

Our objective is to develop metrics quantifying dynamic retraction of cerebral tissue and the manipulation of instruments during a neurosurgical intervention. Methods: We trained a convolutional neural network to analyze microscopic footage of neurosurgical procedures and thereby generate metrics evaluating the surgeon's dynamic retraction of brain tissue and the surgeon's manipulation of the instruments themselves. U-Net image segmentation is used to output bounding polygons around cerebral parenchyma of interest, as well as the vascular structures and cranial nerves. Results: On the validation set, our network achieves a state of the art Intersection over Union (IoU) of 70.1% (Recall = 89%) and 74.3% (Recall = 91%) for surgical tools and biological structures respectively. Multivariate statistical analysis was used to evaluate dynamic retraction and tissue handling. Conclusions: We describe a semantic segmentation model for surgical instruments and intracranial structures to evaluate dynamic retraction of soft tissue and manipulation of instruments during a surgical procedure, while accounting for movement of the operative microscope. Using the intraoperative footage, this model can potentially provide the surgeon with objective feedback.

## P.166

### **Subcutaneous intrathecal catheter and port implants for administration of Nusinersen in patients with Spinal Muscular Atrophy**

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Background: Until recently, no effective treatment was available for spinal muscular atrophy (SMA). In 2017, Health Canada approved intrathecal Nusinersen a medication that prevents degeneration of the motor neurons in the spinal cord. The administration is intrathecally most commonly via lumbar puncture (LP) to have a direct effect on the motor neurons of the spinal cord.

Many older patients with SMA and concomitant spinal deformities present technical challenges to access the thecal sac. Different routes have been described for delivery of the medication. These techniques may require sedation, are associated with radiation exposure, and demand experience personnel. Methods: A new surgical technique has been proposed to overcome these obstacles by combining two Health Canada approved devices: 1) an intrathecal catheter designed for intrathecal baclofen pumps and 2) an implantable subcutaneous port designed for intravascular medication administration Results: We describe the technical nuances and outline the clinical outcomes of six patients with complex spine deformities who have undergone such an implant for administration of Nusinersen. Conclusions: We discuss the benefits of the procedure which includes: 1) administration in the outpatient setting without sedation, 2) avoidance of costly imaging and experienced personnel, and 3) placement of the catheter in the cervicothoracic junction.

## P.167

### **Documented growth of a de novo intracranial capillary hemangioma: a case report**

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Background: Intracranial capillary hemangiomas are rare, particularly in adults, and diagnosis can be challenging. The literature lacks visualization of intracranial capillary hemangioma growth over time. Here we document growth of a de novo intracranial capillary hemangioma, initially interpreted radiologically as a glioma. Methods: We report a case of a 64 year old male with history of HIV, recent Lyme disease and unconfirmed prior COVID-19 infection, who presented with exhaustion and confusion. Imaging demonstrated an intra-axial high T2/FLAIR signal lesion centred in the subcortical white matter of the posterior right temporal lobe. There was faint enhancement, and a few mildly prominent vessels were seen along its anterior aspect. Imaging 2 years prior had not shown the lesion. Stereotactic biopsy was nondiagnostic. Craniotomy and resection was carried out. Results: Pathological examination and immunohistochemistry returned the diagnosis of capillary hemangioma. We review how this case adds to proposed theories of de novo intracranial capillary hemangioma growth. Our patient's co-morbidities support possible inflammation related triggers for symptomatic progression of these uncommon lesions. Conclusions: This unusual case documents the radiological appearance and progression of a de novo intracranial capillary hemangioma. It represents the first time such growth has been visualized in an adult male.

## P.168

### **Improving transitioning from pediatric to adult care: a qualitative study of patients with hydrocephalus and their caregivers**

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Background: Hydrocephalus is a common pediatric condition but many neurosurgeons cannot continue to care for patients into adulthood. Although gaps in care are thought to exist for youth transitioning to adult care, little is known about how patients/caregivers feel about the process. This study examined the perceptions of adolescents and young adults transitioning from pediatric to adult care at a single centre. Methods: We explored the perceptions of patients/caregivers with hydrocephalus about the transitioning process using semi-structured interviews and the qualitative research methodologies of grounded theory. 40 patient/caregivers (7 adolescents, 13 young adults, 20 parents) from BC Children's Hospital and the Hydrocephalus Clinic at Vancouver General Hospital. Interviews were transcribed verbatim and coded, with common themes identified. Results: Four themes

relating to transitioning from pediatric to adult care were identified: (1) Poor communication; (2) Uncertainty relating to living life as an adult with hydrocephalus; (3) Anxiety and fear regarding navigating a new health care environment; (4) sadness in the loss of the relationship with the pediatric health care team. Conclusions: We identified a general dissatisfaction with the transitioning process for hydrocephalus. Common themes and concerns identified may form the basis of an improved transitioning model for youth with hydrocephalus as they become adults.

## P.169

### **Tissue plasminogen activator in addition to twist drill drainage as a treatment for chronic subdural hematomas – a descriptive analysis**

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**Background:** Current literature provides little consensus on universal guidelines for first-line treatment of chronic subdural hematomas (cSDH). However, administration of local tissue plasminogen activator (tPA) may enhance the traditional method of twist drill drainage (TDD). The study aims to explore the efficacy of TDD with and without tPA, at achieving clinically relevant drainage (200mL) and reducing recurrence of cSDH. **Methods:** A retrospective review of patients (N=34) with cSDH is presented. Patients who received TDD with tPA (n=17) were identified and matched, based primarily on age and hematoma volume, to a control group (n=17), TDD without tPA. Variables of interest include initial hematoma volume, volume drained, length of stay, and recurrence rates. Descriptive analysis was run. **Results:** Average age for patients was 74.6 with 76% male. Mean drainage volumes for the tPA cohort was 381.6mL and TDD without tPA cohort was 151.3mL. The addition of tPA resulted in drainage volumes nearly double (1.9x) the clinically relevant amount and had low recurrence rates (12.5%). TDD without tPA failed to result in clinically relevant drainage and had a recurrence rate of 52.9%. Average length of stay differed by two days (9.71 tPA; 7.71 control). **Conclusions:** TDD with tPA was effective at treating cSDH in our population.

## **SPINE AND Peripheral Nerve Surgery**

## P.171

### **Intradural-extramedullary spinal cavernoma with nerve root association: a case report and review of the literature**

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**Background:** Although 5% of cavernomas occur in the spine, intradural-extramedullary cavernomas are exceptionally rare. We

present one such case of cavernoma associated exclusively with a nerve root, and review the literature for similar lesions. **Methods:** Case Report. A 45-year old male patient presented with a six-month history of numbness and paresthesia affecting his lower extremities bilaterally. MRI demonstrated a 16mm intradural-extramedullary lesion at T3-4, compressing the cord. The lesion was surgically removed en-bloc, requiring root sacrifice. The patient's symptoms completely resolved post-operatively, and he remained asymptomatic at 3-month follow up. **Results:** Including the present case, 71 cases of intradural-extramedullary spinal cavernoma have been reported, including 50 with confirmed nerve root involvement. Patients most frequently presented between the ages of 40-59 (41%) with lesions at the lumbar level (54%). Confirmed subarachnoid hemorrhage was present in 14% at presentation, although 23% presented acutely. 49% presented with longstanding/progressive symptoms, and 11% with mixed acute-on-chronic presentation. 37% presented primarily with radiculopathy, 21% with myelopathy, and 11% with pain. Good postoperative recovery was documented in 80% of cases. **Conclusions:** Intradural-extramedullary spinal cavernomas may demonstrate a propensity for radiculopathy at presentation and exhibit substantial subarachnoid hemorrhage risk. Literature review supports the role of surgical resection.

## P.172

### **Work-up and management of asymptomatic extracranial traumatic vertebral artery injury**

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**Background:** Extracranial traumatic vertebral artery injury (eTVAI) is common following non-penetrating head and neck trauma. Most cases are initially asymptomatic with an increased risk for stroke. Consensus is lacking regarding screening, treatment, and follow-up of asymptomatic patients with eTVAI. Our objective was to investigate national practice patterns reflecting these domains. **Methods:** An electronic survey was distributed via the Canadian Neurological Sciences Federation and Canadian Spine Society. Two case-based scenarios featured asymptomatic patients with eTVAI. Case 1: non-displaced cervical lateral mass fracture; angiography stratified by luminal diameter reduction. Case 2: complex C2 fracture; angiography featuring pseudoaneurysm dissection. **Analysis:** descriptive statistics. **Results:** Response Rate: 108 of 182 participants (59%), representing 20 academic institutions.

Case 1: 78% of respondents would screen using CTA (97%), immediately (88%). Most respondents (97%) would initiate treatment, using aspirin (89%) for 3-6 months (46%).

Case 2: 73% of respondents would screen using CTA (96%), immediately (88%). The majority of respondents (94%) would initiate treatment, using aspirin (50%) for 3-6 months (35%). Thirty-six percent of respondents would utilize endovascular therapy.