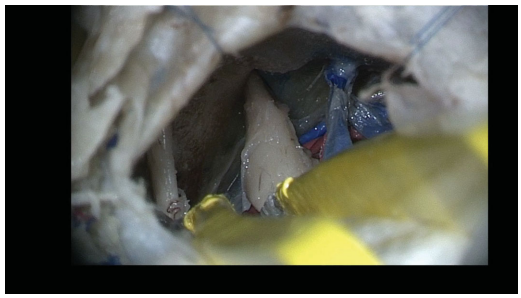
Retrosigmoid Craniectomy and Suprameatal Drilling—3-Dimensionally Printed Microneurosurgical Simulation: 2-Dimensional Operative Video



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Neurosurgical training is being challenged by rigorous work-hour restrictions and the COVID-19 pandemic.[1] Now, more than ever, surgical simulation plays a pivotal role in resident education and psychomotor skill development. Three-dimensional (3D) printing technologies enable the construction of inexpensive, patient-specific, anatomically accurate physical models for a more convenient and realistic simulation of complex skull base approaches in a safe environment.[2] All stages of the surgical procedure can be simulated, from positioning and exposure to deep microdissection, which has an unparalleled educational value. The complex approach-specific anatomy, narrow working angles, and pathoanatomic relationships can be readily explored from the surgeon's perspective or point of view.[2,3] Furthermore, different thermoplastic polymers can be utilized to replicate the visual and tactile feedback of bone (cortical/cancellous), neurological, and vascular tissues.[4] Retrosigmoid craniectomies are widely used in neurosurgery with various applications, including microvascular decompressions in patients with trigeminal neuralgia.[5-7] Removal of the suprameatal tubercle (SMT) extends the retrosigmoid approach superiorly to the middle fossa and Meckel's cave, and anteriorly to the clivus.[8,9] This maneuver may be necessary in patients with prominent SMTs obstructing the view of the trigeminal nerve and in patients with a more anterosuperior neurovascular conflict. This video illustrates a microsurgical training tool for learning and honing the technique of retrosigmoid craniectomy and suprameatal drilling using an affordable (29.00 USD) biomimetic 3D-printed simulator that closely recapitulates not only the anatomy but also the tactile feedback of drilling and manipulating neurological tissues (see Table and Graph 1; minute 07:11) as it happens at the time of surgery.

KEY WORDS: 3D printing, Cerebellopontine angle, Meckel's cave, Skull base, Suprameatal tubercle, Surgical simulation, Trigeminal neuralgia

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