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World's first patient-specific open neurosurgery rehearsal

Background

The potential of virtual reality (VR) surgery is relevant to surgical training and patient safety; however, successfully developing patient-specific simulation has been challenging. We report on our experience in patient-specific rehearsal of a tumor-debulking procedure using NeuroTouch, a platform for surgical planning and VR simulation of neurosurgery

Methods

Anatomical and functional brain imaging data for the simulation planner were obtained from a patient with a suspected left frontal meningioma. Using NeuroTouch, which provides both visual and haptic feedback, removal of the tumor in a VR environment was performed by the operating surgeon and several residents on the day before surgery. Residents completed a short questionnaire describing their experience with the system.

Results

The operating surgeon reported that the simulation scenario was visually faithful to the real procedure; in terms of haptic feedback, surgical instrumentation was realistic whereas simulated tumour consistency was softer. Junior residents became convinced that simulation will play an important part of their surgical education; experienced residents provided valuable feedback for system improvement.

Conclusions

We have successfully performed the first patient-specific preoperative rehearsal of an open neurosurgical procedure. We have demonstrated that VR neurosurgery is a viable technique, one that may fundamentally change how neurosurgeons of the future are trained.