

tients had 81 instances of neuromodulation unit insertion. All patients received the TYRX antibiotic envelope. There were no incidences of infection involving antibiotic envelope-containing implants over an average follow-up period of 11 months. In 77 consecutive cases of neuromodulation unit implantation prior to usage of the antibiotic pouch, there were 4 instances of infection (5.2%). *Conclusions:* Our single center experience demonstrates a significant drop in the rate of infections with the use of an antibiotic envelope for neuromodulation unit implantation. We consider the routine use of the envelope to be a cost-effective method of infection avoidance.

P.085

Spinal cord stimulator for chronic pain syndromes: a national awareness survey

AA Al Jishi (Hamilton)* H Suresh (Hamilton)* F Farrokhyar (Hamilton)

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Background: The expansion of neuromodulation intervention for complex pain syndromes has been significant in the last few decades. Considering the increased load of patients, we thought about evaluating the level of awareness among different medical experts to help assessing their familiarity with spinal cord stimulator (SCS). *Methods:* Survey has been sent to general practitioners, family physicians, pain specialists and spine surgeons. The main outlets of the survey aims to assess the followings:

1. The main source of their knowledge about SC
2. Familiarity with candidates who may benefit from SC
3. Introducing the concept of SC to their patients as an adjunctive treatment
4. Frequency of patients' referral for SC
5. Main reason for referring their patients
6. Familiarity with centres providing SCS

Results: EResults will be provided upon analysing the data from the collected surveys. *Conclusions:* The expansion in neuromodulation is expected to help patients with intractable pain syndromes. Hence, the survey would potentially help to explore the deficiencies in health workers awareness about SCS and outline future directions toward proper patients counseling and optimising their referral to neuromodulation centres.

SPINE AND PERIPHERAL NERVE SURGERY

P.086

Endoscopic assisted ulnar nerve decompression: a technical note

MB Alotaibi (Ancaster)* B Yarascavitch (Hamilton) K Reddy (Hamilton)

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Background: Cubital tunnel syndrome is the second most frequent upper extremity entrapment neuropathy. Various surgical approaches have been described in the literature for Ulnar nerve decompression, ranging from open In-situ decompression to endoscopic Ulnar nerve release. In this technical note we describe a new endoscopic approach

for Ulnar nerve decompression. *Methods:* Four cadavers, a total of eight fresh arms were dissected using our new endoscopic technique. The technique involves a 2.5cm skin incision placed 2.5cm distal to the medial epicondyle, and perpendicular to the long nerve axis. Early identification of motor branches was achieved using this skin incision. Under endoscopic view using 30 degree rigid scope Ulnar nerves were decompressed *Results:* Early identification of motor branches was achieved using distally placed skin incision in all eight arms. *Conclusions:* The safety of identifying Ulnar nerve motor branches in the early steps of the procedure, and the avoidance of scar formation over the elbow joint are the proposed advantages of this approach. More clinical studies needed to validate this outcome.

P.087

Association of pre-operative hyponatremia with morbidity and mortality in patients undergoing elective degenerative spine surgery

R Bokhari (Montreal)* N Al-Garni (Montreal) A Nooh (Montreal) Y Marwan (Montreal) C Santaguida (Montreal) D Sciubba (Baltimore) M Weber (Montreal)

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Background: Hyponatremia has been found to be associated with increased complications in a variety of surgical populations. No study looked specifically at patients undergoing spine surgery. We also specifically address whether it has an effect on the typical low-risk patient admitted for degenerative spine disease, a population that forms the major bulk of clinical practice. *Methods:* Data was obtained from the American college of surgeons National Surgical Quality Improvement Program (ACS-NSQIP). All patients who underwent elective spinal surgery for degenerative disease from 2011 to 2013 were included. The two arms (normonatremic and hyponatremic) were then compared. *Results:* A total of 58049 patients were included, 3037 were hyponatremic. Hyponatremic patients were older and had more comorbidities. They also developed more minor and major complications. When all comorbidities were controlled for, hyponatremia was only associated with increased minor but not major complications. These patients were more likely to require a blood transfusion (OR=1.23, CI 1.10-1.43) and a prolonged hospital stay (OR=1.52, CI 1.33-1.75). *Conclusions:* This study finds an association between hyponatremia and postoperative adverse events in a low risk population that forms the major bulk of clinical practice. This addresses a potential target for quality improvement strategies with significant cost saving implications.

P.088

Spinal computer-assisted intra-operative three-dimensional navigation in Canada: a population-based time trend study

D Guha (Toronto)* A Moghaddamjou (Toronto)* NM Alotaibi (Toronto) A Yee (Toronto) VX Yang (Toronto)

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Background: Spinal computer-assisted navigation (CAN) is proven to increase instrumentation accuracy. Adoption remains limited by workflow restrictions, learning curves and costs. Here, we assess spinal CAN usage among Ontario surgeons to identify gaps

in application, and temporal trends of usage. *Methods:* A prospectively-collected database of provincial insurance billables and diagnostic codes was reviewed retrospectively, from 2002-2014. Patients undergoing instrumented spinal fusions or percutaneous vertebroplasty/kyphoplasty were identified. Fee and diagnostic codes were applied to distinguish surgical indication and approach. The use of intra-operative navigation was determined for each case. *Results:* We identified 4607 instrumented spinal fusions in our cohort. Most cases were performed by orthopedic surgeons (63.2%) and the remainder by neurosurgeons. Of 2239 cases with identifiable etiology, CAN was utilized in 8.8%, predominantly for trauma and degenerative pathologies rather than deformity. In univariate analyses, CAN was used more often by neurosurgeons (21.0% vs. 12.4%, $p < 0.001$), in academic institutions (15.9% vs. 12.3%, $p < 0.001$), and when performed in/after 2010 (18.9% vs. 8.9%, $p < 0.001$). Differences by specialty and year remained significant in multiple logistic regression. *Conclusions:* Spinal CAN has proven benefit for instrumentation accuracy, but is used preferentially by academic neurosurgeons. Significant gains must be made in cost and usability to improve access across disciplines and institutions.

P.089

A comparison of perioperative complication rates in adult spinal deformity correction with one versus two surgeons

K Parvez (Victoria) J Hsu (Victoria) Z Ivanishvilli (Victoria) S Boisvert (Victoria) M Warren (Victoria) E Frangou (Victoria) D Warren (Victoria)*

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Background: Morbidity can be high in the management of adult spinal deformity patients. Complications include blood loss (EBL), durotomy, radicular pain, and postoperative hardware failure. Utilization of one versus two spinal surgeons in spinal deformity correction reduces overall perioperative morbidity is unclear. *Methods:* All procedures were performed by surgeons at a single institution between January 2012-2015. Patients were followed for a minimum of one year and maximum of four years. We retrospectively reviewed 60 cases of adult spinal deformity. Our cohort was divided into 1 versus 2 surgeons (12 vs 48 cases). We analyzed these cases for estimated blood loss and peri-operative complications. *Results:* Cases involving long thoracic to pelvis correction (T3-T6) was 20.8% in the 2 surgeons group and 8.3% in the 1 surgeon group. The EBL > 3.0 L for 1 versus 2 surgeon groups were 25% and 41.6% respectively. Major complications in the 1 versus 2 surgeon group were 25% and 47.9% and the revision rates were 25% versus 37.5%. The percentage of minor complications in the 1 versus 2 surgeon group was 33.3% versus 14.6%. *Conclusions:* Utilizing two surgeons did not reduce complication rates. Procedures performed by two surgeons were more extensive deformity corrections. The extent of correction is the likely explanation for differing complication rates.

P.090

The predictors of patient morbidity after adult spinal deformity correction: bone mineral density and the extent of deformity correction

Z Ivanishvilli (Victoria) J Hsu (Victoria) K Parvez (Victoria) S Boisvert (Victoria) M Warren (Victoria) E Frangou (Victoria) D Warren (Victoria)**

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Background: Instrumentation failure (IF) such proximal junctional kyphosis/failure or distal junctional failure (PJK/PJF/DJF), rod fracture and screw-loosening can cause morbidity in patients with spinal deformity correction. Factors such as bone mineral density (BMD) or region of deformity correction may play a role in postoperative IF. *Methods:* We reviewed the relationship between IF and BMD or extent of spinal deformity. IF includes PJK/PJF/DJF, fractured rod, screw-loosening, radiculopathy, and non-union. BMD groups included Normal, osteopenia/osteoporosis, and Unknown. The extent of correction included Lumbar, Short Thoracolumbar (5-8 levels), Long Thoracolumbar (8 to 12 levels), and Cervical-thoracic. *Results:* 60 patients (41:19 F:M) were included, with average age of 65. Total IF = 29 patients (48.3%). Normal BMD in N=14, with half of them (50.0%) developing IF; Low BMD in N=15, with one-third of them (33.3%) developing IF. Lumbar correction was performed in N=19, with IF in 36.8%; Short Thoracolumbar correction was performed in N=28, with IF in 46.4%; Long Thoracolumbar correction was performed in N=11, with IF in 81.8%; and Cervical correction in N=2, with no postoperative IF. *Conclusions:* Patients that received long-segment thoracolumbar had the highest rates of postoperative morbidity. We did not demonstrate an association between abnormal BMD and postoperative IF. A larger study would be needed for further investigations.

P.091

Anterior surgical fixation for cervical spine flexion-distraction injuries

AS Jack (Edmonton) G Choy (Hamilton) G Hardy St-Pierre (Edmonton) R Fox (Edmonton) A Nataraj (Edmonton)*

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Background: Optimal surgical management for flexion-distraction cervical spine injuries remains controversial with anterior, posterior, and circumferential fixation being accepted. Here, we examined risk factors for clinical and radiographic failure in patients with one segment cervical flexion-distraction injuries having undergone anterior surgical fixation. *Methods:* A retrospective review of 57 consecutive patients undergoing anterior fixation for cervical flexion-distraction injuries between 2008-2012 was performed. The primary outcome was the number of patients requiring additional surgical stabilization and/or radiographic failure. Data collected included age, gender, mechanism and level of injury, facet pattern injury, and vertebral endplate fracture. *Results:* Six patients failed clinically and/or radiographically (11%). Four patients (7%) required additional posterior fixation. Two patients identified met radiographic failure criteria, however had fused radiographically, were stable clinically, and no further treatment was pursued. Progressive kyphosis and translation correlated with need for revision ($p < 0.05$ and $p = 0.02$,