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

opioid usage (78.7% v. 21.7%, p=0.007) both decreased after rhizotomy. Conclusions: Using a novel conduction pathway, we have successfully been able to monitor radiofrequency rhizotomy in patients operated on under a general anesthetic, with promising preliminary results. Further work is needed to better evaluate this intervention.

HEADACHE

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Secondary trigeminal autonomic cephalgia due to pituitary adenomas: systematic search of the literature and case illustration

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Background: Trigeminal autonomic cephalgias (TAC) have been implicated in a multitude of intracranial mass lesions, including pituitary adenomas. Treatment of the associated pituitary adenoma has been reported to result in resolution of the secondary TAC. Methods: We conducted systematic search of the literature in accordance with PRISMA guidelines using Ovid Medline, Pubmed, Scopus, and Web of Science for TACs with associated pituitary lesions. We searched for all the relevant cases to detail the epidemiology, clinical phenotype of TAC, characteristics of the associated pituitary lesion including its hormonal profile, type of clinical intervention, and outcome. Results: Together with our case, 50 cases are reviewed. Prolactinomas were the most common hormone-producing adenomas (n=35; 71%). Few cases were non-functioning (n=3; 6%). Macroadenomas were predominant (n=30, 70%). Cavernous sinus extension was frequent (n=21; 54%). Medical intervention was the most employed form (n=31; 63%). Surgical intervention was carried in several cases (n=18; 37%). The success rate of medical management was high (n=25/31; 81%). Dopaminergic agonist therapy was the most common medical intervention (n=28; 90%). Conclusions: Secondary TACs with associated pituitary adenomas tend to have debilitating symptoms. The pathophysiology of the association is not entirely clear. Identifying the cause and employing the proper intervention is important to avoid unnecessary suffering.

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Acute subdural hematoma in obstetric patients following epidural anesthesia

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Background: Post-dural puncture headache is a known complication of neuraxial anesthesia and acute subdural hematoma has been associated with unintentional dural puncture. Notably, a significant number of unintentional dural punctures remain unidentified. We present two contrasting cases of subdural hematoma (SDH) following labour epidural anesthesia with no sign of dural puncture at time of anesthesia. Patient 1 presented with headache post-partum day (PPD) six, SDH was identified PPD23, and blood-patch treatment performed PPD35. Patient 2 presented with headache immediately, had SDH identified PPD3, and placement of blood-patch PPD4. Methods: The cases are presented and the literature was reviewed for prior cases. Results: Patient 1 developed significant bilateral SDH with severe headache and right abducens palsy. Headache resolved post blood patch however surgical evacuation was required and the abducens palsy persisted. Patient 2 experienced resolution of symptoms two days post blood patch, the small unilateral SDH was managed conservatively, and had no neurological deficits. Conclusions: Headache is common in the postpartum period. The majority are primary etiology and benign. SDH is a rare but serious complication of neuraxial anesthesia, and the consequences may be devastating. Rapid identification and early treatment are essential to avoid severe neurological sequelae.

NEURO-ONCOLOGY

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Intraoperative 5-ALA fluorescence-guided resection of high-grade glioma leads to greater extent of resection with better outcomes: a systematic review

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Background: 5-aminolevulinic acid (5-ALA) enhances intraoperative high grade glioma (HGG) tissue visualization. Despite promising randomized clinical trial data suggesting survival benefit for 5-ALA-guided HGG surgery, patient outcome efficacy is not universally accepted. Methods: We performed a systematic review of the literature to evaluate whether there is a beneficial effect upon survival and extent of resection from the utilization of 5-ALA in HGG surgery. Literature regarding 5-ALA usage in HGG surgery was reviewed according to PRISMA guidelines. Results: 3,756 published studies were screened, 536 evaluated, and 45 included. Of studies that directly compared the use of 5-ALA to white light (28.9%), 5-ALA lead to a better progression-free survival (PFS) and overall survival (OS) in 88.4 and 67.5% of patients, respectively. 42.2% demonstrated that 5-ALA use was associated with less post-op neurological deficits, whereas 23.3% of studies showed that surgeries using 5-ALA lead to more deficits. 34.5% demonstrated no difference between 5-ALA and without. Conclusions: 5-ALA was found to be associated with a greater extent of resection and longer OS and PFS in HGG surgeries. Postop neurologic deficit rates were inconclusive when comparing 5-ALA groups to white light groups. 5-ALA is a useful surgical adjunct for HGG resection with preserved patient safety.