standardized definition for DCI. Conclusions: DCI is an important clinical entity for which no consensus exists in management among Canadian practitioners. The CNRC calls for the development of national standards in the diagnosis and management of DCI.

Neuroimaging

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Evaluation of Arterial Spin Labeling (ASL) perfusion imaging in poorly- defined focal epilepsy in children

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Background: Poorly-defined cases (PDCs) of focal epilepsy are cases with no/subtle MRI abnormalities or have abnormalities extending beyond the lesion visible on MRI. Here, we evaluated the utility of Arterial Spin Labeling (ASL) MRI perfusion in PDCs of pediatric focal epilepsy. Methods: ASL MRI was obtained in 25 consecutive children presenting with poorly-defined focal epilepsy (20 MRI- positive, 5 MRI-negative). Qualitative visual inspection and quantitative analysis with asymmetry and Z-score maps were used to detect perfusion abnormalities. ASL results were compared to the hypothesized epileptogenic zone (EZ) derived from other clinical/imaging data and the resection zone in patients with Engel I/II outcome and >18 month follow-up. Results: Qualitative analysis revealed perfusion abnormalities in 17/25 total cases (68%), 17/20 MRI-positive cases (85%) and none of the MRI-negative cases. Quantitative analysis confirmed all cases with abnormalities on qualitative analysis, but found 1 additional true-positive and 4 false-positives. Concordance with the surgically-proven EZ was found in 10/11 cases qualitatively (sensitivity=91%, specificity=50%), and 11/11 cases quantitatively (sensitivity=100%, specificity=23%). Conclusions: ASL perfusion may support the hypothesized EZ, but has limited localization benefit in MRI-negative cases. Nevertheless, owing to its non-invasiveness and ease of acquisition, ASL could be a useful addition to the presurgical MRI evaluation of pediatric focal epilepsy.

Neuroscience Education

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Action-related fixation in microsuturing, a new gaze behavior metric to differentiate the level of expertise

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Background: Gaze behavior differences between expert and novice surgeons have been established in general surgery literature. Limited information is available about surgeon's visual attention during microsurgery procedures where surgical microscope is used. Methods: 4 experts and 3 novices performed 37 independent sutures under the surgical microscope. Eye movements of surgeons and scene video of the surgical performance were recorded. Total suturing time and subtask times were compared between level of expertise. We defined three discrete surgical actions and examined eye gaze (fixation) directly related to each of these actions. Fixation duration (total, pre-action,and post-action duration) were compared between expert and novice, over 3 subtasks (piercing, exiting and cutting) and between pre- and post-action phases. Results: Expert surgeons completed the suture with shorter total time and displayed longer fixation time than novices. Experts also maintained their visual engagement constantly over the 3 level of subtask in comparison to novices who required a longer fixation time for the challenging subtask (piercing). Experts use longer pre- than post-action fixation, and this pattern is distributed over all three subtasks. This gaze engagement strategy was not shown in novices. Conclusions: The action-related fixation can be used to evaluate microsurgeons' level of expertise and in surgical education for gaze training.

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High-fidelity simulation-based microsurgical training for neurosurgical residents

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Background: Mastery of microsurgical skills requires regular hands-on practice. Simulation is increasingly recognized as an important supplement to operative training experience. The live rat femoral artery model is the gold standard model for microneurosurgical skills simulation. We present an 11-year experience incorporating simulation-based microsurgical training into an established Canadian neurosurgery program. Methods: Postgraduate year 2 (PGY-2) neurosurgery residents completed a one-year curriculum spanning 17 training sessions divided into 5 modules of increasing fidelity. Both perfused duck wing and live rat vessel training modules were used. Three modules comprised live microvascular anastomosis. Trainee performance was video recorded and blindly graded using the Objective Structured Assessment of Technical Skills Global Rating Scale. Results: Eighteen participants completed 107 microvascular anastomoses. There was significant improvement in six measurable skills during the curriculum. Mean overall score was significantly higher on the fifth attempt compared to the first attempt for all 3 live anastomotic modules ($p<0.001$). Each module had a different improvement profile across the skills assessed. The greatest improvement was observed during artery-to-artery anastomosis. Conclusions: This high-fidelity microsurgical simulation curriculum demonstrated a significant improvement in the six microneurosurgical skills assessed, supporting its use as an effective teaching model. Transferability to the operative environment is actively being investigated.