

challenged by variable recurrence rates. Less invasive methods of embolization of the middle meningeal artery (EMMA) could reduce the recurrence rates. Before adopting a newer treatment (EMMA), it is prudent to establish the outcomes from surgical drainage. The purpose of this study is to assess the clinical outcome and recurrence risk in surgically treated CSDH patients. Methods: A retrospective search of our surgical database was done to identify CSDH patients undergoing surgical drainage in 2019-2020. Demographic and clinical details were collected through chart review and a qualitative statistical analysis was performed. Results: A total of 136 patients (mean age-68 years; range-21-100 years; Male-105) with CSDH underwent surgical drainage with repeat surgery in 11.8%(n=16). Periprocedural mortality and morbidity were 8.8%(n=12) and 20.6%(n=28), respectively. No radiological follow-up was seen in 30(22%) of patients. Of those with follow-up, recurrence was seen in 21.7%(n=23). Mean hospital stay was 9.64 days. Conclusions: Our retrospective study showed periprocedural morbidity (20.6%) and mortality (8.8%) with a 21.7% risk of recurrence. This is likely due to older patients but is in keeping with what is reported in the literature.

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Contrast induced encephalopathy following endovascular therapy for the treatment of cerebrovascular disease

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Background: Contrast induced encephalopathy (CIE) is an underrecognized, adverse effect of contrast administration during endovascular procedures. A paucity of literature exists regarding CIE following treatment of cerebrovascular disease. As such, we sought to describe our institutional experience with this entity. Methods: We searched our neurovascular database for instances of CIE following endovascular therapy for cerebrovascular disease. We extracted patient data, including demographics, comorbidities, procedural data, symptoms, radiological findings, and treatment. Informed consent was obtained in all cases. Data was analyzed using descriptive statistics. Results: Two patients underwent coiling of cerebral aneurysms; four were treated for ischemic stroke (thromboembolism or large artery atherosclerosis). Mean age was 67.2 years. Risk factors for microvascular dysfunction were identified for most patients: hypertension (100%), obesity (83%), dyslipidemia (83%), prior stroke (83%), renal disease (80%), and connective tissue disorders (33%). Mean operative duration: 284.5 minutes. Mean contrast volume: 285.7 mL. Decreased level of consciousness and lateralizing neurological deficits were the most common CIE-related symptoms. Treatments included intravenous fluids, corticosteroids, and anti-hypertensives. Radiographic findings included effaced cortical sulci, parenchymal edema, and cortical/subarachnoid contrast enhancement. Conclusions: Here, we describe our

institutional experience with CIE following endovascular therapy for cerebrovascular disease. We hypothesize that CIE may be facilitated by pre-existing microvascular pathology.

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Ruptured intracranial infectious aneurysms: single Canadian center experience

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Background: Ruptured Intracranial Infected Aneurysms (IIAs) are relatively rare, but they portend high mortality. To our knowledge, there are no Canadian case-series on IIA, as well there is a relative paucity of international published experiences. Our purpose is to share the experience of a single Canadian tertiary centre in managing ruptured IIA and to conduct a systematic review. Methods: We did a retrospective case review series of adult patients with ruptured IIA treated at our institution. Secondly, we conducted a systematic review of literature on ruptured IIA between 2011-2021 inclusive. Results: At our institution, of a total 8 cases with ruptured IIA, 4 were treated endovascularly and 2 by surgical bypass. For the systematic review, we included 9 non-comparative studies with a total of 509 patients (318 males) and at least 437 ruptured IIA aneurysms. Favourable outcome was specified for 63.3% of patients (n=57). Regarding ruptured IIA, favourable clinical outcome was described in 59.3% (n=16). Conclusions: This study highlights a single Canadian tertiary centre experience in the management of IIA and compares it to the global trends of the last 10 years in a systematic review.

NEUROSURGERY (CNSS)

FUNCTIONAL NEUROSURGERY AND PAIN

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Unbiased whole brain circuit interrogation reveals neurons restoring walking after spinal cord injury

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Background: There is presently no cure for locomotor deficits after spinal cord injury (SCI). Very few therapies effectively

target the brain due to poor understanding of the brain's role post-SCI. Newly developed tissue clearing techniques have permitted unbiased three-dimensional circuit analysis, opening new opportunities for SCI-related brain interrogation. Methods: We established a novel brain interrogation pipeline by optimizing mouse brain clearing, imaging, and atlas registration. We leveraged a spontaneous recovery lateral hemisection model to analyze whole brain cell activity and connectivity with the lumbar cord using cFos immunolabelling and virus-mediated projection tracing. We identified a functionally and anatomically dynamic region correlating with recovery and interrogated its locomotor role with optogenetics. We assessed deep brain electrical stimulation (DBS) of this region in a more clinically relevant rat contusion SCI using an established bipedal robotic interface. Results: We unexpectedly uncovered the lateral hypothalamus (LH) to functionally and anatomically correlate with recovery. LH^{Vglut2} optogenetic stimulation significantly augmented locomotor function. LH DBS in rats acutely robustly augmented bipedal locomotion post-SCI. Conclusions: This is the first demonstration of the LH's role in locomotion post-SCI and is a novel DBS target that robustly augmented locomotor function, dependent on LH glutamatergic cells. LH DBS may be a promising intervention in humans.

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Subnuclear contact localization within the subthalamic nucleus in deep brain stimulation for Parkinson Disease

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Background: Therapeutic response from subthalamic nucleus (STN) deep brain stimulation (DBS) for Parkinson disease (PD) has been associated with proximity to an ideal target, commonly in the dorsal sensorimotor STN. Automated registration and atlas-based segmentation has allowed for contact localization within STN subnuclei. We sought to apply these methods to characterize the spatial distribution of our active contact placements. Methods: We conducted a retrospective analysis of 55 patients who underwent bilateral STN DBS for PD. Post-operative CT/MRI scans were non-linearly registered into a standard space, and DBS-electrodes were localized using Lead-DBS. 3-dimensional meshes from a segmented atlas (Ewert 2017) were utilized. Analysis was performed in MATLAB R2019b. Results: Mean active contacts were within sensorimotor STN bilaterally, located posteroinferiorly compared to reported ideal targets. Centroids fell within (left/right): sensorimotor (46%/40%), associative (22%/22%), limbic (0%/2%) and outside STN (32%/36%). Principal components analysis demonstrated most spatial variance is explained by the first component (left 65.8%, right 61.9%). Conclusions: We obtained contact locations in relation to STN subnuclei, allowing for an anatomically guided approach to our analysis. 66% of the active contacts were located within the STN, and most of the spatial variation occurred along a single dimension. Future directions include utilizing subnuclei localizations to investigate clinical outcomes.

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Cyberknife radiosurgery for trigeminal neuralgia: a retrospective review of 168 cases

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Background: Gamma Knife radiosurgery for the treatment of refractory trigeminal neuralgia is recognized as an efficient intervention. The CyberKnife, a more recent frameless radiosurgery alternative, has not been studied as extensively for this condition. The aim of this study is to evaluate the clinical outcomes of a first CyberKnife radiosurgery treatment on patients with medically refractory trigeminal neuralgia. Methods: A retrospective study of 166 patients (168 cases) with refractory trigeminal neuralgia treated since 2009 with CyberKnife radiosurgery at the Centre Hospitalier de l'Université de Montreal (CHUM). Results: Adequate pain relief (Barrow Neurological Institute (BNI) pain scores I-IIIb) was achieved in 146 cases (86.9%). The median latency period before adequate pain relief was 35 days (range 0-202 days). The median duration of adequate pain relief was 15.8 months (range 0.6-85.0[DR1] [AG2] [AG3] [AG4] months). The actuarial rates of maintenance of adequate pain relief at 12, 36, and 60 months were 77.0%, 62.5%, and 50.2%, respectively. There was a new-onset or aggravation of facial numbness in 44 cases (26.2%). The maintenance of an adequate pain relief was more sustained in idiopathic cases in comparison to cases associated with multiple sclerosis ($P < 0.001$). Conclusions: In our experience CyberKnife radiosurgery for refractory trigeminal neuralgia is efficacious and safe.

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Radiofrequency rhizotomy for trigeminal neuralgia under general anaesthetic with intraoperative neuromonitoring

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Background: Radiofrequency rhizotomy is an efficacious technique for treatment of trigeminal neuralgia that is classically performed with the patient awake. Previous studies have investigated methods for both anatomic and neurophysiologic optimization for nerve targeting. Methods: We performed a retrospective review of prospectively collected data on patients undergoing radiofrequency rhizotomy under a general anesthetic. Electrodes are placed in the temporalis, masseter and one of mylohyoid or anterior belly of digastric muscles. We then localize of the correct subdivision of the trigeminal nerve. The division of the trigeminal nerve with pain shows a muscle response, which is not present in normal subdivisions. Results: A total of 23 radiofrequency rhizotomies were performed under general anesthetic. Abnormal conduction reflexes were present in all cases, and dissipated after lesioning. Pre-operative BNI pain scores were 4.1 ± 0.3 , which dropped to 1.8 ± 1.9 post-op ($p=0.003$). Number of pain medications (2.9 ± 0.6 v. 1.3 ± 1.3 , $p=0.007$) and number of patients with