Correspondence

Cleft Palate Surgical Skills Training Using an Alternative Synthetic Bench Model

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To the Editor: Although there have been numerous reports of different synthetic simulators that can provide cleft palate training, none offers a completely ideal model. We proposed an alternative three-dimensional (3D) cleft palate bench model to improve understanding and conceptualization of cleft palate repair, as well as offer deliberative and repetitive hands-on training of basic cleft palate repair skills [Figure 1] before applying surgical techniques on live patients.

Figure 1: Step-by-step description of the assembly of our cleft palate bench model. (a) Materials: 2-mm-thick plates of ethylene-vinyl acetate (Eureka E.V.A., Brazil; simulating the oral [skin color], muscle [red], and nasal [white] layers); a red drinking straw (Plastifer, Brazil; simulating the greater palatine vessels); a plastic water cup (Copos Plasticos do Sul Ltda, Brazil) lined by a black fabric (simulating the oral cavity with the size of a 12-month-old child’s mouth); a maxillary dental cast (simulating the bone structures); and double-sided adhesive tapes (3M, Brazil; used to glue the structures together and mimic the interrelationship between the palatal layers). Oral (including the median cleft) and muscle layers (anteriorly oriented and inserted on or near the posterior edge of the hard palate, mimicking the three abnormal insertions of cleft levator [the hard palate, the tensor aponeurosis, and the superior constrictor], which must be addressed in repairing the defect) were adapted from landmark anatomical pictures of the cleft palate; origami-like paper copies of these designs facilitated later repetition. (b) Different marking for flap designs (2-flap palatoplasty, V-Y pushback palatoplasty, and double-opposing Z-palatoplasty). Note the four projections used to hold the dental cast to prevent any undesirable rotation during training. (c) Greater palatine vessels were sandwiched in the glued oral and muscle layers. The nasal layer was glued onto the dental cast (hard palate), and oral/muscle component was then mounted onto the nasal layer/hard palate component using adhesive tape. (d) These composed components were fitted and stabilized into the water cup at the desired angle using adhesive tape. (e) The oral layer was dissected from the hard palate and the muscle with preservation of the greater palatine vessels on both sides. The soft palate muscles were dissected from the nasal layer and from the posterior edge of the hard palate. The nasal layer was closed and the muscles were retroposed and sutured together (intravelar veloplasty). (f) Final appearance after closure of the oral mucosal flaps. Photographic documentation belongs to authors’ archives.

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As we used a life-sized maxillary dental cast, all the training processes were carried out with reliable anatomical relationships and surgical movements (i.e., incision, dissection, flaps, and sutures), and individuals can be trained using important referential anatomical points (e.g., Ernst’s space, pterygoid hamulus, palatine canals, and palatine vessel localizations). The synthetic material we adopted to simulate the oral, muscle, and nasal layers allowed dissection and suturing under reasonable tension. Further, as the texture of this material mimics the fragility of the palate soft tissues, gentle tissue handling is necessary. In fact, this synthetic material can tear; as this occurs when the trainee make a wrong movement (e.g., does not follow the curvature of the needle, applies excessive force), this feature might serve as an excellent evaluation mechanism and provide opportunities for feedback from the faculty trainers.

Numerous important anatomical structures (oral cavity, muscle layer, and blood vessels) are not simulated in some of the available cleft palate bench models; therefore, these simulators do not allow the hands-on training of relevant surgical skills, such as dissection and suturing of the muscles of the soft palate. High cost and limited accessibility are also limitations of previous 3D cleft palate simulators. We, therefore, proposed a 3D, homemade, simple, inexpensive, portable, reproducible, and life-sized bench model of the oral cavity of a pediatric cleft palate patient. Although these features have also been described as advantages of a previous cleft palate bench model, we can simulate greater palatine vessels and the nonanatomic orientation of the soft palate musculature. In addition, as similar to some available cleft palate bench models, our simulator was developed to facilitate trainees’ acquiring of cleft palate repair skills, including operating in a small cavity, poor depth perception, awkward angles, limited access, poor visualization, fragile soft tissue, delicate tissue handling, small flaps, in-depth suturing, simultaneous access by the trainee surgeon and the assistant faculty, and the use of the operating microscope.

The primary criticism of both our and previous synthetic cleft palate bench models has been their lack of fidelity with actual surgical practice. Surgical practice on living animals and human cadavers, however, has been associated with infection risks, high costs, need for specialized installations, and ethical and legal concerns. Further, the use of virtual reality simulators has been hampered by high costs and lack of access. Therefore, these synthetic inanimate bench models offer cleft palate surgical training opportunities that can develop trainees’ knowledge, skills, and attitudes while protecting patients from unnecessary risks.

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Conflicts of interest
There are no conflicts of interest.

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