

tumour revealed *E. Coli*. He was treated with Meropenem for six weeks, and at follow-up, the patient was asymptomatic. Our scoping review illustrated that 18 meningioma-associated abscesses have been reported in the literature since the first report in 1994. Conclusions: This case highlights the hematogenous spread of a urinary infection, resulting in an intratumoural abscess. Review of the literature indicated that, similarly, 39% of cases had recent or concurrent urinary tract infections. Future studies should seek to determine conclusive guidelines for diagnosing intratumoural abscesses.

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The use of 5-Aminolevulinic acid (5-ALA) in high-grade glioma surgery, a single Canadian center experience

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Background: 5-Aminolevulinic acid (5-ALA) is a prodrug used to selectively illuminate high-grade glioma (HGG) tissue intra-operatively, shown to nearly double complete resection rates in a 2006 multicentre, phase III clinical trial. Here, we review the history of the 2020 approval of 5-ALA in Canada and present some of the first preliminary results on resection rates, survival analysis, and adverse effects from a single Canadian center. Methods: We enrolled 76 patients (median age 61 years, 42 male) with suspected HGG amenable to surgical resection between June 2020 and January 2023. Gross total resection was defined by the absence of enhancing lesions on postoperative MRI. We compared the survival distributions of confirmed HGG cases with complete vs. incomplete resection using a log-rank test and Kaplan-Meier statistic. Results: 52 patients were confirmed as having a HGG based on a pathological diagnosis. In 32 of these patients (60.3%) a gross total resection was achieved. 82.76% were still alive at 180 and 270 days, and 72.73% at 360 days. 47.8% had a survival of 600 or more days. Conclusions: 5-ALA fluorescence-guided surgery resulted in high complete resection rates, and improved overall survival comparable to the literature with no notable adverse side effects.

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5-ALA guided surgical resection of newly diagnosed high grade gliomas at Health Sciences North (HSN) in Sudbury, Ontario

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Background: Since its approval by Health Canada in 2020, several neurosurgical centres across Canada have used 5-ALA, an oral drug that assists with surgical resection of malignant gliomas by causing tumour cells to fluoresce under the microscope. The study's objective is to prospectively evaluate the extent of resection (EOR) and clinical outcomes in 5-ALA-guided surgery at HSN compared to historical controls. Methods: A retrospective analysis was performed of patients with

malignant gliomas having undergone surgery at HSN from 2011 to December 2020, assessing the EOR (contrast-enhanced tumour on post-operative CT/MRI), progression-free survival (PFS), overall survival (OS). Results: 235 patients underwent surgery for malignant glioma including 51 newly-diagnosed patients felt to be surgically resectable and with post-operative imaging. 25/51 (49%) had no residual tumour. The median PFS and OS were 7.1 and 11.5 months respectively. To date, 3 patients have successfully undergone 5-ALA-guided surgery with complete resection of contrast-enhancing tumour and no new focal neurological deficit post-operatively. Conclusions: We continue to recruit and follow prospectively patients having undergone 5-ALA-guided resection of malignant gliomas at HSN. Patients living in Northern Ontario may derive significant benefits from the use of 5-ALA-guided surgery, particularly since other technologies, such as intraoperative MRI and ultrasound, are costly and not available.

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Location pattern of recurrence of WHO Grade 1 Meningiomas

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Background: Meningiomas can lead to significant morbidity and mortality and have recurrence potential despite their benign classification. The precise location of the recurrence has not been delineated. The objective of this study was to determine any spatial clustering of recurrence for surgically treated Grade 1 meningiomas. Methods: Patients diagnosed with Grade 1 meningiomas and treated with surgical resection with recurrence were reviewed. Patient demographics, presentation, extent of resection, time to recurrence, and location were established by medical records. Outcomes were the time to recurrence and location relative to the original surgical bed. Results: Among the 42 cases that met the study inclusion criteria, 12 were male and 30 were female. The mean age at treatment was 49.7 years, and the mean years until recurrence was 5.2 years. 33 (68.8%) tumours recurred locally, 12 (25.0%) recurred at the periphery (<1cm of the surgical bed), and 3 (6.3%) recurred distal to the resection site. Conclusions: A sizeable portion of cases may benefit from therapy directed beyond the resection margin. It may be more successful to prevent recurrence in these patients by performing a more aggressive resection of the dural attachment surrounding the tumour and/or focusing adjuvant therapy on the area surrounding the resection cavity.

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Impact of 5-ALA on rates of complete high grade glioma resection: a Canadian perspective

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Background: The relationship between glioblastoma extent of surgical resection (EoR) and survival is well documented.¹⁻³ The

advent of 5-aminolevulinic acid (5-ALA), a tissue selective fluorophore, has led to increased rates of gross total tumour resection.⁴⁻⁶ Since 5-ALA received approval for use in Canada in 2020, no Canadian centres have examined its impact on rates of complete resection (CR) for newly diagnosed high grade glioma (HGG) patients. Methods: This study evaluates the difference in EoR class⁷, for newly diagnosed HGG. Fifty-one consecutive patients underwent awake craniotomy with white light illumination (WLS) while 45 consecutive HGG patients were operated with fluorescence guidance (FGS). Analysis of EoR class was blinded and performed by 2 independent reviewers with a third adjudicator available for discrepancies. Residual tumour volumes were quantified by segmentation of postoperative 1mm slice MRI. Results: The FGS group was found to have: 80% complete resection (CR), 11% near-total resection (NTR), and 9% subtotal resection (STR). This compared favourably to the WLS respective rates of 67%, 6%, and 28%. Conclusions: For awake craniotomy protocol, the odds of complete resection were higher in the FGS group, compared to the WLS group (OR = 2; 95% CI 1.06, 2.93).

NEUROIMAGING

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When functional neuroimaging is ambiguous for language localization: a case for Wada testing

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Background: To localize cortical speech areas, methods such as fMRI are commonly used, but the Wada test can also determine whether a region is critical to the particular task. We report a case of a left-handed patient with a left frontal tumour in whom fMRI language paradigms produced both left and right Broca's and Wernicke's areas. Methods: All imaging used a 3 Tesla Siemens Skyra scanner. The patient performed five speech tasks: word reading, picture naming, semantic questions, pseudohomophone reading, and word generation. All preprocessing and statistical analyses for functional images were performed using Brain Voyager QX. Results: The fMRI results revealed right hemisphere dominance for language processing. A Wada test was performed in order to confirm whether the regions in the left hemisphere were critical to speech. The patient experienced speech arrest during the Wada test, thus confirming that despite bilateral speech activation, the left hemisphere speech regions are required for speech production. Conclusions: This case emphasizes the importance of preoperative fMRI in assessing the location of eloquent cortices adjacent to a tumour and the Wada test is still warranted for examining necessity of left hemisphere language regions when fMRI fails to show clear left-lateralization.

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MRI based methodology for assessment of white matter neuroplasticity: preclinical validation using human motor training data

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Background: Disruption of white matter (WM) tracts is common in traumatic injury to the brain and spinal cord. However, imaging techniques for prognostication and monitoring of recovery are lacking. Myelin Water Imaging (MWI) is a validated MRI based method of quantifying myelin volume and represents a potential tool for application in a clinical environment. Methods: 12 healthy, right-handed participants completed a two-week visuomotor maze training program with MRI scans at baseline and endpoint. The task was designed to be difficult for the non-dominant hand and easy for the dominant, allowing for an inbuilt control. Diffusion Tensor Imaging (DTI) along with MWI data were collected at both timepoints using a 3T MRI. Results: Performance metrics confirmed task performance increased only in the non-dominant hand, and a corresponding endpoint > baseline comparison showed significant increases in the MWF ($p < 0.05$) and DTI indices ($p < 0.05$) in the right corticospinal tract (CST), and no significant change in the left CST. Conclusions: This preclinical validation shows MWI is capable of quantitatively tracking WM changes over the course of weeks in humans. MWI's clinical utility lies in its ability to assess WM changes over short time periods, as monitoring changes in tissue integrity will assist in guiding treatment decisions after critical injury.

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Anatomical fiducials used to quantify localization and registration accuracy in deep brain stimulation

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Background: Studies of deep brain stimulation (DBS) require accurate electrode localization and image registration. We used anatomical fiducials to investigate localization and registration errors in patients who underwent subthalamic nucleus (STN) DBS for Parkinson's disease (PD). Methods: We conducted a retrospective analysis of patients who underwent bilateral STN DBS for PD. Pre and post operative MRI scans were non-linearly normalized to a standard template (MNI152NLin2009bAsym). Four raters localized DBS electrodes (Lead-DBS), the anterior commissure (AC) and posterior commissure (PC). Errors between rater localizations were calculated (fiducial localization error; FLE). We transformed AC and PC coordinates from template to patient space to calculate the fiducial registration