Neurosurgery (CNSS)

Functional Neurosurgery and Pain

P.087

The influence of disease lateralization in Parkinson's Disease on tractography in DBS patients

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doi: 10.1017/cjn.2019.183

Background: Asymmetric motor symptoms are typical in Parkinson's disease (PD), with potential implications on disease course. Imaging modalities have demonstrated asymmetry, including thinning of motor-related cortex in the contralateral hemisphere of symptomatic side. The objective is to assess correlation between lateralized symptoms and Diffusion Tensor Imaging (DTI) characteristics of pyramidal tract. **Methods:** 34 PD patients and 30 controls were evaluated. Disease dominance was assessed using UDPRS III. DTI was performed with 60-directional 3Tesla MRI protocol. A $1cm^3$ subcortical region of interest was positioned underneath motor cortex. Primary outcome was the difference in fibers between disease-dominant and non disease-dominant cortex. **Results:** There was a significantly higher number of fibers in the hemisphere corresponding to disease dominance (p=0.0031). The same was true for seed number (p=0.0032) and fractional anisotropy (p=0.0427). Based on 23 patients operated on, the threshold for stimulation-induced side effects on the left side was inversely correlated with number of fibers in left ROI (Spearman -0.497, p=0.0158). **Conclusions:** Based on current literature we expected a reduction of fibers in the contralateral hemisphere to symptom dominant side. Surprisingly, DTI analysis showed an inverse correlation. The underlying pathophysiology remains unclear with the possibility of a compensatory mechanism or compacting of fibers underneath a shrinking motor cortex.

Movement Disorders

P.089

Ultra-high frequency deep brain stimulation at 10,000 Hz improves motor function

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doi: 10.1017/cjn.2019.184

Background: Stimulation frequency has been considered a crucial determinant of efficacy in deep brain stimulation (DBS). DBS at frequencies over 250Hz is not currently employed and consensus in the field suggests that higher frequencies are not clinically effective. With the recent demonstration of clinically effective ultra-high frequency (UHF) spinal cord stimulation at 10kHz we tested whether UHF stimulation could also be clinically useful in movement disorder patients with DBS. **Methods:** We studied the effects of conventional (130Hz) and UHF stimulation in five patients with Parkinson's disease (PD) with STN DBS and in one patient with essential tremor (ET) with VIM DBS. We compared the clinical benefit and adverse effects of stimulation at various amplitudes either intraoperatively or postoperatively with the electrodes externalized. **Results:** Motor performance improved in all six patients with UHF DBS. 10kHz stimulation at amplitudes ≥3.0mA appeared to be as effective as 130Hz in improving motor symptoms (46.2% vs 53.5% motor score reduction, p=0.110, N=90 trials). Interestingly, 10kHz stimulation resulted in fewer stimulation-induced paresthesiae and speech adverse effects than 130Hz stimulation. **Conclusions:** Our results indicate that DBS at 10kHz produces clinical benefits while possibly reducing stimulation-induced adverse effects in patients with movement disorders.

Neuro-oncology

P.090

A case of delayed uncal herniation secondary to external hydrocephalus post intraventricular surgery

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doi: 10.1017/cjn.2019.185

Background: Central neurocytoma's are typically located in the lateral ventricles and are optimally treated with surgical resection. Surgical entry into the ventricles are associated with a number of complications, including subdural hygroma and shunt-dependent hydrocephalus. **Methods:** We report a patient who developed acute bilateral uncal herniation from progessively enlarging subdural hygromas following intraventricular tumour resection. **Results:** A 60-year-old female underwent minimally invasive transcortical transventricular resection of an intraventricular CN. The patient's postoperative course was complicated by repeated presentations to the emergency department due to persistent and intractable nausea and headaches, without focal neurological deficits. Imaging demonstrated small bilateral subdural hygromas. The patient eventually presented with acute deterioration in her level of consciousness with clinical and radiologic evidence of bilateral uncal herniation, requiring urgent insertion of a subdural drain to treat elevated intracranial pressure (ICP). After insertion of a ventriculoperitoneal shunt, the patient was discharged in stable condition and is currently followed by the multidisciplinary neuro-oncology team. **Conclusions:** Bilateral subdural hygroma could mask underlying external hydrocephalus post transventricular surgeries. Patients who are symptomatic from bilateral subdural hygromas after transventricular resection of tumors should be carefully monitored for radiographic or clinical progression, in order to avoid acute deterioration caused by elevated ICP.