

records for new spine surgery consultations from May 2011 through October 2012 were correlated with subsequent lumbar surgery. Two tertiary centers (TC1 and TC2) were compared with reference to the Health Region of origin of the patient. Wait times for surgery and utilization of spine pathway clinics was analyzed. *Results:* TC1 had significantly higher rates of spine fusion and lumbar spine surgery. The percentage of new referrals that went to surgery was 14.0% in TC1 and 11.8% in TC2 ($p < 0.0001$, Z-Test). Population-based calculation of the rate of new referrals was $1581/482387 = 0.33\%$ for TC1 vs. $970/601739 = 0.16\%$ for TC2 ($p < 0.0001$, Z-Test). Utilization of the spine pathway clinic was lower and wait times for surgery were longer in TC1. *Conclusions:* Causes of regional variation are unknown and likely multifactorial. In Saskatchewan, the most striking variance was that the rate of primary care referrals for lower back conditions in regions served by TC1 was double that for TC2. This could potentially be reduced through more regionally consistent utilization of the spine pathway.

F.07

Utilizing NeuroTouch, a virtual reality simulator, to assess and monitor bimanual performance during brain tumor resection

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Background: NeuroTouch simulator provides the potential to determine performance metrics, but validation and easily utilized software are essential before implementation of this platform into neurosurgical training. *Objectives:* Evaluate and validate neurosurgical performance metrics for simulated brain tumors resection. Develop software and a global web based system to allow utilization of these metrics. *Methods:* The bimanual resection of 8 simulated brain tumors with differing complexity was evaluated. Software was developed to automatically generate all the metrics from NeuroTouch data output including: blood loss, tumor percentage resected, total brain volume removed, maximum and sum of forces utilized, efficiency index, ultrasonic aspirator path length index (UAPLI), coordination index and ultrasonic aspirator bimanual forces ratio (UABFR). Six neurosurgeons and 12 residents were evaluated. *Results:* Resident performance was significantly more impaired than neurosurgeon by increasing tumor complexity. Significant differences were found between neurosurgeons, senior, and junior residents on efficiency index and UAPLI. UABFR outlined significant differences between senior and junior residents. Coordination index demonstrated significant differences between junior residents and neurosurgeons. *Conclusions:* Utilizing metrics employed the NeuroTouch platform differentiated novice from expert performance. Software was developed for metrics and will be made available online for all NeuroTouch users allowing global comparison of neurosurgical performance.

F.08

Endoscopic resection of colloid cyst: long-term followup with 65 patients

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Introduction: Colloid cysts of the third ventricle are rare, histologically benign lesions that can be associated with obstructive hydrocephalus. Endoscopic removal developed as an alternative to microsurgical craniotomy as a less invasive surgical treatment. This review examines the endoscopic surgical experience for a consecutive series of patients with colloid cyst of the third ventricle. *Methods:* Patients with a diagnosis of "colloid cyst of the third ventricle" who were treated in Calgary between January 1994 and July 2014 were reviewed using a clinic database and registry. *Results:* 95 patients were identified. 30 patients without hydrocephalus underwent serial MRI and clinical observation with one patient developing hydrocephalus leading to surgical treatment. 65 patients underwent endoscopic treatment of their colloid cyst (male=34; female=31). The mean age at diagnosis was 45.5 years. 3 patients had been previously treated with other surgical approaches. All surgically treated patients had hydrocephalus and hydrocephalus resolved in all 65 patients. 1 patient sustained an injury to the internal capsule with transient hemiparesis. Mean followup was 8.2 years (range 0.1-19.3 years). 3 patients experienced colloid cyst recurrence treated with a second endoscopic removal. *Conclusion:* Endoscopic treatment of third ventricle colloid cysts can be performed with low risk as an alternative to microsurgical resection.

F.09

Disparity of volumetric and linear measurements of meningioma response to gammaknife radiosurgery

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Objective: To identify clinical, radiological, and dosimetric predictors of meningioma response to stereotactic radiosurgery (SRS), and post-SRS adverse radiation events (ARE). *Methodology:* A retrospective review was conducted. Seventy-five patients had at least 24 months of clinical and radiological follow-up. Tumor control was defined as any volumetric/diametric change less than +10%. Volumetric measurements were made using T1-Gadolinium enhanced 3T MRI scans with ITK-SNAP2.2 software. Univariate statistics were used to identify predictors of post SRS AREs. *Results:* Females comprised 69.3% of patients, mean treatment age was 58.6 years, and median follow up was 36.2 months. Twenty-one patients had undergone prior surgical resection. Volumetric tumor control (52%) was inferior to diametric control (92%). Twenty-six patients (34.6%) experienced some form of new-onset complication after SRS: Headache (17.3%), cranial neuropathy (10.6%), speech impairment (2.7%), tremor (2.7%), and ataxia (1.3%). Fourteen patients (18.7%) experienced new onset T2 signal change signifying of edema; eight of these patients were symptomatic. Lower Conformity index (1.24 vs. 1.4), and higher treatment-volume ratio (TVR) (0.80 vs. 0.72) were significantly associated with development of edema after SRS ($p < 0.05$,

power > 0.8). *Conclusion:* Volume-based reporting of SRS outcomes for meningiomas is more accurate for reporting tumor control. Conformity index and TVR were identified as predictors of edema following radiosurgery.

F.10

Recent trends in hospitalization and in-hospital mortality associated with traumatic brain injury in Canada: a nationwide, population-based study

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Background: Traumatic brain injury (TBI) is the leading cause of traumatic death and disability worldwide. We examined nationwide trends in TBI-related hospitalizations and in-hospital mortality between April 2006 and March 2010 using a population-based database that is mandatory for all hospitals in Canada. *Methods:*

Trends in hospitalization rates were analyzed using linear regression. Independent predictors of in-hospital mortality were evaluated using logistic regression. *Results:* Hospitalization rates remained stable for children and young adults, but increased considerably among elderly adults (ages 65 and older). Falls and motor vehicle collisions (MVCs) were the most common causes of TBI hospitalizations. TBIs caused by falls increased by 24% ($p=0.01$), while MVC-related hospitalization rates decreased by 18% ($p=0.03$). Elderly adults were most vulnerable to falls, and experienced the greatest increase (29%) in fall-related hospitalization rates. Young adults (ages 15-24) were most at risk for MVCs, but experienced the greatest decline (28%) in MVC-related admissions. There were significant trends towards increasing age, injury severity, comorbidity, hospital length of stay, and in-hospital mortality. However, multivariate regression showed that the odds of death decreased over time after controlling for relevant factors. *Conclusions:* Hospitalizations for TBI are increasing in severity and involve older populations with more complex comorbidities.