Table: Sensitivity and specificity estimates for the simple and complex hedges

Neurological condition (total number of articles)	Sensitivity (95% CI)			Specificity (95% CI)		
	Simple hedge	Complex hedge	p-value	Simple hedge	Complex hedge	p-value
Migraine (n=321)	86.6 (82.4, 89.9)	88.5 (84.5, 91.5)	0.0313	99.9 (99.8, 100.0)	99.9 (99.8, 99.9)	0.1250
Stroke (n=1848)	70.9 (68.8, 73.0)	89.4 (87.9, 90.7)	< 0.0001	98.9 (98.6, 99.1)	97.0 (96.7, 97.4)	< 0.0001
Dementia (n=1401)	48.4 (45.8, 51.0)	83.4 (81.4, 85.3)	< 0.0001	99.2 (99.0, 99.1)	97.3, 96.9, 97.6)	< 0.0001
Epileptic seizures (n=1028)	63.8 (60.8, 66.7)	83.9 (81.6, 86.1)	< 0.0001	99.3 (99.1, 99.5)	99.2 (99.0, 99.4)	< 0.0001
Parkinson's disease (n=1002)	60.8 (57.7, 63.8)	92.3 (90.5, 93.8)	< 0.0001	99.7 (99.6, 99.8)	98.6 (98.4, 98.9)	< 0.0001
Multiple sclerosis (n=1000)	93.7 (92.2, 95.0)	95.2 (93.7, 96.4)	0.0001	99.7 (99.5, 99.8)	98.1 (97.8, 98.3)	< 0.0001

P.004

Diagnostic evaluation of cerebral fat embolism: single center retrospective review

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doi: 10.1017/cjn.2017.89

Background: Cerebral Fat Embolism (CFE) is a rare though potentially devastating complication of orthopedic injury which can present with neurologic deterioration. Although specific findings have been described, definitive diagnosis of CFE remains challenging. *Methods:* Retrospective chart review from a major U.S. trauma hospital. *Results:* Of 33 patients with CFE, all had long bone fractures, 15 had rib fractures, and 16 occurred following orthopedic surgery for long bone fracture. Cutaneous petechiae were documented in 21%. Diagnostic brain MRI was performed in 26 patients. MRI revealed diffusion-restricting lesions in 24 (92%), with 17 (65%) demonstrating the classic "starfield" pattern, and 14 (54%) with hypointense signal on blood sensitive sequences. Transcranial Doppler (TCD) revealed active microemboli in 9 of 17 (53%) cases. Ophthalmologic consultation occurred in 13 with 9 patients found to have retinal hemorrhage or cotton wool spots suggestive of Purtscher or Purtscher-like retinopathy. "Starfield" pattern on MRI was seen in all 9 patients with retinal findings. TCD microemboli were not associated with retinal findings. *Conclusions:* The optimal diagnostic workup of CFE is complicated by confounding conditions, the unknown sensitivity of diagnostic modalities, and the unclear implications of findings on treatment and outcome. Nonetheless, brain MRI, TCD and ophthalmologic evaluation should be considered in all suspected CFE patients.

P.005

Painful epileptic seizures involving the insula

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doi: 10.1017/cjn.2017.90

Background: We have previously described painful epileptic seizures involving the primary and second somatosensory cortices. A recently encountered 24 year old man described left hemicorporial, painful seizures in association with a tumor involving the right insula. *Methods:* Case description with imaging and EEG. *Results:* The patient described frequent, sharp pains simultaneously involving the left face, upper and lower limbs and trunk that lasted from several seconds to a minute and were 10/10 in intensity. These markedly lessened in frequency but the severity of the pain persisted with a maintenance dose of 600 mg/day of carbamazepine. Neurological examination, including cortical sensation, was normal. MRI revealed a 3 cm rounded lesion deep to but immediately against the entire right insula but not extending cortically beyond the confines of the insula. EEGs have been unremarkable. The lesion has been stable for over 1 year. *Conclusions:* Insular seizures can produce brief, sharp, intense pain that involves the whole of the contralateral body simultaneously. This is in keeping with the insula as part of the pain matrix with connections with the thalamus. Stimulation of the posterior insula can produce hemicorporial pain without a march similar to that experienced by our patient.

General Neurosurgery

P.006

Engineering neurosurgery: role of inter-disciplinary collaboration in development of a remote controlled stereotactic system

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doi: 10.1017/cjn.2017.91

Background: Well-crafted engineering solutions have overcome technical challenges faced by surgeons. We present a collaborative effort to develop an innovative solution aimed at saving time and subsequently operating room costs in procedures utilizing a traditional stereotactic system. *Methods:* We met with our University's local engineering team to collaborate a solution over a much-appreciated intra-operative technology gap with respect to mechanical adjustment of a stereotactic frame's co-ordinates. AUTO-CAD software simulated our design, which was materialized with a 3D printer using PLA (polyactic acid). *Results:* We present a novel stereotactic system where co-ordinates can be digitally entered remotely to localize a point in 3D space. As such, this automated stereotactic frame decreases operative time when compared to manually adjusting a traditional stereotactic system such as the Leksell system. In addition our remote controlled stereotactic system helps minimize human-factor risks and allows one the option to modify stereotactic system co-ordinates from a non-sterile field. *Conclusions:* Marriage between Engineering and Neurosurgery can improve clinical outcomes for patients suffering from neurological diseases. We provide a grass roots

organization's attempt at overcoming an operative need by designing a remote controlled stereotactic system.

P.007

Symptoms free survival of ventriculoperitoneal shunt versus lumboperitoneal shunt in idiopathic intracranial hypertension: a systematic review

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doi: 10.1017/cjn.2017.92

Background: Idiopathic intracranial hypertension (IIH) is a unique disorder that is characterized by an intractable high intracranial pressure. Several interventions have been in clinical practice upon failure of medical management. Yet, none of the available modalities have been evaluated systematically for an CSF diverion procedure. *Methods:* We conducted a systematic review in order to compare the therapeutic efficacy of the most two common interventions, namely VPS vs. LPS. The complications rate and incidence of shunt revision were assessed. The electronic database from EMBASE, Medline, Cochrane databases, and references of review articles have been used. *Results:* A total of five retrospective comparative studies had been included out of 724 articles based on inclusion and exclusion criteria. A 2570 VPS were compared to 1832 LPS with 85% of heterogeneity. Although there was a tendency that suggests better outcome in VPS over LPS but it was not statistically significant [OR=0.91, 95% CI: 0.26-3.24]. Similar tendency was observed as well with shunt obstruction. *Conclusions:* The overall outcomes for stabilizing visual deterioration and improvement of headaches were similar among VPS and LPS. A large prospective multicenteric randomized controlled trial is needed in order to compare effectiveness of VPS and LPS, and also to establish a treatment guideline for IIH.

P.008

Anterior skull base surgery future: intraoperative flash visual evoked potentials a novel technique to lessen intraoperative optic nerves and chiasmal injury

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doi: 10.1017/cjn.2017.93

Background: Optic nerve/chiasmal injury is a devastating outcome that may happen during endoscopic surgery. Additionally, one of the goals of endoscopic skull-base surgery is visual improvement, currently there is limited ability of intraoperative visual pathway monitoring. We examine a novel technique using continuous flash visual evoked potentials (FVEPs). *Methods:* Eyes were stimulated by light stimulators (3 LEDs on each side, 640 nm peak wavelength, 10 ms pulse width, 3000mCd of luminous intensity). Uniform illumination was placed over eyelids. Recording electrodes were placed at Oz-Fz. The filter cuts were ≤5 Hz and 100 Hz with amplifier gain 20,000 or 50,000. EEG was recorded. Recordings were correlated to pre and post operative VFs and acuity. Droop in the FVEP was examined in relation to intraoprative events. *Results:* Thirty patients had FVEPs in addition to other neurophysiologic monitoring. Patients demographic data, co-morbidities, diagnosis, surgical approach, length of surgery, MAP, and blood loss during surgery were recorded. All patients' visual acuity and field deficits were evaluated by neuro-opthalmologist before their surgery and within 30 days after surgery. *Conclusions:* FVEP is reproducible throughout surgery and can predict the post surgical outcome. Additionally, we found that FVEP is transiently affected by different stages of surgery. Also boluses of propofol and electrocautery can artificially affect FVEP.

P.009

Cervicomedullary decompression through expanded endoscopic endonasal approach: our clinical experience

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doi: 10.1017/cjn.2017.94

Background: patients with ventral cervical-medullary compression require anterior decompression of the cervicomedullary junction. Odontoid resection can be accomplished through expanded endoscopic approach especially in cases of irreducible basilar invagination in which the pathology is situated well above the palatine line. *Methods:* We are presenting our experience at the Ottawa Hospital (TOH) over the last seven years in patients who underwent expanded endoscopic endonasal decompression of their cervicomedullary junction. 16 patients underwent such procedure, those patients with preoperative cervical instability underwent posterior fusion for stabilization at the same surgical setting. Follow up ranged from 9 months to 5 years. *Results:* All patients had severe symptoms of myelopathy and some lower cranial nerves dysfunction. All patients were extubated after recovery from anesthesia and allowed oral intake next day. patients demonstrated improvement in their symptoms and none of them required tracheostomy. 12.5% experienced transient velopharyngeal insufficiency. one patient had CSF leak which was successfully treated with lumbar drain and one patient developed infection from the posterior cervical fusion and required debridement. All patients were eventually discharged home. Postoperative imaging demonstrated excellent decompression of the anterior cervicomedullary junction pathology. *Conclusions:* The expanded endoscopic endonasal approach for odontoidectomy should be considered as a minimally invasive approach for anterior decompression in selected cases

P.010

5 layers reconstruction, superior semicircular canal dehiscence repair: our experience and surgical technique

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doi: 10.1017/cjn.2017.95

Background: Superior semicircular canal dehiscence (SSCD) is a recently described rare condition. SSCD symptoms include vertigo, oscillopsia, autophony, sound hypersensitivity , and conductive hearing loss. Patients with sever symptoms may require surgical treatment. Tranmastoid and middle fossa (MCF) approaches are common approaches. *Methods:* We are presenting our experience at the Ottawa Hospital over the last three years. Also we describe our multidisciplinary surgical approach and modalities to localize the SSCD intraoperatively. Demographic data, presenting symptoms, comorbidities, radiologic imaging, and surgery length were recorded. All patients had hearing and vestibular tests before and after their