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Surgical outcomes for patients undergoing repeat endoscopic endonasal trans-sphenoidal surgery for recurrent pituitary adenomas

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Background: Endoscopic endonasal trans-sphenoidal surgery (EETS) is a commonly used approach for the surgical treatment of primary pituitary adenomas. The role of this approach in patients with recurrent disease remains unclear. Here we review a high-volume institutional experience with repeat EETS for recurrent pituitary adenomas and compare outcomes against primary surgeries. **Methods:** A retrospective chart review of patients who underwent EETS at Toronto Western Hospital from 2008-2016 for pituitary adenomas was completed. Baseline patient characteristics and surgical outcomes were recorded for each surgery. Primary and repeat operations were compared for analysis using Fisher's exact test and *t*-test where appropriate. **Results:** 347 primary and 48 repeat surgery patients were identified. The median follow-up was 3.6 years (range 0-10.6 years). Rates of GTR, optic decompression, endocrinopathy cure, and visual improvement in repeat EETS were 44%, 21%, 22%, and 21%, respectively. While these rates are lower when compared to primary surgeries (75% $p<0.001$, 58% $p<0.001$, 75% $p=0.01$, 37% and $p=0.04$), they demonstrate that desirable outcomes are still achievable after EETS for recurrent disease. **Conclusions:** These results from a quaternary-care centre suggest that repeat EETS is a viable option that is safe and effective at improving the visual and endocrine status in select patients with recurrent pituitary disease.

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The effect of the timing of surgery on outcomes for incidental low-grade gliomas: a systematic review

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Background: Although previous research has suggested that patients with incidentally discovered low-grade gliomas (iLGG) who undergo surgery prior to the appearance of symptoms have improved outcomes compared to those who are symptomatic, an ideal approach to managing iLGG is not well-established. The purpose of this systematic review is to identify all cases of iLGG in the literature and characterize the effect of the timing of surgery on survival. **Methods:** We searched EMBASE, MEDLINE, and PubMed for articles related to iLGG. After duplicates were removed, the articles were then screened based on strict inclusion and exclusion criteria. **Results:** We retrieved 24/1377 unique articles with a total of 175 patients who underwent surgery for iLGG prior to symptoms appearing. The average age was 29.1yrs (range 1-62) and the mean follow-up period was 56 months (range 1-234months). Unfortunately, only 6/24 articles reported progression-free survival (average 32.4months) and only 1/24 reported 10-year survival. **Conclusions:** The articles we identified favored an early intervention for iLGG, however, there was a considerable lack of long-term follow-up and survival data to justify such a claim. Further studies need to be performed with adequate follow-up data in order to determine the optimal timing of surgical intervention for these patients.

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Visual outcomes after expanded endoscopic endonasal resection of suprasellar meningiomas and optic nerve decompression

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Background: The Endoscopic endonasal approach (EEA) has become increasingly popular in the treatment of suprasellar meningiomas, which often cause visual symptoms due to compression of the anterior optic apparatus. **Methods:** We performed a retrospective chart review on patients who underwent EEA optic nerve decompression and resection of suprasellar meningiomas between January 1st 2005 and December 1st 2018 at McMaster University. **Results:** The mean age of our patients was 59.8 years. We treated 9 male and 23 female patients, with a mean follow up of 6.29 years. 23 patients (71.9%) presented with visual symptoms, with a mean duration of 8.65 months. In our patient cohort, 95.5% had stable or improved visual acuity postoperatively. Less than six months of visual decline was more likely to be associated with postoperative improvement of visual acuity, with an odds ratio (OR) of 0.0222 (95% CI: 0.0017–0.289, $p<0.05$); as well as visual field (OR:0.0625; 95% CI, 0.0042–0.915, $p<0.05$). Additionally, the absence of RAPD was associated with improved postoperative visual acuity (OR: 0.0675; 95% CI, 0.0354–0.706, $p<0.05$). **Conclusions:** Endoscopic endonasal approach can achieve good visual outcome in patients harboring suprasellar meningiomas. Symptom duration of less than six months and absence of RAPD were positive predictor of postoperative visual outcome.

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Incorporating Navigated Transcranial Magnetic Stimulation (nTMS) into the neurosurgical practice: oncological, vascular and research potentials

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Background: Surgical managment of eloquent lesions in the brain require a multidisciplinary approach. Radiographic imaging, such as magnetic resosnance, can provide details of "normal" anatomy however are limited when lesions can distort/displace due to mass effect or neuroplasticity. Functional MRI (fMRI) has limitations due to patient dependent actions can often be limited due oncological or vascular lesions but known to still be near or involving "eloquent" cortex. Navigated transcranial magnetic stimulation (nTMS) provides the physician with the ability to accurately (~2mm error) stimulate cortex of the brain, in a clinical setting, and to understand function of areas of motor and language and incorporate this information into the surgical theatre. **Methods:** We will present a personal expierience of complex oncological and vascular cases to illustrate how nTMS can assist in the determination of surgical approaches and educating patients of potential morbidities. Will also

review potential research opportunities that nTMS provides. Details of Phase 2 clinical trial of nTMS for improving neuro-cognitive outcomes will be discussed. **Results:** Case ilustrations will be provided. Preliminary results of Phase 2 clinical study will be discussed. **Conclusions:** Navigated TMS provides another tool in the armamentarium of neurosurgeons to better manage and approach complex and eloquent lesions in the brain.

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Novel use of fluorescein sodium in the resection of a pediatric posterior fossa tumor

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Background: Gross total resection of pediatric posterior fossa tumors is paramount towards improving progression-free survival.

Fluorescein accumulates in tumoral tissue, where the blood-brain barrier is disrupted. It can therefore potentially aid in differentiating tumoral versus normal tissue. We aimed to evaluate the efficacy of fluorescent-guidance (using fluorescein) towards the resection of a pediatric cerebellar tumor, as the index case at our institution using this technique. **Methods:** 5 mg/kg of IV fluorescein sodium was injected upon induction of general anesthesia. During tumor resection, a yellow 560-nm filter (Kinevo microscope, Zeiss) was employed for fluorescent-guidance. The extent of resection was assessed via post-operative MRI. **Results:** There were no adverse side effects experienced by the patient. Tumoral material was clearly visualized under the yellow 560-nm filter, allowing for satisfactory gross total resection of the lesion (confirmed on post-operative MRI). Preliminary pathology was consistent with medulloblastoma. **Conclusions:** Fluorescent-guided resection of pediatric posterior fossa tumors appears to be a safe and useful adjunct for gross total resection of these lesions. To the best of our knowledge, this is the first reported case in Canada wherein IV fluorescein was used under a yellow 560-nm filter for resection of a posterior fossa medulloblastoma in a child.

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Practice patterns in the management of residual/recurrent non-functioning pituitary adenomas: results from a Canada-wide survey

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Background: Postoperative follow-up of non-functioning pituitary adenomas (NFAs) occasionally detects residual or recurrent disease. Subsequent treatment options range from continued follow-up, to re-resection or radiotherapy. To better understand current practice patterns on this topic, we surveyed neurosurgeons and radiation oncologists in Canada. **Methods:** Skull-base neurosurgeons and radiation oncologists across Canada were invited to complete a 25-item online questionnaire. Summary statistics were computed and 2-tailed t-tests were performed to assess significance. **Results:** 33 participants returned completed questionnaires: neurosurgeons (n=20, 61%) and radiation oncologists (ROs; n=13, 39%). When treating giant (>3cm) tumours, 92% of neurosurgeons in practice for less than 15 years use an endoscopic approach, as compared to only 57% of neurosurgeons in practice for 15 years or more. Additionally, younger neurosurgeons have a greater tendency to advocate for stereotactic radiosurgery (SRS) or re-resection (54% and 38%, respectively), as compared to older surgeons who show a higher propensity (29%) to advocate for observation. The presence of cavernous sinus extension appears to encourage neurosurgeons (40%) to offer radiotherapy sooner, as compared to 62% of ROs. **Conclusions:** Our results identify both variations and commonalities in practice amongst Canadian neurosurgeons. Approaches deviate in the setting of residual tumors based on years of practice.

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Metabolomic and lipidomic profiling of high and low grade gliomas - a matched serum and tissue clinical study

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Background: It is well understood that gliomas require vast supply of energy to proliferate, invade and spread. We wished to identify novel biomarkers by comparing normal brain and plasma to high and low grade gliomas using newer techniques in laser ionization mass spectroscopy - precision metabolomics and lipidomics. **Methods:** Single center IRB approved tissue bank of "normal" brain and plasma (n=6) and IDH wild-type GBM tissue and plamsa (n=29), IDH mutant GBM tissue and plamsa (n=6), Low grade glioma (n=4) tissue and plamsa were analyzed for over 2000 endogenous metbolites and complex lipids. Unbiased clustering and Random Forest plots and pathway analysis were performed with appropriate statsitical analysis (significance $p < 0.05$). **Results:** IDH mutant GBM had higher levels of 2-HG, however, plasma 2-HG did not reflect IDH genotype. Changes in glucose and fatty acid utilization were observed in IDH WT and mutant gliomas compared to normal brain tissue. Lipidomics of plasma and tissue of normal and gliomas did not reveal a biomarker reaching statistical significance. **Conclusions:** We will continue to investigate if plasma and tissue biomarkers including hypotaurine, methionine, branched chain amino acid catabolites and pregnonolone can be used to predict tumor progression, response to treatment and clinical outcomes.

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Novalis Certification of stereotactic radiosurgery programs: methodology and current status

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Background: The Novalis Certification Program is dedicated to providing a comprehensive and independent assessment of safety and quality in stereotactic radiosurgery (SRS). **Methods:** The program includes an independent review of SRS program structure, adequacy of personnel resources and training, appropriateness and use of technology, program quality management, patient-specific quality assurance and equipment quality control. Centres applying for Novalis Certification complete a self-study prior to a one-day visit by reviewers. Reviewers generate a descriptive 77-point report which is voted on by a multidisciplinary expert panel. Outcomes of reviews include mandatory requirements and optional recommendations, with the former requiring resolution prior to award of Certification. Sites undergo recertification every 4 years. **Results:** To date,