

Virtual ACS 2021 Surgeons and Engineers: A Dialogue on Surgical Simulation Meeting

Research In-Progress

The Development and Validation of a Novel High-Fidelity Simulator for Parotid and Facial Nerve Surgery.

Fanny Gabrysz-Forget, MD; and Bharat Bhushan Yarlagadda, MD FACS.

Lahey Hospital and Medical Center, Burlington, MA

Introduction: Parotid surgery is challenging to learn and teach due to potentially morbid complications such as facial nerve injury. We present the development of a novel low-cost high-fidelity model for training of parotidectomy with pilot data of prospective validation studies.

Methods: The model consists of a 3D printed skeletal and multiple silicone-based soft tissue portions of various densities to replicate skin, parotid, and tumor. Copper wire replicates the facial nerve and is circuited to indicate contact with instruments. Face validity is evaluated using a 21-item 5-point Likert scale survey. Participant performance was likewise evaluated. Content validity was determined by comparing expert and novice performance, and via a survey completed by the trainees after their immediate subsequent live parotidectomy following simulation.

Preliminary Results: Twelve residents and six faculty completed the simulated-procedure of superficial parotidectomy after watching a video demonstration. Over the 16 steps of the surgery evaluated by this simulator, the mean assessment score for faculty was 15.83 ± 0.41 compared to 13.33 ± 2.06 for residents ($p=0.0081$). The ability to distinguish groups indicates high content validity. Overall, the value of the simulator as a training tool was well received by both faculty and residents (5 vs 4, $p=0.0206$), however faculty were more likely to respond positively with regards to overall realism (4.5 vs. 3.5, $p = 0.0155$), and tumor realism (5 vs 4, $p = 0.0264$). Low scores were received particularly regarding skin realism.

Next Steps: This low-cost soft-tissue surgical trainer for parotidectomy and facial nerve dissection has showed face and content validity and will contribute the surgical education of early stage trainees. As low feedback was received regarding skin tissue realism and quality, future directives are intended to improve the soft tissue quality via alteration of the silicone materials used. In addition, sensors can be used in the circuit to indicate duration and intensity of facial nerve contact, rather than the current binary feedback. Similar models can be applied to additional anatomies, such as thyroid surgery.

