Endoscopic skull base surgery training

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Endoscopic skull base surgery (ESBS) is complex, requiring methodical and unremitting neurosurgical training. Lee et al. describe the development and evaluation of a novel three-dimensional (3D) printed simulation model for ESBS. We further validate the efficacy of this model as educational support in neurosurgical training.

Methods: A patient-specific 3D printed simulation model using living human imaging data was established and evaluated in a task-based hands-on dissection program. Endoscopic endonasal and transorbital procedures were simulated on the model by neurosurgeons and otorhinolaryngology surgeons of varying experience. All procedures were recorded using a high-definition camera coupled with a digital video recorder system. The participants were asked to complete a post-procedure questionnaire to validate the efficacy of the model.

Results: Fourteen experts and 22 trainees participated in simulations, and the 32 participants completed the post-procedure survey. The anatomical realism was scored as 4.0/5.0. The participants rated the model as helpful in hand-eye coordination training (4.7/5.0) and improving surgical skills (4.6/5.0) for ESBS. All participants believed that the model was useful as educational support for trainees (4.7 [± 0.5]). However, the color (3.6/5.0) and soft tissue feedback parameters (2.8/5) scored low.

Conclusion: This study shows that high-resolution 3D printed skull base models for ESBS can be generated with high anatomical accuracy and acceptable haptic feedback. The simulation program of ESBS using this model may be supplemental or provide an alternative training platform to cadaveric dissection [1].

1)
Lee WJ, Kim YH, Hong SD, Rho TH, Kim YH, Dho YS, Hong CK, Kong DS. Development of 3-dimensional printed simulation surgical training models for endoscopic endonasal and transorbital surgery. Front Oncol. 2022 Aug 5;12:966051. doi: 10.3389/fonc.2022.966051. PMID: 35992880; PMCID: PMC9389537.