

with symptoms of compromised cerebral perfusion. Workup showed a stent fracture distally at the site of severe ICA stenosis secondary to atherosclerotic calcified plaque causing blood flow changes. His PSV (peak systolic velocity) in the left ICA was 383 m/s. As such he underwent left ICA re-stenting for symptomatic severe left ICA stenosis of 70% with 40% residual stenosis following stent deployment. *Conclusions:* Carotid stent fracture post balloon angioplasty for recurrent stenosis is rare but of paramount importance. We demonstrate re-stenting as a viable treatment modality when patient profile is not amenable to a surgical revascularization procedure.

NEURO ONCOLOGY

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A spatial analysis of forces applied during virtual reality brain tumor resection: the force pyramid

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Background: Virtual reality simulators allow development of novel methods to analyze neurosurgical performance. Force pyramids provide visual and spatial analysis of 3 dimensional force application by any instrument used during simulated tumor resection. This study was designed to answer three questions: 1) Do study groups have distinct force pyramids? 2) Do handedness and ergonomics influence force pyramid structure? 3) Are force pyramids dependent on visual and haptic characteristics of simulated tumors? *Methods:* NeuroVR (formerly NeuroTouch), a virtual reality simulator, continually assessed simulated ultrasonic aspirator force application of neurosurgeon, resident and medical student groups during resection of 18 simulated brain tumors with different visual and haptic characteristics. *Results:* Sixteen neurosurgeons, 15 residents and 84 medical students participated. Neurosurgeon, resident and medical students groups displayed easily distinguishable 3 dimensional 'force pyramid fingerprints'. Neurosurgeons had the lowest force pyramids, indicating application of the lowest forces, followed by resident and medical student groups. Handedness, ergonomics, visual and haptic tumor characteristics resulted in distinct well-defined 3 dimensional force pyramid patterns. *Conclusions:* 'Force pyramid fingerprints' provide 3 dimensional spatial assessment displays of instrument force application during simulated tumor resections. Neurosurgeon force utilization and ergonomics data form a basis for understanding and modulating resident force application and improving patient safety during tumor resection.

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Glioblastomas located in the right hemisphere are associated with worse quality of life

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Background: Because glioblastoma is currently incurable, the goal of therapy is the optimization of the patient's quality of life (QOL). Tumor location is critical in screening surgical candidates, yet the impact of tumor location on QOL has never been demonstrated. By using a novel computer-driven algorithm, we set out to investigate the impact of tumor location on QOL. *Methods:* The tumors of forty consecutive glioblastoma patients were segmented and the Euclidian distance between 90 brain regions and each tumor's margin was calculated and correlated to the patients' self-reported QOL as measured by the SNAS questionnaire. *Results:* QOL was statistically associated with proximity to three areas: the right para-hippocampal gyrus, the right posterior cingulate cortex and the right postcentral gyrus. We postulate that the adverse relation between proximity to these areas and QOL results from disruption in large-scale networks involved in high-order functions such as visuospatial memory. While harder to detect with a bedside clinical examination, such deficits are likely more impactful on QOL than those related to the motor cortex or Broca's area. *Conclusions:* Tumor proximity to right parietooccipital region are associated with decreased QOL. This should be considered in the management strategies of glioma patients.

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Clinical impact of functional magnetic resonance imaging for pre-operative planning in patients with low grade gliomas

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Background: This study aims to evaluate the impact of pre-operative functional magnetic resonance imaging (fMRI) on low grade glioma (LGG) patients' outcomes. *Methods:* In this retrospective matched cohort study (N = 48) of a single surgeon's patients, we are comparing two groups of LGG patients (WHO grade II) based on exposure to fMRI. A 1:2 propensity score match from a pool of 764 brain tumour patients was performed. *Results:* Within the group of 16 LGG patients who have undergone fMRI studies over a 12-year period, mean age was 40 years, and most presented with seizures (81%). Most lesions were left-sided (81%), and the lobes most commonly involved were frontal (75%) and temporal (31%). Patients underwent either craniotomy (50%), stereotactic biopsy (25%) or nonsurgically management (25%). In surgical patients, between presurgical assessment and eight week post-surgical follow-up, mean modified Rankin scale improved from 1.80±0.79 to 1.50±0.97. In our cohort, 5-year mortality was 12.5% (patients followed for a mean duration of 5.46 years). *Conclusions:* Data analysis is ongoing with plans to compare relevant demographics and outcomes via 1:2 propensity score matching of LGG patients who underwent fMRI against a control cohort.