



**59th ANNUAL SCIENTIFIC MEETING
ABSTRACTS**

*June 8–11, 2011
Delta Victoria Ocean Pointe Resort and Spa,
Victoria, BC, Canada*

PROGRAM

THURSDAY, JUNE 9, 2011

07.00–08.30

International Rehabilitation Special Interest Group Meeting
Medical Education Special Interest Group Meeting
Pain Management Special Interest Group Meeting
Stroke Special Interest Group Meeting

Drs. E. Lyle Gross and Joy Wee
 Dr. Heather Finlayson
 Dr. Edwin Koshi
 Dr. Robert Teasell

08.45–12.15

Rehab Updates

Reading Between the Lines, The New Breed of Pain Studies
Telehealth
Stimulant Medication in Cognitive Disorder
Outcomes in TBI
An Update on the Role of Fluoroscopic Injections in Diagnosis and Management of Spinal Disorders
New Uses of the CT Scanner

Dr. Andrea Furlan
 Dr. Shaun Gray
 Dr. Anthony Barale
 Dr. Nora Cullen
 Dr. Edwin Koshi
 Dr. Doug Connell

12.15–13.15

Lunch Symposium - Opioids in the Workplace

Dr. Lee Glass

13.30–16.30

The Trials and Tribulations of a Multidisciplinary Spasticity Clinic – The Multiple Aspects of Starting, Maintaining and Managing a Clinic

Dr. Caroline Quartly

13.30–14.20

14.30–15.20

15.30–16.20

Concurrent Workshops (each run three times)

Workshop 1 - If the Shoe Fits - New Advances in Footwear
Workshop 2 - Office Based Ultrasound Guided Injections
Workshop 3 - FES Walking
Workshop 4 - Ultrasound Guided Botulinum Toxin Injection
Workshop 5 - Stroke

Mr. Philip Moore
 Dr. John-Paul Etheridge
 Mr. Robert Johnston
 Dr. Katharine Alter
 Dr. Drew Dawson

FRIDAY, JUNE 10, 2011

07.30–08.45

Amputee Special Interest Group Meeting
Medical Legal Special Interest Group Meeting
Neuromuscular Special Interest Group Meeting
Paediatrics Special Interest Group Meeting
Spinal Cord Injury Special Interest Group Meeting

Capt. Pauline Godsell and
 LCol. Markus Besemann
 Dr. E. Lyle Gross
 Dr. Timothy J. Doherty
 Dr. John Latter
 Drs. Karen Smith and Christine Short

09.00–12.00

Concurrent Symposia

MSK Symposium

Effective Use of Nuclear Medicine
A Functional Back Exam
Achilles Tendonopathy
Spinal Cord Stimulators and Intrathecal Interventions

Dr. James Filbey
 Dr. Robert Burnham
 Dr. Richard Backus
 Dr. Nelson Svorkdal
 Dr. Timothy J. Doherty

Stroke Symposium

The Future of Stroke Rehabilitation: Eight Likely Areas of Change
Evidence for Exercise Program in Stroke [Graded Repetitive Arm Supplementary Program (GRASP); Fitness and Mobility Exercise Program (FAME)]

Dr. Robert Teasell
 Dr. Drew Dawson

*Challenges and Successes in Translating Stroke Evidence into Practice
Towards Objective Outcome Measures In Spasticity Management - Dartfish and Gaitrite Technology in the Clinical Setting*

Dr. Mark Bayley
Dr. Caroline Quartly

SATURDAY, JUNE 11, 2011

09.00-12.00

Scientific Program

Resident Essay Contest Presentation
Resident Research Contest Presentation
Poster Viewing
Podium Presentations

Dr. Jacqueline Foley
Dr. Nadira Rambihar

12.00-13.00

Lunch Symposium - A Pediatric Orthopaedic Journey Through Africa

Dr. Penny Norgrove

13.30-14.00

Pain – From the Internist's Perspective
Pain and Symptom Management in Patients with Chronic Kidney Disease

Dr. Gaylene Hargrove

14.00-14.30

New Directions in Managing Partial Hand Amputations

Dr. Jacqueline Hebert and Mr. Scott Simmons

14.45-15.45

Medical Legal Symposium

The Psychiatrist as an Expert Witness... A Lawyer's Perspective
Medical Legal from the Judge's Perspective

Mr. Peter Downs
Mr. Justice Stephen Kelleher

15.45-16.15

Recent Advances in Peripheral Nerve Trauma

Drs. Thomas A. Miller and
Doug Ross

A 01

IMPACT SOCIAL SUPPORT ON FUNCTIONING OF ADULT SPASTIC CEREBRAL PALSY AND ITS DECISIONS REGARDING BOTULINUM A TOXIN TREATMENT

David Berbrayer

University of Toronto, Toronto, ON

Objective: This study aims to investigate the influence of social support on adult CP participation and autonomy, as well as on their decisions regarding local Botox® injections. **Design:** Adult (19 to 65 years of age) spastic CP patients were randomly selected from a tertiary teaching clinic. The only exclusion criterion was cognitive impairment that precluded the ability to complete the questionnaires. Information on demographics and reasons for deciding on whether to use or not use local Botox injections to relieve spasticity was determined. The Inventory of Socially Supportive Behaviours (ISSB) questionnaire was used to measure level of social support in adult CP patients. The Barthel Index (BI) and the Impact on Participation and Autonomy (IPA) were used to examine patients' physical and social functions, respectively. The Chi-Square test was used to analyze the difference in Botox treatment participation between the high and low social support groups. **Results:** A total of 9 patients with CP with a mean age of 29 years participated in this study. Of the 9 participants, Botox was recommended for 8; 4 had consented to undergo Botox injections and 4 did not. From the group who consented, the most cited reason was "physician's recommendations", while increase in mobility, pain reduction, enhanced muscle movements and easier care also played a part in the decision. From the group who refused Botox treatment, the reasons were more varied including fear of needles, too much hassle, adverse side effects, saving it for last resort, apathy and preference for other mode of treatment such as surgery or conductive education. Although the results were not statistically significant, there was a trend that in CP patients with similar scores on the BI, those with higher ISSB scores tend to also score higher on the IPA questionnaire compared to those with lower social support. In patients with high BI scores, the difference between high and low ISSB groups was not pronounced in any of the categories of participation and autonomy. However, in patients with low functional abilities, the difference between low and high social support appeared especially pronounced in the categories of social relations and work and education. When comparing CP patients' decisions towards Botox treatments, a higher proportion of patients with high social support consented to undergo Botox treatment compared to patients with low social support. **Conclusions:** In CP patients with similar levels of functional abilities, as evaluated by their BI scores, those with higher social support tend to have higher participation and autonomy compared to those with lower social support. A higher proportion of CP patients with high social support chose to undergo Botox treatment compared to those with low social support.

A 02

WEIGHT AND IMAGE-RELATED BARRIERS TO EMPLOYMENT IN SPINA BIFIDA

David Berbrayer

University of Toronto, Toronto, ON

Objective: To elucidate to what degree the medical issue of obesity contributes to actual or perceived barriers to employment in adults (>18 years) with spina bifida. **Design:** The study population included patients with myelomeningocele registered in the patient database at a tertiary teaching hospital. A structured survey was administered to collect information about participant demographics, impairment and function, medical history, objective education and employment history, personal feelings with regard to employment (if employed), weight-perception, and experiences of weight-discrimination. Obesity, our health outcome of interest, was measured using body mass index (BMI), calculated using self-reported height and weight. The

primary outcome for the study was employment status. Chi-square tests were run on each variable versus employment outcome to test for significance. To further test for correlation between obesity and employment outcome, logistic regression was performed. This regression analysis was rerun to include all variables found significant at the univariate chi-square level. **Results:** Fifteen adults with myelomeningocele completed the questionnaire. 67% (10/15) were unemployed. Both employed and unemployed groups were similar in terms of age (31) and BMI, though significant differences existed in sex. Participants demonstrated a high average BMI (27 in unemployed, 32 in employed). Women were significantly better employed than men, with 80% (4/5) of women and 11% (1/9) of men employed ($p=0.007$). The impact of obesity ($BMI>30$), hydrocephalus, ambulatory status, function independence, and education on employment outcome were not statistically significant. However, there was a slight trend towards poorer employment in non-ambulators, with 75% (6/8) of non-ambulators and 57% (4/7) of ambulators unemployed. 47% (7/15) of participants perceived themselves to be overweight, versus 53% (8/15) who felt they were of average weight. There was a trend toward those who perceived themselves as overweight being better employed than those who felt their weight was average (4/7 vs. 1/8, $p=0.067$). Similarly, 27% (4/15) of participants expressed that they had faced weight discrimination at work or that their weight interfered with their personal self-confidence, but those who had faced discrimination were significantly better employed than those who had not (75% vs. 18.2%, $p=0.039$). **Conclusions:** The spina bifida population in this study demonstrated high rates of unemployment (67%) and weight-management issues (33% $BMI>30$, 60% $BMI>25$). Female sex was a positive predictor of employment in spina bifida. The trend toward non-ambulation as a negative predictor of employment is consistent with previous findings. The lack of significance of other predictor variables in contributing to employment outcome (hydrocephalus, ambulatory status, functional independence, and education) may be due to the small sample size of this study. Perception of self was not a factor in employment.

A 03

PHYSICAL ACTIVITY & QUALITY OF LIFE IN DIABETIC PATIENTS USING PROSTHETIC LIMBS FOLLOWING LOWER-LIMB AMPUTATION

David Berbrayer

University of Toronto, Toronto, ON

Objective: Retrospective cross-sectional study was initiated to investigate the relationship between physical activity and perceived quality of life (outcome measure) in diabetic lower-limb amputees. **Design:** Diabetic amputees (>6 months since undergoing a lower limb amputation) receiving treatment at a tertiary teaching hospital were identified and contacted to voluntarily fill out a questionnaire assessing their recent physical activity history, prosthesis use, and quality of life outcomes such as mobility, frustration, social burden, and well-being. Physical activity levels were measured using the short-form of the Physical Activity Questionnaire (IPAQ). Quality of life outcomes were measured using the brief version of the World Health Organization Quality of Life Form (WHO-QOL). Prosthesis-specific quality of life outcomes were measured using subscales of the Prosthesis Evaluation Questionnaire (PEQ). Quality of life outcomes were measured using the brief version of the World Health Organization Quality of Life Form (WHO-QOL). **Results:** In total, 6 (all male) of the 42 people invited to participate returned the questionnaires. Two questionnaires were discarded because of incomplete data. Thus, 4 questionnaires were analyzed with the response rate being 9%. Mean subject age was 61.3 ± 6.3 , and all had Type II diabetes. All subjects reported a post-secondary education and were currently not working. All subjects had a trans-tibial amputation at a mean age of 58.3 ± 6.3 , and one subject had bilateral trans-tibial amputations. Three subjects reported 'low' physical activity levels with mean MET-minutes/week of 286 ± 250 , while one subject reported 'high' physical activity levels at 2,190

MET-minutes/week. Overall quality of life, and prosthetic-specific quality of life was found to increase linearly with an increase in physical activity levels. *Conclusions:* There exists a trend towards a higher quality of life, both overall and prosthesis-specific, with higher physical activity levels.

A 04

BOTULINUM TOXIN INJECTION FOR MANAGEMENT OF THORACIC OUTLET SYNDROME: A DOUBLE-BLIND, RANDOMIZED, CONTROLLED TRIAL

Heather Finlayson¹; Russell O'Connor¹; Penny Brasher²; Andrew Travlos¹

¹GF Strong Rehab Centre, and ²Vancouver Coastal Health Research Institute, Vancouver, BC

Objective: To determine the effect of botulinum toxin type A (BTX-A) injections to the scalene muscles on pain in subjects with thoracic outlet syndrome (TOS). *Design:* Double-blind, randomized, parallel group trial with follow-up at 6 weeks, 3 months, and 6 months. *Subjects:* Thirty-eight patients referred to physiatrists for management of TOS with BTX-A injection. *Methods:* 75 units of BTX-A reconstituted with 0.75 cc of normal saline (BTX-A) vs 0.75 cc of normal saline (placebo) were injected to the anterior and middle scalene muscles using electromyographic guidance. The primary outcome measure was pain as measured on a horizontal visual analog scale (VAS) six weeks post-injection. *Results:* For the primary outcome measure of VAS scores for pain at 6 weeks, the difference in the means adjusted for baseline VAS scores between placebo and BTX-A was 5.03 mm in favour of BTX-A (95% confidence interval -15.7 to 5.7, $p=0.36$). Changes in secondary outcome measures of scores on the VAS for paresthesias, disabilities of the arm, shoulder, and hand questionnaire, and SF-36 physical and mental subscores were also not statistically significant. *Conclusions:* BTX-A injections to the scalene muscles did not result in clinically or statistically significant improvements in pain, paresthesias or function in this population of subjects with TOS.

A 05

FATTY MUSCLE ACCUMULATION AFTER ROTATOR CUFF TEAR

Guy Trudel

University of Ottawa, Ottawa, ON

Objectives: To quantify the accumulation, progression and distribution of fat in and around the supraspinatus muscle from the onset of tendon detachment and validate CT measures. *Design, subjects and methods:* We detached the supraspinatus tendon of 30 rabbits. They were sacrificed in groups of 10 after 4, 8 or 12 weeks. Fifteen unoperated rabbits served as controls. We quantified, volumetrically and histologically, the fat accumulations in and around the supraspinatus muscle and compared them with the values on CT. Weight, volume, histology and CT determinations of fat were compared using one-way ANOVAs. Pearson's test correlated intramuscular fat with CT. *Results:* Four weeks after tendon detachment extra- and intramuscular fat had accumulated (both $p<0.05$) that progressed over 12 weeks, with extramuscular fat being three times greater than intramuscular fat (both $p<0.05$). A proximal-to-distal gradient existed for both extra- and intramuscular accumulation (both $p<0.05$). CT depicted the onset, progression and gradient of extra- and intramuscular fat accumulation (all $p<0.05$). CT attenuation values correlated strongly with histology ($p<0.05$). *Conclusion:* Fat accumulated early, along an increasing proximal-to-distal gradient, and progressed with time after supraspinatus tendon detachment. CT was a valid tool for monitoring the onset, progression and gradient for both extra- and intramuscular fat accumulation.

A 06

THE EFFECT OF REPEATED ZYGAPOPHYSIAL JOINT RADIOFREQUENCY NEUROTOMY ON PAIN, DISABILITY, AND IMPROVEMENT DURATION

Brian Rambaransingh

University of Calgary, Calgary, AB

Objective: To assess the effectiveness of repeated radiofrequency neurotomy (RFN) on pain, disability, and treatment effect duration. *Patients:* One hundred-four patients who underwent repeat RFN for chronic neck or back pain were prospectively followed using a Pain Disability Questionnaire-Spine (PDQ-S). Complete data sets were available for 73, 73, and 36 patients for the 1st, 2nd, and 3rd RFN, respectively. *Results:* Pain intensity, pain frequency, and patient-specific disability measures were significantly improved post-initial, second, and third RFN. Moreover, there was no statistically significant difference among the PDQ-S scores post-RFN 1, 2, and 3. There was no statistical significance between the duration of pain relief post-RFN 1 and pain relief post-RFD 2. *Conclusion:* Repeated cervical and lumbar RFN reduces pain and disability with equal effectiveness for approximately 10 months in patients with facetogenic chronic neck and back pain.

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A 07

"IF I HAD A HATCHET I'D TAKE IT OFF MYSELF": A QUALITATIVE STUDY OF FACTORS INFLUENCING THE DECISION TO HAVE AN ELECTIVE AMPUTATION

Deanna Quon¹; Nancy Dudek²; Meridith Marks¹; Michael Boutet^{2,3}; Lara Varpio^{2,3}

¹The Ottawa Hospital Rehabilitation Centre, ²University of Ottawa, and ³Academy for Innovation in Medical Education (AIME) Faculty of Medicine, Ottawa, ON

Objective: To identify the key factors in the decision making process for elective amputation by analysing the experiences of patients. *Design:* A qualitative research design used one-on-one semi-structured interviews. *Subjects:* Patients from a tertiary care amputee clinic who had chosen to electively amputate a functionally impaired lower limb participated. *Methods:* Narrative analysis was used by three researchers to provide triangulation. Recurrent key themes and patterns were described. Personal factors in the decision making process were identified. *Results:* The factors that had the largest impact on the decision making process were pain, function and participation. Body image, self identity and the opinions of others had little influence. Satisfaction with the outcome of the surgery was related to how closely the result matched the patient's expectations. Patients who were better informed prior to the surgery had more realistic expectations about living with an amputation. *Conclusion:* When deciding to electively amputate a limb, patients benefit from having information regarding life with an amputation in order to set up realistic expectations which is linked with better outcomes. It is imperative that health care professionals knowledgeable in amputee medicine and prosthetic management provide appropriate information to patients facing this decision.

A 08

THE INFLUENCE OF CARDIOVASCULAR FITNESS ON RETURN TO WORK IN UPPER EXTREMITY CUMULATIVE TRAUMA DISORDERS

Curtis Hlushak¹; Nigel Ashworth¹; Doug Gross¹; Iain Muir²

¹University of Alberta, and ²Physiotherapy Alberta, Edmonton, AB

Objective: To examine the value of cardiovascular fitness testing in predicting return-to-work in injured workers with cumulative trauma

disorders. *Design:* Historical cohort study. *Subjects/Patients:* Workers' compensation claimants enrolled in a rehabilitation program from March 24, 1999 to May 14, 2003 inclusive. Exclusion criteria included incomplete data, >30 days between program admission and fitness assessment dates and no increase in exercise heart rate over resting heart rate during the fitness assessment. *Methods:* Data was collected from workers' compensation clinical and administrative databases. Baseline cardiovascular fitness measures taken at admission to rehabilitation included resting heart rate, body mass index, and predicted maximal aerobic capacity on a cycle ergometer. Outcomes included return-to-work status at discharge from the program. Analysis included multivariable logistic regression. *Results:* Subjects ($n=296$) were predominately female (74%) aged 41 years (SD 9.5). None of the cardiovascular fitness indicators taken at time of admission were associated with return-to-work at discharge (predicted maximal aerobic capacity test OR=1.03; 95% CI=0.99–1.08). *Conclusion:* Cardiovascular fitness assessment may not be useful in return-to-work planning and may not be required for all injured workers undergoing rehabilitation for cumulative trauma disorders.

A 09

DETERMINANTS OF PROLONGED LENGTH OF STAY IN A STROKE REHABILITATION PROGRAM – A PROSPECTIVE STUDY

Christine Yang¹; Pingyan Chen²

¹Department of Physical Medicine and Rehabilitation, University of Ottawa, Ottawa, ON, and ²Department of Biostatistics, Southern Medical University, China, Guangzhou

Objective: To identify comprehensive determinants in medical, non-medical, team and hospital characteristics that may influence the length of stay (LOS) of stroke patients in a rehabilitation program. *Design:* A prospective observational study was conducted on consecutive stroke patients admitted to stroke rehabilitation exploring for variables of demographic, medical, neurological, cognitive and functional status on admission. Other information of 12 preselected variables on medical complications, post-stroke depression; psychosocial factors related to discharge planning, team function and hospital characteristics was also recorded during the rehabilitation stay. *Main outcomes measures:* The total days of LOS was used as the primary outcome measure. It was calculated from the date of admission to the stroke rehabilitation program to the date that patients were discharged. The discharge destination was also measured in terms of home or long-term care facility. *Results:* Among the total of 125 patients, 8 were excluded because of incomplete data. The mean and median LOS was 49 and 45 days, respectively. Majority (92.3%) of patients returned to home whereas 9 (7.7%) patients were discharged to institutions. On multivariate linear regression analysis, the significant determinants associated with prolonged LOS were: 1) FIM gain; 2) awaiting long-term care placement; 3) post stroke depression; 4) medical complications; and 5) difficulties from external agencies related to discharge planning. These factors accounted for 48.8% of the total variance in LOS. In this model, factors associated with team function and hospital character such as availability of ambulatory services did not seem to have significant influence on LOS ($p=0.987$). *Conclusions:* Functional status changes measured by FIM gains, medical complications and post stroke mental health problems are significant determinants that prolong the LOS. Difficult discharge planning such as patients waiting for placement in institution remains a key factor. It is also important to ascertain early discharge planning by the team liaison with family and anticipate needs of equipment and home adaptation. The impact of provision of ambulatory service on LOS requires further study.

A 10

COMPARATIVE SENSITIVITY TO CHANGE OF BALANCE OUTCOME MEASURES IN TRANS-TIBIAL AMPUTEES FOLLOWING OUTPATIENT BALANCE TRAINING

Jacqueline Hebert

Glenrose Rehabilitation Hospital, Edmonton, AB

Objective: To compare the sensitivity to change of three balance outcome measures in trans-tibial amputee patients undergoing balance training. *Design:* Longitudinal interventional study. *Setting:* Rehabilitation Hospital, outpatient. *Participants:* Eleven subjects with unilateral below knee amputation. Complete data sets were obtained for 5 subjects and were analyzed. *Interventions:* Six weeks of individualized outpatient balance training. *Main Outcome Measures:* Activities Specific Balance Scale (ABC Scale), Berg Balance Scale (BBS), and Sensory Organization Test (SOT) using Computerized Dynamic Posturography (CDP). Standard Response Mean (SRM) was calculated for each outcome measure at 4 time intervals. *Results:* SRM values varied amongst the different time points of this study and across the three different outcome measures. For all intervals examined, only the ABC scale showed consistently moderate to large SRM values. *Conclusion:* The study data suggests that the ABC scale has the greatest sensitivity to change. Further investigation of SRM values for these outcome measures with a larger sample size is required.

A 11

PRACTICE MANAGEMENT KNOWLEDGE IN A PHYSICAL MEDICINE AND REHABILITATION RESIDENCY PROGRAM

Curtis Hlushak; Hernish Acharya; Nigel Ashworth

University of Alberta, Edmonton, AB

Objective: To determine if informal learning in practice management occurs during a physical medicine and rehabilitation residency training program and to identify knowledge deficiencies in order to guide curriculum development. *Design:* Cross-sectional study. *Subjects:* Residents and staff in a Royal College of Physicians and Surgeons of Canada approved physical medicine and rehabilitation program. *Methods:* Subjects completed a written examination based on the Canadian Medical Association's Practice Management Curriculum (http://www.cma.ca/index.php/ci_id/49620/la_id/1.htm). SPSS v.18 and Microsoft Excel were used for statistical analysis using ANOVA to compare differences between groups. *Results:* Fifteen residents and staff completed the examination. Mean scores for staff were significantly higher than those for residents ($58.1 \pm 10.7\%$ versus $26.6 \pm 6.2\%$, $p < 0.05$). Junior (post graduate years 1–3) and senior (postgraduate years 4–5) resident mean scores were not significantly different. Staff scored significantly higher than residents in financial planning, personal and professional insurance, medical records, physician remuneration, locums, evaluating practice opportunities, marketing a specialist's practice, and staffing and human resources issues. *Conclusion:* We found no evidence that informal learning of practice management principles occurs during residency. Staff out-performed residents, suggesting that practice management knowledge is obtained after residency. Identified knowledge gaps can guide future curriculum development.

A 12

CAPACITY VS PERFORMANCE ON THE QUESTIONNAIRE VERSION OF WHEELCHAIR SKILLS TEST 4.1: WHICH SKILLS ACCOUNT FOR THE DIFFERENCE?

Peter Inkpen¹; Kim Parker²; Lee Kirby¹

¹Dalhousie University, and ²Nova Scotia Rehabilitation Centre, Halifax, NS

Objective: Total scores on the questionnaire version of the Wheelchair Skills Test 4.1 (WST-Q) for capacity consistently exceed scores for performance. Our objective was to determine which skills account for this difference. **Design:** Descriptive study using within-subject comparisons. **Subjects/Patients:** Twenty-three people who had used manual wheelchairs in the community for ≥ 3 months. **Methods:** We administered the WST-Q, using appropriate wording to reflect capacity (“can-do”) and performance (“do-do”), inquiring about the reasons for any discrepancies. Individual skill success rates were calculated for both capacity and performance skills and qualitatively compared, using $\geq 20\%$ as our definition of a clinically significant difference. **Results:** The mean (\pm SD) total percentage WST scores for capacity and performance were 73.9% (± 13.5) and 59.0% (± 18.9) ($p=0.000$). For every skill, the success rate for capacity equaled or exceeded that for performance. For 13/32 (41%) skills, mostly at the community- and advanced-skill levels, the difference was $\geq 20\%$. Reasons for discrepancies included no need for the skill because of indoor use only, avoiding the obstacle and having a caregiver to perform the skill. **Conclusions:** Users of manual wheelchairs demonstrate greater wheelchair skill capacity than performance for some skills, but not others. This finding has implications for wheelchair skills assessment and training.

A 13

THE EFFECTIVENESS OF REPEAT SACROILIAC JOINT RADIOFREQUENCY BIPOLAR STRIP LESIONING LATERAL BRANCH DENERVATION ON PAIN, DISABILITY AND TREATMENT EFFECT DURATION

Robert Burnham^{1,2}; Gordon Stanford¹

¹Central Alberta Pain & Rehabilitation Institute, and ²Division of Physical Medicine & Rehabilitation, University of Alberta, Lacombe, AB

Objective: To assess the effectiveness of repeat bipolar strip lesioning sacroiliac joint radiofrequency denervation (SIJ RFD) on pain, disability and treatment effect duration. **Patients:** Twenty patients who had undergone initial and repeat SIJ RFD for chronic low back pain of SIJ origin confirmed by clinical and comparative block criteria. **Methods:** A Pain Disability Questionnaire-Spine (PDQ-S) was completed just prior to and 8 weeks following both the initial and repeat SIJ RFD. Data were analysed using a 2-way repeated measures ANOVA. **Results:** Following both the initial and repeat SIJ RFD, there were significant and comparable improvements in pain intensity, pain frequency, each of the 2 patient-selected disabilities, and the composite PDQ-S scores. At 8 weeks following both the initial and repeat procedure, 75% of patients had experienced $>50\%$ pain intensity relief. The treatment effect duration was also comparable (10–11 months). **Conclusion:** Initial and repeat bipolar strip lesioning SIJ RFD result in significant and comparable improvements in pain and disability. The treatment effect duration is also comparable.

A 14

HISTOLOGY OF THE HUMAN KNEE CAPSULE IN END-STAGE OSTEOARTHRITIS WITH AND WITHOUT CONTRACTURE

Mark Campbell; Hans K. Uhthoff; Odette Laneuville; Guy Trudel

University of Ottawa, Ottawa, ON

Objective: To compare histologic characteristics of knee capsules from patients with end-stage knee osteoarthritis (OA) with or without flexion contractures. **Subjects:** Patients with knee OA requiring arthroplasty with flexion contracture ($n=6$) or without flexion contracture ($n=6$). **Methods:** Postero-lateral or postero-medial knee capsule tissue was collected at surgery and histological sections examined by light microscopy. We measured the cross-sectional area of non-adipose non-synovial tissue (“fibrous”), adipose tissue, and synovium. We counted the number of fibroblasts and adipocytes per high-powered field (HPF). **Results:** We found a trend towards higher fibrous cross-sectional area (87.0%), lower adipose (8.7%) and lower synovial tissue (4.3%) in the contracture group compared with the group without contractures (69.1%, 16.2%, 14.7%, respectively; all $p>0.05$). We also found a trend towards fewer adipocytes per HPF ($p>0.05$). **Conclusion:** In the first study on this topic, we found that patients with end-stage knee OA with and without contractures had indistinguishable histological characteristics. Improvements in homogeneity of the samples and greater sample size may confirm trends for increased fibrous content of knee capsule in contracture. Analysis of capsule biopsy may constitute a prognostic tool for patients with knee OA.

A 15

NEUROPATHIC ARTHROPATHY AFFECTING THE UPPER LIMBS IN SYRINGOMYELIA: A UNIQUE PRESENTATION OF THUMB AND ELBOW INVOLVEMENT

Caitlin Cassidy; Thomas Miller; George Athwal

University of Western Ontario, London, ON

Neuropathic or Charcot arthropathy in the upper extremities can occur as a consequence of syringomyelia, myelomeningocele and various types of peripheral neuropathies. Neuropathic arthropathy (NA) in the upper limb is uncommon and NA of the thumb and elbow due to idiopathic syringomyelia is rare. To our knowledge, NA of the elbow and thumb (carpometacarpal) joint has not been reported in the literature, and there are only a limited number of publications of NA of the elbow and hand. In this report, a case of NA of the thumb and elbow without associated neurological symptoms in a 52-year-old female patient with upper limb complaints as a result of repetitive use is described. She had no involvement in the lower limbs. Investigations including the work up for rheumatological causes of erosive arthropathy, proved negative. Clinical features of painful restricted range of motion (ROM) of the elbow and thumb, suggested the more common osteoarthropathy as the etiology. However, X-rays, and cervical magnetic resonance imaging led to the diagnosis of syringomyelia. Her treatment to date has consisted of analgesics, work modification, and surgical debridement of the elbow to improve ROM and pain. This case highlights the importance of considering central imaging in cases of unexplained upper extremity joint disease, and of the clinical importance of early identification and rehabilitation strategies in the long term management of NA.

A 16

DEVELOPING AN EVIDENCE-BASED APPROACH TO WHIPLASH-ASSOCIATED DISORDER

Steven Macaluso¹; Robert Teasell¹; Andrew J. McClure¹; David Walton¹; Jason Pretty¹; Katherine Salter¹; Matthew Meyer¹; Keith Sequeira²; Barry Death¹

¹Parkwood Hospital, St. Joseph's Health Care, and ²Department of Physical Medicine and Rehabilitation, Schulich School of Medicine, The University of Western Ontario, London, ON

Introduction: Whiplash-associated disorder (WAD) is a common, yet controversial, entity resulting in substantial social and economic costs throughout the industrialized world. Whiplash injuries, however, are often managed based on individual opinion rather than actual evidence. Thus, there is a growing need to develop an evidence-based approach for the treatment of these injuries. **Objective:** To examine the evidence for WAD treatment interventions. **Design:** A series of systematic reviews of the literature pertaining to acute, subacute and chronic interventions for WAD. **Methods:** Studies were included if they had: 1) A defined treatment intervention. 2) 60% or more of participants with a whiplash injury. 3) At least three participants with a whiplash injury. 4) Measurable outcomes. **Results:** Evidence for acute care of WAD suggests physiotherapy and simple mobilization, along with simple advice to 'act as usual' is beneficial. For subacute care, progressive strengthening programs may actually have detrimental effects. In the chronic phase the best evidence was for modest exercise programs. For those not responding to conventional treatment, radiofrequency neurotomy may be helpful. **Conclusion:** Despite the relative paucity of research in the area, there are WAD treatments with evidence to support them. Further research is required to better define the evidence-based management of WAD.

A 17

THE IMPACT OF COMPUTER-ASSISTED TECHNOLOGY ON PATIENTS WITH SPINAL CORD INJURIES

Steven Macaluso¹; Keith Sequeira²; Robert Teasell¹; Patrick Potter¹; Katherine Salter¹; Angela Woolner¹

¹Parkwood Hospital, St. Joseph's Health Care, and ²Department of Physical Medicine and Rehabilitation, Schulich School of Medicine, The University of Western Ontario, London, ON

Introduction: Patients with spinal cord injuries (SCI) are increasingly using advanced technologies to assist in performing their daily activities. Unfortunately, these technologies have typically been quite costly and usually are not covered by provinces' assistive devices programs. Thus, to help guide decisions on the purchase of computer-assisted devices (CAD), there is a need to determine the impact of these devices on SCI patients' lives. **Objective:** To determine the impact of CAD on the lives of those with SCI. **Design:** Cross sectional, Survey design with collection of demographic data and administration of the Psychological Impact of Assistive Devices Scale (PIADS). **Subjects:** SCI patients who were: 1) 18 years or older. 2) Able to consent to the survey. **Methods:** A convenient sample of patients presenting to a spinal cord clinic at a tertiary care rehab hospital in Ontario were invited to participate in the survey. Those identified to be CAD users were then administered the PIADS tool. **Results:** The PIADS scores showed CAD as having a positive impact on participants perceived level of adaptability, competency, and self-esteem. **Conclusion:** Computer-assisted devices were shown to have a positive impact on the lives of patients with SCI. More research is required to determine the cost-effectiveness of these technologies.

A 18

A DOUBLE-BLIND RANDOMIZED PLACEBO CONTROLLED STUDY FOR ASSESSMENT OF ELECTROMAGNETIC FIELD IN THE TREATMENT OF CHRONIC LOWER BACK PAIN IN OSTEOARTHRITIC PATIENTS

Amarjit Arneja

Rehabilitation Hospital, Winnipeg, MB

Objective: To examine the effects of electromagnetic field (EMF) therapy in patients with osteoarthritis and persistent pain. **Design:** Subjects were randomized into 1 of 2 groups: EMF group ($n=14$, 60.3 ± 9.7 years of age) and the control group ($n=8$, 59.3 ± 12.4 years of age). Participants also completed the following measures: demographic questionnaire, medical history, the Roland Disability Questionnaire (RDQ) and the SF-36 Health Survey. In addition, measurements of mobility (forward, and right/left lateral mobility), Visual Analogue Pain Scale and McGill Total Pain Scale were conducted before and after each treatment. **Results:** The RDQ revealed a larger reduction in the total score in the EMF group as compared to controls, but did not reach significance. However, significant improvements in overall physical health ($p=0.017$), social functioning ($p=0.008$) and reduction in bodily pain ($p=0.040$) were observed in the EMF group. The pain relief rating scale showed a higher level of pain relief at the target area in the EMF group. While a decrease in pain intensity was observed in the EMF group an increase occurred in the control group. An increase in left lateral mobility was seen only in the EMF treated group. **Conclusion:** EMF treatment resulted in improved physical functioning, health and pain reduction as compared to the control group.

A 19

THE DEVELOPMENT OF A SPINAL CORD INJURY OUTCOME MEASURES TOOLKIT FOR CLINICIANS

Vanessa Noonan¹; Dalton Wolfe²; Jane Hsieh²; Swati Mehta²; William Miller³

¹Rick Hansen Institute, Vancouver, BC, ²University of Western Ontario, London, ON, and ³University of British Columbia, Vancouver, BC

Objective: Utility of an Outcome Measures Toolkit to standardize assessments utilized in spinal cord injury (SCI) clinical practice. **Design:** On-line Delphi survey. **Methods:** Clinicians working in SCI were invited to participate. Delphi methodology, utilizing three rounds of participant input was used to develop the Toolkit. Outcome measures in the Spinal Cord Injury Rehabilitation Evidence (SCIRE) project were included in the first round and participants were then asked to identify any additional measures. The Toolkit covers body structure/function such as secondary complications to participation in social activities. Criteria for selecting the measures included: clinical relevance, clinical utility and psychometric properties. Case studies are presented to illustrate a process for implementing outcome measures into clinical practice. **Results:** Sixty-three clinicians participated, from 8 provinces and covering 6 clinical disciplines. Participants provided informed consent. Round one included 156 measures and 48 measures are in the final Toolkit. An example of how the Toolkit and the accompanying implementation module can be used in clinical practice will be described. **Conclusions:** The SCI Outcome Measures Toolkit and case studies are presented to assist standardization and implementation of outcome measures in clinical practice. Further research is needed to evaluate the effectiveness of these tools in changing clinical practice.

A 20

THE WII-AUGMENTED BALANCE TRAINING IN AMPUTEES TRIAL: WII-ABAL-AMPS**Paul Chapman***University of British Columbia, Department of Physical Medicine and Rehabilitation, Vancouver, BC*

Objective: To assess whether an augmented balance-training program using the Nintendo Wii Fit™ (NWF) is effective in the rehabilitation of persons with lower extremity amputation. **Design:** Multiple baseline Single Subject Design. **Subjects:** Three persons with new unilateral transtibial or transfemoral amputations (Recruitment ongoing. Data collection for three additional subjects ongoing at time of abstract submission). **Methods:** Subjects were randomly assigned to a variable baseline period followed by an intervention period, with a total of 24 data points collected for each subject. The intervention consisted of 30 min daily training on the NWF balance platform in addition to the standard lower extremity amputee rehabilitation program. A battery of standardized outcome measures designed to assess strength, balance and ambulation were used. NWF activities were graded from simple to complex as subject abilities improved. **Results:** Significant change was seen in the ambulation indexes: 6 min walk as well as the L-Test. **Conclusions:** The NWF may be an effective tool in retraining balance after lower extremity amputation. Statistically and clinically significant improvements were seen in outcome measures.

A 21

THE USE OF SNIFF NASAL PRESSURE AS A MEASURE OF PULMONARY FUNCTION**Michael Pappachan^{1,3}; Stuart Cleary^{2,3}; K. Ming Chan^{1,3}***¹Physical Medicine and Rehabilitation, ²Faculty of Rehabilitation Medicine, and ³University of Alberta, Edmonton, AB*

Objective: Forced Vital Capacity (FVC) is a commonly used measure of pulmonary function. However, its complexity and technical constraints pose potential major limitations when measuring pulmonary function in patients with neuromuscular disease. In contrast, Sniff Nasal Pressure (SNP), a more direct indicator of diaphragmatic pressure, is also simpler to perform. The aim of this study was to investigate the relationships between SNP and FVC in a large healthy population. **Design:** Within group, cross-sectional analysis. **Subjects:** 101 participants, 20–80 years of age without active illness, a known history of neuromuscular or cardiorespiratory disease, and have not smoked in the last 10 years. **Methods:** FVC was obtained using a standard spirometer. SNP was obtained using a pressure transducer connected to polyethylene tubing and variable sized cork. For each participant, 3 FVC and 8 SNP trials were recorded. **Results:** A modest Pearson correlation was found ($r=+0.43$, $p<0.001$) between FVC and SNP. However, variability at the low end of the range was substantially higher. SNP was well tolerated by the participants. **Conclusion:** SNP has potential as a useful adjunct measure of pulmonary function that is easy to administer. Its utility is being tested in neuromuscular disease patients.

A 22

CASE SERIES IDENTIFYING REHABILITATION ISSUES UNIQUE TO STROKE SURVIVORS POST INFECTIVE BACTERIAL ENDOCARDITIS IN INJECTION DRUG USERS**Ricardo Viana; Robert Teasell***Physical Medicine and Rehabilitation, University of Western Ontario, London, ON*

Background: The incidence of Infective Endocarditis (IE) is 2–5%/year, and IE secondary to Injection Drug Use (IDU) is estimated at 1.5–2/1,000 cases of IE. 20–40% of patients with IE develop

neurological complications. **Objective:** Identify rehabilitation issues in strokes as a consequence of IE. **Methods:** Retrospective chart review identifying individuals admitted to inpatient stroke rehabilitation with stroke associated with IE secondary to IDU from September 2005–September 2010. Information collected included age, gender, type and location of stroke, associated co-morbidities, ICU admission, surgeries, echocardiogram and neuro-imaging results, past medical history, social support and difficulties identified post discharge. **Results:** Five individuals were admitted with stroke associated with IE secondary to IDU from September 2005 and September 2010. Age: 34.2 years (28–44), Male: 5/5, number of co-morbidities: 5.4 (3–7), ICU admission 4/5, Number of surgeries 2.2 (1–5) [3/5 cardiac surgeries, 2/5 general surgical procedure, 1/5 neurosurgical procedure]. 5/5 sustained ischemic strokes, 3/5 associated with a hemorrhage. 4/5 individuals sustained left-sided strokes involving multiple vascular territories, 1/5 bilateral infarcts. Issues post discharge: decreased energy 2/5, depression 4/5, continued substance dependence 1/5, stroke-related physical and cognitive impairments (4/5 & 3/5, respectively), and ongoing cardiac difficulty 4/5. **Discussion:** Over a five-year period 5 admissions were associated with IE secondary to IDU. Unique issues included multiple cardiac and general surgical interventions, multi-territory ischemic infarcts often associated with hemorrhagic conversion. Young age with early loss of function, and productivity on the background of poor social support. Major post discharge goals focused on depression, substance abuse management and possible return to work.

A 23

INFLAMMATORY MYOPATHY, WEAKNESS: DERMATOMYOSITIS AND TUBERCULOSIS MYOFASCIITIS: THE ROLE FOR REHABILITATION**Thomas Miller; Sogol Kachooie; David Ramsay***University of Western Ontario, London, ON*

The prevalence of dermatomyositis is one per 100,000 and the frequency of musculoskeletal manifestation of disseminated tuberculosis (TB) has been described as 1–2%. Individually, both conditions are uncommon and there have been rare reports of both occurring in the same patient described in the literature. In this unique case report, a 53-year-old male with a “recurrence” of dermatomyositis was treated with steroids and immunosuppression (MTX). This resulted in the unfortunate occurrence of disseminated TB infection with TB myofasciitis. He had a prolonged hospital course complicated by ICU admission, ARDS, critical illness neuromyopathy, a right arm deep venous thrombosis, and dysphagia requiring G-Tube feeding. He had features of generalized weakness and developed pain and swelling of the right thigh. Open biopsy proved the swelling to be as a result of TB myofasciitis. TB pyomyositis is a rare complication of disseminated TB without direct spread from adjacent tissue. His treatment required a multidisciplinary approach with consultation from rheumatology, internal medicine, infectious disease, and psychiatry. Rehabilitation management consisted of treatment with steroids, analgesics, therapy, and creatine monohydrate. Concurrently, he was treated with medications (rifampin, isoniazid, ethambutol, pyridoxine) for tuberculosis. This report highlights the goals and challenges of rehabilitation in this medically complex patient, and the importance of his rehabilitation team in his ultimate successful outcome.

A 24

WHICH SELECTION CRITERIA FOR FACET JOINT RADIOFREQUENCY DENERVATION PREDICT OUTCOME?**Robert Burnham^{1,2}; Gordon Stanford¹; Eric Parent³***¹Central Alberta Pain & Rehabilitation Institute, ²Division of Physical Medicine and Rehabilitation, University of Alberta, Lacombe, AB, and ³Department of Physical Therapy, Faculty of Rehabilitation Medicine, University of Alberta, Edmonton, AB*

Objective: To determine which demographic, lifestyle, mood and interventional selection criteria predict pain/disability improvements after facet joint radiofrequency denervation (RFD). **Design:** Prospective cohort criterion validation study. **Subjects:** 352 patients having undergone facet joint RFD for mechanical spine pain. **Methods:** Demographic (gender, WCB claim, age and pain duration), lifestyle (smoking, regular exercise) and mood (Beck Depression Inventory) factors were self-recorded in an intake questionnaire. Interventional factors including vertebral region treated, magnitude and duration of pain relief with the local anesthetic block, and block type were recorded. Patients who experienced >50% index pain relief with facet joint local anesthetic blocks on 2 occasions underwent RFD. The day of and approximately 2 months post-RFD, patients completed a Pain Disability Questionnaire-Spine (PDQ-S). RFD outcome was assessed using dependent *t*-test. Differences in PDQ-S scores between the groups defined by dichotomous variables were examined using independent *t*-test. Relationships between predictor variables and PDQ-S scores were quantified using Pearson's correlation coefficients and multiple regression analyses. **Results:** Overall, RFD resulted in significant improvements in PDQ-S scores (mean pre: 29.4, post: 18.8, $p < 0.01$) and Pain Intensity scores (mean pre: 6.7/10, post: 4.0/10, $p < 0.01$). Gender, WCB claim, age, spine pain duration, smoking, exercising, mood, facet block relief duration or type did not predict RFD outcome. The only significant predictor was the average percent pain intensity drop following facet joint blocks. In the whole sample, the correlation was weak ($r = 0.132$ $p = 0.031$). For cervical interventions, the correlation was not significant but was for lumbar RFD ($r = 0.145$ $p = 0.035$). **Conclusions:** RFD significantly reduces pain and disability. Patient selection for this procedure on the basis of the magnitude of pain relief following local anesthetic facet joint block is valid although its predictive capacity is weak.

A 25

EVALUATION OF SECONDARY STROKE PREVENTION STRATEGIES ON AN INPATIENT REHABILITATION UNIT, SASKATOON, CANADA

Tatjana Zdravkovic^{1,2}; Katherine Knox^{1,3}; Lila Rudachyk^{1,3}; Hyun Lim⁴; Hitesh Bhatt⁴

¹Department of Physical Medicine and Rehabilitation, ²University of Saskatchewan, ³Saskatoon City Hospital, and ⁴Department of Community Health & Epidemiology, Saskatoon, SK

Objective: To evaluate patient-level correlates of secondary stroke prevention targets. **Design:** Retrospective chart review. **Subjects/Patients:** Consecutive sample of 95 patients with stroke admitted to inpatient rehabilitation over one year (2006–2007). **Methods:** Univariate and multivariate analyses were used to determine what demographic and clinical factors may predict achievement of secondary stroke prevention targets from patients' charts (i.e., blood pressure control, appropriate anticoagulation/antiplatelet treatment, dietary consultation, and discharge exercise prescription). **Results:** Of 95 patients, 36% were assessed by a dietician, 68% achieved target BP, 68% were given a discharge exercise prescription, and 88% were prescribed appropriate antiplatelet/anticoagulation medication. In univariate analysis, diabetics were more likely to have dietary consultation than non-diabetics (OR = 7.49; $p < 0.0001$). In multivariate analyses, those with low initial SBP were more likely to achieve BP target levels by discharge (OR = 9.68; $p = 0.0001$) and subjects discharged home were more likely to receive an exercise program (OR = 5.76; $p = 0.001$). **Conclusion:** Diabetes, admission BP and discharge disposition influenced the achievement of some secondary stroke prevention targets, while no association was found for age, gender, aphasia, and FIM scores. Identifying patient-level as well as system-level factors that influence the delivery of secondary stroke care may further improve outcomes after stroke.

A 26

ESTIMATING THE INCIDENCE AND PREVALENCE OF SPINAL CORD INJURY IN CANADA

Matthew Fingas¹; Vanessa Noonan¹; Michael Fehlings²; Anoushka Singh²; Marcel Dvorak¹

¹Rick Hansen Institute, Vancouver, BC, and ²University of Toronto, Toronto, ON

Objective: To estimate the incidence and prevalence of all spinal cord injuries (SCI) in Canada. **Design:** A statistical model using published literature. **Methods:** The incidence of traumatic SCI (tSCI) and nontraumatic SCI (ntSCI) in Canada were estimated using published tSCI rates from Alberta, Canada, and ntSCI rates from Australia. The initial incidence (number of tSCIs at the scene) and the discharge incidence (number discharged into the community from hospital) were calculated. Prevalence was estimated by applying discharge incidence rates for tSCI and ntSCI to Canadian population demographics, by single years of age and gender, for each year between 1921 and 2010. To accurately reflect prevalence, age-specific mortality rates for tetraplegia and paraplegia were used. **Results:** The estimated initial incidence of tSCI is 1,785 cases per year and the discharge incidence is 1,389. Discharge incidence for ntSCI is estimated to be 2,286 cases per year. In 2010, the prevalence of SCI in Canada is approximated to be 85,556 (51% tSCI and 49% ntSCI) and by 2030 it is estimated to be 121,000 (41% increase). **Conclusions:** This is the first Canadian study to estimate the incidence and prevalence of SCI using the best-available data. Further population-based research is needed, particularly for ntSCI.

A 27

CHARACTERIZATION OF INPATIENT FALLS AT A TERTIARY REHABILITATION CENTRE

Ed Hanada^{1,2}; Fedja Saric²; Melissa McKeon³

¹Capital District Health Authority, ²Dalhousie University, Halifax, NS, and ³Saint John Regional Hospital, University of New Brunswick, Saint John, NB

Objective: To characterize falls at a rehabilitation center and to compare the characteristics of "fallers" to "non-fallers". **Design:** Retrospective cohort study. **Setting:** Tertiary rehabilitation center. **Participants:** Data from 1,510 inpatients at a rehabilitation center over a 4-year period. **Main Outcome Measures:** Demographic data, number of falls and co-morbidities, functional independence measures (FIM), client group, length of stay, time and circumstances surrounding the fall, and the injury sustained were derived from incident reports and a local Canadian Institute for Health Information database. **Data Analysis:** Means and standard deviations were calculated for all outcome parameters and two sample *t*-tests were used to compare "fallers" and "non-fallers". **Results:** Of the 1,510 inpatients (age: 62.4 ± 16.3 years), 259 falls were reported from 186 individuals at a rate of 24.8 falls per 1,000 inpatient days. 76.9% of these patients had a single fall while 23.1% of patients had multiple falls. The client groups with the highest number of "fallers" included persons with acquired brain injury (41%) and amputations (21%). The majority of fallers were men (54.8%) with the highest incidence occurring between 10 am–12 pm/2 pm–4 pm, involving some form of transfer. 56% of "fallers" did not sustain any injuries. Persons who fell compared to "non-fallers" were significantly ($p < 0.05$) older (65.1 vs. 59.1 years), had a larger number of co-morbidities (4.8 vs. 4.1), lower FIM cognitive subscale (29.7 vs. 30.8), lower FIM motor subscale (51.9 vs. 56.6), and a longer length of stay (52.6 vs. 39.6 days). Our reported incidence of falls at 12.3% was higher than that reported for centers in the U.S. (9.5%) and lower than a comparable Canadian amputee rehabilitation unit (20.5%). **Conclusion:** The incidence of falls in the tertiary rehabilitation center was high, and mainly affected older adults who were more disabled, and in general these "fallers" had longer lengths of stay. Data from this study and previously reported data justifies a need for formalized fall prevention programs.

A 28

**MANAGEMENT OF POST-STROKE SPASTICITY:
CANADIAN DATA FROM THE BOTOX®
ECONOMIC SPASTICITY TRIAL (BEST)**

*Lalith Satkunam¹; Satyendra Sharma²; Theodore Wein³;
Jörgen Borg⁴; Nicola Wright⁵*

¹Glenrose Rehabilitation Hospital, Edmonton, AB, ²Sunnybrook Health Sciences Centre, Toronto, ON, ³Montreal General Hospital, Montreal, QC, ⁴Karolinska Institutet, Rehabilitation Medicine, Danderyd Hospital, Stockholm, ⁵Allergan Ltd., Marlow Buckinghamshire

Objective: Post-stroke spasticity (PSS) is a serious consequence of stroke. There are few detailed descriptions of PSS patients and how spasticity influences treatment decisions. One aim of BEST was to characterize selected PSS patients. **Design:** International, prospective, double-blind study. Adults with focal PSS were randomized to BOTOX® (BoNT-A)+standard care (SC) or placebo+SC within their rehabilitation regimen, for ≤ 2 treatment cycles, followed by an open-label phase of ≤ 52 weeks. **Patients:** Eligible patients were BoNT-A-naïve, had preserved function and were considered likely to benefit from intervention in the limb to be treated. Fixed contractures and causes of spasticity other than stroke were exclusion criteria. **Results:** In the Canadian BEST cohort ($n=22$), 77% of patients were aged <65 years and 82% experienced their stroke >1 year before study entry. Spasticity was multifocal (both upper and lower limbs) in 77% of patients and severe in 27%. Mean \pm SD Resistance to Passive Movement Scale scores were 17.6 ± 7.53 (overall), 10.7 ± 5.97 (upper limbs only), and 7.0 ± 2.36 (lower limbs only). Study medication was injected in the lower limb (22.7%), upper limb (13.6%) or both upper and lower limbs (63.6%). **Conclusions:** In many patients, spasticity remains a problem >1 year after stroke. Both upper and lower limbs are often affected.

A 29

**IMPROVED CLINICAL AND URODYNAMIC
OUTCOMES AND QUALITY OF LIFE IN PATIENTS
WITH URINARY INCONTINENCE DUE TO
NEUROGENIC DETRUSOR OVERACTIVITY
TREATED WITH ONABOTULINUMTOXIN A**

*Peter Pommerville¹; Jerzy Gajewski²; Catherine
Thompson³; Cornelia Haag-Molkenteller³; Wayne Lam³;
Sender Herschorn⁴*

¹Vancouver Island Health Authority, Victoria, BC, ²Queen Elizabeth II Health Science Centre, Halifax, NS, ³Allergan LLC, Irvine, AB, and ⁴University of Toronto, Toronto, ON

Objective: To evaluate efficacy/safety of onabotulinumtoxin A (onabotA) versus placebo (PBO) for treatment of urinary incontinence (UI) in patients with neurogenic detrusor overactivity (NDO). **Design:** Multicentre, double-blind, randomized, PBO-controlled study. **Subjects/Patients:** Patients with NDO (≥ 14 UI episodes/week) due to multiple sclerosis ($n=154$) or spinal cord injury ($n=121$) were randomized to intradetrusor injection of PBO ($n=92$), onabotA 200 U ($n=92$), or 300 U ($n=91$). **Methods:** Primary endpoint was change from BL in number of UI episodes/week after 6 weeks. Secondary endpoints included maximum cystometric capacity [MCC], maximum detrusor pressure [MDP] during 1st involuntary detrusor contraction [IDC], and Incontinence Quality of Life Instrument (I-QOL) total score. Adverse events (AEs) were recorded. **Results:** Mean age (SD) was $45.8 (\pm 13.5)$ years. At BL, patients reported 33.5 UI episodes/week and 59% were taking anticholinergics, with no differences between groups. At wk 6, UI episodes/week were significantly reduced in both onabotA 200 U (-21.8) and 300 U (-19.4) groups vs PBO (-13.2 ; $p=0.002$ vs PBO). MDP during 1st IDC was significantly reduced in both onabotA groups vs PBO, and MCC and I-QOL were significantly improved. Duration of effect was 92 days for PBO and 295 days in both onabotA groups. 40%, 56% and 64% of patients

reported UTIs and 3%, 20% and 32% reported urinary retention in the PBO, 200U and 300U groups, respectively. In patients not using clean intermittent catheterization (CIC) at BL, 5%, 21.4% and 34.9% initiated CIC in the PBO, 200 U and 300 U groups, respectively, at 6 weeks. **Conclusion:** Significant improvements vs PBO in UI episodes/week, MCC, MDP, and QOL were seen with onabotA 200 U and 300 U, with no clinically relevant difference in efficacy between onabotA doses. Both onabotA doses were well tolerated.

A 30

**ASSESSMENT OF SMALL SENSORY FIBERS
IN DIFFERENT STAGES OF CARPAL TUNNEL
SYNDROME USING QUANTITATIVE SENSORY
TESTING**

Mahsa Mackie; Zaeem A. Siddiqi; K. Ming Chan
University of Alberta, Edmonton, AB

Carpal tunnel syndrome (CTS) is the most common compressive neuropathy with substantial personal and economic impacts. Diagnostic confirmation and staging of disease severity usually rely on electrodiagnostic studies that only measure the large myelinated nerve fibres. However, even in early stages of CTS, patients often complain of burning pain, tingling and numbness in the hand. Although these symptoms are conveyed by small sensory fibers, their involvement has not been adequately quantified. Using quantitative sensory testing (QST), we assessed the extent of A- δ and C-fibers damage in moderate and severe stages of CTS. The cold threshold (CT), warm threshold (WT) and heat pain (HP) from 10 CTS patients (6 moderate, 4 severe) were compared with those from 10 control subjects. Thermal thresholds were measured using the 4, 2, 1 stepping algorithm while HP was measured using the non-repeating ascending algorithm. CT of the severe group at $18.1 \pm 6.4^\circ\text{C}$ was significantly lower compared to the controls ($25.7 \pm 4.0^\circ\text{C}$). In contrast, the WT and HP were not significantly different between the three groups. These results indicate that the A- δ sensory nerve fibers are damaged in severe stages of CTS. Given the important role that these sensory nerve fibers play in shaping the patients' symptoms, quantification of their functions could be valuable in the management of CTS patients.

A 31

**BUILDING A HEALTH PROGRESSION MODEL
TO EVALUATE LONG-TERM OUTCOMES FOR
PEOPLE WITH TRAUMATIC SPINAL CORD
INJURY**

*Rachel Lewis¹; Anthony Burns²; Vanessa Noonan³;
Anoushka Singh²; Rhonda Willms¹; Andrea Townson¹;
Derek Atkins¹*

¹University of British Columbia, Vancouver, BC, ²University of Toronto, Toronto, ON, and ³Rick Hansen Institute, Vancouver, BC

Objective: Develop a health progression model (HPM) to measure long-term (patient and system) outcomes for traumatic spinal cord injury (SCI). **Design:** Computer simulation of an individual's life upon discharge to the community until death for people with traumatic SCI. **Methods:** A discrete event simulation model was developed to describe characteristics of persons with traumatic SCI at the time of discharge into the community, events/experiences occurring in the community and long-term outcomes. Sources of data include the Rick Hansen SCI Registry, expert opinion and the literature. Multivariable regression models were used to predict quality-adjusted life years (QALYs) using the Short-Form 6D. Logistic regression models were utilized to predict secondary complications, estimate hospital re-admissions and days in hospital. A Cox proportional hazards model drawn from the literature was applied with Canadian life-table data to predict mortality. **Results:** This model produces estimates of health-related and economic consequences of SCI, with lifetimes simulated multiple times to generate long-term outcomes

(e.g. QALYs, years experiencing secondary complications and healthcare costs). Preliminary HPM estimates demonstrated earlier than expected mortality due to high secondary complication rates. **Conclusions:** The HPM appears to be a valid model for evaluating long-term health outcomes and economic consequences for persons with traumatic SCI.

A 32

MODELING THE PROVISION OF CARE FOR PATIENTS WITH TRAUMATIC SPINAL CORD INJURY IN BRITISH COLUMBIA

Argelio Santos¹; Andrea Townson¹; Lesley Soril²; Rhonda Willms¹; Vanessa Noonan²; Marcel Dvorak¹; Michael Fehlings³; Derek Atkins¹

¹University of British Columbia, Vancouver, BC, ²Rick Hansen Institute, Vancouver, BC, and ³University of Toronto, Toronto, ON

Objective: Develop a model of pre-hospital, acute and rehabilitation services in British Columbia for patients with traumatic spinal cord injury (SCI), in order to evaluate potential administrative and clinical policies and their impact on patient and system outcomes. **Design:** Computer simulation of patient flow for traumatic SCI using operations research. **Methods:** A discrete event simulation (DES) model of patient flow through the traumatic SCI continuum of care (pre-hospital, acute, rehabilitation) was developed using data from the Rick Hansen SCI Registry (RHSCIR) ($n=534$), literature reviews and expert opinion. Extensive statistical analyses were used to develop the model. The model was validated by comparing patient, injury and treatment attributes of simulated and real RHSCIR patients. **Results:** The DES model can evaluate the effect of changes to the system such as increasing unit capacity or the impact of eliminating secondary complications. Potential policy initiatives can be compared and the impact can be evaluated throughout the entire continuum of care. Examples of analyses and the corresponding effect on patient and system outcomes will be presented. **Conclusions:** The DES model can assist in evaluating the impact of new policy initiatives across the entire SCI continuum of care and their effect on patient and system outcomes.

A 33

RESOURCE UTILIZATION BY PATIENTS WITH ADULT FOCAL SPASTICITY AND CEREBRAL PALSY RECEIVING BOTULINUM TOXIN TYPE A IN A PROSPECTIVE OBSERVATIONAL COHORT STUDY: MOBILITY STUDY

Farooq Ismail¹; Richard Beauchamp²; Theodore Wein³; Mandar Jog⁴; Robert Miller⁵; Baisong Huang⁶; Meetu Bhogal⁷; Susan Simonyi⁷

¹West Park Health Centre, Toronto, ON, ²Children's & Women's Health Centre of B.C., Vancouver, BC, ³McGill University, Montreal, QC, ⁴London Health Sciences Centre, London, ON, ⁵Dalhousie University, Halifax, NS, ⁶McKesson Specialty, Toronto, ON, and ⁷Allergan Inc., Markham, ON

MOBILITY is an ongoing observational study in patients receiving botulinum toxin type A (BoNTA) for various therapeutic uses, and provides an opportunity to evaluate healthcare resource utilization by this patient cohort. This interim analysis describes medication use, frequency of surgeries related to the condition treated with BoNTA, and types of rehabilitation services used by patients with adult focal spasticity (AFS) ($n=360$, 49% female, mean age 54 years) and cerebral palsy (CP) ($n=64$, 48% female, mean age 28 years). Among AFS patients, 44% received concomitant medications and 11% had surgery. Rehabilitation services were used by 50% of AFS patients, including one or more of the following: physiotherapy (34%), occupational therapy (14%), nursing support (4%), casting/splinting (16%), and admission to a long term care facility (1%).

Among CP patients, 41% received concomitant medications, 55% had surgery, and 50% received one or more of the following rehabilitation services: physiotherapy (28%), occupational therapy (8%), casting/splinting (19%), and admission to a long term care facility (5%). The most frequently prescribed medications for AFS patients were baclofen (73%), gabapentin (16%), and dantrolene (12%), and for CP patients, baclofen (73%) and gabapentin (8%). Patients with spasticity receiving BoNTA utilize a diversity of healthcare resources, supporting the need for ongoing multidisciplinary collaboration as part of their long-term management plan.

A 34

THE EFFICACY OF FUNCTIONALLY BASED STREAMING IN TRAUMATIC BRAIN INJURY

Nora Cullen; Kalyani Vimalasan; Tracy Aznar; Carolyn Go; Christina Taggart

Toronto Rehabilitation Institute, Toronto, ON

Objective: To examine the efficacy of a novel functionally-based streaming program for acquired brain injury rehabilitation which separates traumatic brain injury (TBI) patients into neurocognitive (NC) and neurophysical (NP) streams based on their respective needs. **Design:** A case-controlled design was used to compare TBI recovery before and after rehabilitation streaming program implementation in 2002. **Participants:** The control group consisted of 69 TBI patients admitted prior to 2002 who were retrospectively assigned to the NP or NC stream based on functional independence measure (FIMTM) motor transfer sub-scores. From this group, 41 patients served as the NP controls and 28 as the NC controls. For the functionally based streamed groups, 41 NP patients and 28 NC patients were included. **Methods:** Both control and streamed groups were matched according to age, Glasgow Coma Scale (GCS), and length of stay (LOS). FIMTM and Disability Rating Scale (DRS) data were collected at admission and discharge from both groups and analyzed using SPSS software. **Results:** All groups were comparable with respect to total FIMTM and GCS scores at admission. The NP streamed group had a significantly higher FIM efficiency for the motor subscale than its control ($p=0.01$). The NC streamed group had significantly less disability as measured by the DRS than its control ($p<0.05$). No other outcome measures were significantly different between groups. **Conclusion:** The streaming program shows promising results for advancing the efficacy of TBI rehabilitation as suggested by the improved FIMTM efficiency and DRS scores in streamed patients. Future research examining functional outcome measures at one-year post-discharge could further clarify the benefits of a streaming program.

A 35

CASE REPORT: COMMUNICATION AUGMENTATION WITH LORAZEPAM ADMINISTRATION IN A PATIENT WITH TETRAPLEGIA AND BRAIN INJURY

Vithya Gnanakumar¹; Daniela Lanc¹; Keith Sequeira^{1,2}

¹University of Western Ontario, and ²Department of Physical Medicine and Rehabilitation, Schulich School of Medicine, London, ON

Objective: Discuss the etiologies of decreased speech production responsive to oral lorazepam. **Case Summary:** This 29-year-old male developed C4 ASIA (American Spinal Injury Association) A tetraplegia secondary to a February 2010 snowmobile accident. Cardiac arrests in the first weeks of hospitalization resulted in aphasia and a suspected anoxic brain injury. Seven months later a capacity assessment done using eye movements and tongue protrusion deemed him competent in multiple domains. Significant spasticity affected his extremities and trunk, but not his face. Though he remained aphasic for 8 months, he spoke spontaneously in the hours following administration of 1 mg of oral lorazepam. The drug had been given

prior to a routine imaging test. Clonazepam was ineffective, but scheduled lorazepam resulted in speech, and improved mouth and tongue movements. Higher doses were more effective, but did not treat his spasticity or cause somnolence. He is maintained on 2 mg orally three times daily. *Literature review:* Oropharyngeal muscle spasticity, epilepsy, post-traumatic mutism, akinetic mutism, and cerebellar mutism are potential diagnoses. Intracranial anatomic localizations and lorazepam mechanisms of action are discussed. Evidence against the use of lorazepam in traumatic brain injury is reviewed. *Conclusion:* We present an interesting case of posttraumatic mutism responsive to lorazepam.

A 36

ATYPICAL SUBTROCHANTERIC FEMORAL SHAFT FRACTURES AND THE ASSOCIATION WITH BISPHOSPHONATES. A REHABILITATION PERSPECTIVE

Thomas Miller; Michael Payne; David Sanders; Mark Macleod

University of Western Ontario, London, ON

Bisphosphonates is an important drug in reducing the incidence of fractures and have an excellent benefit to risk ratio. The long-term effects of bisphosphonates on bone remains unclear. We report 3 cases of non-traumatic atypical femoral shaft fractures in patients on a long-term bisphosphonate (alendronate). The patients were female and aged in range from 71 to 88. All shared the following features (1) no major trauma or lack of trauma precipitating a femur fracture (2) prodromal pain in the mid- thigh, (3) bisphosphonates for greater than 10 years (alendronate), (4) and radiographic features of thickening of external cortex, and a transverse fracture of the femur. All patients required internal fixation with intramedullary rod (IM). Multidisciplinary, inpatient rehabilitation consisted of weight bearing exercises, and discontinuation of bisphosphonate treatment. Average admission FIM of 80.4 and discharge FIM of 108 are similar to the rehabilitation outcomes in the older hip fracture patient, as was the LOS of 27.2 days. The improvement primarily attributed to the motor FIM score. Subtrochanteric femoral shaft fractures are much less common than hip fractures, and a subset of these subtrochanteric fractures have a unique fracture pattern (transverse) with a clear association to prolonged bisphosphonate therapy. The goals and challenges of rehabilitation are similar to hip fracture patients with the added component of the long term treatment of the osteoporosis and suggested discontinuation of bisphosphonates.

A 37

HOW WELL DO HEALTH CARE PRACTITIONERS PREDICT OUTCOME IN PEDIATRIC TRAUMATIC BRAIN INJURY?

Vithya Gnanakumar¹; Naveen Poonai^{1,2}; Lisa Pearlman^{1,2}; Rhiannon Taranik^{1,2}; Craig Campbell^{1,2,3}

¹University of Western Ontario, ²Department of Pediatrics, Schulich School of Medicine and Dentistry, and ³Clinical Neurological Sciences and Epidemiology, London, ON

Objective: To determine how accurately pediatric acute care clinicians (intensivists, neurologists, neurosurgeons, neuroscience nurse practitioners) and rehabilitation physicians (physical medicine and rehabilitation physicians) predict outcome in moderate and severe pediatric brain injury. *Design:* Cross-sectional survey. *Subjects:* Twenty-eight acute care clinicians ($n=14$) and rehabilitation clinicians ($n=14$). *Methods:* Retrospective data was used to create summaries (demographics, injury mechanism, GCS, clinical parameters, and neuroimaging) of the first 24-hours of hospitalization for 39 actual patients with known outcomes. Clinicians predicted mortality and outcome (Glasgow Outcome Scale). *Results:* In this ongoing study, ten responses (6 acute, 4 rehabilitation) are avail-

able. Participants report using Glasgow coma scale, vital signs, and neuroimaging most frequently for prognostication. 86% (330/338) of predictions of early mortality, and 52% (191/370) of predictions of GOS at hospital discharge are accurate. Given three choices for each case (confident, somewhat confident, not confident), clinicians are 'confident' about 40% (147/366) of their predictions. *Conclusion:* Additional responses will allow for a comparison of predication accuracy between acute care and rehabilitative TBI specialists. This study provides information about prediction patterns in pediatric TBI from differing health care team members. Such knowledge is relevant for team members as they work together to provide consistent messages to families about prognosis.

A 38

LIFE-ALTERING CONSTIPATION FOLLOWING INITIATION OF INTRATHECAL BACLOFEN INFUSION THERAPY FOR SPASTICITY MANAGEMENT

Daniela Lanc^{1,2,3}; Vithya Gnanakumar^{1,3}; Keith Sequeira^{1,2,3}

¹Department of Physical Medicine and Rehabilitation, ²Schulich School of Medicine, and ³The University of Western Ontario, London, ON

Case Summary: We report on a 57-year-old man with T7 paraplegia resulting from a motorcycle collision 36 years prior to the onset of severe spasticity (Ashworth Scale score 3–4) subsequently treated with intrathecal baclofen infusion therapy (ITBI). Previous mild constipation was present and was managed through a 15-min daily bowel routine with digital rectal stimulation. Initiation of ITBI improved spasms but instigated profound constipation resulting in overflow incontinence of stool and in great emotional distress to the patient. Conservative medical management has failed to improve bowel symptoms. We have been unable to establish a baclofen dose that sufficiently relieves spasticity without compromising bowel motility. In this case, gastrointestinal motility may actually depend on an indeterminate level of spasticity to enhance function. *Literature Review:* Spasticity is a common sequela of upper motor neuron spinal cord injury. Intrathecal baclofen infusion therapy is a safe and effective treatment for intractable spasticity in patients with SCI. Some degree of constipation is a recognized but infrequent complication of ITBI, occurring in 3–10% of treated patients. *Conclusion:* ITBI may significantly impact bowel motility and decrease quality of life in some patients. For patients considering ITBI, this must be discussed in the informed consent process.

A 39

WHEELCHAIR PROPULSION TEST: RELIABILITY OF SPEED, PUSH FREQUENCY AND PUSH EFFECTIVENESS

Sussan Askari^{1,2}; Lee R. Kirby²

¹Division of Physical Medicine and Rehabilitation, and ²Dalhousie University, Halifax, NS

Objective: To assess the reliability of the derived measures (speed, push frequency and push effectiveness) of the Wheelchair Propulsion Test (WPT), a simple new outcome measure for people who propel their manual wheelchairs with their hands and/or feet. *Design:* Repeated measures. *Subjects/Patients:* Twenty people who had used their manual wheelchairs for ≥ 2 weeks, using hand and/or foot propulsion. *Methods:* We administered the WPT, collecting data including the time to complete the 10 m distance and the number of propulsive cycles. From these data, we derived speed (m/sec), push frequency (cycles/sec) and push effectiveness (m/cycle). The WPT was administered twice by one tester to assess test-retest and intra-rater reliability and a third time by a second tester to assess inter-rater reliability. *Results:* The Pearson correlation coefficients for test-retest and intra-rater reliability were 0.96 for speed, 0.90 for

push frequency and 0.75 for push effectiveness. For inter-rater reliability the coefficients were 0.96 for speed, 0.83 for push frequency and 0.89 for push effectiveness. *Conclusions:* The reliabilities of the derived measures from the WPT range from very good to excellent. Although further work is needed, the WPT holds promise to complement existing measures of wheelchair mobility.

MSE 01

LEVOCARNITINE TREATMENT IN SPINAL CORD INJURY: A POTENTIAL TREATMENT FOR FATIGUE

Jane Wacker

University of British Columbia, Vancouver, BC

Fatigue is a prevalent symptom experienced by many individuals with spinal cord injury (SCI). Researchers have estimated that the prevalence of fatigue, significant enough to disrupt the normal physical function of outpatients, ranges from 57% to 65% in the SCI population. Levocarnitine (L-carnitine) is a naturally occurring substance that is involved in mammalian energy metabolism. It acts as a carrier molecule that shuttles long chain fatty acids into the mitochondrial matrix. This process increases the availability of fatty acid substrate in the mitochondria for metabolic oxidation and energy production. L-carnitine administration has successfully decreased fatigue in numerous medical conditions including: cancer chemotherapy induced fatigue, multiple sclerosis, chronic fatigue syndrome, celiac disease, and certain chronic neurologic conditions. L-carnitine has never been studied as a treatment for fatigue in individuals with SCI. This paper discusses the potential use of L-carnitine as a treatment for fatigue in individuals with SCI and outlines future research possibilities.

MSR 01

THE EFFECT OF SOCIOECONOMIC AND HEALTH FACTORS ON PROSTHETIC USE AFTER LOWER EXTREMITY AMPUTATION

Veena Agrawal¹; Ryan Skrabek^{1,2}; John Embil^{1,3}; Patrick Gross⁴; Elly Trepmann^{1,5}

¹University of Manitoba, ²Section of Physical Medicine and Rehabilitation, Department of Internal Medicine, Section of Infectious Diseases, ³Department of Internal Medicine, ⁴Department of Physiotherapy, Rehabilitation Hospital, Health Sciences Centre, and ⁵Department of Medical Microbiology, Winnipeg, MB

Objective: To determine predictors of functional prosthetic use after transtibial (below knee) or transfemoral (above knee) amputation. *Design:* In-person or telephone survey of patients two years after prosthetic fitting and completion of primarily rehabilitation. *Setting:* University-based tertiary care rehabilitation hospital. *Participants:* Fifty-two patients (41 [79%] male; 39 [75%] diabetic; mean age, 59±14 years; mean BMI, 29±5 kg/m²) who had below knee (43 limbs) or above knee (10 limbs) amputation, most frequently for peripheral vascular disease (44 [85%] patients). *Main Outcome Measures:* Level of ambulation (K-level) was determined upon completion of rehabilitation. Frequency of prosthetic use, functional prosthetic use (Houghton Scale), activity level with prosthesis (Locomotor Capabilities Index, LCI), and self-rated satisfaction were determined approximately two years after completion of rehabilitation. *Results:* Functional prosthetic outcome (one or more outcome measures) was significantly associated with younger patient age, higher household income, higher level of completed education, greater level of ambulation (K-level) at discharge from rehabilitation, fewer medical comorbidities, and patient satisfaction with prosthetist, cosmetic appearance, and prosthetic fit. There was no demonstrated effect of ethnicity, community of residence, amputation level, living arrangement, pre-morbid independence, or specific comorbidities on frequency of prosthetic use, functional prosthetic use (Houghton Scale), or activity level

(LCI). *Conclusions:* Several factors, including level of ambulation upon completion of rehabilitation, may predict functional prosthetic outcome after below or above knee amputation.

RE 07

THE CLASSIFICATION, DIAGNOSIS, PATHOPHYSIOLOGY AND MANAGEMENT OF THORACIC OUTLET SYNDROME AND A REVIEW OF THE POSSIBLE ROLE OF BOTULINUM TOXIN IN THE TREATMENT OF THIS SYNDROME

Jacqueline Foley

University of British Columbia, Vancouver, BC

Objective: To discuss the classification, diagnosis, pathophysiology and management of Thoracic outlet syndrome (TOS). TOS is a complex entity that is characterized by different neurovascular signs and symptoms involving the upper limb. It is defined as upper extremity symptoms due to compression of the neurovascular bundle in the area of the neck just above the first rib. Compression is thought to occur at one or more of the three anatomical compartments: the interscalene triangle, the costoclavicular space and the retropectoralis minor spaces. The clinical presentation can include both neurogenic and vascular symptoms. TOS can be difficult to diagnose because there is no standardized objective test that can be used and the clinician must rely on history and several positive findings on physical exam. The medial antebrachial cutaneous nerve conduction may be a sensitive way to detect pathology in the lower trunks of the brachial plexus which is promising for future research. Treatment options continue to be conservative and surgical. However, for those who have failed physical therapy there is research to suggest that botulinum toxin may help with symptom relief. However, given that there has been conflicting evidence, further research is required using randomized controlled trials.

RR 02

THE OPINION OF ORTHOPAEDIC SURGEONS IN ONTARIO ON HIP PRECAUTIONS FOLLOWING PRIMARY TOTAL HIP ARTHROPLASTY FOR OSTEOARTHRITIS

Nadira Rambihar¹; John Flannery²; Rajiv Gandhi³; Andrea Furlan²; Nizar Mahomed³

¹University of Toronto, ²Toronto Rehabilitation Institute, and ³University Health Network, Toronto, ON

Objectives: To describe and compare the beliefs and practices of Orthopaedic Surgeons in Ontario on hip precautions following primary total hip arthroplasty (THA) for osteoarthritis (OA), and to identify any predictors of hip precaution recommendations. *Design:* Survey. *Setting:* Active members of the Ontario Orthopaedic Association (OOA). *Participants:* 414 surveys were sent to members of the OOA, with 170 respondents. *Interventions:* Not applicable. *Main Outcome Measures:* A 15-question, self reported survey was designed through expert consensus and literature review. Surgeons were asked to provide demographic data, their belief and practice of prescribing hip precautions and identify functional limitations they believed were necessary following primary THA for OA. *Results:* 84% (n=119) of surgeons believed in hip precautions following THA, and 88% (n=128) advised hip precautions. There was variability in mobility restrictions advised, duration of these restrictions and recommended functional applications of hip precautions. There were no predictors of hip precaution recommendations. However, 100% of surgeons performing a posterior approach to THA believed and advised hip precautions. *Conclusions:* There is no uniform consistency between surgeons on which hip precautions are necessary following THA and the duration they should be advised. The role of hip precautions following THA should be re-examined.

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