Scores were significantly correlated with the blood pressure change during head-up tilt (OS:r=-0.445;NS:r=-0.354; p<0.001). Patients with orthostatic intolerance had significantly higher symptom scores compared to controls (OS:66.5±18.1 vs. 17.4±12.9; NS:19.9±11.3 vs. 10.2±6.8; p<0.001, respectively). Test-retest reliability: Both symptom scores were highly reliable (OS:r=0.956;NS:r=0.574, respectively; p<0.001) with an internal consistency of 0.978 and 0.729, respectively. **Conclusions:** Our initial results demonstrate that the ODSS is capable of producing valid and reliable Orthostatic and Non-Orthostatic Symptom Scores.

P.112

Hospital readmission following neurology discharge: A systematic review

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Background: Unplanned hospital readmission is inconvenient for patients, puts them at risk of harm, and is a resource strain. We reviewed available literature on risk factors for readmission following discharge specifically from neurology inpatient services with a focus on factors unique to non-stroke neurology admissions. **Methods:** We conducted a systematic search using PRISMA methodology of MEDLINE, EMBASE, and CENTRAL databases up to January 1, 2018. Two independent reviewers screened articles for inclusion. English-language articles were included that identified factors related to hospital readmission after discharge from a neurology service. Admissions with stroke as the primary focus were excluded. **Results:** Of 9508 unique abstracts, 25 met inclusion criteria and were included for review. Multiple factors impacting probability of readmission were identified including age, living alone, history of nonepileptic seizure, length of stay, services consulted during hospital stay, hospital volume, and severity of illness. **Conclusions:** There are identifiable risk factors that influence likelihood of readmission to hospital following discharge from neurology inpatient services, although the non-stroke literature is sparse. There is a need for future prospective work to investigate modifiable risk factors and opportunities to reduce readmission rates and improve patient safety.

P.113

Down Syndrome: robust neurophysiological perspectives

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Background: Down Syndrome (DS) has a mosaicism of presentations, but a number of common features. Cerebral evoked potentials (somatosensory, visual and auditory) can be higher in amplitude in DS. The aim of this study is to explore the value of the neurophysiological amplitude of three different modalities in DS individuals undergoing spinal surgery, or epilepsy evaluation. **Methods:** Standard procedure of EEG evaluation was conducted. We routinely monitor somatosensory (SSEP) and motor evoked potentials (MEP), using peripheral nerves stimulation and transcranial electrical stimulation during surgery. We report findings from 14 DS individuals age-matched to 14 individuals with idiopathic scoliosis **Results:** The amplitude of the SSEP is significantly higher in DS individuals than in age-matched controls using the same parameters. SSEP;10.2±2.5μV vs 2.4±2.3μV (p<0.05, paired t-test). The threshold for eliciting MEPs was also significantly lower in DS in comparison to controls, 175±20V vs 629±100V, (p<0.05, paired t-test). Interictal EEG showed high amplitude spike and waves, and greater intracortical coherence in DS with epilepsy than non-DS patients **Conclusions:** Robust neurophysiological findings showed high amplitude sensory evoked potentials, low threshold motor evoked potentials, and high amplitude spikes and wave, all reflect a common process of increased neuronal synchronicity and oscillatory behaviour in Down Syndrome.

P.114

Twice negative PCR in a patient with HSV-1 Encephalitis

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Case Description: A 64 year-old male presented with left-sided weakness and altered level of consciousness after a suspected seizure. MR Brain demonstrated right mesial temporal lobe diffusion restriction. Empiric antiviral and antibiotic treatments were initiated despite CSF negative for HSV/VZV and enteroviruses. Lumbar puncture on admission day five was unchanged and empiric treatments were discontinued. On day 13 he deteriorated into status epilepticus necessitating ICU transfer. A third lumbar puncture demonstrated elevated protein and HSV-1 positive PCR. Acyclovir was restarted with guarded prognosis. **Discussion:** Detection of HSV-1 in CSF is considered the diagnostic gold standard for HSV-1 encephalitis. The validated multiplex assay used in Alberta, Canada has a 95% level of detection significantly better than the recommended threshold for HSV laboratory diagnosis. Previous reports have indicated that CSF PCR may be negative early in the disease course. Others have suggested that initially negative/follow up positive HSV PCR cases may represent secondary reactivation or release from underlying tissue damage. Consideration of the full clinical picture is crucial in patients with HSV negative PCR. Continuation of antiviral therapy may be appropriate in select HSV PCR negative patients.

P.115

Association of phantogeusia with Parkinson Disease

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Background: Phantogeusia associated with Parkinson Disease has not heretofore been reported. **Methods:** A 59 year old right handed female presented with a four year history of a bitter, sour and sweet taste on her entire tongue and roof of her mouth, 8/10 intensity, constant, persistent, without any external stimuli. Drinking water tasted bitter and sour. The phantogeusia was unresponsive to dietary changes, gabapentine, and allergy medications. **Results:** Abnormalities in Neurological examination: Decreased blink frequency. Hypokinetic. Hypomimetic face. Mood appears sad. Cranial Nerve (CN) examination: CN lll, lV, Vl: Saccadization of horizontal eye movements. Motor Examination: Pill rolling tremor in right hand. 1+ cogwheel rigidity in left upper extremity. Gait: 2+ retropulsion. Chemosensory testing: Olfactory: Alcohol Sniff Test: 6 (anosmia). SNAP Phenylethyl Alcohol Threshold Testing left -2.5 (hyposmia)

& right > -2.0 (anosmia). Gustatory testing: Propylthiouracil Disc Taste test: 10 (normogeusia). Taste Testing Threshold: normogeusia to NaCl, Sucrose, HCl, Urea, and PTC. Other: DOPAPET: positive for Parkinson disease. Upper endoscopy: normal. **Conclusions:** Investigation for the presence of parkinsonian features in those with phantogeusia is warranted and chemosensory dysfunction including phantogeusia in those who presents with Parkinson's disease is worthy of exploration.

Other Neurosurgery (Adult and Paediatric)

P.116

Orbital lymphaticovenous malformation with intradural extension: a rare case

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Orbital lymphaticovenous malformations (LVM) are congenital vascular lesions that are typically infiltrative in nature. There have been reports of orbital LVMs extending intracranially through orbital fissures, but there have been no reports of intradural extension that we are aware of. We present the case of an otherwise healthy 25-year-old female with an orbital LVM extending intradurally. Imaging revealed an intraorbital lesion extending through a bony defect in the medial orbital roof to the orbitofrontal cortex. A modified orbitozygomatic approach was used to obliterate this lesion. A durotomy was created to examine the intradural extension of the lesion, which appeared as a lobulated red vascular structure emanating from the dura along the roof of the orbit. This was gradually and comprehensively bipolar coagulated and subsequently obliterated. Neurosurgical and ophthalmological collaboration was used in the surgical management of this case. In summary, we report the first case of an orbital LVM extending intradurally, and provide pre and post-operative imaging as well as images captured through the intraoperative microscope. Through this case we highlight the importance of an interdisciplinary approach when managing orbital LVMs, as both ophthalmological and neurosurgical expertise were critical in the success of the surgery.

P.117

A systematic review on opioid free analgesic techniques for supratentorial craniotomies

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Background: Post-craniotomy pain can be severe and undermanaged. While opioids are the mainstay treatment, they have the potential to interfere with neurological monitoring. The objectives of this review are: 1) to identify measures to provide opioid-free analgesia 2) to compare the effectiveness of non-opioid to opioid analgesia in post-craniotomy pain. **Methods:** A comprehensive search of EMBASE, MEDLINE, and the Cochrane Central Registry of Controlled Trials (CENTRAL) databases was conducted for RCTs evaluating the effect of opioid vs non-opioid pain control strategies in patients undergoing supratentorial craniotomy. **Results:** The literature search yielded 462 citations, 5 RCTs that met the inclusion criteria for a total of 250 patients. Scalp infiltration/block was found to provide equivalent analgesia to morphine[1] and fentanyl.[2] Morphine was associated with slightly higher postoperative nausea and vomiting. Paracetamol was less likely to induce nausea and vomiting,[3,4] but provided inadequate pain relief compared to nalbuphine,[3] tramadol,[3] morphine[4] and sufentanil.[4] Dexmedetomidine[5] provided similar analgesia to remifentanil but did delay the time to first dose of rescue analgesia with similar side effects. **Conclusions:** Based on the limited number of RCTs comparing opioid to non-opioid techniques, no definite recommendations can be made with regards to the optimal management of post-craniotomy pain. Considerations should be made for use of multimodal analgesia-including adjuvant analgesics.

P.118

Trigemino-cardiac reflex: a case report of intra-operative asystole in response to manipulation of the temporalis muscle

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Background: The trigemino-cardiac reflex (TCR) is a sudden onset of bradycardia, hypotension, apnea or gastric hypermotility during stimulation of the trigeminal nerve. **Methods:** We conducted a MEDLINE search for surgical cases of TCR and herein describe a case seen recently at our institution. **Results:** A 60 year-old female underwent a left orbitozygomatic craniotomy for resection of a skull-base tumor. Pre-operative anesthesia evaluation was unremarkable and negative for a history of cardiovascular disease. Intra-operatively, retraction with moderate force of the temporalis muscle consistently produced asystole. Cessation of retraction resulted in immediate return of sinus rhythm. Otherwise, intra-operative heart rate was 60-90 BPM. Post-operatively, vital signs and clinical course were unremarkable. The patient experienced a similar phenomenon during an operation 6 years earlier, when manipulation of tumor near cranial nerves IX/X resulted in bradycardia. TCR is the result of a polysynaptic brainstem network involving the afferent trigeminal sensory nucleus, the reticular formation, and the efferent vagal motor nucleus. **Conclusions:** This is a case of exaggerated vagal response following manipulation of the temporalis muscle. Our report emphasizes the importance for neurosurgeons and anesthesiologists alike to be wary of TCR in order to avoid deleterious consequences when operating on structures associated with the trigeminal nerve.

P.119

Industry relationships with neurological surgery in the 2015 Open Payments Database

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Background: The 2013 Physician Payments Sunshine Act mandates that all US drug and device manufacturers disclose payments to physicians annually in the Open Payments Database (OPD).