

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.

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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.

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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.

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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