

P.151**The development of an image-guided, multi-biopsy tool for neurosurgical applications***K Andrews (Kingston)* H Ploeg (Kingston) J Purzner (Kingston) T Purzner (Kingston)*

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Background: Molecular characterization of spatially heterogeneous tumors, such as primary brain tumors, requires precise, contamination-free tissue collection. This study develops a novel biopsy instrument enabling efficient, spatially registered tissue collection across tumors and surgical cavities, advancing personalized tumor characterization and treatment. **Methods:** Iterative modeling and 3D printing were used to develop prototypes, which underwent proof-of-concept and phantom testing. Final device evaluation compared the novel capsule biopsy tool to Yasargil tumor grasping forceps, with six neurosurgeons and six students conducting tests on porcine brain. Additionally, intraoperative samples were collected, with spatial coordinates recorded on preoperative scans. **Results:** The design features a capsule that attaches to the end of a Frazier suction. When suction is applied, an internal piston secures the sample, which can later be released before or after tissue fixation. The capsule method reduced variability in sample weight and collection time compared to Yasargil forceps, maintaining tissue integrity without contamination or instrument failure. Notably, students demonstrated proficiency comparable to experienced surgeons, highlighting the tool's ease of use. **Conclusions:** This low-cost, optically tracked biopsy tool provides an efficient, reliable method for spatially precise tissue collection, meeting the demands of precision medicine and translational research.

P.152**Local control and survival in brain metastases treated with cavity directed gamma knife radiosurgery: a single center retrospective study***N Alarifi (Toronto)* A Ajisebutu (Winnipeg) J Beiko (Winnipeg)*

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Background: This local study aims to address gaps in understanding factors influencing local control in patients with brain metastases treated with adjuvant Gamma Knife Radiosurgery. **Methods:** A retrospective analysis used a local, prospectively kept Gamma Knife database. Sixty-three patients treated with GK SRS were included. Variables included demographics, tumor characteristics, SRS parameters, and outcomes such as local control, recurrence, survival, and adverse effects. **Results:** At 12 months, local control was 66.7%, decreasing to 57.1% at 24 months. Distant progression occurred in 58.7%, leptomeningeal disease in 15.9%, and adverse radiation effects in 20.6%. The 12-month survival rate was 63.5%, dropping to 38.1% at 24 months. None of the examined factors significantly influenced local control. Local progression within the first year of treatment was associated with a 5.0-fold increased risk of death at 24 months, while distant intracranial progression showed a 6.0-fold increased risk at 12 months and an 8.2-fold increased risk at 24 months. **Conclusions:** While the

parameters we examined were not linked to local control, intracranial progression significantly impacted survival. This real-world cohort provides valuable insights into the challenges of managing brain metastases. Further work is needed to refine the current treatment strategies for intracranial progression and ultimately improve survival outcomes.

P.153**Predictors and clinical outcomes of postoperative cerebrospinal fluid leak after endoscopic endonasal skull base surgery***A Vargas-Moreno (Ottawa)* S Khairy (Ottawa) M Saymeh (Ottawa) J Rabski (Ottawa) S Kilty (Ottawa) F AlKherayf (Ottawa)*

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Background: This study aimed to identify risk factors for postoperative cerebrospinal fluid (CSF) leaks and assess their outcomes following endoscopic endonasal approach (EEA) for resection of skull base tumors. **Methods:** A retrospective review was conducted of patients who underwent EEA for resection of intradural pathology between October 2001 and October 2023. Data on demographics, approach type, reconstruction technique, tumor pathology, complications and outcomes were analyzed. **Results:** A total of 542 patients were included, with 80.1% undergoing surgery for sellar or suprasellar pathology. Lumbar drains were used in 14.9%, and dural sealants in 57.7%. Forty patients (7.3%) developed postoperative CSF leaks, with the highest rate in sellar or suprasellar lesions (5.9%). CSF leaks were associated with longer hospital stays ($p < 0.001$), higher 30-day readmission rates ($p < 0.001$), increased sepsis risk ($p = 0.021$), and higher rates of diabetes insipidus ($p < 0.001$). Lumbar drains increased the incidence of CSF leaks ($p = 0.021$), while nasoseptal flap reconstruction reduced leak rates ($p = 0.0015$). Higher BMI and intraoperative CSF leaks were also significant risk factors ($p = 0.001$). **Conclusions:** CSF leaks are associated with increased complications and extended hospital stays, highlighting the need for vigilant intraoperative monitoring and targeted strategies.

P.154**The endoscopic endonasal transclival approach for the treatment of skull base lesions***A Vargas-Moreno (Ottawa)* S Khairy (Ottawa) M Saymeh (Ottawa) J Rabski (Ottawa) S Kilty (Ottawa) F AlKherayf (Ottawa)*

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Background: Surgical access to the clival region is challenging, but advanced endoscopic endonasal approaches (EEA) provide a minimally invasive corridor. This study aimed to review the clinical outcomes of patients who underwent EEA for skull base lesions involving the clivus and to analyze prognostic factors. **Methods:** A retrospective review was conducted of patients who underwent EEA for resection of clival lesions between October 2001 and October 2023. Data on demographics,

approach type, reconstruction technique, tumor pathology and outcomes were collected. Results: Forty-six patients underwent transclival EEA. The majority had ASA scores II and III (71.7%), with clival chordomas being the most common pathology (37%). Cranial nerve impairment was present in 65% of patients, and 80% showed improvement post-surgery. The mean procedure duration was 308 minutes, with a mean blood loss of 424 mL. A lumbar drain was used in 10.9%, and 76.1% received a pedicled nasoseptal flap for reconstruction. Complete tumor resection was achieved in 74% of malignant cases. Postoperative CSF leaks occurred in 4.3%, and the mean length of stay was 12.2 days. Higher readmission rates were associated with ASA IV classification ($p=0.006$). Conclusions: EEA to the clival region is safe and effective, with low perioperative complications and high rates of postoperative improvement.

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Endoscopic endonasal approaches for the resection of anterior skull base meningiomas

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Background: This study aims to review the clinical outcomes, extent of resection, complications, and prognostic factors in patients undergoing endonasal endoscopic resection (EEA) of anterior cranial base meningiomas. **Methods:** We conducted a retrospective review of 25 patients who underwent EEA resection of these lesions between 2001 and 2023. We assessed the extent of resection, complications, postoperative outcomes, and key technical aspects of the procedure. **Results:** 84% of patients were classified as ASA class III. Additionally, 64% of patients presented with visual disturbances. The mean blood loss was 472 ml. Intraoperative lumbar drains were used in 40% of cases, and dural sealants in 56%. A pedicled nasal flap was employed for reconstruction in 92% of cases. One vascular injury was documented, and 16% of patients developed a cerebrospinal fluid (CSF) leak in the postoperative period. The degree of resection varied according to tumor location. Prognostic factors for achieving gross total resection, functional improvement, and key factors for reconstruction are discussed. The rate of CSF leaks decreased dramatically in the later years of the series. **Conclusions:** Cranial base meningiomas can be successfully managed via a purely endoscopic endonasal approach, with acceptable morbidity and mortality rates.

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The role of indocyanine green fluorescence in the treatment of pituitary tumors

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Background: Biochemical cure in functional pituitary adenomas (FPA) is crucial for reducing patient morbidity and improving

quality of life following endoscopic endonasal procedures (EEA). The extent of resection plays a key role in achieving these outcomes. However, even with the aid of intraoperative navigation, complete resection of tumor components can be challenging due to the difficulty in distinguishing them from normal pituitary tissue. Indocyanine green (ICG) fluorescence has been used effectively in various cranial and spinal procedures, but its role in endoscopic skull base surgery has not yet been routinely established. **Methods:** In this study, we describe our experience using ICG during EEA for the resection of FPA. **Results:** We discuss the fluorescence profiles of both adenomas and normal gland tissue. ICG helped identify additional tumor tissue that was not initially detected after macroscopic adenoma resection. It also allowed for perfusion assessment of the pituitary gland and nasoseptal flaps. No complications were observed following the ICG injection, and biochemical cure was achieved in more than 90% of cases. **Conclusions:** Our experience suggests that ICG is a safe and promising tool, improving both the extent of resection and endocrinologic outcomes in patients undergoing EEA for FPA.

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TERT expression predicts progression-free survival in meningiomas

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Background: TERT promoter mutation (TPM) is an established biomarker in meningiomas associated with aberrant TERT expression and reduced progression-free survival (PFS). TERT expression, however, has also been observed even in tumours with wildtype TERT promoters (TP-WT). This study aimed to examine TERT expression and clinical outcomes in meningiomas. **Methods:** TERT expression, TPM status, and TERT promoter methylation of a multi-institutional cohort of meningiomas ($n=1241$) was assessed through bulk RNA sequencing ($n=604$), Sanger sequencing of the promoter ($n=1095$), and methylation profiling ($n=1218$). 380 Toronto meningiomas were used for discovery, and 861 external institution samples were compiled as a validation cohort. **Results:** Both TPMs and TERT promoter methylation were associated with increased TERT expression and may represent independent mechanisms of TERT reactivation. TERT expression was detected in 30.4% of meningiomas that lacked TPMs, was associated with higher WHO grades, and corresponded to shorter PFS, independent of grade and even among TP-WT tumours. TERT expression was associated with a shorter PFS equivalent to those of TERT-negative meningiomas of one higher grade. **Conclusions:** Our findings highlight the prognostic significance of TERT expression in meningiomas,