consultations. These difficulties are various: inaccessibility of the premises, maladapted materials, and insufficient time of consultation, communication difficulties or patients' behaviors... Among the possible solutions, National Health Authorities have promoted the creation of consultations dedicated to people with disabilities (1). PROPARA center was selected as part of a call for projects to set up such a consultation center.

Material and Method

PROPARA Center chose to develop an original consultation unit by with a wide range of medical disciplines covered (radiology – ultrasound, dental care, OB/Gyn, ophthalmology, ENT...).

The other characteristic of Handiconsult34 is its economic model with the establishment of a multidisciplinary consultation unit within an ESPIC rehabilitation center.

Results

The project developed in partnership with scientific and medical societies on the one hand and university hospitals on the other hand refines the three level of access to care: level 1: primary care; level 2: handiconsult34 and level 3: University Hospital. At the end of 2017, a first dedicated imaging consultation was inaugurated, followed in early 2018 by the installation of a complete dental consultation room, followed by Ob/Gyn and ENT consultations.

An ophthalmological consultation and consultation of complex situations of failure of access to care will complete the system by 2019.

Conclusion

The progressive development of the project and its opening in the Herault department must enable to meet its dual objective: to offer access to care for persons with disabilities as well as being a resource for local healthcare professionals.

Keywords
people with disabilities; Primary care access; healthcare pathways

No conflict of interest
Introduction/Background

Comprehensive review of the literature concerning Indigenous peoples has previously found “rehabilitation has been grossly neglected by health researchers”, despite the disproportionate representation in this patient populations. Indigenous peoples in Canada, USA, New Zealand, and Australia continue to experience elevated rates of systematic racism and impacts of colonialism, live in or come from rural and remote environments and have determinants of health that differ from settler populations. The current literature focuses on health deficits, however little is documented on the resiliencies or perspectives of rural Indigenous peoples. The goal of this scoping review is to document broadly the current body of literature concerning the experiences of rural Indigenous peoples with medical rehabilitation.

Material and Method

Using methodology from Arksey and O’Malley (2005), SCOPUS and PubMed were searched with terms describing populations of Indigenous peoples in Canada, USA, New Zealand, and Australia, medical rehabilitation professionals and conditions, and rurality, then screened by title, abstract, and full article, with 13 articles included.

Results

Rehabilitation populations included chronic pain, brain injury, stroke and acquired communication disorders, pediatric developmental disability, diabetic amputation, and spinal cord injury. Distinct worldview, including emphasis on spirituality and healing, holistic approach, and learning styles were highlighted, including differing priorities from health care providers. Interdependence of family and community networks was a strong resiliency, with meaningful roles and inclusion despite deficits. Funding issues for both allopathic and traditional medicines and healers were identified as gaps. Communication, perception of hierarchy and “cultural invisibility” with health care professionals were sources of frustration.

Conclusion

Changing practice guidelines towards patient centred care and social determinants of health must necessarily reflect understandings of different worldview, and be grounded in cultural safety. Physiatrists should engage with participatory action research to inform holistic care partnerships with Indigenous patients and communities for improved medical rehabilitation.

Keywords
rural health; indigenous health; rehabilitation

No conflict of interest
Introduction/Background

The ability to live independently is very important for people with disability. One of strategi that can be done to improve the independence of people with disability is through community-based rehabilitation program (CBR). This program is implemented by Puskesmas Batipuh II Tanah Datar.

The purpose of this study is to get an overview about implement of the CBR program. We hope that this research will attract many parties to work together in CBR program.

Material and Method

The type of this research is descriptive qualitative research. It shows description of the implementation of community-based rehabilitation program (CBR) at Batipuh II Community Health Center. Data obtained by three ways; observation, interview, and documentation study.

Results

This program provides rehabilitation services for 37 people with disability in the 0-18 years old, which each disability person is served by one RBM cadre. The process of providing services is done by providing self-training and regular medical examinations. The training package is tailored made to the ability of disabilities persons based on 23 independence criteria.

The obstacles experienced in implementing this program is the limited funds and time. The efforts to overcome these obstacles is by making the CBR program as a compulsory program of the Community Health Center. Parties that are invited to work together in this program include the doctors of medical rehab RSUP M. Djamil, cadres RBM, Cross Sector (Wali Jorong, Wali Nagari, Polsek, Danramil, FORKOPINCA) and the parents of disabilities persons.

Conclusion

This program reportedly able to increase the independence level of people with disability.
CBR, PwD

No conflict of interest
Introduction/Background

The processing of patients data in Physical Medicine and Rehabilitation (PMR) is currently done on paper files. These paper files are not easy to use and are not suitable for supplying the national health information services with good quality indicators on disability and rehabilitation. A system of "digitalization of data in PMR" is being implemented in Burundi. The aim is to develop a computerized medical record (CMR) for PMR services. This software must be very user-friendly and must allow users to store and use information on the state of health of patients and their evolution.

Material and Method

The Burundian Ministry of Health, the Belgian Development Agency (ENABEL) and the "ICT4Development" office have been developing an "Hospital CMR" software for several years in Burundian hospitals. The APEFE-WBI-UCL "B4" program (Benin-Burundi-Burkina Faso-Belgium) aims at developing PMR in Africa. It includes a "digitalization of PMR information" axis. In collaboration with the National Reference Center for Physiotherapy and Medical rehabilitation (NRCPMR) team of Bujumbura, the "B4" program contributed to the addition of a "PMR" module to this CMR. It consists of 3 parts: (i) administrative information and billing, (ii) physician's consultation form, (iii) physiotherapist's report sheet

Results

Since 2018, the software is operational at the NRCPMR (University Hospital of Kamenge in Bujumbura). It enabled to abandon the use of paper files. The computerized record of the patient covers some common pathologies with detailed and user-friendly sheets. 13 internationally validated assessment scales of patient's functional abilities supplement the physiotherapist's assessment sheet. They allow frequent assessments of patient's progress in
daily life. This "Open Clinic" software is freely accessible to all rehabilitation centers and services

Conclusion

The software is an innovative tool, perceived as a durable solution for the collection of internationally comparable data on disability and rehabilitation in Africa

Keywords

Burundi; Computerized Medical Record; Physical Medicine-Rehabilitation

No conflict of interest
SPASTICITY MEASUREMENTS USING PENDULUM TEST FOR PREDICTING GAIT PERFORMANCE IN PATIENTS WITH HEMIPLEGIC STROKE

W. Li
Taipei medical university hospital, Rehabilitation, Taoyuan City, Taiwan R.O.C.

Introduction/Background

The association between spasticity and gait performance in patients with stroke is yet to be sufficiently explored. The present study assessed whether spasticity measurement using the pendulum test can predict gait performance in patients with hemiplegic stroke.

Material and Method

This study included 40 patients with post-stroke hemiplegia who could walk independently. Spasticity measurements were obtained using the pendulum test and the Modified Ashworth Scale (MAS) for knee and ankle. The timed up and go test, Brunnstrom stage assessment, Tinetti balance assessment, and 10-meter walking test (10 MWT) were conducted. The correlations among the aforementioned clinical variables were evaluated through multiple stepwise regression analyses.

Results

The relaxation index (RI) calculated using the pendulum test had a significant positive correlation with 10 MWT performance (c = 0.274, p = 0.021). However, the MAS scores for knee flexion and ankle dorsiflexion, Brunnstrom stage, and Tinetti balance assessment were not significantly correlated with gait speed performance.

Conclusion

The pendulum test is a simple and objective method for evaluating spasticity. We suggest that the RI obtained from the pendulum test can be used as a predictive parameter of gait performance in patients with stroke. However, the MAS may not be a favorable predictor of gait outcomes.

Keywords

Pendulum test; Gait; Stroke

No conflict of interest
Poster Tour

Poster tour: Spasticity: Medical treatments

ISPR8-2617

PAIN DURING BOTULINUM TOXIN INJECTIONS IN SPASTIC ADULTS: INFLUENCE OF PATIENTS’ CLINICAL CHARACTERISTICS AND OF THE PROCEDURE

L. Mathevon¹, P. Davoine², M. Tardy², N. Bouchet², I. Gornushkina², D. Pérennou²

¹CMCR les Massues, Physical and Rehabilitation Medicine, Tassin la Demi-Lune, France
²South Hospital- University Hospital Grenoble-Alpes, Physical and Rehabilitation Medicine, Grenoble, France

Introduction/Background

The evaluation of pain during botulinum toxin (BT) injections has never been conducted in adults. Our main objective was to quantify pain perceived by individuals with a stroke, during BT injections. A second objective was to analyze clinical and technical determinants of a painful procedure.

Material and Method

Observational study on 46 persons (19M/27W, 60.5±16 years) evaluated without analgesia during injections of BT-A performed by 2 experts (15 years of experience each), 6.5 years after a stroke. Pain was evaluated by numeric verbal scale (0–10) after each step. Pressure hypoesthesia was assessed by Semmes–Weinstein monofilaments. The existence of chronic pain was established from a long-term intake of antalgic drugs. Following are presented in median [25 and 75th percentiles].

Results

A total of 1288 numerical verbal scale results were analyzed. The most painful time was stimulation (4 [2.6–5.3]; p < 0.001) followed by needle insertion (3.1 [1.3–4.1]; p <0.01). Pain resulting from toxin injection was not negligible (1 [0.1–2.3]; p < 0.01), over pain resulting from needle withdrawal (0 [0–0.3]; p < 0.05). Pain perceived during stimulation was inversely correlated with hypoesthesia (p<0.02) Patients who suffered from chronic pain perceived a greater pain during puncture and stimulation (p <0.05). Pain was not influenced by age, time duration since stroke, stroke side, number of muscle’s injections per session. Pain was positively correlated with the needle’s length, for puncture (r=0.3, p=0.01) and the withdrawal (r=0.4, p=0.009). The needle’s brand also influenced pain during puncture (p=0.01). Pain was not influenced by the dose or the volume injected, neither by the product used.

Conclusion

Botulinum Toxin injection is a very painful act which imposes a rigorous pain prevention. Suppressing the stimulation does not suppress pain. Patients at risk for pain should be identified, and the procedure adapted.

Keywords
botulinum toxin: pain evaluation

No conflict of interest
THE EFFICACY AND SAFETY OF PHENOL 5% NEUROLYSIS IN PATIENTS WITH LOWER LIMB SPASTICITY.

E. Rocha¹, E. Suzigan¹, F. Galvao¹
¹Santa Casa Sao Paulo, Rehabilitation Center, Santo André, Brazil

Introduction/Background

The phenol use in spasticity is a recognized treatment but used by only a few group of colleagues. The phenol cost is accessible, but its use needs experience in order to avoid adverse effects like pain, local fibrosis, loss of sensitivity.

Material and Method

This study is a retrospective cohort of medical record analysis of patients treated with Phenol 5% neurolysis to lower limbs spasticity from January 2014 to December 2016 in a Brazilian Public General Rehabilitation Center from all the patients that were submitted a Phenol 5% neurolysis to treat lower limbs spasticity from January 2014 to December 2015. The patients submitted to the phenol 5% injections were evaluated in relation to their spasticity by both, Asworth Modified Scale (AMS) and Range of Motion (ROM) from knee flexion/extension and hip extension/abduction. All patients were inquired about side effects (including pain, local reactions and any other comorbidities) thirty days after the injection.

Results

128 patients were treated with phenol 5% neurolysis due to lower limbs spasticity. The average age was 27.8 years old, 47 were under 18, being the youngest 4 years old, and 23 were elderly. 73 patients had a cerebral palsy, 38 had a spinal cord injury and 17 a stroke. The treated muscles and nerves were sciatic motor branch nerve (n=69), obturator nerve (n=74), femoral nerve (n=6) and psoas muscle (n=35). Seven patients reported moderate pain after the injection in the region of femoral cutaneal nerve (all of them after the obturator injection) with full resolution up to 7 days. Any other side effect were reported.

Conclusion

The study concludes that phenol injections are safe and efficient in the lower limbs spasticity treatment.

Keywords

spasticity treatment; phenol; lower limbs

No conflict of interest
Poster Tour

Poster tour: Spasticity: Medical treatments

ISPR8-0465

EFFECTS OF BOTULINUM TOXIN A THERAPY AND MULTIDISCIPLINARY REHABILITATION ON LOWER LIMB SPASTICITY CLASSIFIED BY SPASTIC MUSCLE ECHO INTENSITY IN POST-STROKE PATIENTS

T. Hara¹, A. Masahiro², H. Hiroyoshi³, K. Kazushige²
¹The Jikei University School of Medicine, Rehabilitation medicine, Minato-Ku, Japan
²The Jikei University School of Medicine, Department of Rehabilitation Medicine, Tokyo, Japan
³Kikyougahara Hospital, Department of Rehabilitation Medicine, Nagano, Japan

Introduction/Background

Objectives: The purpose of the present study was to investigate retrospectively the relationship between botulinum toxin type A plus multidisciplinary rehabilitation and muscle echo intensity in post-stroke patients with spasticity. The primary aim was to investigate whether the effects of the intervention on the improvement of spasticity depend on muscle echo intensity, and the secondary aim was to investigate whether the motor function of the lower limbs depends on muscle echo intensity.

Material and Method

Methods: A 12-day inpatient protocol was designed for 102 post-stroke patients with spasticity due to lower limb paralysis. Muscle echo intensity of the triceps surae muscle was measured by ultrasonography, and the patients were categorized into 4 groups based on Heckmatt scale grades (Grades I–IV).

Results

Results: All 4 groups classified by the Heckmatt scale showed significant pre-to-post-intervention differences in the knee and ankle modified Ashworth scale scores (p < 0.05). Grade I–III patient groups showed a significant improvement in lower limb motor function following intervention. Grade IV patients did not show a significant improvement in lower limb motor function.

Conclusion

Conclusions: We observed significant improvements in the modified Ashworth scale scores after botulinum toxin type A and multidisciplinary rehabilitation therapy on post-stroke patients with spasticity. Although patients with lower muscle echo intensity demonstrated improvements in motor function, the improvement was poor in those with higher muscle echo intensity.
Keywords

Stroke; Botulinum toxin A; Muscle echo intensity

No conflict of interest
SPASTICITY SEVERITY AFTER STROKE AND RELATION TO HAND MOTOR RECOVERY AND CORTICO-SPINAL TRACT INTEGRITY

J. Plantin, G.V. Pennati, E. Laurencikas, A.K. Godbolt, J. Borg, P. Lindberg

1Karolinska Institutet, Department of Clinical Sciences - Division of Rehabilitation Medicine, Stockholm, Sweden
2Karolinska Institutet, Department of Clinical Sciences - Division of Radiology, Stockholm, Sweden
3Centre de Psychiatrie et Neurosciences, Inserm U894, Paris, France

Introduction/Background

Spasticity of muscles controlling the hand is common after stroke, however, its impact on hand motor recovery and its neural correlates are poorly understood. This longitudinal observational study investigated hand spasticity after stroke in relation to motor recovery, secondary complications and lesion location.

Material and Method

Sixty-one patients were assessed at three weeks (T1), three (T2) and six months (T3) after stroke. Neural (NC) and viscoelastic (EC and VC) stretch-resistance in wrist and finger flexors were quantified with the NeuroFlexor method. Clinical evaluation included Fugl-Meyer (FMA-HAND), Box and Block Test (BBT), passive range of movement (ROM) and pain (FMA-subscale). Magnetic Resonance Imaging data were analyzed for weighted corticospinal tract lesion load (wCST-LL) and voxel-based lesion symptom mapping (VLSM).

Results

Four spasticity subgroups were defined: early severe (SS, n=10), early moderate (MS, n=10), late developing (LS, n=17) and no spasticity (NS, n=24). All groups except SS improved in FMA-HAND to T3. SS and LS had no recovery in BBT. SS showed a larger loss of ROM and more frequent arm pain at T3. wCST-LL predicted NC at T3, also when including FMA-HAND and lesion volume as covariates. VLSM showed that lesioned white matter below the cortical hand knob correlated positively with spasticity.

Conclusion

Severe hand spasticity impairs motor recovery, ROM and may increase risk for development of arm pain. This study provides the first data showing that spasticity is related to lesion load of the CST. The significance of early quantification of spasticity for prediction of motor outcome and rehabilitation planning will be discussed.

Keywords
All Cerebrovascular disease/Stroke ; Prognosis ; MRI

No conflict of interest
Poster Tour

Poster tour: Spasticity: Medical treatments

ISPR8-0753
Efficacy of a Second “Drug Holiday” in the Treatment of Intrathecal Baclofen Tolerance – A Case Study
S. Estrela Rego¹, I. Amorim², B. Condeça², F. Faria²
¹Centro Hospitalar Universitário do Algarve, Physical and Rehabilitation Medicine, Faro, Portugal
²Centro de Medicina de Reabilitação de Alcoitão, Physical and Rehabilitation Medicine, Lisbon, Portugal

Introduction/Background

Spasticity and muscle spasms are common complications following a SCI. Intrathecal Baclofen (ITB) infusion is an effective treatment for severe spasticity of spinal cord origin.

However, concerns over tolerance remain controversial. It is manifested by an escalation of dose required to produce a previously obtained effect or by a given dose of drug with continued administration.

To combat baclofen resistance, a drug holiday is an effective method, interrupting the trend of accelerated dosage by weaning off the baclofen during 4-6 weeks.

Material and Method

We report a case of a 45-year-old patient who suffered an accident on 1996 with SCI. He has incomplete tetraplegia AIS B, motor level C5 and sensitive L1.

Results

Due to severe uncontrolled spasticity (MAS=4), he was implanted with a ITB pump in 2002. Since than, it remained controlled (MAS=2) with 310ug/day.

In 2009, because the resurgence of severe spasticity (MAS=5), resistant to a fast increase on daily dose of baclofen until 360ug/day, drug tolerance was suspected. We conducted a drug holiday over 4 weeks and reintroduce baclofen. With 220ug/day he showed a good control of spasticity (MAS=1).

During 2017, he presented an increase in spasticity (MAS=4), combined with clonus of lower limbs (Spasm Frequency Scale – SFS=2). We tried to control it, increasing the daily dose of baclofen, without response.

He was admitted in CMRA for a second drug holiday. After 4 weeks without any baclofen, we gradually refill the pump. With 60ug/day we noticed an improvement on lower limbs spasticity.
(MAS=2) and a decrease on muscle spasms (SFS=0). He was discharged with this dose, appreciably below from admission.

**Conclusion**

The use of ITB is increasing so we want to highlight the importance of being aware for cases of tolerance to baclofen. In this case, both drug holidays were effective, as measured by MAS and SFS.

**Keywords**

baclofen;intrathecal ;tolerance

*No conflict of interest*
Introduction/Background

Potassium chloride co-transporter KCC2 plays a key role in chloride homeostasis and inhibitory functions in mature neurons. Animal studies have demonstrated a down-regulation of KCC2 function following spinal cord transection. This reverses the inhibitory effect of gamma aminobutyric acid and glycine to an excitatory effect, resulting in reduced inhibition. We have previously demonstrated in healthy subjects that furosemide, a potent KCC2 antagonist, can be readily used to assess inhibitory synapse efficiency in humans. We have shown that furosemide reduces both presynaptic and postsynaptic inhibitions without altering monosynaptic excitatory transmission (1) thus suggesting that furosemide can be used as a probe to study the function of inhibitory synapses in humans. The aim of this presentation is to explore if in paraplegic patients a down regulation of KCC2 may contribute to the reflex hyperexcitability following spinal cord injury.

Material and Method

In the present study, we used a similar experimental design to that developed in healthy subjects: the study of the effects of 40 mg of furosemide intake per os onto soleus H reflexes conditioned by inhibitory percutaneous stimulations were explored during 60 minutes following furosemide intake.

Results

Furosemide fails to modulate both pre- and postsynaptic inhibitions relayed to soleus spinal motoneurons in spinal cord injured patients. The reduced inhibitory effect of furosemide in spinal cord injury patients suggests a KCC2 dysfunction in human spinal neurons, resulting in a regression to immature inhibitory synapses, similarly to animal models.

Conclusion
The reversal from inhibitory to excitatory synapses may be an important contributor to hyperreflexia in spinal cord injury and may lead to novel therapeutic strategies centred on chloride homeostasis.


Keywords

spinal cord injury; spasticity; neurophysiology

No conflict of interest
ASSESSMENT OF THE EARLY EFFECTS OF BOTULINUM TOXIN TYPE A INTRAMUSCULAR INJECTION ON EXTENSOR DIGITORUM BREVIS MUSCLE IN HEALTHY ADULTS
C. Boulias¹, F. Ismail¹, C. Phadke²
¹West Park Healthcare Centre, Physiatry, Toronto, Canada
²West Park Healthcare Centre, Spasticity Research Program, Toronto, Canada

Introduction/Background

In our clinical experience, some patients indicate that their spasticity improves on the day of botulinum injection. Previous studies have indicated that compound motor action potentials (CMAPs) show a decrease as early as 2 days post-injection. However, no studies have assessed if neurophysiological changes take effect earlier than 48 hours post-injection.

Material and Method

Fifteen healthy control subjects (10F; mean age 41±11 years) participated in this randomized double-blind study. We injected 10 units each of onabotulinumtoxinA and incobotulinumtoxinA in the extensor digitorum brevis (EDB) muscle, one in each foot. We performed serial CMAP assessments using nerve conduction study of the peroneal nerves at following time intervals after botulinum injection –24 hours and 6 days post-injection. We used an ANOVA with repeated measures separately for each type of toxin.

Results

The mean EDB amplitudes differed statistically significantly between the tested time points in both the incobotulinumtoxinA group (F(2, 28) = 157.329, p < 0.0001) and onabotulinumtoxinA group (F(2, 28) = 66.464, p < 0.0001). Post hoc tests using the Bonferroni correction revealed that each type of toxin resulted in a statistically significant decrease in the EDB amplitude from pre-injection time point to 24 hours and 6 days post-injection (p<0.0001). In the incobotulinumtoxinA group (34% reduction at 24 hours and 68% reduction at 6 days), and onabotulinumtoxinA group (31% reduction at 24 hours and 61% reduction at 6 days).

Conclusion

We conclude that both types of toxins tested in this study exert a significant decrease in EDB CMAP amplitude at 24 hours post-injection.

Keywords

botulinum toxins

Conflict of interest
Disclosure statement:
Authors have received funding from Allergan and Merz as research grants (CP, FI, CB) and speaker fees and honoraria (FI, CB).
Introduction/Background

Poststroke spasticity (PSS) is one of functional barrier for stroke survivors. There is a need for early identification and understanding of change of PSS over time. Therefore, we want to establish the change of post stroke spasticity until 12 months from the onset of stroke.

Material and Method

Seven hundred and eighteen stroke patients with emerging spasticity (430 cerebral infarct and 278 cerebral hemorrhagic patients) were enrolled. These patients were followed up 12 months after the onset of stroke to monitor the development of spasticity via a retrospective review of medical record. Main outcome measures were change of post stroke spasticity (PPS) measured at the elbow, and wrist in hemiplegic upper limb using the Modified Ashworth Scale at 1, 3, 6, and 12 months after stroke.

Results

PPS was aggrevated from at 1 month after the onset of stroke to at 3, 6 and 12 months measured in hemiplegic elbow (1.16, 1.29, 1.54 and 1.82) and wrist (1.23, 1.30, 1.47 and 1.84) using the Modified Ashworth Scale, respectively. PPS in hemiplegic elbow measured 1 month after stroke was more severe in cerebral hemorrhage than in cerebral infarction (p<0.01), but not significantly at 3, 6 and 12 months in all stroke patients. When the changes of PPS in patients with supra- or infra-tentorial lesion were followed up for one year, there was significant increment in only supratentorial lesion at 3, 6, and 12 months after onset (p<0.05).

Conclusion

PPS has a tendency to deteriorate over time, especially in hemiplegic upper limb of patients with cerebral hemorrhage and supra-tentorial lesions.

Keywords

stroke;spasticity

Conflict of interest
Disclosure statement:
This work was supported by a research grant from Eisai Korea Inc.
Poster Tour

Poster tour: Spasticity: Medical treatments

ISPR8-1803
MOTOR OVERFLOW IN SPASTIC HEMIPLEGIA AFTER STROKE
S. Li, Y.T. Chen, E. Magat, S. Li, P. zhou
1The University of Texas McGovern Medical School, PM&R, Houston, USA
2University of Texas McGovern Medical School - Houston, Physical medicine rehabilitation, Houston, USA

Introduction/Background

The phenomenon of exaggerated motor overflow (involuntary movements accompanying a motor task) is well documented, particularly in stroke survivors with spasticity. In this study, we aimed to investigate the possible underlying mechanisms its possible relations with post-stroke spasticity.

Material and Method

Methods: 11 stroke patients (63.6 yrs ± 6.4 yrs; 4 women) and 11 healthy subjects (Age: 31.18 yrs ± 6.18 yrs; 2 women) were recruited and performed unilateral isometric elbow flexion at submaximal levels (10%, 30%, and 60% of maximum voluntary contraction, MVC). Electromyograms (EMG) was measured from the contracting biceps muscle and resting contralateral biceps, ipsilateral flexor digitorum superficialis, and contralateral FDS muscles. Motor overflow was quantified as the normalized EMG of the resting muscles. EMG-EMG coherence was calculated between the contracting muscle and each of the resting muscles. Elbow flexor spasticity was quantified through reflex torque.

Results

Overall, our results demonstrated that unilateral elbow flexion caused diffuse motor overflow from proximal to distal muscles on the impaired side (ipsilateral motor overflow) and from the non-impaired side to the impaired side (contralateral motor overflow). Moreover, there were significantly high EMG-EMG coherence between 6-12Hz between the contracting muscle and all other resting muscles during elbow flexion on the non-impaired side. Our results of diffuse ipsilateral and contralateral motor overflow with EMG-EMG coherence in the alpha band suggest subcortical origins of motor overflow. Post-stroke spasticity is attributed to reticulospinal hyperexcitability secondary to the unmasking of ponto-medullary reticular formation. A high correlation between spasticity and motor overflow supports a potential role of reticulospinal activation in motor overflow.

Conclusion

Collectively, these results suggest that diffuse motor overflow to the impaired side is likely related to activation of hyperexcitable reticulospinal pathways after stroke.

Keywords
stroke;motor overflow;spasticity

No conflict of interest
NEUROTOMY AS A TREATMENT FOR INTRACTABLE TRIPLE FLEXION SPASMS OF THE LOWER LIMB IN PATIENTS WITH SPINAL CORD INJURY: TWO CASE REPORTS

E. Duinslaeger¹, N. Draulans¹, E. Roels², T. Theys³, C. Kiekens¹

¹University Hospitals Leuven, Physical and Rehabilitation Medicine, Leuven, Belgium
²University Medical Center Groningen-University of Groningen, Department of Rehabilitation Medicine, Groningen, The Netherlands
³University Hospitals Leuven, Department of neurosurgery, Leuven, Belgium

Introduction/Background

Spasticity is a frequent complication after spinal cord injury (SCI). A subtype consists of flexion spasms of the lower limb. There are several treatment options, ranging from physical therapy over oral pharmacological interventions, injection techniques, to intrathecal baclofen and surgery.

The purpose is to describe two cases of SCI patients who underwent a neurotomy of radix L2 and the sciatic nerve as a minimally invasive treatment for flexion spasms in the lower limb.

Material and Method

Case report

Results

We describe two men, 38 and 40 years old who suffered a traumatic spinal cord injury T4 AIS A, respectively 13 and 14 years earlier. Despite oral pharmacological and intrathecal baclofen treatment (ITB), flexion spasms were insufficiently controlled in both patients. An attempt to block these spasms was made by injecting 100 Units of onabotulinumtoxinA in the psoas muscle in patient1. This injection provided a clear relief of spasms for 3 weeks. As we aimed for a more permanent cost-effective treatment, a nerve block with 0.5ml Chirocaïne 0.5% of radix L2, was performed in both patients to mimic neurotomy. The positive results supported the decision to perform a minimal invasive extraforaminal L2 neurotomy.

Preoperatively patient 1 scored 3 on frequency and 3 on severity on the Penn Spasm Frequency Scale (PSFS) in comparison to 2+1 postoperatively. Patient 2 scored 4+3 preoperatively, 3+1 postoperatively and 2+3 after 2 years. Both patients regained functionality and comfort. Patient 1 wanted to stop ITB-therapy to scuba-dive to greater depths. As spasms in the hamstrings reappeared after lowering his ITB-dose, he received bilateral sciatic nerve block and subsequent selective neurotomy of hamstring branches of the sciatic nerve. 2 years postoperatively, without ITB-therapy he scores 1+2.

Conclusion

A minimally invasive neurotomy is technically feasible and can be an efficient method for reducing intractable flexion spasms in the lower extremities, after successful nerve block.
Keywords

neurotomy; flexion spasm; spinal cord injury

No conflict of interest
Poster Tour

Poster tour: Spasticity: Surgical treatments

ISPR8-1087
SPASTICITY-REDUCING HAND SURGERY: IMPROVED FUNCTION, ACTIVITY AND PATIENTS' SATISFACTION AT ONE YEAR FOLLOW-UP
U. Bergfeldt\textsuperscript{1}, J. Strömberg\textsuperscript{1}, T. Ramström\textsuperscript{1}, K. Kulbacka-Ortiz\textsuperscript{1}, C. Reinholdt\textsuperscript{1}
\textsuperscript{1}Sahlgrenska University Hospital, Centre for Advanced Reconstruction of Extremities, Gothenburg, Sweden

Introduction/Background

We evaluated if spasticity-reducing surgery in the upper extremity could improve motor function, fulfill patient's specific goals and influence performance of daily activities in patients with muscle over-activity.

Material and Method

Thirty consecutive patients with spasticity due to various CNS injuries were evaluated pre- and post-surgery and followed one year by the team consisting of physician, physiotherapist and occupational therapist.

Prior to surgery the patients' clinical problem related to spasticity was defined and motor function and activity was assessed. Each patient’s potential to comply with the post-surgical rehabilitation procedure was estimated and the intensity level chosen (low, moderate or high). The surgical intervention comprised lengthening of tendons, release of muscles and occasionally deformity corrections.

Physiotherapy, occupational therapy, wrapping and application of orthoses started the first post-operative day. Patients were taught how to perform a home training program. One week of intensive in-hospital rehabilitation followed 2-3 weeks after surgery and a new home-training program was designed. Subsequent follow-up visits were scheduled at 3, 6 and 12 months.

General hand function (usefulness) and pain were evaluated using the VAS scale (0-10), spasticity using the Modified Ashworth Scale (0-5) and activity by COPM (mean values of performance and satisfaction). Wilcoxon signed rank test was used.

Results

At one year follow-up patients' assessment of general hand function increased, 2.1 vs. 4.2 (p< 0.001), pain decreased, 3.0 vs. 1.7 (p< 0.05), and spasticity decreased, 3.5 vs. 2.1 (p<0.001). Both activity measures improved: performance 2.0 vs. 5.5 (p<0.01) and satisfaction 1.9 vs. 5.5 (p<0.01).

Conclusion

In patients with disabling spasticity, hand surgery combined with comprehensive rehabilitation reduced muscle over-activity, improved hand function, reduced pain, and promoted patient ability for arm-hand activities and satisfaction in daily life at one year follow-up.
Keywords

stroke;spinal cord injury;spasticity management

No conflict of interest
Poster Tour

Poster tour: Spasticity: Surgical treatments

ISPR8-1169
INTRATHECAL BACLOFEN THERAPY VERSUS CONVENTIONAL MEDICAL MANAGEMENT IN POST-STROKE SPASTICITY: ASSESSMENT OF PATIENT-REPORTED OUTCOME: QUALITY OF LIFE, PAIN AND SATISFACTION (SISTERS)
M. Yochelson1,2, M. Creamer3, G. Cloud4,5, P. Kossmehl6, G. Francisco7, A.B. Ward8, J. Wisse9, M. Zampolini10, A. Abouihia11, A. Calabrese11, L. Saltuari12,13
1Shepherd, Center, Atlanta, USA
2MedStar, National Rehabilitation Network, Washington, USA
3Central Florida, Pain Relief Centers, Orlando, USA
4Alfred Health, Department of Neurology, Melbourne, Australia
5St George’s University Hospitals, NHS Foundation Trust, London, United Kingdom
6Kliniken Beelitz GmbH, Neurologische Rehabilitationsklinik, Beelitz-Heilstätten, Germany
7TIRR Memorial Hermann Hospital and University of Texas Health Science Center, Department of Physical Medicine and Rehabilitation, Houston, USA
8Haywood Hospital, North Staffordshire Rehabilitation Centre, Stoke on Trent, United Kingdom
9Vivantes Klinikum Spandau, Neurological Rehabilitation and Physical Therapy, Berlin, Germany
10Ospedale di Foligno, Department of Rehabilitation, Perugia, Italy
11Medtronic International, Clinical and Research Neuromodulation, Tolochenaz, Switzerland
12Landeskrankenhaus Hochzirl, Abteilung für Neurologie, Zirl, Austria
13Research Unit for Neurorehabilitation, South Tyrol, Bolzano, Italy

Introduction/Background

SISTERS is the first multicenter randomized trial demonstrating superiority of Intrathecal Baclofen (ITB) therapy versus Conventional Medical Management (CMM) with oral antispastic in decreasing muscle hypertonia in lower and upper limbs of post-stroke patients with severe spasticity. Here we report Numeric Pain Rating Scale (NPRS), Quality of Life (QoL) assessed by EQ-5D and Stroke Specific QoL (SS-QoL), satisfaction and safety.

Material and Method

Sixty stroke patients with spasticity in ≥2 extremities and an Ashworth Scale score ≥ 3 in ≥ 2 affected muscle groups in the lower limbs were randomized to ITB or CMM group and both arms received physiotherapy.

Results

Mean changes (SD) from baseline to month 6 in ITB patients versus CMM group were -1.17 (3.17) vs. 0.00 (3.29) for NPRS actual pain, -1.61 (2.29) vs. 0.24 (3.07) for NPRS least pain and 0.09 (0.26) vs. 0.01 (0.16) for EQ-5D utility score. These between-group differences were statistically significant (P<0.05, Wilcoxon test). ITB patients showed greater improvements in NPRS worst pain [-1.35 (2.42) vs. -0.04 (3.69)], EQ-5D health status [9.68 (20.42) vs. 4.40 (21.75)] and SS-QoL [0.26 (0.58) vs. 0.05 (0.58)], although between-group differences were not statistically significant. Extreme problems of individual EQ-5D dimensions at baseline were
reported by 30%, 26%, 17% and 13% of ITB patients in self-care, usual activities, pain/discomfort and mobility, respectively. At 6 months there was a decrease in the percentage of patients reporting extreme problems for all domains except mobility. More ITB than CMM patients (73% vs. 48%) were satisfied with the spasticity reduction at month 6. In total 17 (68%) ITB implanted patients reported at least one treatment-related adverse events versus 7 (20%) in CMM group. No treatment-related adverse event led to discontinuation of ITB therapy.

Conclusion

Reduction of muscle tone with ITB therapy is associated with improvements in pain and QoL in post-stroke patients with severe spasticity.

Keywords

spasticity; intrathecal baclofen; quality of life

Conflict of interest
Disclosure statement:
MC, MZ, and LS report personal fees from Medtronic. GF and JW report personal fees from Allergan, Ipsen, Merz, and Medtronic. AA and AC are employees of Medtronic. All other authors declare no competing interests.
EFFECT OF SURGICAL CORRECTION OF EQUINUS FOOT DEFORMITY ON TRICEPS SURAE SPASTICITY IN STROKE PATIENTS

E. Giannotti¹, A. Merlo¹, M. Galletti¹, P. Zerbinati¹, P. Prati¹, F. Mascioli¹, D. Mazzoli¹
¹O.P.A. Sol et Salus, Gait & Motion Analysis Laboratory, Torre Pedrera di Rimini RN, Italy

Introduction/Background

Equinus foot deformity (EFD) in stroke can be due to Triceps Surae (TS) spasticity. Aim of this work is to study the short-term effects of EFD surgical correction on TS spasticity in a sample of hemiplegic patients.

Material and Method

A sample of 48 chronic stroke patients, 53(14) years, 19/29 R/L, 6(5) years after lesion, median FAC=4, walking speed 0.51(0.28) m/s who underwent surgical TS lengthening was included in the study. TS spasticity was assessed through the Modified Tardieu Scale (MTS) before and 1 month after surgery both with the knee extended and flexed at 90 degrees (MTS_KE, MTS_KF). Before/after surgery MTS values were compared using the Wilcoxon test. Percentages of patients with worsened, unchanged and improved MTS scores were also computed and reported.

Results

Both MTS_KE and MTS_KF scores significantly decreased one month after surgery (p=0.002 and p<0.001 respectively). MTS_KE score (see Figure) worsened in 4 subjects (8%), was stable in 23 (48%) and improved in 21 subjects (44%). MTS_KF score worsened in 2 subjects (3%), was stable in 18 subjects (38%) and improved in 28 subjects (58%). Eight subjects were completely relieved from spasticity.

Conclusion
Along with restoring ankle joint range of motion, surgical TS lengthening can also decrease muscle reflex overactivity. This is reasonably due to the reduction in spindle activation during the stretching maneuver consequent to the decrease in muscle shortening, passive tension and stiffness. This should reduce the reflex inputs to the spinal pathways involved in muscle tone control. In conclusion, FS can produce positive changes on TS spasticity in adult stroke survivors. A study on long term effects is ongoing.

**Keywords**

Spasticity; Functional surgery; Equinus foot

*No conflict of interest*
Poster Tour

Poster tour: Spasticity: Surgical treatments

ISPR8-1876

EFFECT OF UPPER EXTREMITY ORTHOPEDIC SELECTIVE SPASTICITY SURGERY ON MUSCLE TONE AND FUNCTIONAL OUTCOME IN PERSONS WITH CEREBRAL PALSY

D. Sharan¹, J.S. Rajkumar²

¹RECOUP, Orthopaedics and Rehabilitation, Bangalore, India
²RECOUP, Physiotherapy, Bangalore, India

Introduction/Background

Upper extremity of persons with spastic cerebral palsy (CP) typically presents with various problems including an impaired range of motion that affects the positioning of the upper extremity. This impaired range of motion often develops into contractures that further limit functioning of the spastic hand and arm. Orthopaedic Selective Spasticity Surgery (OSSCS) involves 2 procedures of intramuscular lengthening and sliding lengthening for reduction of spasticity. To evaluate effectiveness of upper extremity OSSCS on muscle tone and functional outcome in persons with Cerebral Palsy (CP).

Material and Method

A retrospective analysis was done among 120 persons with spastic quadriplegia and hemiplegia, aged 5 to 20 years, who underwent OSSCS of elbow flexors, forearm flexors, pronators and hand intrinsic muscles. The rehabilitation after the removal of plaster after 2 weeks, involved occupational therapy, physiotherapy and aquatic therapy. The rehabilitation was for 6 days per week for 5 months. The outcome measures were modified Ashworth Scale (mAS), Manual Ability Classification System (MACS) and Melbourne Assessment of Unilateral Upper Limb Function (MAUULF). Data were collected at baseline and at 5 months’ post-surgery. Follow up data was collected 1-year post surgery.

Results

Among the study group, females (62%) were predominant and 45% of the participants were aged 10 to 15 years. The commonest muscles released were the forearm flexors and pronators (78%). Persons who underwent OSSCS followed by rehabilitation showed a significant improvement of mAS (p<0.001), MACS (p<0.001), MAUULF (p<0.001) compared to the baseline. The follow up data were obtained for around 55% of the participants, in which the progress was maintained in more than 80% of the participants.

Conclusion

Upper extremity OSSCS followed by intensive rehabilitation is effective in reduction of upper extremity muscle tone and improvement of function among persons with cerebral palsy.

Keywords
upper limb surgery; spasticity management; hand function

No conflict of interest
Poster Tour

Poster tour: Spasticity: Surgical treatments

ISPR8-1995
OUTCOMES OF EQUINUS/VARUS FOOT SURGERY IN PATIENTS WITH SPASTIC PARESIS: A RETROSPECTIVE STUDY ON 126 PATIENTS
M. Lucas¹, R. Gross¹, V. Jooste², S. Touchais³, G. Gadbled³, K. Buffenoir⁴, O. Hamel⁵, B. Perrouin-Verbe⁶
¹CHU Nantes Hôpital Saint Jacques, Physical and Rehabilitation Medicine, Nantes, France
²CHU Dijon, Clinical Research Division, Dijon, France
³CHU Nantes Hôtel Dieu, Orthopaedics, Nantes, France
⁴CHU Nantes Hôtel Dieu, Neurosurgery, Nantes, France
⁵Clinique des Cèdres, Neurosurgery, Toulouse, France

Introduction/Background

Equinovarus foot is the most frequent complication in patients suffering from spastic paresis. Surgical treatment of equinovarus spastic foot includes different kinds of surgery, such as: selective tibial neurotomy, lengthening of the gastrocnemii, soleus, or Achilles tendon, tendon transfer, or rear- and midfoot arthrodesis. So far, there is a lack of precise guidelines about the surgery to consider, for these patients according to their clinical situation.

Aim: To describe the outcome and complications of equinovarus foot surgery.

Material and Method

We performed an analytic, retrospective, single centre study. We included all patients with spastic paresis acquired after 18 years who were operated for an equinovarus foot, on a 12-year period. Four time points were studied: the preoperative situation, postoperative at 3 and 12 months, and the last assessment during follow-up. Considering three main clinical situations (dynamic equinus, fixed equinus and fixed rear and mid-foot deformities), we described the surgical procedures and their outcomes.

Results

From 200 patients who underwent surgery, 126 feet were included. 48% of patients presented with a dynamic equinus foot and had a neurotomy; in such cases 10% of surgery failed, whereas only 6% failed in fixed equinus. The rate of subjective success (assessed by the patients) was 86%. 30% of patients experienced a revision surgery, and 15% presented with complications. 15% of patients had claw toes after surgery in each group. Five patients had bone surgery because of a fixed varus. The occurrence of post-operative neuropathic pain, was associated with neurotomy of the plantar nerve (p<0,01).

Conclusion

Equinus/equinovarus foot is a complex situation in patients with spastic paresis. Several clinical pictures can be identified. An important variety of surgical procedures is performed in these
patients. The predictive factors of failure and complications of such surgeries can be suggested from this study.

Keywords

Equinovarus Spastic Foot; Spasticity; Surgery

No conflict of interest
Introduction/Background

The rehabilitation of older victims with traumatic brain injury (TBI) presents substantial challenges due to the limited mobility and poor capacity for neurological recovery of older adults. In this study we present a novel approach for identifying TBI-affected white matter (WM) connections whose functional role likely involves them in modulating clinically-observed neurological deficits being targeted by rehabilitation routines for the elderly.

Material and Method

This study was undertaken according to US federal law (45 CFR 46) and with IRB approval. Informed written consent was obtained from all volunteers. This study included 26 older victims of mild TBI (age: $\mu = 66.8$ years, $\sigma = 5.93$ years) and 26 age- and sex-matched healthy control (HC) volunteers. MRI volumes were acquired using $T_1$, $T_2$, GRE/SWI and DWI sequences. Cerebral lesions were identified in each volunteer using a robust supervised classifier and deterministic tractography was implemented. Peri-lesional white matter (WM) streamlines were identified and changes in their functional anisotropy (FA) were assessed using a novel approach which involved DTI streamline matching, streamline prototyping and along-tract analysis. WM streamlines found to experience substantial FA changes were integrated with a search engine which queries the scientific literature to identify aspects of brain function deficits modulated by TBI-affected connectivity.

Results

In all patients where CMBs had been identified, the WM connections identified as peri-lesional were found to be involved in specific circuits which modulates memory retrieval, processing speed, speech and executive control. The patient-specific insights gained can suggest how rehabilitation routines could be modified to benefit the individual needs of each patient.

Conclusion

Because next-generation rehabilitation protocols for TBI victims will likely rely on the ability to understand which brain network alterations lead to neurological deficits in specific patients, personalized methods such as ours could one day be valuable to TBI rehabilitation professionals.

Keywords
traumatic brain injury; neuroimaging; connectomics

No conflict of interest
ABNORMAL BONE AND CARTILAGE METABOLISM COULD BE ANTAGONIZED BY PULSED ELECTROMAGNETIC FIELDS (PEMFS) AND TNF-α AND IL-6 GENE KNOCKOUTS IN A SIMILAR MECHANISM

S. Zhu¹, H. He¹, H. Wang¹, C. Gao¹,², Q. Wang¹, D. Wang³, Q. Wei⁴, X. Yu⁴, C. He¹,²

¹West China Hospital- Sichuan University, Department of Rehabilitation Medicine, Chengdu, China
²Sichuan University-The Hong Kong Polytechnic University, Institute for Disaster Management and Reconstruction, Chengdu, China
³Sichuan University, School of Aeronautics and Astronautics, Chengdu, China
⁴West China Hospital- Sichuan University, Laboratory of Endocrinology and Metabolism, Chengdu, China

Introduction/Background

PEMFs, as a non-invasive method, could positively affect bone and cartilage metabolism. However, the bio effect and underlying mechanisms remain poorly understood. The present study is designed to investigate the effect of PEMFs on osteoporotic bone and degenerative cartilage together with its potential molecular mechanisms in mice with different gene background.

Material and Method

Twenty 12-week male and Female wild-type (WT), TNFα knockout (TNFα−/−) or IL6 knockout (IL6−/−) mice, respectively, were sham-operated (SHAM) or subjected to destabilization of the medial meniscus (DMM) and ovariectomy (OVX) surgeries. After surgeries, WT mice were equally assigned to the non-treatment and PEMFs groups. After surgeries, WT mice were equally assigned to the non-treatment and PEMFs groups. Mice in PEMFs group were subjected to daily 1-hour PEMFs exposure with 8 Hz, 3.8 mT (peak value). Then all mice were
euthanized after 4 weeks.

**Study Design**

- 12-week-old female mice
- Bilateral OVX and right-knee DMM or SHAM
- Analysed at 4 week post-surgery

- Wild-type
- TNF-α⁻/⁻
- IL-6⁻/⁻
- Only WT underwent surgeries for PEMFs
- Body weight was measured weekly

- Uterus was removed and weighed
- Serum cytokines analysis
- Micro-CT (Right Femur and Knee)
- Histological analysis (Right Femur and Knee)
- Real-time PCR/WB (Distal metaphyses of left femurs and left knees)

---

**PEMFs exposure system (Version 1.0)**

---

**PEMFs exposure system (Version 2.0)**

- 3.8mT magnetic field intensity and 8 Hz frequency for 1 h/day, 5 days/week, for 4 weeks. Other groups were exposed to placebo PEMFs device.

---

**Results**
The surgical models of osteoporosis and osteoarthritis were proved successful evidenced by the analysis of micro-CT data and histological analysis. The bone loss and damaged cartilage were largely repaired by TNFα and IL6 gene knockout and partially inhibited by PEMFs exposure. Interestingly, no difference in Micro-CT data analysis was found between PEMFs group and gene knockouts, although a slight increase could be observed in TNFα−/− mice when compared to the PEMFs group. Negative effects on bone and cartilage was proved by testing key cytokines in anabolism and catabolism. PEMFs treatment and gene knockouts corrected the negative effects by targeting mediators in molecular pathways like Wnt and RANK in a similar way.

Conclusion

PEMFs alleviated surgeries induced bone loss and cartilage degeneration by promoting anabolism and inhibiting catabolism possibly in a similar mechanism to TNF-α and IL-6 gene knockouts, which imply that TNF-α and IL-6 may become new potential targets for PEMFs in treating degenerative bone diseases.

Keywords

osteoporosis; osteoarthritis; pulsed electromagnetic fields (PEMFs)

No conflict of interest
Poster Tour

Poster tour: Biological and imagery biomarkers leading to personalized rehabilitation

ISPR8-1003
AQUATIC EXERCISE TRAINING INCREASES SERUM BRAIN-DERIVED NEUROTROPHIC FACTOR IN PATIENTS WITH MULTIPLE SCLEROSIS: A RANDOMIZED CONTROLLED STUDY
M. Kargarfard1, A. Shariat2
1University of Isfahan, Department of Exercise Physiology- Faculty of Sport Sciences, Isfahan, Iran
2Sports Medicine Research Center- Neuroscience Institute- Tehran University of Medical Sciences- Tehran- Iran,
Sports Medicine Research Center- Neuroscience Institute- Tehran University of Medical Sciences- Tehran- Iran, Tehran, Iran

Introduction/Background

Background and aims: Brain-derived neurotrophic factor (BDNF) is neurotrophic factor for MS pathogenesis. However, the impact of acute exercise on BDNF factor is less clear in patients with MS and no study to date has examined this assumption. The purpose of this study was to examine the effects of 12-weeks supervised aquatic exercise on serum concentration BDNF, balance, functional exercise capacity, and fatigue in patients with multiple sclerosis.

Material and Method

Methods: 28 patients MS (mean age [X±SD]=37±9 years) were randomly assigned to either aquatic exercise group (EX: n = 13), or the control group (CON: n= 15). The patients Ex group exercised 3 times per week, 30 to 60 minutes per session for 12 weeks and included aerobic exercises, strength, flexibility, balance exercise training and walking activities, and the subjects in CON group were asked to maintain normal daily life pattern for the duration of the study. Balance, functional exercise capacity, fatigue, and BDNF serum concentration were measured at before and after intervention.

Results

Results: The results showed that 12 weeks of aquatic exercise increased BDNF and improved balance, functional exercise capacity, and fatigue in the EX group. In CON group, the serum BDNF level slightly decreased, and fatigue level increased significantly after 12 weeks, but balance and functional exercise capacity did not change. Also, there were significantly differences in serum BDNF, balance, functional exercise capacity, and fatigue between Ex and CON groups after intervention (p < 0.05).

Conclusion

Conclusions: The study showed that aquatic exercise more effective than treatment in increase BDNF levels of the subjects with MS. This type of activity is a beneficial training method to maintain functional parameters and also to increase the rate of BDNF in the MS.
Keywords

No conflict of interest
Introduction/Background

The sense of verticality results from a complex multisensory integration suggesting the existence of internal models of verticality perception. Recent data from our team suggest that the parietal operculum, the posterior insula and the posterior-lateral thalamus, in the right hemisphere, constitute the core polymodal regions that construct and update the internal models of verticality.

The aim of this study was double. First, to analyze functional connectivity, in a group of healthy participants, of the three core regions in a larger verticality perception network, established on literature data. Second, to analyze functional connectivity of these three regions in a group of stroke patients presenting an altered perception of verticality.

Material and Method

Functional connectivity was studied using ROI-to-ROI method in Connectivity toolbox with resting state functional Magnetic Resonance Imaging (fMRI). The regions of interest were selected from Anatomy toolbox, with source regions OP1, OP2, Ig1, Ig2, parietal and somatosensory thalamus. The first study concerned 74 healthy participants and the second study concerned 5 stroke patients with altered verticality perception in visual modality.

Results

In the healthy participants group, the three regions (represented by OP1, OP2, Ig1, Ig2, ThP and ThS) constitute a highly connected network in both hemispheres. In stroke patients group, this network was globally preserved in the healthy hemisphere, but disrupted in the brain-damaged hemisphere. Moreover, we observed a correlation between the loss of inter-hemispheric connectivity within this network and the altered perception of verticality in the visual modality.

Conclusion

The parietal operculum, the posterior insula and the posterior-lateral thalamus form a network that could correspond to the 'sense of upright' network.
Keywords

Verticality perception; Functional connectivity; fMRI

No conflict of interest
Poster Tour

Poster tour: Biological and imagery biomarkers leading to personalized rehabilitation

ISPR8-1688
PLASMA D-DIMER LEVEL FOR PREDICTION OF FUNCTIONAL OUTCOME IN ISCHEMIC STROKE
I.S. Choi¹, H.G. Prof²
¹Chonnam National University Hospital, Department of Physical & Rehabilitation Medicine, Gwangju, Republic of Korea
²Chonnam National University Bitgoeul Hospital, Department of Physical & Rehabilitation Medicine, Gwangju, Republic of Korea

Introduction/Background

Elevated D-dimer level has positive correlations with infarction volume and stroke severity on admission. Previous studies have demonstrated that D-dimer levels predict a progressing stroke, which is associated with poor short-term outcome in acute ischemic stroke. Conflicting data about the relationship between D-dimer level and functional outcomes were reported. We aimed to investigate the relations between serum D-dimer levels on admission and functional outcome of subacute stage in ischemic stroke patients.

Material and Method

We retrospectively reviewed the medical records of 68 first-ever acute cerebral infarction patients (35 men, 33 women; age 67.2±13.8 years). Plasma D-dimer level was measured on admission within 24 hours after stroke onset. The patients were classified into elevated group (plasma D-dimer > 0.55 mg/L FEU, 31 patients) and control group (≤ 0.55 mg/L FEU, 37 patients) based on the level of plasma D-dimer. National Institutes of Health Stroke Scale (NIHSS) was checked within a week after stroke onset. Modified Barthel Index (MBI) and PULSES profile were assessed on admission and at 3 months after stroke onset.

Results

1) Plasma D-dimer level on admission was 0.32±0.11 mg/L in control group and 2.59±3.61 mg/L in elevated group. 2) NIHSS was 6.32±3.80 in control group and 9.30±6.63 in elevated group. There was no significant difference in NIHSS between both groups (p=0.073). 3) ΔMBI was 23.39±16.28 in control group, 12.00±13.05 in experimental group. There was significant difference in ΔMBI between both groups (p=0.004). There was a significant correlation between the level of plasma D-dimer on admission and ΔMBI (r=-0.304, p=0.012). 4) ΔPULSES was 2.00±2.42 in control group and 1.03±1.83 in elevated group. There was no significant difference in ΔPULSES between both groups (p=0.059).

Conclusion

Plasma D-dimer level measured on admission would be helpful for predicting the functional outcome at subacute stage in ischemic stroke patients.
Keywords
D-dimer;functional outcome;subacute stroke

No conflict of interest
Poster Tour

Poster tour: Biological and imagery biomarkers leading to personalized rehabilitation

ISPR8-2033
AUTOANTIBODIES IN THE SERUM OF POST-STROKE PATIENTS WITH DIFFERENT CLINICAL OUTCOME
A. Trukhanov¹, A. Poletaev²
¹State scientific center for reanimatology and rehabilitation, Metabolic rehabilitation, Moscow, Russia
²State scientific center for reanimatology and rehabilitation, Metabolic rehabilitation, Moscow, Russia

Introduction/Background

Natural autoantibodies (auto-Abs) of IgG class against nervous tissue proteins, as well as corresponding anti-idiotypic antibodies (AIAbs) are presented in serum of each healthy adult and their content are relatively constant among individuals. In opposite, in patients with disorders of the nervous system serum levels of such AIAbs were often found beyond the normal ranges. Characteristic changes of auto-Abs against protein S100, glial fibrillary acidic protein (GFAP), MP-65 protein and nervous growth factor (NGF) and corresponding immune reactivity were investigated in serum samples obtained from patients with ischemic stroke. Samples for investigation were collected at 3, 10, 21 days after stroke and 6 months later.

Material and Method

42 post-stroke patients were examined in acute period of disease and 6 months later. The follow up was based NIHSS score. Outcomes were assessed with the Bartel Index at 6 month. Severity of post-stroke dementia was defined according to the DSM-IV and NINDS-AIREN. Auto-Abs against S100, GFAP, MP-65 and NGF as well as corresponding AIAbs were determined in patient serum by standard immuno-ferment assay (ELISA).

Results

In acute period of disease in 100% of post-stroke patients the serum immune reactivity of auto-Abs and AIAbs against proteins S100, GFAP, MP-65 and NGF were deviated compare to the same characteristics in serum samples of healthy persons (p<0.001). Sixth months later the deviations of serum immune reactivity were revealed in most part of post-stroke patients and relations between changed immune reactivity and clinical spate were found. The most characteristic feature of patients with post-stroke dementia was deviations of normal balance between pairs of specific auto-Abs and corresponding AIAbs.

Conclusion

Changes in the serum content of auto-Abs against nervous tissue proteins and corresponding AIAbs in post-stroke patients may reflect intensity of reparative processes and probably could be used for prognostic aims of rehabilitation program success.
Keywords

No conflict of interest
Poster Tour

Poster tour: Biological and imagery biomarkers leading to personalized rehabilitation

ISPR8-2410
ELUCIDATION OF GENE EXPRESSION PATTERNS IN THE BRAIN AFTER SPINAL CORD INJURY
J.Y. Park¹, S.H. Kim¹, J.Y. Jang¹, H.C. Lee¹
¹Yonsei University Wonju College of Medicine, Rehabilitation, Wonju, Republic of Korea

Introduction/Background

Spinal cord injury (SCI) is a devastating neurological disease. The pathophysiological mechanisms of SCI have been reported to be relevant to central nervous system injury such as brain injury. Recent studies have shown that SCI causes brain inflammation, progression of nerve cell loss as well as loss of brain functions. In this study, gene expression of the brain after SCI was elucidated using transcriptome analysis to characterize the temporal changes in global gene expression patterns in a SCI mouse model.

Material and Method

Subjects were randomly classified into three groups: sham control, acute (3 hour-post injury) and subacute (2 week-post injury) groups. We sought to confirm the differentially expressed genes (DEGs) between post injured groups and sham control groups. Therefore, we performed transcriptome analysis to investigate the enriched pathways associated with pathophysiology of the brain after SCI using Database of Annotation Visualization and Integrated Discovery (DAVID), which yielded Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway.

Results

Following enriched pathways were found in brain: oxidative phosphorylation pathway, inflammatory response pathways—cytokine-cytokine receptor interaction, chemokine signaling pathway—, ER stress related pathways: antigen processing and presentation, and MAPK signaling pathway. Oxidative phosphorylation was identified at acute phase, while inflammation response and ER stress related pathway were identified at subacute phase.

Conclusion

Our study provided gene expression patterns in brain after SCI in pathophysiological processes. In brain after SCI, mitochondria dysfunction occurred at acute phase, sequentially inflammatory response and ER stress aroused at subacute phase. Finally, these stress environments led to activation of MAPK signaling pathway at subacute phase compared to acute phase. These pathophysiological mechanisms already have been reported in SCI. Our results emphasized that SCI is closely associated with brain injuries. Hence these mechanisms may provide not only a link between SCI and brain injury, but also valuable reference data for understanding gene expression patterns at acute phase and subacute phase.

Keywords
1. Spinal cord injury; 2. Brain; 3. Transcriptome analysis

No conflict of interest
Poster Tour

Poster tour: BTS contest: Movement analysis

ISPR8-2534
RANGES OF MODIFICATIONS IN STEP WIDTH AND FOOT PROGRESSION ANGLE FOR EVERYDAY WALKING
B. Ulrich¹, S. Edd¹, S. Bennour¹,², B.M. Jolles¹,³, J. favre¹
¹Centre Hospitalier Universitaire Vaudois and University of Lausanne, Musculoskeletal Medicine, Lausanne, Switzerland
²National Engineering School of Sousse, Mechanical Laboratory of Sousse, Sousse, Tunisia
³Ecole Polytechnique Fédérale de Lausanne, Microengineering, Lausanne, Switzerland

Introduction/Background

Gait retraining through instructions to modify step width (SW) and foot progression angle (FPA) is quickly gaining in interest for the rehabilitation of a range of pathologies. Diverse systems have been proposed to guide the patients modifying these variables, but their uses are limited by the paucity of data regarding individuals’ willingness to walk with these modifications. This study aimed at characterizing the range of SW and FPA modifications that individuals would consider walking with.

Material and Method

Ten healthy subjects (6 males; 25 ± 6 years old; 22 ± 2 kg/m2) performed 10 m long walking trials with various amplitudes of SW and FPA modifications (Table 1) in a gait lab equipped with a motion capture system (Vicon, UK) linked to a custom device displaying footprint instructions on the ground. After each trial, the participants indicated whether they “could” or “were not willing or able to” walk with the proposed modification every day.

Results

Ninety percent or more of the participants indicated that they could walk every day with SW modifications between -0.10 m and +0.16 m (Table 1). Less than 50% would however consider larger amplitudes of SW modifications. Concerning FPA, 90% or more reported that they could walk every day with modifications in the range -10° to +10°. Fifty to 90% would either consider larger FPA increases (up to 20°), whereas less than 50% would consider larger decreases.
**Conclusion**

This study showed that healthy subjects would be willing modifying SW and FPA. It further provided first modification ranges, between -0.10 m and +0.16 m and between -10° and +10°, that a vast majority would consider for everyday walking. This study therefore confirmed the potential of SW- and FPA-based gait retraining and provided important information for the design of future rehabilitation protocols.

**Keywords**

Gait retraining; Step width; Foot progression angle

*No conflict of interest*
ISPR8-2616
IS MUSCLE STRENGTH RELATED TO SPATIO-TEMPORAL GAIT PARAMETERS IN ADULTS WITH MYOTONIC DYSTROPHY TYPE 1?
M. Harvey¹, M. Gosselin¹, M. Vocos², A.S. Comtois¹, L.N. Veilleux³, L. Ballaz⁴
¹Université du Québec à Montréal, Département des Sciences de l’Activité Physique, Montréal, Canada
²Centre de Réadaptation Lucie-Bruneau, Physiothérapie, Montréal, Canada
³Hôpital Shriners pour Enfant-Canada, Centre d’analyse du mouvement, Montréal, Canada
⁴Centre de Réadaptation Marie Enfant - CHU Sainte-Justine, Laboratoire de la Marche - LAM CRME, Montréal, Canada

Introduction/Background

The Myotonic Dystrophy type 1 (DM1) is the most common adult muscular dystrophy. DM1 is clinically characterized by a decrease of muscle strength during adolescence and adulthood, resulting in a decrease of functional capacity. In this population, gait is characterized by a lack of hip and knee range of motion, as well as lower ankle power generation during the push-off phase. Distal muscle weakness can be suspected as a key parameter resulting in such gait adaptation in people with DM1. The aim of this study was to explore the relationship between lower limb muscle strength and spatio-temporal gait parameters in adults with DM1.

Material and Method

An instrumented gait analysis, including kinematic and kinetic measurements was performed in 17 adults with DM1. All participants were asked to walk at their comfortable speed along a 13-meter walkway. Maximal isometric muscle strength was measured at the hip and knee joints by an experimented assessor using hand held dynamometer. Ankle power generation during walking was used as plantar strength indicator.

Results

Ankle peak power generation was correlated with stride length (r=0.64) and walking speed (r=0.76, p<0.01). Stride length was also correlated with maximal contralateral (r=0.64) and ipsilateral (r=0.68) knee extensors strength (p<0.01) and maximal contralateral (r=0.59) and ipsilateral (r=0.53) hip abductors strength (p<0.05). Linear regression models were fitted using a forward stepwise model selection procedure to explain the variance of spatio-temporal gait parameters. Maximal isometric lower limb muscle strength and ankle peak power generation were considered as independent variables. Ankle peak power generation accounted for 57% of the walking speed variance (p<0.001). Ankle power, knee extension and hip flexion account for 72% of the step length variance (p<0.05).

Conclusion
The present study highlighted the key role of ankle power generation and knee extensor strength on gait pattern adaptation in people with DM1.

**Keywords**

Steinert disease; gait; muscle strength

*No conflict of interest*
Introduction/Background

Stroke is a complex neurological problem with numerous negative impacts on both cognitive and physical functions. One of the most prominent physical impairments occurs to gait, leading to risk of falls due to loss of postural control. Falls in stroke survivors is complex and depends on the interrelationship between individual, environment and the nature of the task. The aims of this study were to examine the effect of walking task constraint on dynamic stability and the association between dynamic stability and walking ability and balance in people with stroke.

Material and Method

Ten hemiplegic stroke survivors (6 males and 4 females) voluntarily took part in this study and walked on a treadmill at their preferred speed under 2 different conditions: level walking and uphill walking (5˚ slope). A motion analysis system was used to assess gait performance in initial contact and toe-off moments. The primary outcomes of this study were margin of stability, balance (TUG test) and walking ability (10MWT and treadmill speed).

Results

The results of this study showed that uphill walking had greater stability in initial contact in anterior-posterior direction (t= -2.49, p<0.05, ES=0.43), whereas level walking showed greater stability in toe-off in mediolateral direction (t=2.31, p<0.05, ES=1.5). In addition, dynamic stability showed strong associations with walking ability (r=0.82, p<0.05) and balance (r=0.92, p<0.05) in the uphill walking condition.

Conclusion

Walking in a challenging condition, like uphill, requires adjustments in dynamic gait stability in stroke survivors that is predicted by adaptations in walking performance.

Keywords

Chronic stroke;Walking ability;Dynamic stability

No conflict of interest
Poster Tour

Poster tour: BTS contest: Movement analysis

ISPR8-0746
SIMULTANEOUS RECORDING OF BRAIN ACTIVATIONS AND MOVEMENT KINEMATICS SUB-ACUTE POST-STROKE: UNDERSTANDING NEUROMOTOR CONTROL TO OPTIMIZE RECOVERY

L. van Dokkum1,2, E. Le Bars2,3, D. Mottet4, J. Froger5, A. Bonafe3, N. Menjot de Champfleur2,3, I. Laffont1,4

1CHU Montpellier, Physical Medicine and Rehabilitation, Montpellier, France
2CHU Montpellier, I2FH research platform, Montpellier, France
3CHU Montpellier, Neuroradiology, Montpellier, France
4Montpellier University, Euromov, Montpellier, France
5CHU Nimes, Physical Medicine and Rehabilitation, Grau de Roi, France

Introduction/Background

Rehabilitation, aiming to stimulate underlying neural plasticity, takes an important place in patients’ treatment post-stroke. Here we confront fine-grained movement kinematics with corresponding brain activations to reveal recovery markers usable to individualize therapeutic approaches favoring plasticity and maximizing recovery.

Material and Method

21 participants early post-stroke with initial severe motor deficits were compared with 13 controls. Participants were evaluated twice, <8 weeks post-stroke and after 6 weeks of rehabilitation. Kinematic data were collected during movement execution within the fMRI. The movement consisted of a continuous elbow flexion/extension. Calculated kinematics captured the movements’ shaping (amplitude, frequency) and the structure (fluency, directness, and the variability’s entropy).

Results

People post-stroke generally moved with decreased amplitude, smoothness, directness and entropy compared to controls. The frequency was lower for the paretic upper-limb and during bilateral movements, but comparable to controls during ipsilesional upper-limb movement. The variability’s entropy was in both controls and patients related to increased activations in the middle frontal lobe, presumably indicating more feedforward based control. In patients, the amplitude and smoothness were correlated with strong implication of the occipital lobe, and additional recruitment of the rolandic opercularis (visualization) was observed during both paretic and ipsilesional movement, related to motor learning. Patients’ kinematic characteristics were unrelated to clinical scores and lesion characteristics, supporting the idea that they reflect motor control strategies.

Conclusion

The co-registration of fine-grained kinematics and fMRI measures revealed how different kinematic profiles are related to different motor control organizations. Analyzing kinematics in a
standardized manner might contribute to the implementation of a personalized rehabilitation strategy, and more targeted brain stimulation protocols to stimulate plasticity and optimize recovery.

**Keywords**

Stroke; Brain imaging; Movement Kinematics

*No conflict of interest*
Poster Tour

Poster tour: BTS contest: Movement analysis

ISPR8-0792
RELATIONSHIP BETWEEN THE MEDIAL LONGITUDINAL ARCH, FOOT DORSIFLEXION RANGE OF MOTION, AND DYNAMIC GAIT PARAMETERS
T. Shirosita

1Gunma Paz University, School of Physiotherapy, 603Lab 1-7-1 Tonyamachi Takasaki, Japan

Introduction/Background

When an evaluation focuses on movement, there is little chance of error by oversight, even by an inexperienced therapist. This study aimed to clarify relationship between the medial longitudinal arch (MLA), foot dorsiflexion range of motion (DF), and the dynamic gait parameters.

Material and Method

This study evaluated 20 participants (16 males, 4 females; mean age 21.2 ± 0.4 years). MLA was measured using the navicular drop test (ND) developed by Brody. DF was measured with the knee in extension.

Dynamic data were collected with a 9-camera, motion capture system with 3 force plates. The participants performed barefoot gait five times. The gait parameters were navicular height, DF, dynamic navicular drop, ankle moment peak value in stance phase (AMP), and maximum dorsiflexion range of motion, with the ankle moment value and DF measured at 12%, 31%, and 50% of the gait cycle, respectively. These gait parameters were compared using coefficients of correlation for ND and DF.

For statistical analysis, we used Pearson’s correlation coefficient using the IBM SPSS statistical software (version 21), and p<0.05 was considered as significant. This study was approved by the Ethics Committees for Human Research of Gunma Paz University.

Results

ND did not show a relationship with any gait parameters. However, DF showed a negative correlation with ankle moment at 50% (p=0.003, r=-0.623) and AMP (p=0.008, r=-0.574)

Conclusion

These findings show that DF is more important than ND in gait assessment. In the terminal stance, when DF is limited, the ankle moment shows a higher value. When DF is larger, this is reversed. Eccentric contraction using stretch-reflection was observed in the terminal stance phase. In our opinion, a reflective factor strongly influences gait movement. Thus, evaluation of DF before gait assessment is essential.
Keywords

the medial longitudinal arch; foot dorsiflexion range of motion; gait analysis

No conflict of interest
Poster Tour

Poster tour: BTS contest: Movement analysis

ISPR8-0803
EVALUATION OF KINEMATIC ONSET FOR SIT-TO-STAND TASK IN STROKE PATIENTS
H. Hanawa¹, M. Sonoo¹, K. Hirata¹, K. Kubota¹, T. Miyazawa², Y. Matsumoto¹, T. Kokubun², N. Kanemura³
¹Saitama Prefectural University, Graduate Course of Health and Social Services, Koshigaya, Japan
²Ageo Futatsumiya Clinic, Department of Rehabilitation, Ageo, Japan
³Saitama Prefectural University, Department of Health and Social Services, Koshigaya, Japan

Introduction/Background

Sit-to-stand task is an important and kinetically challenging task for stroke patients. From the muscular strength perspective, it is well known that a large knee extension moment is required to lift the thigh. Energy flow from trunk and shank to lift the thigh has already been shown. Therefore, kinematic coordination is also necessary for the sit-to-stand task.

Material and Method

In this study, sagittal movement onset of each segment of the body (thorax, pelvis, thigh, shank), hip joint center (HJC), and knee joint center (KJC) were compared between young (YOUNG, three people) and elderly (ELDERLY, four), and stroke patients (STROKE, three) for sit-to-stand task. We used VICON Nexus 2.5 (VICON corp.) to measure the body kinematics.

Results
A figure presents temporal order of movement onset of the body parts. The time difference within 0.005 [sec] is regarded as simultaneous, and a single quotation is added on number. The group difference existed between YOUNG and ELDERLY (e.g. mean thigh-shank was 0.13, -
0.07 [sec], respectively; p = 0.01). ELDERLY and STROKE (two-thirds people, paretic side) had similar timing.

Conclusion

In YOUNG, there is a possibility that trunk flexion lead to the translation of HJC and KJC, so that tilted the shank forward. Also, these results were consistent with a previous study that movement (work) of the trunk and shank contributes to lift the thigh. ELDERLY and some STROKE were different from this order. They may have used the movement strategy inferior in terms of energy cost, because the movement trajectory of healthy adults is controlled so that the torque of each joint is minimized. Although movement coordination is difficult to evaluate, we could provide basic knowledge from the standpoint of kinematics.

Keywords

sit-to-stand;kinematics;coordination

No conflict of interest
Poster Tour

Poster tour: BTS contest: Movement analysis

ISPR8-1209

USING INERTIAL SIGNALS TO CHARACTERIZE MAIN LOWER LIMB GAIT PATTERNS IN INDIVIDUALS POST-STROKE

N.C. Duclos¹, G. Parent², R. Aissaoui², C. Duclos¹, S. Nadeau¹

¹Laboratoire de Pathokinésiologie / Centre de Recherche Interdisciplinaire en Réadaptation, École de Réadaptation- Université de Montréal, Montréal, Canada

²Laboratoire de recherche en Imagerie et Orthopédie / Centre de Recherche du Centre Hospitalier Universitaire de Montréal, École de Technologie Supérieure- Université de Montréal, Montréal, Canada

Introduction/Background

Different lower limb (LL) gait patterns (spastic, flexum, hyperextension, buckling) have been described post-stroke that require specific interventions (strengthening, botox, medication, orthosis). We explored whether the analysis of angular velocities of the femur and tibia, easily recorded using wearable inertial sensors, might be a good tool to assess LL gait deviations. The objective was to define how the sagittal angular velocity of the femur (ωF) and tibia (ωT) change with walking speed, hemiparesis and LL gait patterns.

Material and Method

Twenty chronic hemiparetic individuals, with an inertial sensor (OPAL, APDM inc.) fixed at each tibia and thigh, walked over ground at self-selected walking speed in the laboratory. A physiotherapist noted the presence of LL gait pattern and recorded with a camera the LL movement. Participants also stayed 5 seconds in upright position and did 5 squats to calibrate the system. In addition, three healthy controls walked on a treadmill at comfortable, 0.8 and 0.4 m/s speeds. A preliminary analysis confirmed that treadmill data could be used as reference for data collected over ground. The normal range of ωT and ωF was determined using +/- 2 SD around the mean values at similar walking speed.

Results

The speed changed the amplitude of ωT and ωF and the profiles of some individuals post-stroke differed from normal limits. In seven participants with specific LL gait pattern, their ωT and ωF revealed specific profiles, with typical deviations to each LL pattern. Clear deviations from the normal ωT and ωF profiles were also observed for two participants having deviations less observable with the naked eye.

Conclusion

These preliminary findings suggest that wearable inertial sensors have the potential to characterize specific LL movement deviations and add objective data to gait clinical assessment. It could be an interesting complement to assess the treatment effects.

Keywords

Inertial sensors;Gait patterns;Stroke
No conflict of interest
Poster Tour

Poster tour: BTS contest: Movement analysis

ISPR8-1342
USING THE BODY KINEMATICS TO ASSESS THE UTILIZATION OF TRANSHUMERAL PROSTHESSES
M. Merad¹, E. de Montalivet¹, M. Lestoille¹, A. Touillet², N. Martinet², J. Paysant², A. Roby-Brami¹, N. Jarrassé¹
¹Institut des Systèmes Intelligents et de Robotique, Université Pierre et Marie Curie, Paris, France
²Centre Louis Pierquin- Institut Régional de Médecine Physique et de Réadaptation, UGECAM Nord-Est, Nancy, France

Introduction/Background

There is a gap between the technical capability of upper limb prostheses, and the control strategy (commonly sequential myoelectric control) used to actuate the motorized joints. Surprisingly, the control method is the same for prosthetic hands and hand/wrist/elbow systems, which leads to a complex utilization. Research groups are investigating new control strategies to make the prosthetic control easier. Most studies are focusing on the task achievement, but it is nonetheless essential to assess the achievement method, especially since high-level amputees are prone to develop compensation-related musculoskeletal disorders. The study aims to show that body kinematics can be used to compare different control strategies, or prosthetic equipments.

Material and Method

Transhumeral amputees performed a reaching task with different prosthetic parameters (different sockets, different control strategies). They performed the task with a prosthesis prototype that could be adapted to any socket, and implemented with any control strategy. They were equipped with motion capture sensors in order to record their body kinematics. The body motion analysis included the trunk and shoulder displacements, as well as the weight deviation.

Results

We could observe that each transhumeral amputee had a unique utilization of their prosthesis, and that they had their own residual capabilities. All the participants performed the task with the two tested control strategies successfully. However, the kinematic analysis showed differences between the control strategies in terms of coordination restauration, that the participants described but that the task assessment (success or not) could not provide.

Conclusion

Differences could be highlighted between control strategies that the standard assessment method could not show. Hence the whole body kinematics can be a substantial source of information, especially given the potential severity of compensatory strategies in upper limb prosthesis utilization.
Keywords

Compensatory strategies; Upper limb prosthetics; Transhumeral amputation

No conflict of interest
Poster Tour

Poster tour: BTS contest: Movement analysis

ISPR8-1576

AUTOMATIC ASSESSMENT OF MOTOR FUNCTION IN PATIENTS WITH SPINAL MUSCULAR ATROPHY: MFM-DIGITAL STUDY

D. Vincent-Genod¹, A. Gomes Lisboade Souza², P. Rippert³, G. Thomann², M.D. Morard¹, C. Vuillerot¹

¹Hospices Civils de Lyon, Service de Rééducation Pédiafrérique l’Escale, Bron, France
²Univ. Grenoble Alpes- CNRS, G-Scop, Grenoble, France
³Hospices Civils de Lyon, Pôle Information Médicale Evaluation Recherche, Bron, France

Introduction/Background

Given the progress of research and management in Spinal Muscular Atrophy (SMA), validated tools are needed to assess patients’ motor function. The Motor Function Measure assessment (MFM) is a validated and sensitive to the change tool applicable in SMA. Clinicians from the Neuromuscular Diseases Department (Hospices Civils de Lyon, France) are developing the MFM-digital, an automated system to assess SMA patients’ motor function based on MFM. By using a Microsoft Kinect and a digital tablet, the objective is to improve reliability and acceptability of the MFM by lowering the measure’s subjectivity linked to heteroevaluation and by creating a hybrid serious-game.

Material and Method

The feasibility study assesses the relevance of the system to capture postures and motions during a MFM test. On 32 items, 14 were recognized by the Kinect and 3 items were performed using a tablet. Scores provided by a therapist looking at the patients directly were compared to scores obtained by a blind scoring based on digital data coming from Kinect and tablet records and performed by a single evaluator.

Figure 1. Analysis Process

Results

21 records of MFM were collected with Kinect sensors. Records with tablets are still on-going. A great concordance between items scoring by a therapist and items scoring on captured digital data were found (76%).

Conclusion

The data supplied by the system MFM-digital bring additional data, in particular the timing of items’ exercises and kinematic parameters. Tracks of improvements of the system are on-going in particular concerning the capture for weaker patients. The next step is to use an algorithm to provide an automatic scoring based on digital data.

Keywords
automatic score;Spinal Muscular Atrophy;Motor Function Measure

*No conflict of interest*
Introduction/Background

Virtual reality (VR) has been shown to be an effective treatment for specific phobias, post-traumatic stress disorder, and chronic pain. Combined with a 3D motion capture system, VR becomes a valuable rehabilitation tool giving the clinician real-time measurements of joint movements. While 3D motion capture is prohibitively expensive, a tracking system released by Vive in March 2017, provides an inexpensive method to provide 6-Degrees of Freedom (DOF) motion data. The aim of this study was to assess the accuracy of position and orientation measures reported by Vive Tracker pucks in comparison to Vicon with movements in healthy adults performing trunk motions in a VR game.

Material and Method

Light-reflective markers were mounted on custom designed 3D printed plates along with Vive Tracker pucks. The plates were attached to the thorax and pelvis with elastic straps. Movement of the marker clusters were recorded by twelve Vicon Bonita 10 cameras (spatial resolution of 0.1 mm) using Vicon Tracker and The Motion Monitor software packages. Position and orientation of the Vive Tracker pucks were tracked by two infrared laser emitter units and recorded using the Unity game engine. Both Vicon and Vive data were recorded at 100 Hz. The two data streams were aligned based on game event markers with custom designed Matlab programs. The root mean square error was then calculated across a series of trials.

Results

The root mean square (RMS) difference between Vicon cluster markers and the Vive Tracker pucks was, on average, 0.26 degrees for the angular displacement and 0.336 mm for the positional data.

Conclusion

The Vive Tracker pucks provide an accurate measurement of angular displacement and position that is consistent with the gold standard of the Vicon opto-electric system. This finding will help in translating laboratory based VR treatments to the clinic at very little cost.

Keywords
Lumbar Spine; Virtual Reality; kinesiology

No conflict of interest
Introduction/Background

In hemiparesis, functional electrical stimulation (FES) of the peroneal nerve aims to compensate for ankle dorsiflexor paresis in swing phase. The present prospective study compared the effects of gait training with FES vs. conventional therapy on plantar flexor overactivity.

Material and Method

Twenty subjects with chronic hemiparesis (6±4 years post-lesion; mean±SD) were randomized into two groups: FES (45 min/day of gait self-training using FES) and Control (CON, 3x45 min/week of conventional physiotherapy) for 10 weeks. Outcomes at Day 1 and Week 10 included comfortable speed barefoot gait analysis with gastrocnemius medialis (GM) and soleus (SO) electromyography, yielding: walking speed; and, at the paretic ankle: maximal passive dorsiflexion during stance, maximal active dorsiflexion during swing, velocity of active dorsiflexion over early swing, coefficient of spastic cocontraction in GM and SO over the three thirds of swing (CSC, calculated by the ratio of the RMS of the electromyogram in the period of interest over the RMS of the electromyogram of the same muscle over 100 ms around its maximal voluntary contraction). Intra- and inter-group comparison used rank-ANOVAs.

Results

No difference was observed in walking speed changes (both groups pooled; D1, 0.73±0.25 m/s, W10, 0.80±0.30 m/s, ns) and in passive and active dorsiflexion amplitudes (ns). However, the velocity of active dorsiflexion increased in FES while it decreased in Controls (D1 vs W10, FES, +5±2°/sec, p=0.02; CON, -4±1°/sec, p=0.04). In parallel, CSC_{GM} in early swing tended to improve in FES only (FES, -41±23%, p=0.09; CON, -24±89%, ns; between group difference ns).

Conclusion

In chronic hemiparesis, FES, which focuses on agonist dorsiflexor stimulation during gait improves active dorsiflexion velocity in swing and may also be associated with reduction of plantar flexor spastic cocontraction. Further studies are required to confirm these findings and evaluate whether reciprocal inhibition toward plantar flexors may be restored by FES.
Keywords

Hemiparesis; Coefficient of spastic cocontraction; WalkAide® device

No conflict of interest
THE EFFECT OF BODY MASS INDEX ON FUNCTIONAL OUTCOME OF PATIENTS ON CARDIAC REHABILITATION

D. Burke¹, R. Bratton Bell¹, S. Al-Adawi², D.P. Burke³

¹Emory University School of Medicine, Rehabilitation Medicine, Atlanta, USA
²Sultan Qaboos University, Department of Behavioral Medicine, Al-Khoud, Oman
³Georgia State University, Georgia State University, Atlanta, USA

Introduction/Background

While data suggests that obesity increases the risk for cardiovascular disease, some have demonstrated that after a cardiovascular event those with obesity tend to recover more quickly than those whose weight is normal; a phenomenon termed the “obesity paradox”. This study was designed to determine whether this obesity paradox is also reflected in the recovery of patients with debility secondary to a cardiovascular event undergoing care in a rehabilitation hospital.

Material and Method

Retrospective cohort study which included all patients admitted to a rehabilitation hospital, with a recent diagnosis of acute cardiac decline from January 2000 – April 2006.

Results

Of the 678 patients admitted during the observation period, BMI was compared with FIM score changes per day (FIM efficiency). After adjusting for age, and sex, the FIM efficiency differed by BMI, though the difference was not statistically significant (p=0.069). While not statistically significant, the normal weight group showed the best results, followed, in order by the obese group, the overweight group, and the underweight group.

Conclusion

This study of patients on a cardiac rehabilitation unit failed to demonstrate that obesity significantly impairs functional progress during the rehabilitation process.

Keywords

Stroke; Cardiovascular Disease; FIM Efficiency

No conflict of interest
IMPROVEMENT OF EXERCISE CAPACITY IN PATIENTS WITH DIABETES MELLITUS DURING CARDIAC REHABILITATION

Y. Choe¹, W.Y. Shin¹, J.Y. Han²
¹Gwangju Veterans Hospital, Department of Physical & Rehabilitation Medicine, Gwangju, Republic of Korea
²Chonnam National University Medical School & Hospital, Department of Physical & Rehabilitation Medicine, Gwangju, Republic of Korea

Introduction/Background

The presence of diabetes is known as a major risk factor for cardiovascular mortality after acute myocardial infarction (AMI). Decreased exercise capacity is also independent poor prognostic factor for all-cause cardiovascular mortality in patients referred to a rehabilitation program after AMI. This study aim to investigate the difference of exercise capacity between diabetic (DM) and non-diabetic (non-DM) patients with AMI in cardiac rehabilitation (CR).

Material and Method

This retrospective study consisted of patients referred for CR after percutaneous coronary intervention from October 2010 to December 2015. 223 patients who continued follow-up for 3 months after initiation of CR were enrolled. All patients (56 with DM and 167 without DM) participated in 12-week CR program. ETT was performed by modified Bruce protocol (mBP) at the initiation of CR, 6 weeks and 3 months after initiation of CR. We measured resting heart rate, maximum heart rate, resting systolic blood pressure, metabolic equivalents of tasks (METs), submaximal rate pressure product at stage 3 of mBP, total exercise time (TET), and peak oxygen consumption (peakVO₂). The parameters of exercise capacity were peakVO₂, METs and TET.

Results

At initiation of CR, the DM group had significantly lower exercise capacity in TET, peak VO₂, and METs than did the non-DM group. Although both of two groups showed significantly improved exercise capacity after completing phase II CR, the DM group did not show statistically significant improvement of METs and peak VO₂ at 6 weeks after initiation of CR. Still, The DM group had significantly lower exercise capacity than non-DM group after completing phase II CR.
Table 1. Clinical characteristics of the study population (n, %)

<table>
<thead>
<tr>
<th></th>
<th>Non-DM group (n=167)</th>
<th>DM group (n=56)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>54.72 ± 10.22</td>
<td>58.54 ± 10.67</td>
<td>0.018*</td>
</tr>
<tr>
<td>Sex (men)</td>
<td>155(87.6%)</td>
<td>43 (78.2%)</td>
<td>0.124</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>25.06 ± 2.85</td>
<td>25.10 ± 2.82</td>
<td>0.933</td>
</tr>
<tr>
<td>LVEF (%)</td>
<td>56.73 ± 8.89</td>
<td>54.74 ± 9.95</td>
<td>0.275</td>
</tr>
<tr>
<td>Hypertension</td>
<td>51(30.5%)</td>
<td>36 (64.3%)</td>
<td>0.000*</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>37(34.1%)</td>
<td>22(39.3%)</td>
<td>0.485</td>
</tr>
<tr>
<td>Current smoker</td>
<td>91(54.5%)</td>
<td>24(42.9%)</td>
<td>0.131</td>
</tr>
<tr>
<td>CHD type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STEMI</td>
<td>82(49.1%)</td>
<td>22(39.3%)</td>
<td></td>
</tr>
<tr>
<td>NSTEMI</td>
<td>85(50.9%)</td>
<td>34(60.7%)</td>
<td></td>
</tr>
<tr>
<td>Medication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-blocker</td>
<td>121(72.5%)</td>
<td>43 (76.8%)</td>
<td>0.521</td>
</tr>
<tr>
<td>ACEI</td>
<td>61(36.5%)</td>
<td>18(32.1%)</td>
<td>0.747</td>
</tr>
<tr>
<td>Statin</td>
<td>119(71.3%)</td>
<td>44 (78.6%)</td>
<td>0.278</td>
</tr>
<tr>
<td>Glucose at admission</td>
<td>142.30 ± 46.89</td>
<td>217.35 ± 107.29</td>
<td>0.000*</td>
</tr>
<tr>
<td>SBP at admission</td>
<td>123.45 ± 25.06</td>
<td>123.57 ± 20.49</td>
<td>0.371</td>
</tr>
<tr>
<td>DBP at admission</td>
<td>79.20 ± 16.38</td>
<td>76.80 ± 16.55</td>
<td>0.339</td>
</tr>
<tr>
<td>1 year fU</td>
<td>50(28.2%)</td>
<td>11(20.8%)</td>
<td>0.375</td>
</tr>
</tbody>
</table>

Values are presented as mean ± standard deviation or number (%)
DM, diabetes mellitus; BMI, body mass index; LVEF, left ventricular ejection fraction; CHD, coronary heart disease; STEMI, ST elevation myocardial infarction; NSTEMI, non-ST elevation myocardial infarction; ACEI, angiotensin-converting enzyme inhibitor; SBP, systolic blood pressure; DBP, diastolic blood pressure
p-values are for comparison between DM group and Non-DM group
*p-statistically significant (p<0.05) in comparison of the non-DM and DM group

Table 2. Comparison of Effect on Cardiopulmonary Exercise Capacity

<table>
<thead>
<tr>
<th></th>
<th>Non-DM Group</th>
<th>DM Group</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At initial</td>
<td>After 6 weeks</td>
<td>After CR</td>
</tr>
<tr>
<td>METs†</td>
<td>7.49 ± 1.85</td>
<td>8.03 ± 1.90*</td>
<td>8.20 ± 1.84*</td>
</tr>
<tr>
<td>Peak VO2†</td>
<td>1.87 ± 0.61</td>
<td>2.06 ± 0.63*</td>
<td>2.05 ± 0.60*</td>
</tr>
<tr>
<td>TET†</td>
<td>780.87 ± 134.12</td>
<td>799.14 ± 137.49*</td>
<td>799.14 ± 137.49*</td>
</tr>
<tr>
<td>RPP max†</td>
<td>143.11 ± 41.66</td>
<td>129.99 ± 33.94*</td>
<td>129.19 ± 35.75*</td>
</tr>
<tr>
<td>HR rest†</td>
<td>74.68 ± 14.65</td>
<td>72.33 ± 13.36</td>
<td>71.06 ± 11.06*</td>
</tr>
<tr>
<td>HR max†</td>
<td>134.46 ± 22.31</td>
<td>137.30 ± 22.54</td>
<td>137.52 ± 23.90</td>
</tr>
<tr>
<td>SBP max†</td>
<td>113.93 ± 18.98</td>
<td>112.31 ± 16.16</td>
<td>111.76 ± 17.20</td>
</tr>
<tr>
<td>BMI†</td>
<td>25.06 ± 2.85</td>
<td>25.12 ± 2.85</td>
<td>25.00 ± 2.84</td>
</tr>
<tr>
<td>FFM†</td>
<td>19.13 ± 2.49</td>
<td>19.34 ± 1.85</td>
<td>19.40 ± 1.66</td>
</tr>
</tbody>
</table>

Values are mean ± standard deviation
METs, metabolic equivalents of task; Peak VO2, peak oxygen consumption; TET, total exercise time; RPP, Submaximal rate pressure product; HR rest, maximal heart rate; HR max, resting heart rate; SBP, Systolic blood pressure; BMI, Body mass index; FFM, Fat free mass index
*Statistically significant (p<0.05) in comparison of the non-DM and DM group
**Statistically significant (p<0.05) in comparison of baseline and after 6 weeks
***Statistically significant (p<0.05) in comparison of baseline and after 3 months
†p-value<0.05; comparison according to period of time using two-way repeated measures analysis of variance (RMANOVA)
‡p-value<0.05; comparison according to period of time using two-way repeated measures analysis of variance (RMANOVA)
§p-value<0.05; comparison according to period of time using two-way repeated measures analysis of variance (RMANOVA)
Conclusion

Even though exercise capacity had improved over time after completing CR regardless of presence of DM, Exercise capacity improved more slowly in DM group than in non-DM group. DM group had lower exercise capacity than did the non-DM group all the time of CR.

Keywords

Myocardial Infarction; Diabetes Mellitus; Cardiac Rehabilitation

No conflict of interest
Poster Tour

Poster tour: Cardiac rehabilitation

ISPR8-1333
THE ROLE AND IMPACT OF PHYSICAL MEDICINE AND REHABILITATION IN CARDIAC REHABILITATION PROGRAMS AROUND THE WORLD
M. Supervia Pola¹, K. Turk-Adawi², F. Lopez-Jimenez³, E. Pesah⁴, M. Lazovic⁵, C. Terzic⁶, S.L. Grace⁷
¹Gregorio Marañón General University Hospital, Physical Medicine and Rehabilitation Department, Madrid, Spain
²Qatar University, Qatar University, Doha, Qatar
³Mayo Clinic, Cardiovascular Diseases Department, Rochester, USA
⁴York University, York University, Toronto, Canada
⁵Institute for Rehabilitation, Institute for Rehabilitation, Belgrade, Serbia
⁶Mayo Clinic, Physical Medicine and Rehabilitation Department, Rochester, USA
⁷York University & University Health Network, York University & University Health Network, Toronto, Canada

Introduction/Background

While the role of Physical Medicine and Rehabilitation (PMR) in most areas of medicine is well-established, little is known about the role of PMR in cardiac rehabilitation (CR). This study assessed the frequency with which CR programs were part of PMR departments, how often PMR physicians lead CR programs and were on CR staff, and the impact of this globally for the first time.

Material and Method

In this cross-sectional study, an online survey was administered to CR programs globally. National medical associations and local champions facilitated program identification.

Results

111/203 (54.7%) countries in the world offer CR, of which data were collected in 93 (83.78%; N=1082 surveys, 32.1% response). CR was part of a PMR department in 251 (23.19%) programs. Programs had more equipment when they were within PMR departments, such as bicycle ergometers (97.48% vs 87.69%, p<0.0001) and body composition analyzers (43.58% vs 37.05%, p = 0.0172). PMR physicians were the type of provider with overall responsibility in 12.42% (n=123) of programs, with the highest rate in South–East Asia (n=12, 38.71%). When responsibility was under PMR, some cardiac indications were more likely to be accepted, such as cardiomyopathy (61.11% vs 38.89%, p=0.0005); moreover, alternative CR models (e.g., home-based) were more frequently offered (80.51% vs 67.13%, p=0.0024). PMR physicians were part of the team in 389 (43.37%) CR programs. When part of the team, more non-cardiac diagnoses were accepted (34.04% vs 17.63%, p<0.0001), like stroke (36.71% vs 25.32%, p=0.0005). Overall, 7.07±0.13/10 core components were offered by programs, with a significantly higher number offered where a PMR physician was on the team (p <0.0001).

Conclusion
We found significant differences among programs based on the PMR involvement in the program. PMR physicians should more often be part of CR programs, as this could result in benefits for patients.

**Keywords**

Cardiac rehabilitation;Survey;Global

*No conflict of interest*
Poster Tour

Poster tour: Cardiac rehabilitation

ISPR8-1842
EFFECT OF CARDIOVASCULAR FUNCTION TO RESISTANCE EXERCISE TRAINING WITH BLOOD FLOW RESTRICTION
Z. YAN¹, L. Aicui², C. Andong³, L. Beibei¹
¹Nanjing Sport Institute, Department of Sports and Health Science, Nanjing, China
²the First Hospital of Nanjing, the First Hospital of Nanjing, Nanjing, China
³Shenzhen Huawei Technologies Co.- Ltd., Shenzhen Huawei Technologies Co.- Ltd., Shenzhen, China

Introduction/Background

This investigation aims at probing the long-term influence of different levels upper limbs BFR training with low-intensity resistance training on cardiac function.

Material and Method

Twenty-four participants (men 20.63±0.88 yr) were randomly assigned to three groups: resistance exercise without occlusion cuff (CON), resistance exercise with occlusion cuff pressure set at 65% resting systolic blood pressure (BFR-L) and resistance exercise with occlusion cuff pressure set at 130% resting systolic blood pressure (BFR-H). Each subject underwent five bouts of 1-minute 30%1RM flexor elbow resistance exercise with 2-min interval, 5 times a week for 8 weeks. Cardiovascular responses were elevated before, immediately after, and for 8 weeks rest and post-exercise.

Results

1. After the 8-week training, compared with that at rest before the 8-week training, Group CON and group BFR-L’s systolic pressure(SV) decreased significantly (P<0.05), while aortic compliance of CON group increased obviously(P<0.05). 2. Compared with those before 8 weeks, systolic pressure(SV) in Group CON and Group BFR-L decreased dramatically in (P<0.05), while aortic compliance of the group CON and group BFR-L increased obviously(P<0.05), FS and EF in the group BFR-H ascended prominently(P<0.05).

Conclusion

Conclusions: 1. Both CON and BFR-L could help increase the aortic compliance, decrease the systolic pressure(SV) at rest and make diastolic pressure decrease immediately after the exercise, which demonstrates both kinds of exercises have positive influence on blood pressure. 2. CON can help left atrial diameter decrease, implying such exercise could improve the left ventricular diastolic function(LVDF),bring protection to cardiac function at some degree and also have positive significance on prevention hypertension. 3. BFR-H increase the ejection fraction , fractional shortening and stroke volume, which shows its positive influence on myocardial systolic and cardiac pump function.
Keywords

*No conflict of interest*
Poster Tour

Poster tour: Cardiac rehabilitation

ISPR8-2140

OBSTRUCTIVE SLEEP APNEA SYNDROME IN CARDIAC REHABILITATION PATIENTS

D. HUPIN1, V. Pichot1, M. Berger1, J. Raffin1, P. Labeix1, D. Maudoux1, J.C. Barthélémy1, F. Roche1

1University Hospital of Saint-Etienne, Clinical and Exercise Physiology, Saint-Etienne, France

Introduction/Background

While regular physical activity improves obstructive sleep apnea (OSA) syndrome in the general population, this was not assessed in post-myocardial infarction (MI) patients in a rehabilitation setting (coronary artery disease, CAD).

Objective: We aimed to determine if cardiac rehabilitation may benefit post-MI patients in terms of OSA disease and associated autonomic nervous system (ANS) activity.

Material and Method

Consecutive post-MI patients participating in the ambulatory cardiac rehabilitation program of St-Etienne University Hospital were included in this study. The apnea-hypopnea index calculated from ECG-derived respiration (AHI_{EDR}) was obtained through nocturnal Holter ECG recordings. According to AHI_{EDR}, patients were classified as normal, mild, moderate or severe OSA (<5, 5-14, 15-29, ≥30, respectively). Physiological performance (peak VO\textsubscript{2}) was established through cardiopulmonary exercise testing. ANS activity was evaluated through spontaneous baroreflex sensibility as well as heart rate variability analysis.

Results

Out of the 105 CAD patients suffering OSA included (95 men, 55.2±12.4 years), 100 had at least one cardiovascular risk factor (98%) and 51% had an ANS dysfunction. Surprisingly, 65% of these OSA patients were free of classical diurnal symptoms usually associated with sleep apnea. In response to cardiac rehabilitation, AHI_{EDR} decreased significantly (-9.3±9.5, p<0.0001) only in severe OSA patients, and the decrease was even greater when peak VO\textsubscript{2} and baroreflex sensibility improved beyond 20% compared to basal values (-11.6 ±9.1, p<0.001).

Conclusion

Severe OSA in CAD patients is significantly improved after 2 months of cardiopulmonary rehabilitation. Reviving ANS activity through physical activity might be a target for complementary therapy of OSA in CAD patients.

Keywords

Physical activity; Autonomic nervous system; Obstructive sleep apnea
No conflict of interest
INFLUENCE OF PATIENTS’ EXPECTATION OF RETURN TO WORK ON EMPLOYABLE DISCHARGE FROM MULTI-COMPONENT CARDIAC REHABILITATION AFTER ACUTE CARDIAC EVENT

A. Salzwedel1, M. Hadzic1, H. Buhlert2, H. Völler1
1University of Potsdam, Center of Rehabilitation Research, Potsdam, Germany
2Klinik am See, Rehabilitation Center for Internal Medicine, Rüdersdorf, Germany

Introduction/Background

Psychosocial factors such as depression and negative expectations reduce the probability of return to work after cardiac rehabilitation (CR). We aimed to characterize patients after an acute coronary syndrome (ACS) or cardiac surgery with negative expectations in terms of return to work and its impact on employable discharge from CR.

Material and Method

We analyzed data from 884 CR-patients (52±7 years, 76% men). The 3-week inpatient multimodal CR started within 14 days after discharge from hospital. Sociodemographic data (age, sex, education level), diagnoses, functional data (exercise stress test, 6-min walking test [6MWT]), hospital anxiety and depression scale (HADS) as well as self-assessment of occupational prognosis (negative expectations and/or unemployment, Würzburger screening) at admission to CR were taken from patient records. The status at discharge from CR (employable vs not) as primary outcome was analyzed by regression model.

Results

384 patients (43%) had an unfavourable occupational prognosis: 368 of these (96%) expected no return to work after CR; 113 (29%) were unemployed before CR. Affected patients showed reduced exercise capacity (ergometry: 100 vs 118 W, p<0.01; 6MWT 380 vs 421 m, p<0.001), more often depression diagnosis (12% vs 3%, p<0.001) and higher HADS-levels (anxiety 7.7 vs 5.9 points, p<0.01; depression 6.9 vs 4.9, p<0.001). At discharge, 21% of this group (n=81) were employable (vs 35% of patients with normal occupational prognosis (n=175), p<0.01). The probability of employable discharge was reduced by sick leave before ACS and negative occupational expectations. An additional unemployment and higher exercise capacity were
positively associated (figure).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>OR</th>
<th>(95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfavourable occupational prognosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative occupational expectations (yes vs no)</td>
<td>0.43</td>
<td>(0.26-0.71)</td>
<td>0.001</td>
</tr>
<tr>
<td>Negative occupational expectations + unemployed (yes vs no)</td>
<td>2.89</td>
<td>(1.63-5.13)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Unemployed (yes vs no)</td>
<td>1.31</td>
<td>(0.41-4.26)</td>
<td>0.649</td>
</tr>
<tr>
<td>Sick leave before cardiac event (yes vs no)</td>
<td>0.38</td>
<td>(0.24-0.61)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diagnoses/procedures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CABG (yes vs no)</td>
<td>0.16</td>
<td>(0.07-0.34)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Valve implantation (yes vs no)</td>
<td>0.07</td>
<td>(0.02-0.22)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Valve insufficiency (yes vs no)</td>
<td>2.57</td>
<td>(1.12-5.94)</td>
<td>0.028</td>
</tr>
<tr>
<td>Peripheral artery disease (yes vs no)</td>
<td>0.55</td>
<td>(0.32-0.96)</td>
<td>0.036</td>
</tr>
<tr>
<td>Diabetes mellitus n (yes vs no)</td>
<td>1.85</td>
<td>(1.14-3.02)</td>
<td>0.014</td>
</tr>
<tr>
<td>COPD (yes vs no)</td>
<td>0.40</td>
<td>(0.17-0.93)</td>
<td>0.033</td>
</tr>
<tr>
<td>Depression (yes vs no)</td>
<td>0.32</td>
<td>(0.13-0.77)</td>
<td>0.012</td>
</tr>
<tr>
<td>Functional parameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-min walking distance at CR admission (per SD=75 m)</td>
<td>1.36</td>
<td>(1.07-1.73)</td>
<td>0.013</td>
</tr>
<tr>
<td>Max. exercise capacity at CR admission (per SD=35 W)</td>
<td>1.26</td>
<td>(1.02-1.57)</td>
<td>0.035</td>
</tr>
<tr>
<td>Left ventricular ejection fraction (per SD=9 %)</td>
<td>1.30</td>
<td>(1.05-1.60)</td>
<td>0.017</td>
</tr>
</tbody>
</table>

**Conclusion**

A high proportion of patients in CR after ACS expected no return to work. These patients showed often a reduced physical performance and high psychosocial burden. Patients’ occupational expectation is a predictor of employable discharge from CR. Therefore, affected patients should be identified at admission to allow a targeted psychological care.

**Keywords**

cardiac rehabilitation;return to work;acute coronary syndrome

*No conflict of interest*
Poster Tour

Poster tour: Cardiac rehabilitation

ISPR8-2355
GENDER DIFFERENCES CONFIRMED IN CARDIAC SURGERY PATIENTS IN CARDIAC REHABILITATION
G. Jurėnaitė1, E. Tamuleviciute-Prasciene1, R. Kubilius1, K. Drulyte2, U. Lukauskaite2, K. Gerulyte2
1Lithuanian University of Health Sciences Hospital Kaunas clinics, Reabilitation Hospital of Kulautuva, Kaunas, Lithuania
2Lithuanian University of Health Sciences, Faculty of medicine, Kaunas, Lithuania

Introduction/Background

The leading cause of death in Europe is cardiovascular diseases (CVD), it causes 4 million deaths a year. Lithuania is classified as a high risk group of CVD. Many studies have shown that there are gender related differences in the way cardiac symptoms and diseases are perceived the incidence and course of coronary disease, cardiac treatments, and cardiac surgery.

Material and Method

125 patients after cardiac surgery: valve surgery 37.8% (n=48), coronary artery bypass graft surgery (CABG) 52.8% (n=67), combined 9.4%(n=10) undergoing exercise training inpatient CR were studied in order to evaluate the effect of a CR programme on the quality of life. Functional capacity was assessed by a 6 minutes walking test and quality of life was assessed by using The Short Form (36) General Health Survey (assess patient's health and emotional well-being) scale from 1 to 100, on admission and at the end of 3 weeks programme.

Results

In the study participated 89 men (71.2%) and 36 women (28.8%). Men average age was 62.53 ±1.85; women - 67.78 ± 1.6 (p=0.017). The prevalence of risk factors was not statistically significantly different between men and women (p> 0.05). The physical capacity according to 6MWT was statistically significantly lower in women before and after CR (before 341.2±24.1 vs. 246.2±21.2 m., p=0.004 after 417.1 ±13.29 vs. 341.2±24.1, p=0.009). Results of SF-36 general health assessment (45.9±1.9% vs. 47.4±3.5%) and emotional well-being (59.1±2.81% vs. 62.4±2.9%) at the beginning of CR did not differ (>0.05). After CR women rated their general health (45.72±2.36% vs. 54.4±2.77%, p=0.037) and emotional well-being (82.35±2.65% vs. 71.2±2.57%, p=0.012) statistically significantly higher.

Conclusion

In the female group, general health and emotional well-being assessment after CR were better evaluated, although women were older and their physical capacity was lower.

Keywords
Cardiac rehabilitation; Cardiac surgery; Quality of life

No conflict of interest
THE EFFECT AND SAFETY OF AEROBIC INTERVAL TRAINING ACCORDING TO THE INTENSITY OF EXERCISE IN ACUTE CORONARY SYNDROME

C. Kim¹, H.E. Cho²

¹Inje Univ Sanggye Paik Hosp, Rehabilitation Medicine, Seoul, Republic of Korea
²Inje Univ Haeundae Paik Hosp, Rehabilitation Medicine, Pusan, Republic of Korea

Introduction/Background

High-intensity aerobic interval training (HAIT) increases maximal oxygen uptake (VO2max) more effectively than moderate-intensity continuous training (MCT) in patients with coronary heart disease (CHD). However, even within the same category of high intensity interval training protocols, higher intensity might be better for improving VO2max. The purpose of this study is to assess the effect for increasing VO2max and the safety of maximal-intensity aerobic interval training (MAIT) compared to HAIT.

Material and Method

Patients receiving percutaneous coronary intervention and attended cardiac rehabilitation within two weeks after acute coronary syndrome (ACS) were recruited. Participants were randomly assigned to either a MAIT or a HAIT protocol three times a week for six weeks. The MAIT protocol was set up for four cycles of maximal-intensity (95-100% of HRR, four minutes/cycle) walking with three cycles of active pause with low intensity intervals walking alternatively for every session. In contrast, the HAIT protocol was composed of three cycles of high-intensity (85% of HRR, eight minutes/cycle) walking training and two cycles of active pause with low intensity intervals walking alternatively for every session. The change of VO2max, rate pressure product, echocardiographic findings, body mass index, Borg’s rate of perceived exertion scale were examined before and after training.

Results

After completion of six-week aerobic interval training, there were significant increase of VO2peak in both groups. But the increment of VO2peak in MAIT group was significantly greater than HAIT group (p<0.05). The percentage increases for the MAIT and HAIT were 31% and 17% respectively. And a total of 670.5 exercise-hours during MAIT and HAIT, we found no major cardiovascular complication and musculoskeletal complication.

Conclusion

The results of the current study indicate that six-week supervised MAIT is significantly more effective than HAIT in improving VO2peak in ACS patients. Also it appeared safe after both MAIT and HAIT in a CR setting.

Keywords
acute coronary syndrome; cardiac rehabilitation; interval training

No conflict of interest
Poster Tour

Poster tour: Carpal tunnel syndrome

ISPR8-0149
ULTRASOUND-GUIDED VS. LANDMARK-GUIDED LOCAL CORTICOSTEROID INJECTION FOR CARPAL TUNNEL SYNDROME: A SYSTEMATIC REVIEW AND META-ANALYSIS.
A. Babaei-Ghazani1, P. Roomizadeh1, A. Shirin2
1Neuromusculoskeletal Research Center- Department of Physical Medicine and Rehabilitation- Iran University of Medical Sciences- Tehran- Iran,
Department of Physical Medicine and Rehabilitation, Tehran, Iran
2Dr Shirin Alyan Clinic, Physical Medicine and Rehabilitation- Dentistry, Tehran, Iran

Introduction/Background

To review the randomized controlled trials (RCTs) and assess the comparative effectiveness of ultrasound-guided versus landmark-guided local corticosteroid injections in patients with carpal tunnel syndrome (CTS).

Material and Method

RCTs from Cochrane Central Register of Controlled Trials, MEDLINE (PubMed), EMBASE (Ovid), and Web of Science (from inception to 1 February 2017) were included. Two authors independently screened abstracts and full texts. The Outcomes of interest were symptom severity scale (SSS) and functional status scale (FSS) scores of Boston Carpal Tunnel Questionnaire as well as four electro-diagnostic parameters including compound muscle action potential, sensory nerve action potential, distal motor latency, and distal sensory latency.

Results

Overall, 569 abstracts were retrieved and checked for eligibility and finally 3 RCTs were included (181 injected hands). Pooled analysis showed that ultrasound-guided injection was more effective in SSS improvement (mean difference [MD] = -0.46, 95% confidence interval (CI) = -0.59 to -0.32, P<0.00001); whereas, no significant difference was observed between the two methods in terms of FSS (MD= -0.25, 95%CI= -0.56 to 0.05, P=0.10). There were also no statistically significant differences in improvements of CMAP (MD=1.54, 95%CI=0.01 to 3.07, P=0.05), SNAP (MD= -0.02, 95%CI= -6.27 to 6.23, P=1.00), DML (MD=0.05, 95% CI= -0.30 to 0.39, P=0.80) or DSL (MD=0.00, 95%CI= -0.65 to 0.65, P=1.00).

Conclusion

Ultrasound-guided injection was more effective than landmark-guided injection in symptom severity improvement in patients with CTS; however, no significant differences were observed in functional status or electro-diagnostic improvements between the two methods.

Keywords

Carpal Tunnel Syndrome; Ultrasonography; Injection
No conflict of interest
CONSECUTIVE CHANGES IN NERVE CONDUCTION STUDIES AFTER SURGERY FOR CARPAL TUNNEL SYNDROME
M. Muraoka¹, K. Watanabe²
¹Kameda-Daiichi Hospital, Rehabilitation, Niigata, Japan
²Kameda-Daiichi Hospital, Orthopedic Surgery, Niigata, Japan

Introduction/Background
Patients without marked recovery following surgery for carpal tunnel syndrome (CTS) require quantitative evaluation. We determined the most sensitive nerve conduction study (NCS) parameters for postoperative recovery.

Material and Method
NCS were performed in 50 hands preoperatively, and at 1 and 3 months postoperatively. Four parameters of postoperative recovery were monitored: distal motor latency (DML), distal sensory latency (DSL), and 2nd lumbral-interossei (2L-INT) and digit 4 comparisons.

Results
The 50 hands were classified with moderate (n=8), severe (n=26), or extreme (n=16) CTS following Padua’s classifications. Abductor pollicis brevis compound muscle action potentials (CMAPs) were undetected in 16 hands, and remained undetected in 14 hands for 3 months, whereas 34 hands exhibited significant DML recovery (8.0±2.0 to 5.6±1.4 ms, p<0.01). Index sensory nerve action potentials (SNAPs) were undetected in 41 hands, and remained undetected in 26 hands for 3 months. 2L-INTs were undetected in 4 hands and remained undetected in 2 hands for 3 months, whereas 46 hands exhibited significant recovery (4.0±2.4 to 1.7±1.0 ms, p<0.01). Ring-SNAPs were undetected in 50 hands and remained undetected in 46 hands for 3 months.

Conclusion
SNAPs are susceptible to dispersion and conduction-block, and are often undetectable in severe CTS. Therefore, DSL and digit 4 comparison study are not suitable. Long-lasting CMAPs are maintained even in severe cases, and the nerve fibers to 2L, which are located deep in the carpal tunnel, resist entrapment. 2L-INT and DML, in this order, are significantly correlated with recovery, making them suitable parameters for evaluating postoperative recovery.

Keywords
Carpal tunnel syndrome; Nerve conduction study; Postoperative evaluation
No conflict of interest
Entrapment of median nerve in carpal tunnel is called carpal tunnel syndrome (CTS). The main purpose of this research is to compare the natural course of the syndrome during the first 6 months after delivery in the women feeding their children using formula and breastfeeding mothers.

Material and Method

The present research was done in 50 pregnant women with symptoms and signs of CTS visited by obstetricians and then referred to physiatrist for electrodiagnostic studies. After delivery and confirming the CTS, women classified in two groups: breastfeeding (33) and non-breastfeeding (17) women. The 5 breastfeeding women missed from study. Follow-up of clinical and electrodiagnostic of women were done in first 6 months after delivery.

Results

Complete recovery in breastfeeding, non-breastfeeding and all women were 10.7%, 52.9% and 26.7% respectively. Partial recovery in breastfeeding and non-breastfeeding women was 71.4% and 47% respectively. Complete recovery in mild stage in breastfeeding, non-breastfeeding and all women were 22.2%, 57.1% and 33.3% respectively. Complete recovery in moderate and severe stages in all women were 23.3%. Rate of complete recovery to partial recovery in non-breastfeeding women was 1.7 times than breastfeeding women.

Conclusion

This study was showed the relief of symptoms and reduction of severity of CTS in the women who feed their children on formula is higher than those who breastfeed their children. Pregnancy related CTS would not usually resolve after delivery and must be follow-up by clinical symptoms and electrodiagnostic studies. Hormonal changes during lactation and repetitive motions and/or excessively flexed wrist positions during breastfeeding may be causing aggravated pregnancy related CTS after delivery.
Keywords

Pregnancy related carpal tunnel syndrome; Breastfeeding; Recovery

No conflict of interest
Poster Tour

Poster tour: Carpal tunnel syndrome

ISPR8-0522
MODIFIED HAND ELEVATION TEST AS AN AID IN DIAGNOSING CARPAL TUNNEL SYNDROME
S. Jun¹, J.S.K. Dr²
¹College of Medicine- The Catholic University of Korea- Seoul- Korea, Rehabilitation medicine, SEOUL, Republic of Korea
²College of Medicine- The Catholic University of Korea- Seoul- Korea, Rehabilitation medicine, Suwon, Republic of Korea

Introduction/Background

Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy. It causes pain and paresthesia in the hand area innervated with median nerve. In 2001, Ahn D-S announced a new method called hand elevation test (HET). In this study, we will investigate the effect of modified hand elevation test (MHET) to increase the pressure of the wrist joint by fully bending both wrists to induce ischemia. This can improve the diagnosis rate through physical examinations of patients with that disease.

Material and Method

We enrolled patients with symptoms of CTS and also showed a reasonable finding of in electrodiagnostic test. We enrolled 63 patients from 2014 to 2017 and exclude 28 patients. Finally there were 70 hands of 35 patients in experimental group. To doing the HET, patients raised their hands based on their own strength, against gravity above the head (Figure 1). MHET also maintain same position with HET but additionally fully flex wrist joint. All patients enrolled this study, were examed electromyography (EMG) exam and sonogram at the wrist and mid forearm level.

Results

In 70 hands enrolled in this study, Sensitivity of HET was 75.0% and 77.08% in MHET. Specificity was 68.18% in HET and 63.63% in MHET. Positive predictability was 82.22% and negative predictability was 56% in MHET. 46 subjects showed shorter time for inducing positive symptoms in MHET than HET. The group of positive symptoms in MHET showed higher value of the Wrist-Forearm ratio in ultrasonography and larger cross sectional areas in carpal tunnel inlet in ultrasonography.

Conclusion

In this study MHET showed superior to HET in sensitivity and negative predictability and shortened time to response. Especially, 17 subjects showed reductions in time to response in MHET than HET. So we thought the clinical implication of theses statistical findings is that the MHET may be valid and usable diagnostic method.
Keywords

Carpal tunnel syndrome; Hand elevation test; Modified hand elevation test

No conflict of interest
NEW TECHNIQUE OF ULTRASOUND GUIDED INJECTION IN THE CARPAL TUNNEL SYNDROME
K. Joon-Sung¹, S. Bomi¹, H. Bo Young¹, L. Seong Hoon¹
¹St. Vincent's Hospital, Rehabilitation Medicine, Suwon, Republic of Korea

Introduction/Background

In conventional ultrasound-guided corticosteroid injection in carpal tunnel syndrome (CTS), the entry point is usually at the distal crease of the wrist. However, actual pathology of CTS is caused by thickening of the transverse carpal ligament (TCL). Injection of corticosteroid can reduce inflammation and ameliorate the symptoms, but it cannot reduce the thickness of TCL. If we change the entry point to just 10 mm below the distal crease rather than at the distal crease, we can inject corticosteroid around the median nerve and into the TCL.

Material and Method

Five patients with CTS treated with ultrasound-guided corticosteroid injection around median nerve and into the TCL. The diagnosis of CTS was made by history, physical examination, sonographic evaluation, and electrophysiologic confirmation. Sonographic examinations were performed by one physiatrist using Samsung scanner with a 5-12 MHz linear transducer. Standard 23-gauge needles were used for administration of local anesthetics and triamcinolone mixture (total 1cc). After transverse view and longitudinal view, the entry point was determined. The entry point was below the distal crease, where the needle could easily introduce the injection material into the thickened TCL. The direction of the needle entry point was from lateral to ulnar side.

Results

Total of five female patients with CTS were included. The mean age was 55.4 ± 3.6 years. The mean duration of disease was 4.6 (range 3-8 mo) months. The results were good to excellent in all patients. There were no complications during the procedure.

Conclusion

Ultrasound-guided corticosteroid injection in CTS, combined with injection at the thickened TCL may be a good method and further research is needed to confirm the usability.

Keywords

Carpal tunnel syndrom;Injection;Sonography

No conflict of interest
Introduction/Background

Carpal tunnel syndrome is the most popular among all entrapment neuropathies. It has common clinical presentation however the objectivity of the clinical exam is not so accurate. Confirmation of the diagnosis by electrophysiological study is highly recommended.

Material and Method

Design: cross sectional study
Setting: outpatient setting
Material: 109 patients (83 females, 26 males) with clinical manifestations of carpal tunnel syndrome.
Method: Medical history and neurological examination including Tinel's sign and Phalen test and nerve conduction studies including median-ulnar, median-radial comparative studies and electromyography of both upper extremities were done for all patients.

Results

Results: mean age 57.71±13.4. pain was mild in 9.2%, moderate in 25.7% and severe in 56% of patients. Numbness was present in 87.2%. Impaired sensory exam in 43.1%, Impaired motor exam in 8.3%. Positive Tinel's sign unilateral (38.5%) and bilateral (47.7%). Positive Phalen test unilateral (30.3%) and bilateral (34.9%). Unilateral thenar Muscle wasting in 4.6% and bilateral in 1.8%. Pure sensory median neuropathy was found in 65 patient(59.6%), sensorimotor median neuropathy in 44 patients (40.37%). Demyelinating neuropathy in 91.7% and demyelinating-axonal neuropathy in 8.3% of patients. Abnormal distal motor latency was significantly correlated with severity of pain p=0.0025, impaired sensory exam p=0.0001, impaired motor exam p=0.0001, positive Tinel's sign of both hands p=0.0001, positive Phalen test of both hands p=0.0001. as well as with unilateral or bilateral muscle wasting p=0.001.
Prolonged peak median sensory latency was significantly correlated with numbness p=0.0001, severity of pain p=0.001, Impaired sensory exam p=0.005, positive Tinel's sign for either one or both hands p=0.0001, positive Phalen test of one or both hands p=0.0001

Conclusion

Highly significant correlation was found between subjective and objective sensory manifestation and peak median sensory latency. While distal motor latency were significantly correlated with
severe pain, only bilateral positive Tinel’s sign and Bilateral Phalen test and the objective sensory and motor deficit.

Keywords

carpal tunnel, clinical, electrophysiological

No conflict of interest
**Poster Tour**

**Poster tour: Carpal tunnel syndrome**

**ISPR8-2052**

**CORRELATION OF MUSCULOSKELETAL ULTRASOUND AND ELECTRODIAGNOSIS IN PATIENTS WITH CARPAL TUNNEL SYNDROME**

*L.M. Allen Hermosillo¹, D. guerrero aguilã¹, S. alvarado ramos¹

¹instituto mexicano del seguro social, unidad de medicina física y rehabilitaciòn no. 1, monterrey, Mexico

**Introduction/Background**

**INTRODUCTION**: The MSK USG provides a clear image of tendons and nerves at level of the carpal tunnel. However, there is no specific ultrasonographic standardized measure in Mexicans that supports diagnosis of STC. **OBJECTIVE**: To establish ultrasound measurements of the median nerve in healthy people and their correlation with electrodiagnosis in patients with STC.

**Material and Method**

Two phases were performed; In first, 48 hands in 24 healthy subjects were assessed with EMG study. By means of the *musculoskeletal ultrasound*, the Cross Sectional Area of the median nerve was measured in two points: 12 cm cephalic to the proximal crease of the carpus and the tunnel entrance. The index A is calculated with these two measurements and finally the thickness of the transverse carpal ligament was measured. In the second phase, 25 patients with a clinical and electromyographic diagnosis of CTS were evaluated, who underwent the same ultrasonographic measurements. We explored Kolmogorov-Smirnov distribution of quantitative series of sample, Student’s T for variables of central tendency (P <0.05) Fisher's test for comparison groups and Momios OD coefficient to establish sensitivity and specificity of indicators.

**Results**

Index A and AST were found with greater difference in patients with CTS (P = <0.001) with respect to controls, having direct correlation with clinical stage. The predictive variables of CTS were age > 44 years, BMI > 26.381, and index A greater than 1.1.

**Conclusion**

The MSK USG in CTS is useful for perform its diagnosis. Index A is a tool with high sensitivity and specificity as well as being essential in cases where median nerve in initial stages still has no increase in size of its thickness.

**Keywords**

Carpal tunnel syndrome; musculoskeletal ultrasound; cross sectional area

*No conflict of interest*
Poster Tour

Poster tour: Carpal tunnel syndrome

ISPR8-2193

QUANTITATIVE STIFFNESS MEASUREMENT OF STRUCTURES IN CARPAL TUNNEL ACCORDING TO MOTION OF WRIST AND FINGERS USING ACOUSTIC RADIATION FORCE IMPULSE (ARFI) ELASTOGRAPHY

S. Lee¹, J.W. Park¹, J. Kwak¹, S. Lee¹
¹Soonchunhyang University Hospital, Physical medicine & Rehabilitation, Seoul, Republic of Korea

Introduction/Background

Repetitive use of wrist and finger is well known cause of damage of the median nerve and the soft tissue around it and contributes to development of the carpal tunnel syndrome. The aim of this study is to unveil the stiffness variation of the structures in the carpal tunnel according to the hand and the wrist motions.

Material and Method

This study was designed as a prospective, cross-sectional study and 26 healthy volunteers were enrolled (TABLE 1). Target structures for stiffness measurement in the carpal tunnel were median nerve (MN), transverse carpal ligament (TCL), and tendon of flexor digitorum superficialis (FDS) and profundus (FDP). Stiffness measurement were done transversely at the carpal tunnel inlet (pisiform bone to scaphoid tubercle) of non-dominant hand in combination of the 2 wrist joint motions; wrist neutral and wrist 30 degrees extension, and the 3 finger motions; finger neutral, full finger grasp, and full finger extension.

<table>
<thead>
<tr>
<th>Male/Female, n (%)</th>
<th>20/6 (76.9/23.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), mean (SD)</td>
<td>24.7 (3.7)</td>
</tr>
<tr>
<td>Height (cm), mean (SD)</td>
<td>171.7 (6.6)</td>
</tr>
<tr>
<td>Weight (kg), mean (SD)</td>
<td>69.0 (11.8)</td>
</tr>
<tr>
<td>Comorbidities, n (%)</td>
<td></td>
</tr>
<tr>
<td>Atopic dermatitis</td>
<td>1 (3.9)</td>
</tr>
<tr>
<td>Asthma</td>
<td>1 (3.9)</td>
</tr>
</tbody>
</table>

Results
Stiffness (m/s) of mean and range of the target structures in wrist neutral-finger neutral position were 2.3 (1.6-3.4), 3.4 (2.7-3.9), 2.9 (2.7-3.4), and 3.2 (2.8-3.8) each. Those in wrist extension-finger full extension position were 3.0 (2.3-4.0), 4.0 (3.3-5.1), 3.5 (2.8-5.1), and 3.9 (2.9-5.0) (TABLE 2). Stiffness were significantly higher compared to wrist neutral-finger neutral position in other all five wrist-finger motions (FIGURE 1).

### Conclusion

Generalized estimating equation (GEE) analysis among the all six wrist-finger joint motions shows that wrist and finger joint movement increases stiffness of the structures in carpal tunnel compared to the wrist neutral-finger neutral position. Further study with large sample size and with carpal tunnel syndrome patients should be required to clarify these tendencies.

### Keywords

Carpal tunnel syndrome; Elastography; Median nerve
No conflict of interest
EVALUATING DEGREE OF SYMPTOM IMPROVEMENT, SAFETY AND THE CHANGE OF ELECTROPHYSIOLOGICAL FINDINGS AFTER ULTRASOUND VERSUS LANDMARK GUIDED STEROID INJECTION IN TREATMENT OF CARPAL TUNNEL SYNDROME

S. haghighat¹, B. vahdatpoor¹, Z. azimi¹
¹Isfahan medical school of sciences, physical medicine and rehabilitation, Isfahan, Iran

Introduction/Background

to evaluate the degree of symptom improvement, safety and the change of electrophysiological findings after Ultrasound (US)-guided versus Landmark (LM)- guided local steroid injection in treatment of carpal tunnel syndrome (CTS).

Material and Method

fifty two patients with moderate or moderate to severe CTS were recruited in this study. The subjects were randomly assigned into each US-guided or LM-guided steroid injection group and received 40 mg methylprednisolone. After 4 weeks and 12 weeks, the patients were evaluated using Boston questionnaire and electrophysiologic parameters.

Results

All variables including symptom/functional scores and electrophysiological findings improved significantly in both groups after 4 weeks (all P < 0.05) except CMAP amplitude in LM-guided group. However, LM-guided group showed a regress with all variables after the 12 week period compared with the 4-week period, these improvements persisted at the week 12 after treatment in the US-guided group (P < 0.05) except Functional Status Scale (FSS) and Sensory Nerve Action Potential (SNAP). The improvement in the Compound Muscle Action Potential (CMAP) amplitude in the US-guided group at the week 12 was higher than in the LM- guided group (P<0.05); however, SNAP amplitude and SNAP Nerve Conduction Velocity (NCV) had improved significantly in the LM-guided group. Significant differences were not observed between groups with respect to Symptom Severity Score (SSS), FSS, SNAP latency, and CMAP latency in 4 or 12 weeks after treatment (P >0.05).

Conclusion

symptom severity, functional status and all electrophysiologic parameters improved significantly in both groups and generally no statistical significant difference was observed between two groups.

Keywords

Carpal Tunnel Syndrome; steroid injection; ultrasound
No conflict of interest
Effect on Community-based Adapted Tango for Patients with Parkinson's Disease and Their Caregivers

E. Guettard¹, C. Royes¹, I. pollet¹, J. maury¹
¹Clinique Beau Soleil, Rehabilitation, Montpellier, France

Introduction/Background

People with Parkinson's disease (PD) frequently have low activity levels, reduced quality of life and their caregivers often experience social isolation. Recent evidence suggests that tango dance program improve balance, functional mobility, spatial cognition and quality of life for patients. The aim of this study was to evaluate the impact on caregivers' burden feelings.

Material and Method

People with Parkinson disease and their caregivers participated in an adapted tango for PD dancing classes once per week for 3 months in Montpellier in France. Both balance (Berg Balance Scale, sit to stand test), gait (6 minut walk test T6M), mood (hospital anxiety and depression scale) and caregivers burden (Zarit Caregiver Burden Inventory) were assessed prior and after therapy with appropriate tools and questionnaires. We analyzed pre post differences with Wicoxon tests.

Results

28 patients (not only Parkinson disease but also atypical forms, Hoehn and Yahr : 2,5 +/-0.65, duration of the disease : 7.4 y +/-5.1 ) and 18 caregivers enrolled in the program. Participants significantly improved at the Berg Balance Scale (54.3 +/- 3.55 vs 52.61 +/- 5.03, p=0.03). No significant improvement was observed on the other tests : sit to stand, T6M, Hospital and Anxiety depression scale. We even noted an increasing Zarit scale (32.7 +/-17.9 vs 25.5 +/-18.3) for the caregivers. Eight of them experienced infectious disease, cancer or stroke during the program, in accordance with their fragility.

Conclusion

As previously demonstrated, adapted tango was effective in improving balance in PD patients. In our study, we noted that even if, tango partnered dance is not enough to relieve caregivers from the stress of providing continuous care, we observe that, from now on, most of caregivers are able to recognize the signs of caregiver stress, so they can seek the necessary support.

Keywords

tango;caregivers
No conflict of interest
Poster Tour

Poster tour: Community based rehabilitation and tele rehabilitation - Part I

ISPR8-0649

DEVELOPMENT OF A SMARTPHONE-BASED BALANCE ASSESSMENT SYSTEM FOR SUBJECTS WITH CHRONIC STROKE

Y.R. Hou¹, Y.L. Chiu¹, S.L. Chiang², W.H. Sung¹
¹National Yang-Ming University, Physical Therapy, Taipei, Taiwan R.O.C.
²Tri-Service Hospital, Rehabilitation, Taipei, Taiwan R.O.C.

Introduction/Background

Balance is one of the most important issues that chronic stroke sufferers have to deal with. Balance assessment is needed to be taken to know the balance performance. However, assessing balance performance with existed objective methods (such as forceplate or biodex balance system) are not convenient and with subjective methods (such as functional tests or questionnaires) are not accurate enough. Smartphones had been proved effective in assessing balance, but new specific application is needed to be developed for subjects with chronic stroke. Therefore, the purpose of this study is to develop a smartphone-based balance assessment system for subjects with chronic stroke.

Material and Method

Android Studio was used to develop the balance assessment application. Six postures were designed to evaluate the balance performance: shoulder-width stance with eyes opened (E/O) and closed (E/C), feet-together stance with E/O and E/C, and semi-tandem stance with E/O and E/C. Each posture was tested for 30 seconds, with a ASUS Zenfone 3 smartphone fixed at back on the level of second sacrum spine. The smartphone collected built-in accelerometer and gyroscope data to represent balance performance: the more data changed, indicated the more instability. The reliability test was executed after development of the application, and it included within-day (1-hour rest) and between-day (24-hour rest) assessments. Ten healthy adults were recruited. Intraclass correlation coefficient (ICC) was used to analyze the reliability, calculated by SPSS 20. Confidence interval was set as 95%.

Results

The within-day ICC of the accelerometer data is 0.904 (p=0.000), between-day ICC is 0.764 (p=0.000); the within-day ICC of the gyroscope data is 0.897 (p=0.000), between-day ICC is 0.857 (p=0.000). The results demonstrate that the application is reliable.

Conclusion

The developed application is reliable to assess balance ability, and have the potential to be a convenient and valid alternative in assessing balance.

Keywords
Stroke;Balance;Smartphone

No conflict of interest
A private home-based training program was developed by the specialized team of rehabilitation in Elderly Welfare Department of the Shinagawa Ward in Tokyo. We used this program to increase the physical activity of the daily living in patients with stroke.

To evaluate the program, we measured the amount of physical activity in daily living for one year in these patients using a Lifecorder EX (Suzuken Co. Ltd, Nagoya, Japan) and compared the changes in patients in whom the private home-based training program was used with the changes in a control group.

**Material and Method**

Subjects of this study included 16 patients with stroke that lived at home (average age 61.6 years old, men:8, women:8).

We randomized the patients to two groups of the training group:8 (average age 62.5 years old) and the non-training group:8 (average age 60.8 years old). We measured the activity level (a value that is average activity level divided with activity time) by Lifecorder EX. We compared the change of the activity level between both groups.

**Results**

In the training group, mean activity level gradually increased with 11% in the fall season, 14% in the winter season, 30% in the spring season, 38% in the summer season comparison with three months before initiation. On the other hand, in the non-training group, there was hardly the change with -4% in the fall season, -1% in the winter season, 0% in the spring season, 0% in the summer season comparison with three months before initiation.

**Conclusion**

We suggested that the activities of daily living of patients with stroke at home were increased by the private home-based training program “Mizikaderihabili (Japanese)”.

**Keywords**

stroke;activity;community-based rehabilitation

*No conflict of interest*
Poster Tour

Poster tour: Community based rehabilitation and tele rehabilitation - Part I

ISPR8-0691

ALTERNATIVE TO SUPPLY OF HEALTH SERVICES IN PHYSICAL MEDICINE AND REHABILITATION : FROM MOBILE TEAM TO HOME HOSPITALIZATION

A. Duruflé1, J.F. Aubry1, M. Bordas2, P. Gallien1, C. Le Meur4, B. Nicolas1

1Pôle MPR Saint Hélier, Ille et Vilaine, Rennes, France
2Hôpital à Domicile 35, Ille et Vilaine, Rennes, France

Introduction/Background

In France, the notion of care pathway is enshrined in the circular of March, 2012 relative to the organization of care for patients’ victim of stroke.

Material and Method

The rehabilitation-reinsertion mobile team of the pole Saint-Helier (EM2R) was created in 2012 in this context, with support from the Regional Health Agency of Brittany. The main mission of this newly created team is to implement the necessary devices to facilitate the home returning of people hospitalized after a neurological event or maintain home people with neurological disorders (more than 200 coverage a year). The neurodegenerative diseases plan of 2014-2019 points, especially in its 15th measure, that we shall remove all things slowing down the hospital care access at home for people with neurodegenerative diseases and this no matter where they live. And this is done mainly through mobile teams and home medical care (HAD in France) activities.

Results

In coherence with the activities recently developed "outside the walls" by the pole Saint Helier (EM2R and telemedicine), the establishment of a HAD-SSR (home medical care of rehabilitation care), further consolidated the healthcare pathway for people with disabilities. This activity has been developing since September, 2017 in relation with the HAD 35 and two rehabilitation centers which provide reeducation professionals’. 15 patients have already been cared, mostly persons with stroke.

Conclusion

The aim is to ensure a global, coordinated and specialized care by bringing to patients’ home a variety of expertise in the field of rehabilitation: doctors of physical medicine and rehabilitation, physiotherapists, occupational therapists, speech therapists, neuropsychologists… and to propose an additional alternative to hospitalization in rehabilitation care when the situation permits it in the healthcare pathway of people with disabilities.

Keywords

early supported discharge;rehabilitation care;disability
No conflict of interest
Poster Tour

Poster tour: Community based rehabilitation and tele rehabilitation - Part I

ISPR8-0940

EATING PLEASURE IN NURSING HOMES: A MULTI-DISCIPLINARY PREVENTIVE HEALTHCARE

Y. Tannou1, E. Cugy2,3,4, X. Cormary1, M. Bras5, M. Culis6, V. Blasco-Baque7,8

1Association Pluridisciplinaire de Prévention de la Dysphagie, Speech and Language Therapist, Muret, France
2CH Arcachon, Service de Médecine Physique et de Réadaptation, La Teste de Buch, France
3Bordeaux University, EA 4136 Handicap Activité Cognition Santé, Bordeaux, France
4CHU Bordeaux, Physical Medicine and Rehabilitation, Bordeaux, France
5Le Suquet, Le Suquet, Laguiole, France
6Sodexo, Nutrition and Restoration, Guyancourt, France
7INSERM, Institute of Cardiovascular and Metabolic Diseases I2MC - UMR1048, Toulouse, France
8Toulouse III University, Faculté de Chirurgie-Dentaire, Toulouse, France

Introduction/Background

Because a Nursing Home is at first a place to live, the quality of everyday life must be preserved, especially the pleasure of eating, despite the risk of swallowing disorders. A multi-disciplined approach to enhance the residents’ eating pleasure (ABC prevention plan) was developed.

Material and Method

Nine nursing homes were included in 2016. Four were considered at a control group, without any change in current practice. Five were in the treatment group, where all the workforce Nursing Homes was involved as follows:

- a professionalization for kitchen staff to achieve this new cuisine, developed by chef Michel Bras on IDDSI texture recommendations to maintain the distinct taste and identity of the food
- a training course for caregivers to organize efficient swallowing screening and oral hygiene
- an awareness campaign for the serving personnel in order to maintain the residents’ autonomy and to present the news dishes

The evaluation of nursing homes residents’ enjoyment was assessed every 3 months thorough a questionnaire. Pneumonia, malnutrition and death were recorded.

Results

Full data are available for six nursing homes (4 in treatment group, 2 in control group) representing 458 residents.
There is no difference between groups at baseline on age, weight or autonomy. There is less modified texture food in treatment group.

Only 52% (162/308) and 58% (87/150) residents could express satisfaction, respectively in treatment and control group. Satisfaction increased in treatment group (24.4 ± 4.1 vs 22.5 ± 4.3, p<0.0001) and still stable in control group (23.9 ± 3.1 vs 23.7 ± 3.2, p>0.99).
Pneumonia was recorded in 33% vs 24% residents (p=0.04), malnutrition in 65% vs 44% (p<0.0001), death in 21% vs 28% (p=0.08) in control vs treatment group respectively.

**Conclusion**

Patients were satisfied from the ABC prevention plan. This plan was safe regarding swallowing disorders complications.

**Keywords**

Swallowing disorders; Prevention and control; Nursing homes

*No conflict of interest*
Poster Tour

Poster tour: Community based rehabilitation and tele rehabilitation - Part I

ISPR8-1079
MOBILE BIOFEEDBACK LOW COST THERAPY SYSTEMS FOR HOME, OUTPATIENT AND INSTITUTIONAL REHABILITATION CARE
J. Petioky¹, K. Hoidekrova², M. Janatova³, K. Hana³
¹Rehabilitation Centre Kladruby, Rehabilitation, Kladruby, Czech Republic
²Faculty of physical education and sport, Rehabilitation, Prague, Czech Republic
³Faculty of biomedical engineering CTU in Prague and First fakulty of medicine Charles universit y, Biomedical engineering, Prague, Czech Republic

Introduction/Background

The aim of the work was to evaluate the efficiency of the therapist's time by using the modern technology of HomeBalance (HB), consisting of Nintendo Wii Balance Board and a tablet with therapeutic software for visual feedback, as a substitute for individual therapy.

Material and Method

The study included patients with a diagnosis of vertebral algic syndrome (VAS) in the subacute and chronic phases, who were hospitalized in Rehabilitation center Kladruby (RUK). 73 patients were screened, from which 5 patients had a higher reference grade than the standard for a healthy population and 34 of which were included in the study. All patients received conventional individual physiotherapy (1:1 ratio) for 4 times per week and and once a week they received group balance therapy with HB under a physiotherapist's supervision (1:7 ratio). The whole program lasted for 6 weeks. This group balance therapy consisted of testing and reference exercises using HB (3 min), therapy with HB (5 min) and independent exercise (15 min).

Results

A more significant improvement was achieved by patients who performed poorly at the initial examination and had a scoring record in the therapeutic game which was higher than the standard for a healthy population. There was an improvement of 23 seconds in the patients who practiced for 2-6 weeks. Stability examinations showed improvement in laterolateral symmetry. A more significant improvement in posture was detected when visual feedback was given.

Conclusion

The effective use of therapeutic time (man-hours) using modern HB technology was evaluated in 38 patients who exercised within the range of one exercise unit using HB per week. With the utilisation of 1 therapist in 3 x 30 minute training units, a total of 21 therapies, the number of therapists needed for regular individual therapy was decreased by 18 therapists, thus by 86%.

Keywords
HomeBalance;Stability;balance therapy

*No conflict of interest*
EXAMINING THE IMPACT OF PRISM POWER ON PRISM ADAPTATION EFFECTS USING A HOME-FRIENDLY PROCEDURE

A.S. Champod¹, L. Mckenzie², K. Hagen², B. Fougere², L. Smith², G. Eskes³
¹Acadia University, Department of Psychology, Wolfville, Canada
²Acadia University, Psychology, Wolfville, Canada
³Dalhousie University, Psychiatry, Halifax, Canada

Introduction/Background

Studies investigating the use of prism adaptation to treat symptoms of spatial neglect have used goggles inducing a rightward shift of 6 to 15°. However, the impact of prism power (i.e., the magnitude of visual shift) on after-effects (i.e., leftward shift in pointing movements after prism exposure), and effects on more functional tasks (e.g., a throwing task) are unknown. The purpose of this study was to clarify the relationship between these variables in a sample of healthy young adults as a first step towards the validation of a new home-friendly prism adaptation procedure (Peg-the-Mole/PTM).

Material and Method

Sixty participants were randomly assigned to one of four conditions and used PTM with 5° (condition 1), 10° (condition 2), 5°/10°/15° deviating goggles (gradual shift – condition 3) or with sham/non-deviating goggles (condition 4). Pointing tasks and a throwing task were administered before and after PTM to assess a prism-induced leftward shift in pointing or throwing movements.

Results

The main effect of prism power on after-effects and throwing effects was significant (p<0.05). After-effects were larger in the gradual and 10° group when compared to the 5° and sham groups (gradual = 10° > 5° > sham). For the throwing task, only the effects in the gradual condition differed from the sham condition (only participants in the gradual condition threw significantly more to the left after PTM). Direct effects (pointing errors during PTM) predicted after-effects (p<0.05) but not throwing effects. Furthermore, after-effects did not correlate with throwing (functional) effects.

Conclusion

These findings suggest that larger prism power induces larger after-effects and a gradual transition from increasingly larger prism power may facilitate the generalization of after-effects to functional tasks. The lack of relationship between after-effects and throwing effects should be investigated further as it may explain the mixed findings regarding the generalization of prism effects to functional activities.
Keywords

Spatial Neglect; Prism Adaptation; After-Effects

No conflict of interest
Introduction/Background

Brain gliomas are the largest group of primary central nervous System tumors. Cognitive impairment is the most common problem in brain glioma patients. This deficit impacts patient’s independence causing functional impairment. To improve cognition, independence on daily life activities and quality of life is a main objective in this population’s treatment. There are few studies of cognitive rehabilitation interventions in brain tumor patients. The objective is to evaluate the efficacy of a neurocognitive telerehabilitation program on cognition and quality of life in patients with primary brain tumor undergoing surgery.

Material and Method

Clinical, unicentric, controlled, randomized, prospective and double-blind trial of patients operated between June 2012 and June 2015 at the Germans Trias hospital (Badalona). Project funded by the TV3 Marathon. Inclusion criteria: age between 18-70 years, histological confirmation of primary brain tumor, KPS> 60, availability of personal computer and internet connection. Exclusion criteria: difficulty understanding the language, severe mental disorder, dementia or neurological deficit that hinders neuropsychological assessment. The intervention group participated in a cognitive rehabilitation program developed by Institut Guttmann, Neuropsychology, Barcelona, Spain. The control group followed the usual treatment. The demographic, clinical-surgical and neuropsychological variables were collected at month, four and seven months after surgery.

Results

There were 84 patients randomized, 42 in each group. There were no statistically significant baseline differences between the two in terms of sociodemographic, clinical, surgical or neuropsychological variables. At 4 and 7 months the intervention group experienced a significant improvement (p = 0.017 and p = 0.027) in cognition that was not detected in the control group. A practically constant trend was detected for better results among the intervention group regarding the quality of life.
Conclusion

Neurocognitive telerehabilitation improves cognition in brain glioma patients at four and seven months post surgery.

Keywords

brain tumor; cognitive rehabilitation; telerehabilitation

No conflict of interest
TREATMENT EFFICACY OF A HYBRID HOME-BASED REHABILITATION INTERVENTION FOR PATIENTS WITH STROKE: A RANDOMIZED CROSSOVER TRIAL

Y.W. Hsieh\textsuperscript{1}, C.Y. Wu\textsuperscript{1}, K.C. Chang\textsuperscript{2}

\textsuperscript{1}Chang Gung University, Department of Occupational Therapy, Taoyuan, Taiwan R.O.C.
\textsuperscript{2}Kaohsiung Chang Gung Memorial Hospital, Division of Cerebrovascular Diseases- Department of Neurology, Kaohsiung, Taiwan R.O.C.

Introduction/Background

This study aimed to investigate the treatment effects of a hybrid home-based rehabilitation program combining mirror therapy and task-specific training compared with clinic-based rehabilitation in stroke patients.

Material and Method

This was a single-blinded, 2-sequence, 2-period, crossover-designed study. The participants were randomly allocated to 1 of 2 order conditions: home-based rehabilitation first or clinic-based rehabilitation first. During each period, each participant received 12 treatment sessions, with a 4-week washout phase between the 2 periods. Both the home-based and clinic-based rehabilitation groups received 30 to 45 minutes of mirror therapy, followed by 45 to 60 minutes of functional task training, at each 90-min session. Before the interventions began, the client-centered Canadian Occupational Performance Measure was administered to help identify individual tasks and goals of patients. Outcome measures were selected based on the ICF. Outcomes of impairment level were the Fugl-Meyer Assessment, Box and Block Test, and Revised Nottingham Sensory Assessment. Outcomes of activity and participation levels included the Motor Activity Log, Canadian Occupational Performance Measure, and EuroQoL-5D Questionnaire.

Results

A total of 24 and 18 patients with stroke completed the study during the intervention period 1 and 2, respectively. Pretest analyses showed that there was no significant evidence of carryover effect. Home-based rehabilitation resulted in significantly greater improvements on the amount of use subscale of Motor Activity Log ($P = 0.01$) than clinic-based rehabilitation. Clinic-based rehabilitation group had better benefits on the health index measured by the EuroQoL-5D Questionnaire ($P = 0.02$) than home-based rehabilitation. There were no statistically significant differences between the 2 groups on the other outcomes.

Conclusion

This study is unique in developing a hybrid home-based stroke rehabilitation intervention with patient-oriented goals. The home-based and clinic-based rehabilitation groups had comparable benefits in the outcomes of impairment level but showed differential effects in the outcomes of activity and participation levels.
Keywords

home-based rehabilitation; stroke; mirror therapy

Conflict of interest
Disclosure statement:
This study is supported by the Chang Gung Memorial Hospital (CMRPD1E0391), and partly supported by the Chang Gung Memorial Hospital (BMRP553 and BMRPD25) and the Ministry of Science and Technology (MOST 106-2314-B-182-015-MY3) in Taiwan.
COMMUNITY-BASED REHABILITATION IN BENIN: WHAT EVOLUTION HAVE THE BENEFICIARIES OF THE PROGRAM IN ITS SECOND DECADE (2000-2010)?

T. Kpadonou¹, E. Alagnide¹, D. Niama Natta², G. Houngbedji¹, A. Rahimi², H. Azanmasso²

¹FSS, physical and rehabilitation medicine, Cotonou, Benin
²Centre National Hospitalier et Universitaire CNHU, Physical and Rehabilitation Medicine, Cotonou, Benin

Introduction/Background

Community Based Rehabilitation (CBR) is an appropriate strategy for people with disabilities in developing countries to enable them to access a rehabilitation system adapted to their socio-economic and cultural realities. Implemented in Benin since 1989, it involved the daily work of family and volunteers from the community. The purpose of this study was to evaluate the becoming of the beneficiaries this program on its second decade from 2000 to 2010.

Material and Method

This is a cross-sectional study with a descriptive and analytical aim that took place from July to December 2015. 200 former beneficiaries were reviewed to assess their becoming.

Results

Average age of patients entering the CBR program was 10.17 years, with extremes of 3 months to 55 years; a male predominance with a sex-ratio of 1.2. Only 6.5% had an income generating activity at the beginning. At the end, 20.5% had an income generating activity with a monthly income of 15000 to 120 000 FCFA (23 to 185 €). 64.5% of disabled people had a moderate quality of life in terms of physical health, 25.8% a good quality of life in terms of psychological health, 11.3% a poor quality of life on the plane social relations and 48.4% an average quality of life on the environmental level. The factors that have influenced this evolution are specialized care (surgical, medical and orthopedic equipment).

Conclusion

CBR remains an ideal solution for comprehensive care for people with disabilities in developing countries, including socio-professional integration.

Keywords

Community-Based rehabilitation, disabled people, Benin;becoming, quality of life

No conflict of interest
Poster Tour

Poster tour: Community based rehabilitation and tele rehabilitation - Part II

ISPR8-1254
HOME-BASED REHABILITATION WITH SWORD PHOENIX VERSUS STANDARD OF CARE AFTER TOTAL KNEE REPLACEMENT: A RANDOMIZED CONTROLLED STUDY
F. Correia¹, A. Nogueira¹, I. Magalhaes¹, J. Guimaraes¹, M. Moreira¹, I. Barradas¹, L. Teixeira², J. Tulha³, J. Seabra³, V. Bento⁴
¹SWORD Health, Clinical Department, Porto, Portugal
²Abel Salazar Institute of Biomedical Sciences, Department of Population Studies, Porto, Portugal
³Hospital da Prelada, Orthopaedics Department, Porto, Portugal
⁴University Institute of Maia, Electronics Department, Porto, Portugal

Introduction/Background
While home- and clinic-based rehabilitation after total knee arthroplasty (TKA) can be equally effective, home-based care is very demanding in terms of logistics and human resources. The same is true for tele-rehabilitation, which still relies on constant human supervision. SWORD Phoenix® is a novel digital system that allows independent home-based rehabilitation under remote monitoring from clinical teams. The objective of this study was to compare home-based rehabilitation after TKA using SWORD Phoenix® against conventional rehabilitation.

Material and Method
Single-center, non-blind, randomized controlled trial. Both study groups had a home-based 8-week program after surgery. The experimental group performed a program using SWORD Phoenix® while the active comparator group had three 1h sessions per week with a physical therapist. Patients were assessed pre-operatively, at week 4 and week 8. Primary endpoint was the change in the Timed Up and Go Test (TUG) score. Secondary endpoints were the change in: a) the Knee Osteoarthritis Outcome Scale (KOOS) scale; b) knee range of motion; c) adverse events.

Results
Sixty-nine patients included (37 SWORD Phoenix®: 32 traditional rehabilitation), 59 completed the study (30 versus 29). There were no differences in the baseline demographic and clinical characteristics both groups except for lower KOOS scores in the SWORD Phoenix® group. Change between baseline and week 8 was superior in the SWORD Phoenix® group in all outcome measures: median improvement in TUG 9.5 sec (IQR 8.0) versus 4.6 (IQR 7.7) (p=0.001); median improvement in KOOS Activities of Daily Living 54.5 points (IQR 16.5) versus 35.0 (IQR 16.0) (p<0.001); mean improvement in standing knee flexion 24.2 degrees (sd=20.9) versus 7.3 (sd=13.5) (p=0.001). Adverse events were similar in both groups

Conclusion
SWORD Phoenix® appears to be safe and effective solution for independent home-based rehabilitation after TKA, with better outcomes than traditional home-based rehabilitation.
Keywords

Knee replacement; Rehabilitation; Technology

Conflict of interest
Disclosure statement:
Fernando Correia and Virgílio Bento have a shareholder position at SWORD Health. André Nogueira, Ivo Magalhães, Joana Guimarães, Maria Moreira and Isabel Barradas are employees of SWORD Health but do not have shareholder positions. Laetitia Teixeira receives honorarium from SWORD but does not have a shareholder position. José Tulha and Rosmaninho Seabra have no conflicts of interest to report.
ASSESSMENT OF THE EFFECTIVENESS OF SELF-REHABILITATION AFTER STROKE IN YAOUNDE

P. Mbonda¹, D. Niama², T. Lejeune²
¹Yaounde General Hospital, Neurology/Physical and Rehabilitation Medecine, Yaounde, Cameroon
²Catholic University of Louvain, Physical and Rehabilitation Medecine, Brussels, Belgium

Introduction/Background

Stroke is common in sub-Saharan Africa, where it is the leading cause of motor disability in adults. Because of the high cost of care, many patients can not follow a suitable rehabilitation program giving them all the possibilities to have certain autonomy. In order to improve the rehabilitation of stroke patients, particularly the functional recovery of the upper limb, 50 patients were recruited for a self-rehabilitation program of the upper limb

Material and Method

The selected patients were recent stroke victims recruited during their hospitalization in neurology. During their stay in the hospital a program of exercises of self-reeducation of the upper member was given to them (started at the exit of the neurology department for the return home, in addition to the physiotherapy) and explained through a document containing several images it was to do 1 hour /day of exercises, 6 days / 7 for 8 weeks and monitoring was done by phone and through multiple appointments. The assessment made by different tests: BBT, FMA-EU, Abilhand. Before and after the program

Results

Of the 50 patients recruited, 8 (16%) were able to follow the program faithfully, and the results showed a real evolution. Many did not participate in the program, complaining about fatigue, discouragement, lack of motivation, time and interest. And some have disappeared

Conclusion

Self-reeducation is an interesting method to improve autonomy, it is convenient for practitioners to explain more to our patients and coach them for better results

Keywords

self-rehabilitation ;stroke

No conflict of interest
RELIABILITY OF A SMARTPHONE-BASED HOME MONITORING OF FREEZING OF GAIT IN SUBJECTS WITH PARKINSON’S DISEASE.

L. Pepa1, E. Andrenelli2, L. Di Biagio1, L. Ciabattoni2, L. Spalazzi2, M.G. Ceravolo1, M. Capecci1

1Università Politecnica Marche, Department of Experimental and Clinical Medicine, Ancona, Italy
2Università Politecnica Marche, Department of Information Engineering, Ancona, Italy

Freezing of Gait (FOG) is a distressing gait disorder frequently related to Parkinson’s disease (PD) progression and severe disability. Detecting and quantifying FOG, in a clinical setting, is difficult given its episodic nature; hence, reliable tools are warranted for FOG monitoring in the daily life. A number of wearable sensors to detect FOG have been studied, but the majority of the available technology lacks “ecological” validation. The study is aimed at assessing the usability, at home, of the smartphone-based system for FOG detection, validated in the outpatient setting (Capecci et al, 2016). Moreover, the correlation between data collected in the daily living scenario and those recorded in the laboratory has been sought.

Material and Method

24 patients with PD-related resistant-FOG were studied. At baseline, the following measures were taken: UPDRS, New-FOG-Q, 6MWT, PDQ-39, GFQ and video-recorded TUG-test with and without dual-tasks while wearing the smartphone, in both OFF and ON medication conditions. Patients were instructed on how to use the FOG monitoring system at home, and were requested to wear it for three consecutive days. The system was customized to record the number of FOG events and FOG duration per minute walking.

Results

23 out of 24 patients (95.83%) complied with the recommendations about system wearing, and used the system 263[185;461] minutes/day. Median[IQR] values recorded during the 3 days were:3[1.05;5.15] FOG/min and 5.1[1.52;9.47]sec/min of FOG duration. Both parameters were significantly related with the number and duration of FOG events recorded during the simple-TUG performed either in OFF or in ON medication conditions(p=.001), and with dual-task in ON condition(p=.003). They were also related with GFQ(p=.006) and NFOG scores(p=.03).

Conclusion

A smartphone-based FOG monitoring system is usable and reliable, even in daily living situations. It could be of great help in assessing the efficacy of rehabilitation approaches to relieve FOG-related disability.

Keywords
freezing of gait; home monitoring; wearable sensor

No conflict of interest
Poster Tour

Poster tour: Community based rehabilitation and tele rehabilitation - Part II

ISPR8-1554

WHO MAKES USE OF ACTIVITIES AND EVENTS ORGANIZED BY A CONSUMER ORGANIZATION IN THE SWISS TETRAPLEGIA POPULATION?

G. Lüthi Corridori¹, B. Martin W.G.²³, K. Hans Georg¹, M. Gross⁴

¹Swiss Paraplegic Association, Life counseling, Nottwil, Switzerland
²Swiss Paraplegic Research- Guido A. Zäch Institute, Life Course Epidemiology Group, Nottwil, Switzerland
³University of Lucerne, Department of Health Sciences and Health Policy, Lucerne, Switzerland
⁴Swiss Paraplegic-Research, SwiSCI Study Center, Nottwil, Switzerland

Introduction/Background

Persons with a physical disability are at risk of exclusion from general leisure and tourism activities that are beneficial for personal development, recovery, psychological and physical well-being, quality of life, as well as social inclusion. To overcome barriers to participation, many consumer organisations offer leisure and travel events that are tailored to the specific needs of these persons. Yet, objective evidence regarding the effectiveness of such services is limited. We thus evaluated participation among persons with a tetraplegic spinal cord injury (SCI), who were as members of the consumer organization ‘Swiss Paraplegic Association (SPA)’ systematically invited to make use of holiday and cultural events.

Material and Method

The study utilized prospective data from two databases: self-reported data from the Swiss Spinal Cord Injury Cohort Community Survey 2012 (SwiSCI) and objective data on participation in non-sportive leisure time activities during the period 2012-2017 from the SP YA. We included all subjects with tetraplegia, aged ≥16 years who are SPA members and resident in Switzerland. Univariable and multivariable regression modelling was employed to evaluate determinants of participation.

Results

Out of 344 eligible participants 42 (12.2%) participated in any non-sportive events organized by the SPA between 2012 and 2017. Preliminary analyses showed that having a partner and traumatic SCI as origin were associated with increased participation in leisure time activity. In multivariable regression analysis those participants with a partner were twice as likely to participate in any SPA event (trend). Differentiation between cultural events and holidays will be analysed separately and provide additional information.

Conclusion

This analysis belongs to one of the rare studies analysing participation in non-sportive leisure time activities in tetraplegics using objective data on participation. Having a partner was the most informative determinant for participation. This information may be highly relevant for the SPA to tailor their offers according to the needs of their customer.
Keywords
Swiss tetraplegia population; Participation in leisure activities; Effectiveness of tailored activities

No conflict of interest
Introduction/Background

Care pathways are designed to improve continuity of care and hospital operational efficiency. Those relating to individuals with paraplegia or tetraplegia are demanding due to the multisystem effects of spinal cord injuries. The purpose of this paper is to describe the existent resources available in France in 2018 necessary to provide competent care to persons with SCI.

Material and Method

A nationwide survey was submitted to 40 rehab centers affiliated to the AFIGAP Network (Association Francophone Internationale des Groupes d'Animation de la Paraplégie) during the year 2017. The reference year considered for the description of the clinical activities dedicated to the care of patients with SCI care was 2016. Questions were relating to all the aspects of a clinical activity within a specialized SCI care unit.

Results

Twenty nine PMR units responded to the survey. Sixteen corresponded to specialized SCI care units and in thirteen units, SCI and non SCI patients were cared in the same environment. The mean number of patients with SCI admitted at an acute phase was of 38 ± 30 (range: 3-100), at a secondary phase of 42 ± 57 (range: 0-260) for a full 24h hospitalization and of 43 ± 63 for a day hospitalization. The number of ventilated patients was of max 2 in average and reached 8 to 9 in 2 of the nine units identified as welcoming long term ventilated in-patients. The organization of multidisciplinary consultations corresponds to various discipline areas that differ greatly from one unit to another. The same finding is made for diagnostic as well as therapeutic equipment.

Conclusion
This survey is a recent attempt to identify the French network of PMR units more specifically dedicated to the care of patients with SCI. It unveils the disparity of the efforts made to offer a care strategy consistent with the care pathways designed in 2012.

Keywords

spinal cord injury; organization; physical medicine and rehabilitation

No conflict of interest
Poster Tour

Poster tour: Community based rehabilitation and tele rehabilitation - Part II

ISPR8-2328

STATUS OF THE COMMUNITY-BASED REHABILITATION IN CHINA REFLECTED FROM MULTILEVEL MEDICAL INSTITUTIONS

J. Jia¹, H. Wang¹, S. Chen¹, P. Deng²

¹ Huashan Hospital- Fudan University, Rehabilitation department, Shanghai, China
² Jing'An District Centre Hospital of Shanghai, Rehabilitation department, Shanghai, China

Introduction/Background

The study was conducted to investigate the status of community-based rehabilitation in China, and to provide evidence for the formulation of relevant policies.

Material and Method

From January to February in 2018, questionnaires were sent to the rehabilitation departments from 23 provinces, 4 municipalities and 5 autonomous regions in China. The questionnaire had 4 versions, for rehabilitation department (community hospital / general hospital), non-rehabilitation department (community hospital / general hospital). The questionnaires covered the configuration of equipment, professionals in community rehabilitation department and the deployment of community-based rehabilitation services.

Results

1,798 valid questionnaires were retrieved, of which 434 were community hospital version (210 rehabilitation and 224 non-rehabilitation), 1,364 were general hospital version (1,118 rehabilitation and 176 non-rehabilitation). Among all the survived community hospitals, 54.4% of which had rehabilitation clinics, 51% had rehabilitation doctors, 60% had therapists and 33.4% had rehabilitation wards. 55.6% of rehabilitation department of community hospital receive <500 patients per month. Rehabilitation department in community receive most patients with dysfunction after brain damage due to various reasons. More than 70% of rehabilitation department in community conducted therapeutic exercise, traditional Chinese medicine rehabilitation and therapeutic physical agents, and the rate of occupational therapy, language therapy, deglutition training and family rehabilitation indication were less than 50%. Only 27.8% of rehabilitation department in community has referral business with superior rehabilitation institutions, and nearly half of staff had no access to higher level rehabilitation training.

Conclusion

The community rehabilitation in China has witnessed a rapid development over the past decade, but there are still many problems to be solved. A lack of corresponding medical policies, unbalance of regional development, relative weak basic construction, incomplete training system of community talents are all unsolved problems. With the growing problem of aging in China, the demand for community rehabilitation will increase day by day, which puts forward new challenges to China's medical and health decision-making.
Keywords

Community-based Rehabilitation; Multilevel medical institutions; Questionnaire investigation

No conflict of interest
Poster Tour

Poster tour: PRM and cancer

ISPR8-0177
WE ASKED OUR PATIENTS – ‘WHAT DO YOU NEED IN A CANCER REHABILITATION PROGRAM?’
A. Cole¹, C. Poulos², R. Poulos³, B. Walmsley⁴, N. Reynolds⁴
¹HammondCare, Jacaranda Rehabilitation Unit, Greenwich NSW 2065, Australia
²HammondCare, Centre for Positive Ageing + Care, Hammondville NSW 2170, Australia
³University of New South Wales, School of Public Health & Community Medicine, Sydney NSW 2052, Australia
⁴HammondCare, Centre for Learning & Research, Greenwich NSW 2065, Australia

Introduction/Background

Papers published in the literature and/or presented at rehabilitation congresses in recent years have demonstrated the efficacy of rehabilitation programs in addressing residual problems of impairment and function after cancer treatment. Functional outcomes of programs delivered to patients impacted by a cancer diagnosis are comparable to those delivered to patients with ‘benign’ disease diagnoses, as are post-discharge living arrangements and care outcomes.

Whilst data to support the efficacy of rehabilitation in the context of a cancer diagnosis well justifies these programs, for the individual patient the most important thing is the lived individual narrative of their illness and associated problems. The intersection of this narrative and functional outcome measures may at times be tenuous.

Material and Method

To address this, we undertook in-depth interviews with a purposive sample of patients at the time of their admission into the Jacaranda Cancer Rehabilitation Unit at Greenwich Hospital, and also prior to their discharge, to evaluate their own individual goals and hear the narrative of their experience in our rehabilitation program. We also convened focus groups of the medical, nursing and allied health professional members of the multi-disciplinary team, to find out their experiences at the intersection of individual patient narrative, and formal rehabilitation goal setting.

Both positive and negative perspectives were sought.

Results

We discovered that despite the challenges of goal setting and rehabilitation, the shared experience of a real therapeutic community between patients, families and the multidisciplinary team, lies at the heart of effective rehabilitation that puts people’s lives back together, in ways that they can manage and continue with, after hospital discharge.

Conclusion

Qualitative review of patients’ goals and their experience in rehabilitation provides a rich source of information that complements traditional quantitative outcome data.
Keywords

Cancer Rehabilitation; Goal-setting; Therapeutic Community

No conflict of interest
Ambulatory cancer rehabilitation programs vary widely in the types of services offered, and there is a lack of consistency with respect to the coordination of rehabilitation with oncologic treatment plans. There are no guidelines for outpatient interdisciplinary rehabilitation team meetings, and the types and characteristics of interventions that a physiatrist can provide during these meetings have not been reported. The aims are as follows: 1) identify the frequency and characteristics of interventions derived through monthly interdisciplinary outpatient cancer rehabilitation team meetings involving physiatrists, physical therapists, and occupational therapists 2) compare the clinical characteristics of patients who did and did not receive interventions.

Material and Method

This is a retrospective study of consecutive monthly outpatient interdisciplinary rehabilitation team meetings with physiatrists’ participation.

Results

Over a 7-month period, there were 57 potential patients to be discussed and 42 patients were discussed. Among the 42 patients, 12 of them did not receive any interventions and 30 did, which yields 71% of patient receiving at least one intervention. Some patients required repeated discussions in different months; thus, a total of 71 discussions occurred and resulted in 51 interventions. Of the 71 discussions, 41 (58%) resulted in interventions and the most common intervention was coordination of care (37%). Thirty discussions (42%) did not result in any interventions, with the most common reason being stable or having improved functional status.

Conclusion

Regularly scheduled outpatient interdisciplinary cancer rehabilitation team meetings increase communication among rehabilitation specialists to identify outpatients experiencing barriers to therapy progress, provide interventions to address those barriers, and reassess rehabilitation goals previously established.

Keywords
Interdisciplinary meetings; cancer rehabilitation; team meetings

No conflict of interest
Poster Tour

Poster tour: PRM and cancer

ISPR8-0447
THE CORRELATION BETWEEN BIOIMPEDANCE AND OUTCOMES OF LYMPHEDEMA TREATMENT IN BREAST CANCER PATIENTS
S. Kwon¹, S.H. Rhie¹, J.Y. Jeon¹
¹Asan Medical Center - University of Ulsan College of Medicine, Department of Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background

Bioimpedance can be used for lymphedema assessment. As lower as the frequency is, current passes through mostly extracellular fluid, considered to be major part of changes during treatment of lymphedema. The aim of this study is to evaluate responsiveness to treatment and prognosis by using bioimpedance and to indentify that the lower frequency impedance more reflects the actual volume changes during treatment.

Material and Method

Among the subjects who visited outpatient clinic from December, 2015 to December, 2016 and underwent initial complex decongestive therapy (CDT) for 2 weeks with bioimpedance analysis before and after treatment, we included 64 unilateral breast cancer related lymphedema (BCRL) patients. The ratios of single frequency bioimpedance analysis (SFBIA) at 5 kHz, 1 kHz and the ratio of bioimpedance at 0 kHz were measured. The volume of the affected arm was estimated by integrating arm circumference for 4 cm intervals.

Results

The higher ratios of impedance at 0 kHz, 1 kHz, and 5 kHz before CDT were statistically significantly correlated with arm volume reduction in affected arm. Furthermore, as the frequency of SFBIA increases in order of 0 kHz, 1 kHz, and 5 kHz, the coefficient of correlation (r) showed tendency to increase. However, in the analysis of the relationship between changes in affected arm volume and impedance ratios, there was a statistically significant correlation only at 5 kHz impedance.
<table>
<thead>
<tr>
<th>Factors</th>
<th>Values (n=62) †</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (Male : Female)</td>
<td>0 : 62</td>
</tr>
<tr>
<td>Age (years)</td>
<td>53.03 ± 10.40</td>
</tr>
<tr>
<td>BMI (kg/m²) §</td>
<td>24.34 ± 4.71</td>
</tr>
<tr>
<td>Affected side (Right : Left)</td>
<td>30 : 32</td>
</tr>
<tr>
<td>Disease duration (months)</td>
<td>50.16 ± 72.86</td>
</tr>
<tr>
<td>Measured arm volume (cm³)</td>
<td>2452.13 ± 472.40</td>
</tr>
</tbody>
</table>

† Values are expressed as numbers or as the mean ± SD
§ BMI, Body mass index
Fig 1. Relationship between $Y$: Bioimpedance ratio (unaffected/affected) in 0, 1 and 5 kHz at pre-treatment and $X$: Measured arm volume changes after treatment ($V_0 - V_1$).

- A: at 0 kHz, B: at 1 kHz, C: at 5 kHz
- $V_0$: Affected arm volume at pre-treatment
- $V_1$: Affected arm volume at post-treatment
- $r$: Pearson’s correlation coefficient
- $p$-value < 0.05 by Partial correlation coefficient, adjusted for age, BMI and disease duration.
- SFBA, single frequency bioimpedance analysis.
Conclusion

The results are consistent with previous studies in that ratios of SFBIA before CDT are useful tools for predicting responsiveness to treatment in BCRL patients. Unexpectedly, SFBIA of low frequency did not predict the outcomes better than that of high. Similar result were obtained in the analysis of the relationship between changes in affected arm volume and impedance ratios, showing a statistically significant correlation only at 5 kHz impedance. Further study will be needed to findout other factors to be considered.

Keywords

Lymphedema ; Bioimpedance ; Breast Cancer

No conflict of interest
THE IMPACT OF BREAST CANCER RELATED LYMPHEDEMA ON HEALTH CARE UTILIZATION: A POPULATION-BASED COHORT STUDY

A. Cheville

1Mayo Clinic, Physical Medicine and Rehabilitation, Rochester, USA

Introduction/Background

Importance: Cancer-related impairments degrade survivors’ quality of life, independence, and societal integration, yet may be ameliorated, or even reversed, with effective care. Unfortunately, few patients receive care for their impairments. The impact of this neglect remains under-researched and its impact on healthcare (HC) utilization is unknown.

Objective: To delineate the magnitude and patterns of HC utilization between breast cancer (BC) survivors with and without one of its most common, remediable and functionally limiting sequelae; upper extremity lymphedema.

Material and Method

Design, Setting, Participants: We conducted a population-based, retrospective longitudinal cohort study of Olmsted County, MN residents who were newly diagnosed with BC in the 21 year period beginning on January 1, 1990 and concluding December 31, 2010. HC utilization was characterized using the Berenson-Eggers Type of Service (BETOS) categories.

Main Outcome Measure: Overall HC utilization as well as its compartmentalization into the BETOS categories of: 1) Evaluation and management, 2) Procedures, 3) Imaging, 4) Tests, 5) Durable medical equipment, 6) Physical/occupational therapy, 7) Other, and 8) Exceptions/Unclassified.

Results

Results: The cohort included 1906 subjects of which 94% (1800) had records meeting the inclusion criteria. Mean follow-up per survivor was 8.8 years (median, 8, range 1 - 23 years); 1239 were living and residing in Olmsted County at the study’s conclusion. Analysis revealed that 1) survivors with BC-associated lymphedema used >30% more services annually than their unaffected counterparts; 2) their increased utilization lessened but persisted for at least 10 years after diagnosis; and 3) this finding of increased utilization is robust, extending across all BETOS categories, and is further amplified as BMI increases.

Conclusion

Conclusions: An analysis of BC-related lymphedema as an exemplar of cancer impairment-associated HC utilization revealed that this often remediable condition is
associated with a significant, >30%, increase in HC utilization that extends for a prolonged period.

Keywords

survivorship;utilization;lymphedema

No conflict of interest
ULTRASOUND EVALUATION OF THERAPEUTIC EFFECTS OF COMPLEX DECONGESTIVE THERAPY IN SECONDARY LYMPHEDEMA DUE TO BREAST CANCER

M. Carrillo, M. Torra, L. Solà, N. Pérez, M. Ruiz, R. Garreta

Hospital Universitari Mútua de Terrassa, Physical Medicine and rehabilitation, Terrassa, Spain

Introduction/Background

Lymphedema due to breast surgery affects 20-25% of patients treated with lymphadenectomy. Most studies on lymphedema and ultrasound are based on the use of ultrasound as a diagnostic method, but not as a method for treatment evaluation. Objective: To evaluate by ultrasound the effect of complex decongestive therapy (CDT) in patients with lymphedema after lymphadenectomy due to breast surgery.

Material and Method

Prospective study from February to September 2016. The sample consists of 12 patients with lymphedema treated with CDT during 5 weeks.

Circumferences in both, affected and unaffected limb, were measured with measuring tape. Thickness of subcutaneous tissue and compliance were measured by ultrasound at 7 and 14 cm above the elbow, and 7 and 14 cm below. Compliance is calculated: (thickness without pressure - Thickness with maximal pressure)/Thickness without pressure.

All three measurements, circumference, thickness and compliance were made before and after treatment.

Data analysis of means. Means compared using t-student and non-parametric tests. Statistical significance was set at p<0.05.

Results

After treatment, significant improvements were found on the resultant difference of the circumferences measurements, between affected and unaffected limb, decreasing from 7.92+/-2.91 to 3.83+/-3.16 (P=0.00). Resultant difference of the thickness also appeared significantly improved, from 0.77+/-0.35 to 0.37+/-0.20 (P=0.002).

Compliance slightly increased in all measurements on affected limb. No significant changes in compliance were found either at the affected not at the unaffected side.

<table>
<thead>
<tr>
<th></th>
<th>Compliance Pre</th>
<th>Compliance post</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unaffected upper limb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Distal to Elbow</td>
<td>Proximal to Elbow</td>
<td>Proximal to Elbow</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------</td>
<td>-------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>14 cm distal to elbow</td>
<td>0.27 ± 0.20</td>
<td>0.33 ± 0.16</td>
<td>0.27 ± 0.20</td>
</tr>
<tr>
<td>7 cm distal to elbow</td>
<td>0.33 ± 0.16</td>
<td>0.33 ± 0.12</td>
<td>0.32 ± 0.20</td>
</tr>
<tr>
<td>7 cm proximal to elbow</td>
<td>0.33 ± 0.12</td>
<td>0.35 ± 0.14</td>
<td>0.35 ± 0.12</td>
</tr>
<tr>
<td>14 cm proximal to elbow</td>
<td>0.27 ± 0.20</td>
<td>0.28 ± 0.23</td>
<td>0.28 ± 0.23</td>
</tr>
</tbody>
</table>

**Affected upper limb**

<table>
<thead>
<tr>
<th></th>
<th>Distal to Elbow</th>
<th>Proximal to Elbow</th>
<th>Proximal to Elbow</th>
<th>Proximal to Elbow</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 cm distal to elbow</td>
<td>0.21 ± 0.13</td>
<td>0.25 ± 0.21</td>
<td>0.29 ± 0.24</td>
<td>0.26 ± 0.20</td>
</tr>
<tr>
<td>7 cm distal to elbow</td>
<td>0.21 ± 0.21</td>
<td>0.25 ± 0.24</td>
<td>0.30 ± 0.21</td>
<td>0.31 ± 0.23</td>
</tr>
<tr>
<td>7 cm proximal to elbow</td>
<td>0.29 ± 0.24</td>
<td>0.30 ± 0.21</td>
<td>0.30 ± 0.21</td>
<td>0.30 ± 0.21</td>
</tr>
<tr>
<td>14 cm proximal to elbow</td>
<td>0.26 ± 0.20</td>
<td>0.31 ± 0.23</td>
<td>0.31 ± 0.23</td>
<td>0.31 ± 0.23</td>
</tr>
</tbody>
</table>

**Conclusion**

Ultrasonic thickness measurement could be a good tool for evaluating the therapeutic effects of TDC, but further studies are needed with larger sized sample.

**Keywords**

lymphedema; breast cancer; ultrasound

*No conflict of interest*
Poster Tour

Poster tour: PRM and cancer

ISPR8-1597
MECHANICAL PROPERTIES OF MUSCLES AROUND SHOULDER IN BREAST CANCER PATIENTS: INTRA- AND INTER-RELIABILITY AND SYMMETRY USING MYOTONPRO
S.Y. An¹, S.M. Yeo¹, I.Y. Cheong¹, J.H. Hwang¹
¹Samsung Medical Center, Physical and Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background

Treatment related shoulder dysfunction and anterior chest wall stiffness is common in breast cancer patients. Objective information of muscle properties can be useful for evaluating these problems and the effect of intervention. Recently MyotonPRO has been used to measure muscle properties such as stiffness, tone and elasticity. Our study aimed to assess mechanical properties and symmetry of muscles around shoulder and to investigate the inter- and intra-rater reliability of parameters measured by MyotonPRO in breast cancer patients.

Material and Method

22 breast cancer patients who underwent mastectomy were studied. Frequency(tone,Hz), Stiffness(N/m) and Decrement(elasticity) were measured in both Pectoralis major(PM), Sternocleidomastoid(SMC) and Upper trapezius(UT). Rater 1 measured two sets with a time interval of 30 minutes in order to confirm intra-rater reliability. Rater 2 measured one set at the time interval. After the each measurement, the markings are completely erased so as to not influence the subsequent testing session. A paired t-test was used to compare muscle properties between affected side and unaffected side. Reliability was assessed using intra-class correlation coefficients (ICCs) and Bland and Altman analysis.

Results

Intra-rater reliability was excellent (ICC>0.75, 0.85-0.98) in all parameters for two sets of repeated measurements from the PM, SCM and UT in affected and unaffected upper limb in breast cancer patients. Inter-rater reliability was fair to excellent in all parameters except the unaffected PM elasticity (ICC=0.34). Significant differences in all parameters were observed in the affected side PM and the unaffected side PM. In both SCM and UT, there was no significant difference between all the parameters.
Table 1. Intra-rater reliability of the parameters using MyotonPRO in breast cancer patients (n=22).

<table>
<thead>
<tr>
<th></th>
<th>Tone (Frequency, F; Hz)</th>
<th>Stiffness (S; N/m)</th>
<th>Elasticity (Decrement, D; Log)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ICC (95% CI)</td>
<td>SEM</td>
<td>MDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affected side</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM</td>
<td>0.97 (0.92-0.99)</td>
<td>0.32 (2.1%)</td>
<td>0.89</td>
</tr>
<tr>
<td>SCM</td>
<td>0.83 (0.59-0.93)</td>
<td>0.39 (2.8%)</td>
<td>1.08</td>
</tr>
<tr>
<td>UT</td>
<td>0.98 (0.96-0.99)</td>
<td>0.31 (1.6%)</td>
<td>0.86</td>
</tr>
<tr>
<td>Unaffected side</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM</td>
<td>0.97 (0.94-0.99)</td>
<td>0.42 (3.1%)</td>
<td>1.16</td>
</tr>
<tr>
<td>SCM</td>
<td>0.90 (0.77-0.96)</td>
<td>0.34 (2.4%)</td>
<td>0.94</td>
</tr>
<tr>
<td>UT</td>
<td>0.90 (0.75-0.96)</td>
<td>0.45 (2.4%)</td>
<td>1.25</td>
</tr>
</tbody>
</table>

ICC: Intraclass correlation coefficient; CI: Confidence Interval; SEM: Standard error of measurement; MDC: Minimal detectable change.

Table 2. Inter-rater reliability of the parameters using MyotonPRO in breast cancer patients (n=22).

<table>
<thead>
<tr>
<th></th>
<th>Tone (Frequency, F; Hz)</th>
<th>Stiffness (S; N/m)</th>
<th>Elasticity (Decrement, D; Log)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ICC (95% CI)</td>
<td>SEM</td>
<td>MDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affected side</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM</td>
<td>0.76 (0.42-0.90)</td>
<td>0.83 (5.3%)</td>
<td>2.30</td>
</tr>
<tr>
<td>SCM</td>
<td>0.61 (0.06-0.84)</td>
<td>0.50 (3.6%)</td>
<td>1.39</td>
</tr>
<tr>
<td>UT</td>
<td>0.83 (0.60-0.93)</td>
<td>0.86 (4.8%)</td>
<td>2.38</td>
</tr>
<tr>
<td>Unaffected side</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM</td>
<td>0.90 (0.75-0.96)</td>
<td>0.69 (5.1%)</td>
<td>1.91</td>
</tr>
<tr>
<td>SCM</td>
<td>0.69 (0.25-0.87)</td>
<td>0.51 (3.7%)</td>
<td>1.41</td>
</tr>
<tr>
<td>UT</td>
<td>0.81 (0.55-0.92)</td>
<td>0.64 (3.5%)</td>
<td>1.77</td>
</tr>
</tbody>
</table>

ICC: Intraclass correlation coefficient; CI: Confidence Interval; SEM: Standard error of measurement; MDC: Minimal detectable change.
Conclusion

Our findings indicate that MyotonPRO is a feasible tool to quantify PM stiffness and tone in breast cancer patients. Studies assessing the changes in PM muscle properties caused by pathology or treatments are needed.

Keywords

breast cancer; muscle tone; reliability

Conflict of interest

Disclosure statement:
This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIP) (NRF-2017R1A2B4010795).
Poster Tour

Poster tour: PRM and cancer

ISPR8-1607
CHANGES IN MUSCLE TONE AND STIFFNESS AROUND SHOULDER ASSOCIATED WITH RADIOTHERAPY IN BREAST CANCER PATIENTS
S.M. Yeo1, S.Y. An1, I.Y. Cheong2, W. Park3, J.H. Hwang1
1Samsung Medical Center, Physical and Rehabilitation Medicine, Seoul, Republic of Korea
2Samsung Medical Center, Physical and Rehabilitation Medicine, Seoul, Republic of Korea
3Samsung Medical Center, Radiation Oncology, Seoul, Republic of Korea

Introduction/Background

Treatment related shoulder dysfunction and anterior chest wall stiffness is common in breast cancer patients. Radiotherapy is known to alter the properties of muscles such as fibrosis, but it is difficult to objectively assess. Objective measurements of muscle properties can be useful for evaluating these problems and the effect of intervention. Our study aimed to assess changes in serial muscle properties associated with radiotherapy in breast cancer patients using MyotonPRO, a device measuring muscle properties.

Material and Method

35 breast cancer patients who underwent mastectomy and scheduled to undergo radiotherapy were enrolled. Frequency (tone, Hz) and Stiffness (N/m) were measured in both Pectoralis major (PM), Sternocleidomastoid (SMC) and Upper trapezius (UT) before radiotherapy and immediately after radiotherapy. Paired t-test was used to investigate the side to side difference and changes associated with radiotherapy of tone and stiffness of muscles around shoulder.

Results

Before radiotherapy, the stiffness and tone of affected PM were significantly higher than unaffected PM. Immediately after radiotherapy, the stiffness and tone of affected PM were still significantly higher than unaffected PM and the difference became larger than before radiotherapy. Although there was no side to side difference of parameters before radiotherapy, the stiffness of affected UT was significantly higher than unaffected UT immediately after radiotherapy. Stiffness/ tone of affected PM and affected UT increased significantly immediately after radiotherapy compared to before radiotherapy.

Conclusion

After operation, only the tone and stiffness of affected PM were increased. After radiotherapy, the stiffness and tone of affected PM were higher than before radiotherapy, and the tone and stiffness of affected UT were also increased. Our findings confirmed that surgical treatment and radiotherapy affect the stiffness and tone of affected PM. And stiffness and tone of affected UT increased before and after radiotherapy, which is thought to be due to posture of receiving radiotherapy.
Keywords
Reliability; MyotonPRO; breast cancer

Conflict of interest
Disclosure statement:
This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIP) (NRF-2017R1A2B4010795).
Poster Tour

Poster tour: PRM and cancer

ISPR8-2155
HOW CAN TELEMEDICINE OPTIMIZE THE FEASIBILITY OF A PHYSICAL ACTIVITY PROGRAM IN PAEDIATRIC ONCOLOGY?
G. Lambert¹, D. Curnier¹, M. Caru¹, G. Duhamel¹, N. Alos², C. Laverdière², D. Sinnett², L.N. Veilleux³
¹University of Montreal, Kinesiology, Montreal, Canada
²Sainte-Justine University Health Center, Research, Montreal, Canada
³Shriners Hospital for Children, Motion Analysis Center, Montreal, Canada

Introduction/Background

• Cancer patients are prone to secondary diseases and side effects due to treatments. Further, they have a tendency towards inactivity, therefore prompting the expression of comorbidities. However, engagement in daily physical activities is beneficial to improve health-related quality of life and functional health. The aim of this study is to assess the feasibility of a physical activity program for paediatric oncology population throughout treatments.

Material and Method

• This is an ongoing study conducted at Sainte-Justine University Health Center (SJUHC) since July 2017. It is the first feasibility study of its kind, conducted with intention to treat, including patients between the age of 2 and 21 years old. The experimental group will include 150 patients that will receive exercise-based supervised intervention twice per week throughout treatments. The control group, to be completed one year from now, will include 150 survivors who did not receive exercise-based intervention during treatments. Recruitment for control group started before the experimental group to improve the evaluation protocol. Moreover, the main instrument used to provide and optimize supervision during individual physical activity intervention will be telemedicine web platform.

Results

• To date, our sample of 43 survivors (predominately of Acute Lymphoblastic Leukemia) within the control group presents a mean age of 11.6±5.7 years; the Male-Female ratio in the sample is respectively of 44% (n=19) and 56% (n=24). The Incremental Shuttle Walking Test showed that males (927.8±163.6m) can perform a greater distance than females (674.2±330.7m), and distance performed by older participants (870.06±280.39m) was superior to younger participants' (712.50±237.74m). In the next few weeks, results of the experimental group, compared to control, will provide insight on the feasibility of physical activity intervention using telemedicine in the paediatric oncology field.

Conclusion
• This study will provide valuable tools for health professionals who wish to encourage children diagnosed with cancer to exercise.

Keywords

Rehabilitation Technology Assessment; Cancer; Exercise

No conflict of interest
Poster Tour

Poster tour: PRM and cancer

ISPR8-2246
RESULTS OF A RANDOMIZED TRIAL COMPARING AEROBIC EXERCISE AND TAI CHI ON CARDIOVASCULAR FUNCTION, CYTOKINES AND METABOLIC MARKERS IN SURVIVORS OF SOLID TUMORS

1Inova Health System, Medicine, Falls Church VA, USA
2Cancer Consultants, Medicine, Frederick MD, USA
3University of California San Francisco, Medicine, San Francisco, USA
4Uniformed Services University of the Health Sciences, Department of Military and Emergency Medicine, Bethesda- MD, USA
5National Institutes of Health, Rehabilitation Medicine, Bethesda- MD, USA
6George Mason University, College of Science, Fairfax- VA, USA
7George Mason University, College of Science, Fairfax VA, USA

Introduction/Background

There is a high incidence of hyperlipidemia, increased body fat, decreased aerobic performance, function and psychological distress in long-term survivors of cancer. This study compares the efficacy of Tai Chi (TC) vs aerobic exercise (AE) in impacting some of these factors in adult survivors of solid tumors.

Material and Method

We performed an unblinded randomized, repeated measures trial in adult cancer survivors who were free of metastatic disease and had not received chemotherapy for 24 months. Participants were randomized to standard 12 week instructor-led TC program, 12 week supervised AE, or waitlist (WL). WL patients were randomized to TC or AE after 12 weeks and were included in respective group analyses.

Clinical variables and serum analytes were compared at baseline (T0), 6(T1) and 13 (T2) weeks. We measured inflammatory cytokines and growth factors: IL1b, IL6, IL8, IL10, eotaxin, GCSF, INF-g, MCP-1, PDGF-bb, and TNF-a; hormones: cortisol, insulin; and kynurenine using ELISA or Bio-plex assays. Paired group tests were performed along with analysis of unpaired analyte levels between groups for several analytes when repeated measures were not attainable.

Results

Forty-one participants completed all phases of the study. Intervention assignments are presented in Table 1. In (T2-T0) cardiovascular comparisons, the only near significant difference that was detected, was a drop in post-exercise systolic blood pressure in the TC group (p=0.06). After completion of the interventions there was a significant decrease in insulin (p<0.05) and IL10 (p=0.01) and a greater drop in TNFa(p=0.02) in the AE treated group. There was a trend for decrease of PDGF (p=.06) in the TC group. (Table
<table>
<thead>
<tr>
<th>DETAILS</th>
<th>Aerobic</th>
<th>TaiChi</th>
<th>WaitList</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrolled</td>
<td>17</td>
<td>24</td>
<td>19</td>
<td>60</td>
</tr>
<tr>
<td>Gender:</td>
<td>Female</td>
<td>15</td>
<td>23</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Age:</td>
<td>&lt;40</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>40-50</td>
<td>4</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>51-60</td>
<td>8</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>&gt;60</td>
<td>4</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

2).
Conclusion

AE and TC interventions lead to different shifts in serum analyte levels. AE may offer therapeutic benefit in reducing metabolic and inflammatory markers, IL10, TNFa and insulin. TC does not.

Keywords

No conflict of interest
THE EFFECT OF EARLY REHABILITATION INTERVENTION ON THE LIMITED UPPER LIMB MOVEMENT AFTER BREAST CANCER SURGERY

N. Xie¹, J. Jia¹, X. Ruan¹, L. Li², L. Jiang²
¹Huashan Hospital-Fudan University, Rehabilitation Medicine, Shanghai, China
²Shanghai Jing'an district central hospital, Rehabilitation Medicine, Shanghai, China

Introduction/Background

To observe the effect of early systemic rehabilitation intervention on the upper limb function of patients with breast cancer after operation.

Material and Method

128 cases of breast cancer after radical mastectomy were divided into the treatment group and the control group by random grouping. In the control group, the patients had the upper limb brake in 24 hours after operation, and the daily living ability training was carried out. In the treatment group, after applied 24 hours shoulder joint brake, the simple finger joint flexion and extension training was carried out, and the early system rehabilitation training was started after 24 hours, including 6 stages. At the 2 weeks, 4 weeks and 12 weeks after operation, the upper extremity function was assessed by Constant-Murley shoulder function score. The shoulder joint mobility and quality of life scale (QLQ-C30) were used to evaluate the curative effect of 2 groups.

Results

As the time went on, the treatment group and the control group of ipsilateral shoulder function and shoulder joint activity and life quality score were gradually improved, and in the 12 weeks after the operation, the patients in the treatment group Constant-Murley score [(96.32 + 10.14)%], the shoulder joint activity and QLQ-C30 score were significantly better than the control group (P < 0.05).

Conclusion

Systematic rehabilitation intervention in early stage of breast cancer can improve the recovery of upper limb function and life quality of patients, which has important clinical and social value.

Keywords

breast cancer;rehabilitation;upper limb

No conflict of interest
THE IMPACT OF TOTAL HIP ARTHROPLASTY ON SEXUAL FUNCTION

S. zahi

1CHU Ibn Rochd, physical medicine and rehabilitation department, casablanca, Morocco

Introduction/Background

Sexual life is an important component of the quality of life. However, it is a frequently neglected aspect in patients with hip osteoarthritis. The aim of the study was to evaluate the influence of total hip arthroplasty (THA) surgery on the quality of sexual life.

Material and Method

a retrospective study using an anonymous questionnaire administered to 270 patients in a face-to-face interview at physical medicine and rehabilitation department.

Results

The mean age when sexual difficulties began was 45 years (range: 21-63) two years after hip pain occurred. Sexual difficulties were considered severe to major by 19% of patients. The main causes of sexual difficulties were pain, then joint stiffness. Patients with the most pronounced and early sexual repercussions were young women with hip dysplasia. In patients’ opinion, the implementation of THA improves sexual relations. The frequency of intercourse was increased after THA significantly, more frequently in women than in men, due to a change in coital position. Only 17% of patients had information about sexual activity before/after THA.

Conclusion

Sexual difficulties should not be marginalized, but should be assessed before and after surgery. It is the role of a multidisciplinary team: surgeon, physiatrist and physiotherapist as they should provide clear information.

Keywords

Total hip replacement;Sexual activity;Quality of life

No conflict of interest
Poster Tour

Poster tour: Sexuality, pregnancy and motherhood

ISPR8-2675
PARTICIPATION AFTER STROKE: THE IMPORTANCE OF SEXUALITY MANAGEMENT
A. Araujo, A. Cordeiro, P. Aroso, A. Azenha
1Centro Hospitalar e Universitário de Coimbra, Physical and Rehabilitation Medicine, Coimbra, Portugal

Introduction/Background

Stroke is the first cause of disability in Western countries. Sexual dysfunction is common after stroke but frequently neglected by healthcare providers. The aim of this study is to update the clinical recommendations for sexuality management of people after stroke.

Material and Method

It was performed an updated non-systematic review of the literature from 2007 through 2017. Searches of PUBMED/MEDLINE were conducted with a combination of the following terms: stroke, sexual function, sexual dysfunction, sexuality. Ten studies were fully reviewed and evaluated.

Results

The current review yielded impaired sexual activity prevalence as high as 47% after stroke, with no gender differences. Sexual function was assessed through Quality of Sexual Function Scale (QSF) and Changes in Sexual Functioning Questionnaire Short Form (CSFQ-14). It was reported a significant difference between the baseline and post-stroke sexual satisfaction, frequency of sexual activity and performance. Sexual dysfunction was correlated with higher levels of anxiety and depression (Hospital Anxiety and Depression Scale). The majority of patients reported a lack of communication and counseling concerning safety and alternative strategies. A high portion of patients wanted to receive counseling prior to discharge from a rehabilitation center and at the follow-up appointments. A few interventions were described and with low evidence. Pharmacological treatment, proper counseling, written information and sexual rehabilitation are among them.

Conclusion

There is a high prevalence of sexual dysfunction among stroke survivors who report desire for information and counseling from healthcare providers. As sexual function is an important component to quality of life and participation, rehabilitation physicians should receive training in addressing sexuality in the treatment of post-stroke patients. Sexual rehabilitation needs to be an integrative part of stroke survivors’ rehabilitation approach and it is important to explore long-term sustainable interventions to increase and to optimize participation on stroke survivors.

Keywords
Sexuality; Stroke; Sexual dysfunction

No conflict of interest
Introduction/Background

Purpose: to analyze sexual problems after spinal cord injury (SCI) and their repercussions on quality of life and psychological state

Material and Method

This is a cross-sectional study concerning 38 patients with SCI patients followed at a physical medicine and rehabilitation department. In addition to an interview, we used 3 indexes to measure sexual function: MSHQ and SHIM for males and FSFI for females. Other information was collected concerning the duration of the SCI, the level of disability and the repercussions on the couple’s relationship, quality of life and psychological state

Results

Thirty two patients (84, 21%) manage to lead a sexual relationship with variable level of satisfaction caused by several troubles. The prevalence of SD was 69, 2% for males and 83, 3% for females. The most frequent problem for males was erectile dysfunction and orgasm problems. Women experienced mainly a dyspareunia and a lowering of lubrication. The median score of MSHQ and SHIM were respectively 45±13, 86 (30-68) and 12, 76±6, 01 (7-27). The SCI itself affected all the SF-36 items and correlations were found between the SHIM and RP, MCS and PCS. MSQ and HAD were significantly associated. We did not show significant repercussions on the couple’s relationship.
Conclusion

SCI leads to significant changes in almost all aspects of life. Rehabilitation specialists need to understand the importance of satisfaction with sentimental and sexual life and its influence on people with SCI re-entering the community and restoring their wellbeing.

Keywords

spinal cord injury;sexual dysfunction;quality of life

No conflict of interest
Ejaculation disorders are common in Spinal Cord Injury (SCI) patients and require often samples to preserve their fertility potential. The means to obtain ejaculation depend on the neurological level and the experience of the team. We reviewed the results of our cohort, the means used, particularly the benefits of adding Midodrine or penile vibratory stimulation (PVS) to obtain the sample.

**Material and Method**

We collected retrospectively in our cohort of patients the epidemiological data, the type of ejaculation (anterograde or retrograde) and the means used to obtain a frozen sample of sperm. We compared the data of two groups: those who obtained an anterograde ejaculation (AE) and those only a retrograde (ER).

**Results**

Between January 2013 and July 2017, 86 patients were seen in consultation, with a mean age of 30 years, mainly after traumatic injury (90%), cervico-thoracic level (89%) and complete lesion (59%).

Ejaculation was not obtained in 13 patients (15%): 7 (8%) were considered to be failing, 4 had dropped out of care, and 2 were starting treatment. AE and RE were obtained in 73 patients (85%), which could be frozen in 63 patients (73%) mainly from an EA for 47 patients. Only 9 patients were able to obtain their sperm by self-stimulation, the other 54 needed to use single or double PVS associated or not with Midodrine. In the only ER group, predominantly patients with complete deficiency below T10, the dose of Midodrine, the number of trials and the frequency of use of double PVS were more important than in the EA group (respectively 23.5 mg vs 9mg, 3 vs 1.8, 64% vs 29%).

**Conclusion**

In SCI patients for whom it is difficult to obtain an ejaculation, it’s fundamental to look for ER, repeat the tests, aided by increasing dose Midodrine and PVS.
Keywords

Spinal cord injury; fertility; ejaculation

No conflict of interest
M. aissi1, R. масмуд2, N. халуани2, I. лобир3, M. фри2

1University Hospital of Monastir, Neurology department, Monastir, Tunisia
2University Hospital of Sfax, Psychiatry department, Sfax, Tunisia
3University Hospital of Monastir, Physical and Rehabilitation Medicine department, Monastir, Tunisia

Introduction/Background

Sexual dysfunction (SD) is a common complaint in women who suffer from Multiple Sclerosis (MS). This study was conducted to assess the prevalence of sexual dysfunction and to compare the scores of the different dimensions of sexual function of women with multiple sclerosis to a group of control women.

Material and Method

This is a descriptive and analytical case-control study involving 26 women with multiple sclerosis. They were compared to 26 control women matched for age and socioeconomic status. Patients with multiple sclerosis were evaluated by Expanded Disability Status Scale (EDSS) for functional status and by Female Sexual Function Inventory (FSFI) for sexual function.

Results

Sexual dysfunction was found in 18 patients. Sexual desire, arousal and orgasm were the most altered sexual phases in our study. The comparative study found that sexual dysfunctions were significantly more frequent (p = 0.002) in the patients. Total FSFI, and FSFI subscale scores (sexual desire, arousal, lubrication, orgasm and satisfaction) were lower in women with multiple sclerosis compared with controls.

Conclusion

Our study highlighted the importance of sexual dysfunction in women with multiple sclerosis. The inclusion of this aspect in the clinical assessment will improve the quality of life of these patients.

Keywords

sexual dysfunction; female; multiple sclerosis

No conflict of interest
Introduction/Background

The purpose of this study was to evaluate sexual function in patients with rheumatoid arthritis (RA) and its associated factors.

Material and Method

We conducted a cross-sectional descriptive study, to recruit patients with a confirmed diagnosis of Rheumatoid Arthritis followed at the Rheumatology department and the Physical Medicine and Rehabilitation department of the University Hospital of Monastir.

The data analyzed were epidemiological, clinical, biological and functional characteristics. Sexual function was assessed by the use of two questionnaires: Female Sexual Function Index (FSFI) and Sexual Health Inventory for Men (SHIM), functional capacities (Health Assessment Questionnaire HAQ), psychological disorder (Hospital anxiety and depression scale HAD), fatigue (Visual Analogic Scale of Fatigue VAS-F and the multidimensional fatigue inventory MFI-20) and sleep quality (Pittsburgh Sleep Quality Index PSQI).

Results

One hundred patients were included with a mean age of 55.88 ± 10.5 years. The majority was women (85 F/15 M).

Among sixty of our female sexually active, 56.66% had sexual dysfunction (FSFI ≤ 26.55). Lack of arousal and loss of desire were the most reported disorders. On the other side, among nine sexually active men, only one had a normal sexual activity. The most reported disorder was erectile dysfunction.

On both sex, sexual dysfunction was negatively correlated with age, the activity index of RA, functional capacities and fatigue. However there was no correlation with biological and radiological parameters.

The FSFI was also negatively correlated with anxious and depressive disorders. No correlation was found between FSFI and Sleep disorder. Whereas, the SHIM was negatively correlated only with sleep quality.

Conclusion

This study suggests that sexual dysfunction among patients suffering from rheumatoid arthritis is found when a specific questionnaire is used to assess it. The impact of RA on sexual health is rarely discussed by health professionals and RA patients, and needs greater attention.
Keywords
Rheumatoid arthritis; sexuality

No conflict of interest
Poster Tour

Poster tour: Sexuality, pregnancy and motherhood

ISPR8-1864
BREASTFEEDING AND MOTHERHOOD AFTER SPINAL CORD INJURY: BARRIERS AND CHALLENGES.
A. Krassioukov¹, T. Holmgren², A. Lee³, H. Shea⁴, L. Hamilton⁴, N. Sandholdt⁵, I. Hellsing⁵, S. Elliott⁴, H. Claes⁶
¹ICORD, Medicine, Vancouver, Canada
²Karolinska, Medicine, Stockholm, Sweden
³ICORD/UBC, Medicine, Vancouver, Canada
⁴ICORD/UBC, Psychiatry, Vancouver, Canada
⁵Spinalis/Karolinska, Medicine, Stockholm, Sweden
⁶Spinalis/Karolinska, Medicine, Stockholms, Sweden

Introduction/Background

Lactation dysfunction following spinal cord injury (SCI) has been noted in the literature. However, studies often group together all women of physical disability or do not account for level of injury. The extent of lactation dysfunction in this population and impact of SCI on breastfeeding ability and behaviour is not well understood. The goal of the present study was to identify major barriers to lactation and breastfeeding related to spinal cord injury, specifically with comparison between high and low-level injuries.

Material and Method

Two online questionnaires were developed and completed by women who attempted breastfeeding with SCI, primarily in Canada and Sweden.

Results

The first questionnaire was completed by 52 women with spinal cord injury, and 38 participants completed the second questionnaire. Of the 52 women, 28 had high-level spinal cord injury (at or above T6 level) and 24 had low-level injury (below T6). 78% of women with high-level injury reported insufficient milk production or ejection. Only 35% of women with low-level injury reported the same. 39% of women with high-level spinal cord injury experienced Autonomic Dysreflexia. Exclusive breastfeeding duration was significantly shorter ($p < 0.05$) in the high-level injury group (3.3 months) compared to women with low-level injury (6.5 months).

Conclusion

Our result demonstrated that lactation and breastfeeding is disrupted in women with SCI, particularly with injury at or above T6 level which is associated with shorter breastfeeding duration. Autonomic Dysreflexia (AD) is a common breastfeeding complication that should be addressed in all prospective mothers with high-level spinal cord injury. Our findings provide the impetus for further research into AD, therapies to improve lactation, breastfeeding aids and support required to navigate SCI-related breastfeeding difficulties. Given the immense health
benefits of breastfeeding, it is imperative to provide health care professionals with evidence-based information regarding challenges for breastfeeding and lactation for mothers with SCI.

**Keywords**

breastfeeding; women’s health ; spinal cord injury

**Conflict of interest**

Disclosure statement: 
This research was supported by grant from Craig Neilsen Foundation (PI Dr. Krassioukov).
Introduction/Background

Objective: To observe urinary symptoms in patients with Parkinson’s disease (PD) and Progressive Supranuclear Palsy (PSP) and advice bladder dysfunction management based on urodynamic study findings.

Material and Method

Twenty-two patients (12 males) with PD and PSP (15 & 7 respectively) with urinary symptoms were included. All patients except one were on levodopa and carbidopa medication. Urodynamic study (UDS) was performed and bladder management determined.

Results

Mean age was 60.4 years (range 41-73 years, SD8.4). Mean illness duration was 31.9 months (range 9-146 months, SD31.0) and mean duration of urinary symptoms were 14.8 months (range 1-61 months, SD15.8). Eighteen patients reported nocturia and 16 patients had urgency with or without urge incontinence. Three patients had retention and straining to void and 3 had mixed urinary complaints. Twelve out of 22 patients had absence of Voluntary anal contraction (VAC) on per-rectal examination. UDS was suggestive of 12 patients with neurogenic detrusor overactivity (NDO) with or without sphincter dyssynergy. Six patients had normal detrusor pressure and 4 patients were found to have acontractile detrusor. Ten patients had significant post-void residual. Bladder management included pharmacotherapy, supportive and behavioural management as appropriate.

Conclusion

Patients with PD/ PSP are known to develop urinary symptoms during the course of illness. Clinical complaints and UDS findings do not necessarily match. UDS is required to manage urinary symptoms. Most of the patients respond to oral anti-muscarinic medications along with behavioural and supportive therapy.

Keywords

Parkinson’s Disease; Progressive Supranuclear palsy; Urinary symptoms
No conflict of interest
Introduction/Background

Physiotherapists teaching Pelvic Floor Muscle (PFM) exercises for the treatment of Stress Urinary Incontinence (SUI) discouraged the use of the abdominal muscles and their concomitant relaxation. These claims are now changing however, for recent studies have based their findings on the synergistic relationship between pelvic floor (PF), diaphragmatic and abdominal muscles.

Material and Method

The study was a randomized controlled trial in which twenty nine (29) female subjects participated in the study and they were randomly allocated to two groups. The first group comprising 14 participants received PFMT as treatment while the remaining 15 participants received PFMT, diaphragmatic and abdominal muscles training combined. The primary outcome measure was a self-reported improvement which was assessed by a 4-point Likert scale. Meanwhile a secondary outcome measure in the form of a 3-day voiding diary was also recorded.

Results

After a 6-weeks intervention period, a significant reduction in the frequency of urine leakage was recorded in both groups. The cured and improved rate in the training group who received PFMT combined with diaphragmatic and abdominal muscles training were 20% and 80% respectively at (z = -3.42, P = 0.001) and for the control group who received PFMT were 0% and 93.3% respectively at (z = -3.32, P = 0.001).

Conclusion

A 6-weeks period intervention by retraining diaphragmatic, abdominal and PFM coordinated function ameliorate symptoms of SUI. This new approach stands as a potential alternative approach for women with SUI, particularly those who cannot take surgery as an option, including those who have difficulty in learning how to contract the PFM and those who cannot stand the use of vaginal cones and palpation.

Keywords
No conflict of interest
**Introduction/Background**

Survivors of a traumatic brain injury (TBI) frequently suffer from urinary dysfunction. Possible causes are midbrain dysfunction and primary lesions, but cognitive and behavior factors may also play a role. Overactive bladder (OAB) is a frequent urinary disturbance as opposed to urinary retention. In this study, we aim to investigate altered findings in urodynamic tests and possible relations to other TBI outcomes.

**Material and Method**

A retrospective study was conducted with 24 post-TBI patients (21 male, 3 female) admitted to our unit during a 3 year period. Exclusion criteria included stroke, spinal cord injury, previous history of urological pathology or surgery and absence of urodynamic evaluation. Information was gathered relative to results of urodynamics, TBI imaging, initial GCS scale, urinary symptoms, vesical regime, neuropsychological and ultrasound results.

**Results**

Of the 24 patients studied, all had severe TBI with a mean age of 40.1 years and a predominance of motor vehicle related accidents (66.7%) and axonal diffuse injury (62.5%). Median time from TBI was 7.5 months and only 2 patients had a normal urodynamic study. Urinary symptoms were present in 17 (70.8%) patients and the majority (58.3%) had filling symptoms. There was previous history of urinary tract infection in 32% patients. Neuropsychological evaluation was altered in all but one of the assessed patients. The majority had OAB (62.4%) and altered bladder sensation (70.8%). Mean total vesical capacity was 343.6mL. Elevated postvoid residual volume (37.5%) and detrusor sphincter dyssynergia (37.5%) was observed.

**Conclusion**

Most patients had urinary symptoms and an overactive bladder. A subset of patients showed detrusor sphincter dyssynergia, a finding not frequently described. Cognitive impairment can play a role in urologic dysfunction and pseudodyssynergia might be present during the urodynamic test. Further studies are needed to assess urologic dysfunction in severe TBI survivors.
Keywords

traumatic brain injury; urodynamics; neurogenic bladder

No conflict of interest
Introduction/Background

Upper urinary tract damage due to neurogenic lower urinary tract dysfunction has long been reported as the first cause of death in spina bifida patients. However, recent data regarding the causes of death of patients with spinal dysraphism are scarce. The aim of the present study was to assess the current epidemiology of spina bifida in France and report the contemporary causes of in-hospital death of spina bifida patients.

Material and Method

We analyzed data from the French national code registry database (Programme de Médicalisation des Systemes d’Information) from 2009 to 2014 to estimate the number of living births of spina bifida patients and the number of in-hospital deaths and their cause categorized as follows: urological, pulmonary, neurological, digestive, muscular/skin, cardiovascular, skeletal, infectious, cancer, others. The prevalence was calculated by doing the ratio of spina bifida living births over the total number of living births per year based on the Institut National de la Statistique et des Études Économiques (INSEE) data.

Results

The number of spina bifida living births per year ranged from 113 (2009) to 131 (2013) and was stable over the study period. The total number of living births during this period was between 81,1510 (2013) and 83,2799 (2010). The prevalence of spina bifida in France was therefore estimated between 1.3 and 1.6 / 100,000. The number of in-hospital deaths of spina bifida patients per year fluctuated between 14 (2012) and 31 (2011) making a total of 138 in-hospital deaths over the study period. The leading cause of in-hospital death was urological disorders (17%). Other main causes of death were pulmonary disorders (17%), neurological disorders (14%) and bowel disorders (11%).

Conclusion
The current prevalence of spina bifida in France range from 1.3 to 1.6/100,000. Urological disorders remain the leading cause of death in spina bifida patients.

**Keywords**

Dysraphisms; Mortality; Urinary tract disorders

*No conflict of interest*
Poster Tour

Poster tour: Neurogenic bladder dysfunction

ISPR8-0633
IS ON-LABEL DOSAGE OF INTRADETRUSOR BOTULINUMTOXINA LESS EFFECTIVE THAN PREVIOUS OFF-LABEL DOSAGE?
C.S. Guerrero¹, M. Citeri¹, L.G. Zanollo¹, L.G. Rizzato¹, L. Frediani¹, M. Zarbo¹, A. Leo¹, M. Spinelli¹
¹ASST Grande Ospedale Metropolitano Niguarda, Unità Spinale Unipolare, Milan, Italy

Introduction/Background

Evaluate the effectiveness of two types of botulinum toxin A used (abobotulinumtoxin A vs onabotulinumtoxin A) in their different dosages.

Material and Method

Since March 2006 to July 2015 120 patients (70 males, 50 females; average age 44 yo; 32 Multiple Sclerosis, 26 quadriplegia and 62 paraplegia both post-traumatic) were subjected to detrusor injection with botulinumtoxinA in 2 different occasions. First administration: abobotulinumtoxinA 750 and 500 U or onabotulinumtoxinA 300 U. All these patients repeated the treatment with on-label indication of onabotulinumtoxinA 200 U in second administration.

Results

The analysis of these data showed that the time range between first and second administration is reduced in patients treated with on-label onabotulinumtoxinA 200 U, compared to onabotulinumtoxinA at higher dose of 300 U or abobotulinumtoxin A 750 U or 500 U (statistical significance: p (750-200) =0.01; p (500-200) =0.006; p (300-200) =0.05). The same results have been obtained analyzing the recovered data stratifying patients to pathology: paraplegia: p (750-200) = 0.02; p (300-200) =0.008; tetraplegia: p (750-200) = 0.02; p (500-200) =0.05; multiple Sclerosis: p (750-200) = 0.02; p (500-200) =0.05.

Conclusion

The clinical use of onabotulinumtoxinA 200 U is less effective, in term of duration, compared to the previous off-label dosage. Reducing the effectiveness times obviously involves the enforcement's need of a new invasive maneuver with possible complications attached (hematuria, infection) and with an increase of sanitary and social charge.

Keywords

BotulinumtoxinA; Bladder; Dosage

No conflict of interest
Poster Tour

Poster tour: Neurogenic bladder dysfunction

ISPR8-0935

BOTULINUM TOXIN A EXTERNAL URETHRAL SPHINCTER QUADRANT INJECTION GUIDED BY TRANSRECTAL ULTRASOUND FOR TREATMENT OF DETRUSOR SPHINCTER DYSSYNERGIA

W. Yang¹, N. Bian², H. Zhu¹, Y. Hou², C. Shen²

¹The First Affiliated Hospital of Soochow University, Department of Rehabilitation, Suzhou, China
²The Affiliated Suzhou Hospital of Nanjing medical University, Department of Rehabilitation, Suzhou, China

Introduction/Background

Detrusor sphincter dyssynergia (DSD) causes impaired micturition and high intra-vesical pressure that leads to potentially life-threatening urological complications. Botulinum toxin A (BTX-A) is an inhibitor of acetylcholine release at the neuromuscular junction, which can decrease muscle contractility. It has been used successfully in the treatment of focal dystonia and spasticity of skeletal muscles. This study investigates the effectiveness of BTX-A injection to the external urethral sphincter guided by transrectal ultrasound in the treatment of spinal cord injury (SCI) patients with DSD.

Material and Method

A total of 18 patients with DSD (15 men and 3 women) were caused by SCI. BTX-A (100u) was injected into external urethral sphincter (EUS) respectively in four sites at 12, 3, 6, 9 o’clock guided by transrectal ultrasound. Clinical effects and urodynamic parameters were compared at baseline and after treatment one month.

Results

The EUS was clearly identified as a neatly hypoechoic area extending from the prostatic apex to the levator ani muscle in men patients, but not in women patients. After treatment, the urinary function and urodynamic parameters is improved significantly compared with the baseline (P<0.05), and at 4 week up to a maximum efficacy. 6 (33.3%) patients had an excellent result and had 5 (27.7%) significant improvement. Relatively poor bladder contractility tended to be more frequent in the unimproved patients. However, the catheter insertion becomes easier In patients with failed treatment,. Stress urinary incontinence was reported in 4 patient. There was no other obvious side effects occurred in patients.

Conclusion

Transrectal ultrasound is an effective method to visualize the lower urinary tract and allows for the accurate targeting of the EUS. It is a simple and repeatability method for the treatment of DSD. BTX-A injection to the EUS guided by transrectal ultrasound is an effective method in the treatment of SCI patients with DSD.
Keywords

Detrusor sphincter dyssynergia; Botulinum toxin A (BTX-A); spinal cord injury

No conflict of interest
Adults with cerebral palsy can have lower urinary tract dysfunction with organic complications and impact on quality of life. These troubles are well known in the pediatric population but have been less studied among adults with cerebral palsy. The aim of this study was to describe lower urinary tract dysfunction, complications, and urodynamic profiles in our population of adults with cerebral palsy.

Material and Method

Between 2009 and 2015, 137 adults with cerebral palsy, followed in our department, were included (anyway the reason of their visit) and data were analysed retrospectively. We studied clinical parameters (gender, age, neurological clinical picture, clinical picture severity, reason for their visit, lower urinary tract dysfunction, complications) and paraclinical data (renal bladder ultrasound, renal function, urodynamic).

Results

Sixty-six men and 71 women with cerebral palsy, 36.4 years old mean, GMCSF 4 median were included. For 23 patients (16.8%), we didn’t have any data about their vesical status. Twenty-eight patients (20.4%) consulted for a lower urinary tract dysfunction. Eighty-eight patients (64.2%) had urinary troubles: 59 (43.1%) reported voiding symptoms, 72 (52.6%) storage symptoms and 43 (31.3%) both. Forty-nine (35.8%) had complications on bladder or kidney. Especially, renal function was altered among 24 patients (17.5%) and 26 (19%) had multiple urinary tract infections. Forty-eight patients (35%) had urodynamic explorations, sphincter hypertonia was the most frequent anomaly (n=31 (22.6%)), associated with dysuria in 19 patients. GMCSF in symptomatic adults was higher than no symptomatic adults (p<0.0001).

Conclusion

This study shows that lower urinary tract dysfunctions are frequent in adults with cerebral palsy, with an impact on their health and quality of life. As a consequence, a minimal systematic screening may be proposed.

Keywords

Cerebral palsy; urinary disorders; neurogenic bladder
No conflict of interest
Poster Tour

Poster tour: Neurogenic bladder dysfunction

ISPR8-1794
COMPARISON OF NEUROGENIC LOWER URINARY TRACT DYSFUNCTIONS IN OPEN VS. CLOSED SPINAL DYSRAPHISM: RESULTS OBSERVED IN A PROSPECTIVE COHORT OF 395 PATIENTS

C. Olivari-philipponnet¹, A. Manunta², C. Brochard³, M. Jezequel⁴, H. Menard⁴, J. Hascoet⁴, N. Senal⁵, I. Bonafi⁶, L. Siproudhis⁷, J. Kerdraon⁴, X. Game⁸, B. Peyronnet⁹
¹CHU Rennes, Spina Bifida and dysraphisms referral center, Rennes, France
²CHU Rennes, Department of urology, Rennes, France
³CHU Rennes, Department of gastroenterology, Rennes, France
⁴CHU Rennes, Department of Physical Medicine and Rehabilitation, Rennes, France
⁵CHU Toulouse, Department of urology, Toulouse, France

Introduction/Background

Spinal dysraphism is the first congenital cause of neurogenic bladder. Open spinal dysraphism (mainly myelomeningocele) being diagnosed in the neonatal period, neurogenic lower urinary tract dysfunctions (NULTD) are well-known as they have been described in many series. Conversely, closed spinal dysraphisms are often diagnosed later and little data regarding NULTD exist.

The aim of this study was to compare the NULTD in patients with closed dysraphism (CD) to those in patients with open dysraphism (OD).

Material and Method

A prospective study was conducted between 2007 and 2016 including all spina bifida patients seen in a multidisciplinary national referral center. At the first visit, lower urinary tract function was assessed as follow: history of past urological surgery, type of spinal dysraphism, Abbreviated Injury Scale, method of bladder emptying, Urinary Symptom Profil (USP) and Qualiveen scores and urodynamic parameters.

Results

395 patients were included: 274 with OD (69.4%) and 121 with CD (30.6%). Patients in the CD group were older (35.9 vs. 29.5 years, p <0.0001), and had lower BMI (23.8 vs. 28 years, p = 0.0002). The method of bladder emptying was spontaneous voiding, clean intermittent catheterization and transileal cutaneous ureterostomy in 47.1% vs. 29.3%; 47.1% vs. 59.4% and 5.7% vs. 11.2% of CD and OD patients respectively (p = 0.01). The prevalence of urinary incontinence did not differ significantly between the two groups (44.7% vs. 53.5%), as well as the mean Qualiveen score (76.6 vs. 81.7). The main medical concern was NLUTD in 26% of patients with CD and in 27.8% of patients with OD (p = 0.73). Surgery (augmentation cystoplasty, artificial urinary sphincter, continent cystostomy) was more common in patients with OD (p<0.01).

Conclusion
NLUTD were as frequent and troublesome in patients with open vs. closed spinal dysraphism. However the need for a surgical treatment was more common in patients with OD.

**Keywords**

Lower urological dysfunction; Open dysraphisms; Closed dysraphisms

*No conflict of interest*
Poster Tour

Poster tour: Neurogenic bladder dysfunction

ISPR8-2101
LONGITUDINAL LONG-TERM EVALUATION OF PATIENTS WITH A BRINDLEY’S NEUROSTIMULATOR AND FOLLOWED IN BORDEAUX UNIVERSITY HOSPITAL: RETURN ON 30 YEARS OF USE
L. DEBERGE1, C. Delleci1, P.A. Joseph1, H. Cassoudesalle1, B. Glize1
1CHU Bordeaux, Gironde, Bordeaux, France

Introduction/Background

Brindley’s device is an implanted anterior sacral roots stimulator for patients with complete spinal cord injury. It allows obtaining triggered micturitions with an external box.

Material and Method

After a review of the literature, the objective was to evaluate the long-term use of Brindley’s device in patients who had been implanted in Bordeaux University Hospital (BUH) between 1987 and 2016. Secondary objectives were to identify technical failures and their resolution, and to evaluate patients’ general satisfaction after a long-term use. This is a descriptive longitudinal study. Data were collected from electronic or archived medical files in BUH. Patients’ satisfaction was evaluated with a questionnaire performed by telephone. Analyses were performed with Excel® and survey analyses were performed according to the Kaplan-Meier method with R® software.

Results

49 patients were implanted in BUH between 1987 and 2016. Eleven patients are deceased (22.4%), 5 were lost to follow-up (10.5%), and the remaining 32 patients were contacted by telephone. The mean follow-up duration was 16 years. Of the 33 alive patients, 18 (54.5%) are still using the device as a daily voiding way. The mean duration of use for the entire cohort was 14.5 years. General satisfaction for interviewed patients was 87.5%. Paraplegic women and quadriplegic men were the most satisfied groups (89.1% and 95%, respectively).

Conclusion

Brindley’s device has already proven itself clinically, for urodynamics and for the quality of life of spinal cord injury patients. This study confirmed the benefits it could provide for these patients, with a mean follow-up duration of 16 years. However, the device is less and less offered, for multiple reasons: epidemiology, new therapeutics, economics, medical and surgery practices. Neurostimulator indications are delicate because it’s definitive and mutilating. Research on optimization of surgical procedures for implantation is ongoing.

Keywords

Brindley’s device; spinal cord injury; sacral neurostimulation
No conflict of interest
Poster Tour

Poster tour: Neurogenic bladder dysfunction

ISPR8-2314
GENITAL NERVE STIMULATION FOR MODULATING THE LOWER URINARY TRACT FUNCTIONS IN SUBJECTS WITH SPINAL CORD INJURY

C.W. Peng¹, S.C. Chen²

¹Taipei Medical University, Department of Physical Medicine and Rehabilitation and School of Biomedical Engineering, Taipei, Taiwan R.O.C.
²Taipei Medical University, Department of Physical Medicine and Rehabilitation- School of Medicine- College of Medicine, Taipei, Taiwan R.O.C.

Introduction/Background

Neurogenic bladder, a condition associated with spinal cord injury (SCI), is characterized by uninhibited bladder contractions in response to bladder filling; these contractions reduce bladder capacity and urinary continence. Few studies have investigated the amplitude-dependent effects of dorsal genital nerve stimulation (GNS) on the inhibition of bladder hyperreflexia in subjects with SCI. The present study aimed to determine the acute effects of the GNS intensity changes on bladder capacity gain in SCI subjects with neurogenic detrusor overactivity.

Material and Method

A cystometric measurement was used to assess the effects of continuous GNS on bladder capacity during bladder filling. The cystometric trials were in a randomized sequence of cystometric fills without and with continuous GNS at stimulation intensities ranged 1-4 times of threshold (1-4T).

Results

Our data revealed that the average bladder capacity significantly increased to 34%-70% of the control value in response to a stimulation amplitude ranging from 1.6 to 3.2 T, and stimulation amplitude and bladder capacity were significantly linearly correlated (R = 0.89). In addition, the average bladder compliance also increased because of GNS.

Conclusion

This study demonstrates that the stimulation amplitude was positively correlated with bladder capacity gain in subjects with SCI in acute GNS experiments. These results could aid in developing an advanced neural prosthesis to restore bladder function in clinical settings.

Keywords

Genital nerve stimulation, cystometric measurement, spinal cord injury
No conflict of interest
Poster Tour

Poster tour: Non-invasive brain stimulation

ISPR8-0873
SIX-MONTH EFFECTIVENESS OF LOW-FREQUENCY REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION AND INTENSIVE OCCUPATIONAL THERAPY IN UPPER LIMB HEMIPARESIS AFTER STROKE

M. Nakayama1,2, Y. Teramoto2, R. Sasayama2, K. Tsuda2, A. Matsuda2, Y. Sakai1
1Kobe University Hospital, Division of Rehabilitation Medicine, 7-5-2- Kusunoki-cho- Tyouku- Kobe-shi- Hyogo-ken, Japan
2Ishikawa Hospital, Division of Rehabilitation Medicine, 2-150- Bessyo- Bessyo-machi- Himeji-shi- Hyogoken, Japan

Introduction/Background

There has been increasing recognition of combination therapy of low-frequency repetitive transcranial magnetic stimulation (rTMS) and intensive occupational therapy (OT) in upper limb hemiparesis. But few studies have reported on the long term effect. We report the long-term effect of this therapy in upper limb paralysis in chronic stroke patients.

Material and Method

22 patients with chronic hemiparesis, who received combination therapy of low-frequency rTMS and OT were enrolled (age: 55.4±14.8 years; time after onset: 1522±1332 days). Patients underwent 15 days therapy while Wolf Motor Function Test (WMFT) and Action Research Arm Test (ARAT) were recorded before, after, and 6-month after the therapy. Differences in scores were tested for statistical significance by using ANOVA and Tukey.

Results

All patients completed the therapy without any adverse effects.

All of the score improved significantly between before and after the therapy (WMFT time: from 722 to 590 sec, P<0.05; WMFT FAS: from 37.7 to 42.5 points, P<0.05; ARAT: from 15.7 to 20.9 points, P<0.05). The differences between before and 6-month after the therapy were also significant (WMFT time: from 722 to 553 sec, P<0.05; WMFT FAS: from 37.7 to 42.9 points, P<0.05; ARAT: from 15.7 to 22.5 points, P<0.05). But there was no significant difference between after and 6-month after the therapy.
Conclusion

A combination therapy of low-frequency rTMS and OT enhances motor recovery of the upper limb paralysis in chronic stroke patients. These results suggest that the effect lasts for 6 months after the therapy. This is an area of ongoing research and further studies are needed.

Keywords
repetitive transcranial magnetic stimulation (rTMS) ;upper limb paralysis;stroke

No conflict of interest
Poster Tour

Poster tour: Non-invasive brain stimulation

ISPR8-0876
EFFICACY OF REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION ON MOTOR OUTCOMES IN PATIENTS WITH STROKE: A PRELIMINARY STUDY
C.L. Chen¹,², Y.Z. Huang³, C.Y. Chen⁴, H.C. Chen⁵
¹Chang Gung Memorial Hospital-Linkou, Department of Physical Medicine and Rehabilitation, Taoyuan, Taiwan R.O.C.
²Chang Gung University, Graduate Institute of Early Intervention, Taoyuan, Taiwan R.O.C.
³Chang Gung Memorial Hospital-Linkou- Taiwan, Department of Neurology, Taoyuan, Taiwan R.O.C.
⁴Chang Gung Memorial Hospital-Keelung- Taiwan, Department of Physical Medicine and Rehabilitation, Taoyuan, Taiwan R.O.C.
⁵National Taipei University of Technology- Taiwan, Department of Industrial and Management, Taoyuan, Taiwan R.O.C.

Introduction/Background

Intermittent and continuous theta burst stimulation (iTBS/cTBS), a form of repetitive transcranial stimulation (rTMS), is often used to facilitate the affected hemisphere and inhibit the unaffected hemisphere, respectively. This study aims to examine the efficacy of combined iTBS and cTBS on motor outcomes of upper extremity (UE) in patients with stroke.

Material and Method

This was a double-blind randomized controlled trial enrolled patients from a rehabilitation department. Fourteen patients with first-ever chronic and unilateral cerebral stroke, aged 30-70 years, were randomly assigned to the combined TBS or sham group. All patients received 15 daily sessions of either TBS (combined iTBS over affected hemisphere and cTBS over the affected hemisphere) or sham stimulation in addition to conventional neurorehabilitation. Outcome measures, including Modified Ashworth Scale (MAS), Fugle-Meyer Assessment Upper Extremity (FMA-UE), Box and Block test (BBT), and Functional Independence Measure (FIM), were implemented before and immediately after the intervention. The change score is calculated as (post-treatment score – pre-treatment score). An independent t-test was used to compare the pre-treatment and change scores. A p<0.05 is considered as significant differences.

Results

The TBS group showed greater improvement in the FMA than the sham group (p<0.05). However, the change scores in the MAS, BBT, and FIM did not achieve the significant differences between two groups.

Conclusion

The combined iTBS and cTBS may induce greater gains in functional improvement of upper limb. The combined iTBS and cTBS may emerge as an adjuvant intervention in
neurorehabilitation. However, we could not draw the definite the conclusion due to limited case numbers. Future studies may increase the sample size and longitudinal follow-up.

**Keywords**

stroke; rTMS; motor outcome

*No conflict of interest*
Poster Tour

Poster tour: Non-invasive brain stimulation

ISPR8-1099
REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION RELATED CHOREIC MOVEMENT AS AN ADVERSE EFFECT IN STROKE: A CASE REPORT
S.H. Ko1, M. Myunghoon1, M. Ji-Hong1, K. Soo-Yeon1, S. Yong-Ill
1Pusan National University Yangsan Hospital, Department of Rehabilitation Medicine, Yangsan-si, Republic of Korea

Introduction/Background

Repeated transcranial magnetic stimulation (rTMS) has been suggested to be a therapeutic approach for rehabilitation after stroke. Generally, it is considered a safe and well-tolerated procedure, however, it can cause some adverse. In this article, we report a case of choreic movement as an adverse effect of rTMS in the patient with thalamic pain after stroke.

Material and Method

Case Report: A 65-year-old female was admitted to our rehabilitation department for management of thalamic pain after stroke. We tried many pharmacologic treatments to relieve her thalamic pain, however it was not successful. We applied rTMS to her pain. RTMS was applied over the left M1 area using a navigation system. She received 10 rTMS sessions for 2 weeks. Each session was consisted of a total of 1000 pulses at 10 Hz with intensity of 90% of resting motor threshold (RMT) for 20 minutes.

Results

Fig. 1. RTMS navigation systems
After 5 therapeutic rTMS sessions, her pain and hand function were improved. The pain was reduced and the right thumb opposition became possible that she could not perform before rTMS. After 8 sessions, she reported an abnormal involuntary movement of the right hand, lasts less than 10 seconds, once a day. After 10 sessions, her pain and hand function were more improved. However, frequency and intensity of the abnormal involuntary hand movement were increased while the improvements in thalamic pain and hand function were maintained. We consulted the neurologist about the symptom with a video. The neurologist diagnosed it as an episodic choreic movement of the hand and recommended haloperidol if the symptom worsens. The episodic choreic movement gradually decreased without medication, and it disappeared after one month.

**Fig. 2. Flowchart of this case**

**Conclusion**

This is the first report of rTMS related choreic movement as an adverse effect of rTMS after stroke

**Keywords**

Repetitive Transcranial Magnetic Stimulation; chorea; stroke

*No conflict of interest*
Poster Tour

Poster tour: Non-invasive brain stimulation

ISPR8-1323
EFFECT OF REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION ON LEG SPASTICITY IN PRIMARY PROGRESSIVE AND SECONDARY PROGRESSIVE FORM OF MULTIPLE SCLEROSIS
S. Rodić1, S. Filipović2, A. Vidaković3, M. Jelić2, S. Milanović2, S. Dedijer Dujović1, T. Dimić Tomić1, L. Konstantinović3
1Clinic for Rehabilitation Dr Miroslav Zotovic, Belgrade, Neurorehabilitation, Belgrade, Serbia
2Institute for Medical Research- University of Belgrade, Neuroscience, Belgrade, Serbia
3Faculty of Medicine- University of Belgrade- Serbia, Neurorehabilitation, Belgrade, Serbia

Introduction/Background
Lower limb spasticity is one of the most common symptom in Multiple sclerosis (MS) patients with an increasing severity as the disease progresses. Previous clinical and experimental results of excitatory repetitive transcranial magnetic stimulation (rTMS) highlighted possible role in reducing of lower limb spasticity in MS patients. The aim of our pilot study was to explore effects of rTMS on leg spasticity in MS patients.

Material and Method
Our pilot study included 20 MS patients with secondary progressive (SP) and primary progressive form (PP) of disease with Expanded Disability Status Scale (EDDS) score 4-6.5 and lower limb spasticity, that were referred to Clinic for Rehabilitation Dr Miroslav Zotovic, Belgrade. They were simple randomized in two groups: first group included ten patients with rTMS and second group was placebo group with sham rTMS. For rTMS intervention, we used the intermittent theta burst stimulation over M1 leg area for the worst affected leg. Both group had exercise therapy (ET) session after the rTMS (real/sham) intervention during the three weeks. Primary outcome measure for spasticity was Modified Ashworth Scale (MAS). Secondary outcome measures included clinical assessment of spasticity Multiple Sclerosis Spasticity Scale (MSSS88) and the Timed-25-foot walk. Outcome measures were evaluated before and after three weeks of treatment, and compared within the group and between two groups.

Results
There were no statistically differences between the group regarding age, gender, education, form and duration of disease, EDSS. A statistically significant difference was found in the group of patients treated with the rTMS for MAS (W=2.714;p=0.007), T25W (Z=2.813;p=0.005) and MSSS88 (Z=2.803;p=0.005). In placebo group these changes were not statistically significant.

Conclusion
rTMS associated with short period of ET may induce significant reduction of spasticity in SP and PP form of disease.
Keywords

multiple sclerosis; repetitive transcranial magnetic stimulation; leg spasticity

No conflict of interest
Poster Tour

Poster tour: Non-invasive brain stimulation

ISPR8-1537

EFFECTS OF COMBINING TRANSCRANIAL DIRECT CURRENT STIMULATION WITH MIRROR THERAPY ON MOTOR CONTROL, MOTOR PERFORMANCE AND DAILY FUNCTION IN STROKE PATIENTS: A PILOT STUDY

C.Y. Wu

Chang Gung University, Department of Occupational Therapy & Graduate Institute of Behavioral Sciences, Taoyuan City, Taiwan R.O.C.

Introduction/Background

This study investigated whether the sequential and concurrent combination of transcranial direct current stimulation (tDCS) and mirror therapy (MT) engenders greater benefits than MT alone in stroke patients.

Material and Method

Thirty patients with stroke were randomized into one of the three groups: sequentially applying tDCS and MT group (SEQ), concurrently applying tDCS with MT group (CON), and MT with sham tDCS group (SHAM). The interventions were carried out 90 minutes per day, 5 days per week, for 4 weeks. Motor control was evaluated using kinematic variables of a reaching movement. Motor performance was measured by the Fugl-Meyer Assessment (FMA), and the daily function was assessed by the Functional Independence Measure (FIM).

Results

A significant group difference was found in motor control. The post-hoc analysis demonstrated that the CON group had smoother reaching trajectories in the reaching task than the SHAM group. No significant differences were noted in motor performance and daily function among groups. However, within-group comparisons of the SEQ and the CON group revealed significant improvements in the motor function of the proximal and distal upper-extremity after the interventions, but not in the SHAM group. Similarly, the CON group increased the functional independence in the domain of social cognition after the interventions, but no significant improvement was noted in the SHAM group.

Conclusion

Applying tDCS with MT exerted significant effects on the motor control strategy in stroke patients. Future studies using large sample size is warranted to identify possible effects of the combination of tDCS and MT on motor performance and daily function.

Keywords
transcranial direct current stimulation;mirror therapy;stroke

No conflict of interest
Poster Tour

Poster tour: Non-invasive brain stimulation

ISPR8-1770
MULTIPLE SESSIONS OF MOTOR TASK-CONCURRENT ANODAL TDCS TEMPORARILY BOOST LEARNING PLATEAU
P. Besson1, C. De Vassoigne1, M. Muthalib1, J. Rothwell2, S. Perrey1
1Univ Montpellier, EuroMov, Montpellier, France
2University College London, Institute of Neurology, London, United Kingdom

Introduction/Background

Online transcranial direct current stimulation (i.e., tDCS concurrent to the task) and priming tDCS are proposed to have cumulative effects on motor performance. However, the impact of the tDCS polarity for priming remains unclear. The aim of this study was to enhance more motor learning and retention of a motor task with multiple online anodal tDCS (atDCS) sessions using cathodal tDCS (ctDCS) priming as compared to atDCS or sham.

Material and Method

In a double blind randomized and sham controlled study design, 22 participants separated in 3 independent groups underwent for 3 consecutive days high definition-atDCS (20 min, 2 mA) training sessions targeting the left sensorimotor cortex, preceded by a baseline measurement (d0) and followed by two retention tests (d4 and d18, one day and two weeks after training, respectively). A circular tracing-movement task of 5 trials of 1 min intersected by 1 min rest was performed at pre-, during and post- atDCS for each training session and for d0, d4 and d18.

Results

The motor performance increased significantly at the end of training (d3) for both atDCS and ctDCS priming (p<0.001) but not for sham. This increase was also observed at d4 for atDCS (p=0.05) and for ctDCS at d4 and d18 (p<0.001).

Conclusion

The combination of priming tDCS and multiple sessions of motor task-concurrent anodal tDCS was beneficial for improving performance during and after training without being superior to sham. The cumulative effects of priming with training persisted only for ctDCS priming two weeks after the end of the training.

Keywords

tDCS; online; priming

No conflict of interest
Poster Tour

Poster tour: Non-invasive brain stimulation

ISPR8-1851
ANATOMY OF A FAILURE : CHRONIC INTERVENTIONAL PAIRED ASSOCIATIVE STIMULATION IN STROKE (CIPASS)
P. Marque¹, M. Tarri², M. Belle¹, N. Brimhat², D. Gasq², X. de Boissepzon¹, I. Loubinoux², E. Castel-Lacanal¹
¹CHU Toulouse, Physical medicine and reahbilitation, Toulouse, France
²University of Toulouse Paul Sabatier INSERM, Toulouse NeuroImaging Center ToNIC, Toulouse, France
³CHU Toulouse, Physiology, Toulouse, France

Introduction/Background

Paired associative stimulation (PAS) is a specific non invasive brain stimulations technique that allows to modulate motor plasticity in both patients and healthy participants. Our goal was to demonstrate a therapeutic interest for PAS with a lasting increase in motor cortex plasticity for extensor wrist (ECR) muscles and an improvement in upper-limb function after 5 days of daily stimulation, in subacute post-stroke patients.

Material and Method

A total of 24 patients were included in a double-blind, placebo-controlled trial and randomly assigned to one of two groups (PAS or sham). In the PAS condition, patients underwent a 5-day course of electrical peripheral stimulation, combined with magnetic cortical stimulation, which was applied to the ECR muscle in a single daily session at a frequency of 0.1 Hz for 30 min. It was associated with 2 hours of conventional physiotherapy. Variations in the motor evoked potential (MEP) surface area of the ECR muscle and Upper-Extremity Fugl-Meyer Motor Scale scores were analyzed up to Day 12.

Results

No significant difference was observed between the two groups on either electrophysiological or motor parameters. However, repetitive PAS sessions did seem to have an influence on patients with low initial cortical excitability.

Conclusion

The negative results underlines some methodological considerations: the inappropriate characteristic of post stroke MEP for assessing motor recovery, the considerable variability in PAS effects between patients and across the sessions, the heterogeneity of post-stroke population. Five days of daily PAS session failed to improve motor functions in post stroke patients: PAS cannot be recommended as therapeutic adjuvant in post stroke rehabilitation.

Keywords
Paired associative stimulation; TMS; stroke

Conflict of interest
Disclosure statement:
advisory board Ipsen from 2016, advisory board Merz from 2016, Chairman data safety management board Pharm Olam, Symposium honorariums Allergan 2016 and 2017
Poster Tour

Poster tour: Non-invasive brain stimulation

ISPR8-2006
COMBINING TDCS AND COMPUTERIZED MIRROR THERAPY IN UPPER LIMB REHABILITATION IN STROKE PATIENTS. A FEASIBILITY STUDY
J. Touly¹, L. Fanfano², D. Rimaud¹,², P. Giraux¹,²
¹University Hospital of Saint-Etienne, Physical Medicine and Rehabilitation, Saint-Etienne, France
²Univ Lyon- UJM-Saint-Etienne,
Laboratoire interuniversitaire de biologie de la motricité- EA 7424, Saint-Etienne, France

Introduction/Background

Mirror therapy (MT) relies on a mirror and movements of the healthy limb to generate visual illusions of movement of the paralyzed limb. MT has proven to be effective for the motor rehabilitation of the upper limb of stroke patients, but suffers several limitations for patients. To overcome these difficulties, a computerized mirror therapy device was developed (IVS3™, Dessintey). MT effects could also be enhanced by applying simultaneous neuromodulation with tDCS. This small sample trial was conducted to evaluate the feasibility and tolerance of an IVS3 motor training combined with simultaneous bi-hemispheric tDCS.

Material and Method

Four patients with right or left hemiparesis following stroke were included in this trial. They received 20 sessions of computerized MT (IVS3™, Dessintey; 5 sessions / week; 1 hour and 200 movements / session) combined with bi-hemispheric tDCS over the hand motor cortex (2mA, 20 minutes). The primary endpoint was adherence to the therapeutic program. The secondary judgment criteria were the safety assessment and the evolution of the tolerance of repeated tDCS stimulation coupled with IVS3.

Results

The synergy of these two therapies is well tolerated by patients with a compliance rate of 99% ± 0.025. There have been no serious adverse reactions or unknown side effects. The upper-limb motor function of the 4 patients improved, but this small sample non-controlled trial do not allow to conclude on a significant effect.

Conclusion

In this feasibility small sample study, the 4 patients well tolerated and perfectly complied with the computerized mirror therapy associated with bi-hemispheric tDCS. This finding calls for clinical controlled study to evaluate the efficacy of this combined IVS3-tDCS program in stroke patients.

Keywords
Conflict of interest
Disclosure statement:
P. Giraux is co-founder of the Dessintey company
Poster Tour

Poster tour: Non-invasive brain stimulation

ISPR8-2319
THE EFFECT OF TRANSCRANIAL MAGNETIC STIMULATION COMBINED WITH MELODIC INTONATION THERAPY TREATMENT IN STROKE PATIENTS WITH NON-FLUENT APHASIA
Q. Zhang
1Shanghai second rehabilitation, Rehabilitation medicine, Shanghai, China

Introduction/Background

To explore the effect of repetitive transcranial magnetic stimulation combined with melodic intonation therapy in patients with non-fluent aphasia after stroke.

Material and Method

An A-B design was used in the study of 8 patients with non-fluent aphasia after stroke (> 3 months post stroke). Classic melodic intonation therapy coupled with sham rTMS was implemented for 2 weeks (ten working days) in phase A. Classic MIT coupled with rTMS for 2 weeks in phase B. RTMS was administered on the affected side of the frontal lobe, 1Hz, 1200 pulses, 20 minutes per day, 5 days per week, the stimulation intensity was 90% of the threshold value of the healthy lateral limb movement. MIT was performed after the completion of rTMS therapy. The therapist guides the aphasia patients to sing the target words, while helping the patient to beat the affected hand rhythmically to induce the patient’s language expression, 30 minutes per day, 5 days per week. The total treatment time is 50 minutes. The cookie-theft picture description task in BDAE was used to assess all patients before and after therapy sessions, evaluating the index of the length and complexity of content for each phrase.

Results

There was no significant change in spontaneous speech before and after phase A in the aphasic patients, suggesting their language ability reached to “plateau”. After intervention, spontaneous speech results in the cookie-theft picture description task improved more significantly in patients treated with phase B, as compared to patients treated with phase A (P < 0.05).

Conclusion

RTMS combined with MIT can promote spontaneous speech in non-fluent aphasia patients after stroke, with a better performance on speech fluency and information content. The underlying mechanism may be related to stronger cortical activation in language area, which reflects the functional reorganization and remodeling of the brain circuits associated with verbal expression.

Keywords

Transcranial magnetic stimulation; Melodic intonation therapy; Cerebral apoplexy
No conflict of interest
Introduction/Background

The usefulness of Functional Independence Measure (FIM®) scores was questioned by several previous research due to its multidimensional factor structure. The FIM® has been widely used amongst people with spinal cord injury (SCI). Previous evidence on FIM® validity amongst people with SCI is scarce. A few studies have reported that FIM® has substantial ceiling effect in a cognitive area, a possible item redundancy in a motor area, and poor psychometrics assessed by the Rasch analysis. Based on the Rasch analysis, the FIM® motor score was not recommended for use, at least as a raw sum of items’ scores. The cognitive scale was found to work well except for considerable ceiling effect. The aim was to evaluate the factor structure of FIM® scale amongst people with SCI.

Material and Method

The 155 people with SCI participated in multidisciplinary inpatient rehabilitation. FIM® was assessed at the beginning and at the end of intervention. Retrospective register-based study. Cronbach’s alpha and exploratory factor analysis.

Results

The internal consistency demonstrated a high Cronbach’s alpha of 0.95 to 0.96. For both pre- and post-intervention assessments, the exploratory factor analysis resulted in 3-factor structures. Except for two items (‘walking or using a wheelchair’ and ‘expression’), the structures of the identified three factors remained the same at the beginning and at the end of rehabilitation. The loadings of all the items were sufficient exceeding 0.3. Both pre- and post-intervention chi-square tests showed significant p-values <0.0001.

Conclusion

Within the sample of people with SCI, FIM® failed to demonstrate unidimensionality. Instead, it showed a 3-factor structure that was unstable depending on the timing of measurement. Using a total or subscale FIM® scores seem to be unjustified in the studied population.

Keywords

FIM; Validity; SCI
No conflict of interest
**Poster Tour**

**Poster tour: Spinal cord injury**

**ISPR8-0262**  
**EFFECT OF EARLY TREATMENT WITH ZOLEDRONIC ACID ON PREVENTION OF BONE LOSS IN SPINAL CORD INJURY PATIENTS A RANDOMIZED PROSPECTIVE INTERVENTIONAL STUDY**

A. Ranga¹, S. Goenka¹, S. Seth², N. Pandey¹  
¹S. M. S. Medical College and attached group of Hospitals, Physical and Rehabilitation Medicine PRM, Jaipur, India  
²Safdarjang Hospital and Vardhman Mahavir Medical College, Physical and Rehabilitation Medicine PRM, New Delhi, India

**Introduction/Background**

This hospital based randomized, prospective, longitudinal study was conducted at Rehabilitation Research and State Spinal Injury Centre, by department of Physical and Rehabilitation Medicine (PRM) Jaipur, India to assess the magnitude of bone loss and to study the effect of early administration of zoledronic acid in the prevention of bone loss following spinal cord injury.

**Material and Method**

Subjects were randomized to either control group to receive standard nursing and medical treatment along with physical therapy for traumatic spinal cord injury or intervention group to receive standard treatment along with intravenous zoledronic acid (5mg/100ml) infusion. A total of 212 acute spinal cord injury (SCI) patients were screened for eligibility criteria and 118 eligible patients were assigned to either control or intervention group. 28 patients in control group and 29 patients in the intervention group completed the study. Bone mineral density (BMD) was measured at hip and forearm at baseline, 3 months, 6 months and 12 months by Hologic QDR-Delphi dual X-ray absorptiometry (DXA) machine.

**Results**

After comparison of the BMD by DXA scan at baseline, 3, 6 & 12 months a significant difference (p<0.03) was observed between control and interventional group at both 6 and 12 months in both quadriplegics and paraplegics at all sites of hip and at 12 months in quadriplegics at all sites of forearm.

**Conclusion**

This was a pioneer study of this nature in India which showed a single dose of 5mg intravenous zoledronic acid to be an effective treatment in preventing bone loss at the hip and forearm for 12 months following SCI. However, in the bones which continue to be non-weight-bearing, it is logical that there will be ongoing bone resorption. So, larger, controlled studies with longer durations of follow up are still required to determine whether further treatment with bisphosphonates would be required.
Keywords

Spinal Cord Injury; Bone loss; Zoledronic acid

No conflict of interest
Introduction/Background

Functional electrical stimulation (FES) can be used on individuals with upper motoneuron dysfunctions to restore grasping functions. To be functional and useful in daily tasks, the patient must be able to pilot the device by means of an interface. We have investigated two techniques that could address the situation of persons with tetraplegia: electromyography (EMG) and inertial measurement units (IMU), respectively measuring muscle activity and limb movements.

Material and Method

One group of 8 tetraplegic patients (EMG group) was equipped with two pairs of EMG electrodes located on muscles of the upper arm. Selected muscles could be voluntary activated in a comfortable way. Another group of 9 tetraplegic patients (IMU group) was equipped with one IMU (3-axis accelerometer and 3-axis gyroscope) located on the arm. In the EMG group a threshold detection algorithm was used to detect muscle contractions while in IMU group a classification algorithm was used to detect two distinct movements of the limb where the IMU was located. The detection algorithms outputs were used to trigger two postures of a robot hand. The same outputs were also used, for patients where FES of arm muscles lead to visible hand movements, to trigger the contractions of two muscles on their contralateral lower arm.

Results

All the patients were able to control muscle contraction or limb movements to trigger different actions. Patients were asked to control the robotic hand, following a randomized sequence of two pre-defined postures. In EMG group the success score was of 95% and 92% in IMU group. Whenever FES was used, patients could activate grasping movements and wrist extension. Three patients were able to perform functional tasks such as grasping and relocating objects.

Conclusion

Despite little training, all the patients were able to voluntarily control a robotic hand and, when it was possible to test, their own hand with FES.
Keywords

Movement analysis; Electromyography interface; Inertial Measurement Unit interface

No conflict of interest
Post Tour

Poster tour: Spinal cord injury

ISPR8-0652

THORACO-ABDOMINAL ASYNCHRONY ANALYSIS USING OPTOELECTRONIC PLETHYSMOGRAPHY IN PATIENTS WITH CERVICAL SPINAL CORD INJURY

K. Hanayama¹, S. Takefumi¹, T. Akio¹, H. Takashi¹, M. Hiromichi¹, S. Sousuke¹, H. Masaki²

¹Kawasaki Medical School, Department of Rehabilitation Medicine, Kurashiki, Japan
²Isehara Kyodo Hospital, Department of Rehabilitation Medicine, Isehara, Japan

Introduction/Background

Patients with acute cervical spinal cord injury (CSCI) sometimes present paradoxical respiratory pattern, that is, the chest cage is displaced inward during inspiration. It is known as an example of thoraco-abdominal asynchrony which increases work of breathing. On the other hand, it is known that respiratory movement of such paralytic patients are influenced by position change.

The aim of this study was to investigate thoraco-abdominal asynchrony and influence of posture on it in patients with chronic cervical spinal cord injury using optoelectronic plethysmography.

Material and Method

Five patients with chronic CSCI (aged 42±14, ASIA impairment scale classified into A in all patients, neurological level C4: 2, C5: 2, C8: 1) were recruited from outpatient clinic of regional rehabilitation center. As control group, 5 age-gender matched healthy subjects were recruited.

Volume change of the rib cage and the abdomen were measured with 3 dimension optoelectronic motion analysis system (VICON MX, Motion Capture Systems, Oxford, UK), using 45 reflective markers on the chest wall monitored by 6 infrared cameras. The breath which showed maximum volume change among 3 deep breaths was sampled for analysis in each patient. Measurement was done in the supine position and 30 and 60 degrees head elevation position.

With obtained volume change of rib cage and abdomen, Konno Mead Diagram was drawn for each sample. Then we calculated the phase shift angle.

Results

The phase shift angle was 47±2 degrees for the patients and 9±6 degrees for healthy controls in supine position, that is, the CSCI patients group showed larger abdominal contribution. The angle tended to increase as head elevation in both groups.

Conclusion

Patients with chronic CSCI showed larger asynchrony than healthy controls.
Asynchrony tended to increase with head raising in both CSCI patients and controls.

**Keywords**

tetraplegia;respiration

*No conflict of interest*
Poster Tour

Poster tour: Spinal cord injury

ISPR8-0889
SPINAL CORD INJURY TRENDS IN THE UNITED STATES, 1972-2017
Y. Chen¹, H. Wen¹, M. DeVivo¹
¹University of Alabama at Birmingham, Physical Medicine and Rehabilitation, Birmingham, USA

Introduction/Background

This cross-sectional analysis of longitudinal data was conducted to document demographic and clinical characteristics of newly injured and prevalent population with spinal cord injury (SCI) in the United States.

Material and Method

32,727 people with traumatic SCI who received initial hospital care from one of the 30 SCI Model Systems Centers since the early 1970s were included in the analyses with data on demographic, injury and medical characteristics, and psychosocial wellbeing obtained during the initial hospitalization and at year 1, 5, and every 5 years after injury through 2017.

Results

Age at injury has increased from 29 years in the 1970s to 42 years currently. This aging phenomenon was noted for all sexes, races, and etiologies except acts of violence. Although vehicular crashes continue to be the leading cause of SCI overall, injuries due to falls have increased over time particularly among those aged 46 years and older. Injuries resulting in tetraplegia are increasing while neurologically complete injuries are decreasing. Lengths of stay in the acute hospital and rehabilitation unit have declined. About 30% of persons with SCI are re-hospitalized during any given year following injury. Diseases of the genitourinary system are the leading cause of re-hospitalization. Mortality rates are significantly higher during the first year after injury. The life expectancy has improved but remain significantly below life expectancies of persons without SCI. The causes of death that have the greatest impact on reduced life expectancy over the last 5 decades are pneumonia and septicemia.

Conclusion

Study findings call for geriatrics expertise in the care for SCI and also highlights the need for a multi-dimensional risk assessment and intervention to reduce falls and SCI in older adults. Within the prevalent population, those who survive many years typically will have less severe injuries, high levels of independence and overall good health.

Keywords

spinal cord injury; epidemiology; trends

No conflict of interest
Poster Tour

Poster tour: Spinal cord injury

ISPR8-1700

CLINICAL EFFICACY OF UPPER LIMB ROBOTIC THERAPY IN CERVICAL SPINAL CORD INJURED PATIENTS: A RANDOMIZED CONTROL TRIAL
Z.A. Han¹, J. Kim², H.J. Lee¹, H.R. Kim¹, D.Y. Cho³, B.S. Lee¹, J. Kim¹, J.E. Lim³, H.Y. Kim³
¹National rehabilitation center, spinal cord injury rehabilitation, Seoul, Republic of Korea
²National rehabilitation center, rehabilitation, Seoul, Republic of Korea
³National rehabilitation center, Assistive technology, Seoul, Republic of Korea

Introduction/Background

The efficacy of upper limb robotic therapy (UERs) in cervical SCI patients is relatively limited. With a better understanding of the effect of UER in cervical SCI patients, development of therapy programs with more adequate dosing, method, and safe protocols along with valid assessment tools will be possible in the future. This study evaluates the potential effects of (exoskeleton type) UER in cervical SCI patients using a randomized controlled design.

Material and Method

Study patients were randomly allocated to the robotic therapy (RT) or occupational therapy (OT) groups. Both groups received 5 sessions of therapy per week for 4 weeks (both received OT with additional 30 minutes respectively of RT [using the Armeo Power] and OT). Outcome measures were modified Medical Research Council (mMRC) scale motor strength score and Korean Spinal Cord Independence Measurement version III (KSCIM-III) score changes. Measurements were performed twice (baseline and therapy termination).

Results

A total of 30 individuals with cervical SCI were included, with 15 patients in each group. At therapy termination, C6, C7, T1 key muscle score, and the sum of C5–T1 key muscle score increased in the RT group. Increase in C7 and T1 was higher in the RT than OT group. Among (KSCIM-III) sub-categories, use of toilet, mobility, and the total score increased in the RT group. Improvement in mobility in bed and action to prevent pressure sores, mobility indoor, and total score were higher in the RT group.

Conclusion

This is a randomized control trial that investigated the effects of upper-limb exo-skeletal RT in SCI patients. With upper limb RT, cervical SCI patients showed some improvements in muscle power and KSCIM-III scores. For better C7, T1 key muscle power and related functional recovery, upper limb RT seems to be a feasible option. Superiority over one therapy could not be determined in this study.

Keywords
spinal cord injury; exoskeletal robotics; rehabilitation with robotics

No conflict of interest
Poster Tour

Poster tour: Spinal cord injury

ISPR8-1767
EFFECTS OF GAIT-LIKE VIBRATION TRAINING ON GAIT INTRALIMB COORDINATION IN INDIVIDUALS WITH INCOMPLETE TRAUMATIC SPINAL CORD INJURY
M. Barreau¹, M.J. Escalona Castillo², A. Tapin², M. Vermette³, D. H. Gagnon², C. Duclos²
¹Université de Montréal, Rehabilitation Sciences, MONTREAL, Canada
²Université de Montréal, Rehabilitation Sciences, Montréal, Canada
³Centre for Interdisciplinary Research in Rehabilitation,
Institut Universitaire sur la réadaptation en déficience physique de Montréal, Montréal, Canada

Introduction/Background

Gait training is a key element of intensive functional rehabilitation to improve mobility and participation after an incomplete spinal cord injury (iSCI). Gait-like vibration training is an emerging approach that may improve intralimb coordination as shown by preliminary data gathered in a person with a chronic iSCI. The effects of gait training on intralimb coordination have not been studied extensively. This study aimed to analyse the effects of gait-like vibration training on intralimb coordination in individuals with iSCI.

Material and Method

Six participants with iSCI were evaluated pre- (n=4/6; missing data for 2 participants) and post-intervention (n=6). The intervention consisted of a gait-like vibration program encompassing 15 training sessions during which multiple vibrators reproduced typical sensory activity associated with gait movements in standing (Fig.1). During pre-intervention evaluation, participants received twelve minutes of vibrations whereas they received 27 minutes of vibrations during the post-intervention evaluation. During these two evaluations, lower limb kinematics during gait was recorded in standing without vibration before and after the vibrations with a three-dimensional motion analysis system. Intralimb coordination, characterized using hip-knee cyclograms, was compared between the beginning and the end of each evaluation conducted
pre and post-intervention, respectively, using a qualitative gait classification.

Results

Gait cycles variability and cyclograms shape improved mostly at weight acceptance after heel strike (n=6) and for knee excursion during swing phase (n=5). Knee extension at heel strike was also greater in participants with a crouched gait pattern after one pre-intervention evaluation. One participant changed from the resilient to the regular gait pattern.

Conclusion

Gait-like vibration training seems to be beneficial and could improve gait quality through a facilitation of gait movements and a better intralimb coordination. These preliminary results support the potential of gait-like vibration training to improve gait performance after iSCI.

Keywords

Gait; Vibration; Spinal Cord Injury

*No conflict of interest*
RESPIRATORY COMPLICATIONS IN PEDIATRIC PATIENTS WITH ACUTE TRAUMATIC SPINAL CORD INJURY IN SPAIN

D. Gonzalez-Paesani, A. Falco, K. Rojas, L. Montesinos, P. Launois, M.A. Gonzalez-Viejo, B. Planas, A. Gómez-Garrido

1Hospital Universitario Vall D’Hebron, Physical medicine and Rehabilitation, Barcelona, Spain

Introduction/Background

Spinal cord injury (SCI) in the pediatric age continues to be an unusual pathology. In Spain the incidence of SCI in children is low, being approximately 1 per million inhabitants per year, corresponding to the 4%. However, there is not enough statistical data to determine how many of these correspond to traumatic injuries. In the acute phase, especially in cervical and upper thoracic SCI, respiratory complications remain the leading cause of death.

Material and Method

Retrospective study of all patients aged 0-18 years, who suffered traumatic acute spinal cord injury above D6, admitted to the University Hospital Vall D’Hebron, Barcelona from March 2010 to August 2017 using a database specific of the unit. The objective of the study was to determine the incidence of respiratory complications in these patients with respect to the adult population of our center and to correlate the appearance of these complications with the early onset of respiratory physiotherapy.

Results

The total number of children with spinal cord injury was 46, of which 27 were excluded due to spinal cord injury below D6 or traumatic brain injury, thus obtaining a study sample of 19 patients. The 52.6% presented respiratory complications; this result is higher when compared with the adult population of our center (incidence of 36.5%). When correlating the early onset of respiratory physiotherapy and the development of these complications, we found that none of the patients who started the treatment within 72 hours after the injury presented respiratory complications.

Conclusion

In our center, there is a higher incidence of respiratory complications in pediatric patients affected by acute traumatic SCI when compared to adults. There is a significant relationship regarding the impact and importance of the initiation of early physiotherapy, between 72 hours after the SCI, in the prevention of the development of respiratory complications.

Keywords

SpinalCordInjury;Pediatrics;RespiratoryComplications
No conflict of interest