OBJECTIVES

Our objective was to design an inexpensive, reproducible and realistic anatomic model to simulate myringotomy with tympanostomy tube placement for use in the surgical skills laboratory. The model will be utilized for surgical skills training and to familiarize residents with the operating microscope, the surgical instrumentation, and the surgical anatomy used during a typical procedure.

METHODS

MODEL DESIGN: The model was formed by sawing a poly styrene foam head in half in the sagittal plane. An opening was carved into the lateral aspect of the head for insertion of the simulator ear (Fig. 2). Directly opposing this site on the medial aspect of the foam head, an opening was cut to accommodate the Reusable Middle Ear assembly (RME) (Fig. 3). To allow for a window in the medial portion of the Life/form® Simulator ear was removed (Fig. 4) and the ear placed within the cut external opening of the head (Fig. 2 and 5). This portion of the model remains permanently assembled. The RME assembly was created by molding a T-pin to represent a malleus. This was then secured at the inner edge of a three cm segment of a detached bulb syringe tip. A piece of Flesh colored latex paint was later added to improve natural coloring.

ASSEMBLY: A small square of Glad Wrap®, which acts as the disposable tympanic membrane, was then draped over the RME apparatus (Fig. 7). The entire assembly was placed within the medial opening of the head to align with the external ear canal (Fig. 8). A mark on the superior edge of the model and RME assembly ensured anatomic alignment of the landmarks.

RESULTS

ANATOMIC VALIDITY: The view through the operating microscope reveals the landmarks necessary for proper tube placement. As seen in Figure 10 a myringotomy with tympanostomy tube placement was performed under the operating microscope with the finished model. Subjectively, the texture of the Glad Wrap is similar to a normal tympanic membrane. The curved ear canal on the model requires manipulation of the head and microscope to align the canal for proper visualization of the tympanic membrane. Butter Flavor Crisco® can also be added to imitate cerumen impaction.

DISCUSSION

The total cost of the model was approximately $50.00 including replacement parts for disposable portions, and could be reproduced at other institutions. In addition to skills training, this model has the potential to be utilized as an objective assessment of surgical skills in otolaryngology residents. Figures 9 and 10 were captured on the METI Automated Video Capturing System®. We are currently developing a surgical skills module, curriculum, and web based evaluation tool for myringotomy. We have future plans to analyze the impact and validity such a tool would have on otolaryngology residents in training.

CONCLUSION

The model developed is a reproducible and realistic anatomic model for simulation training of myringotomy with tympanostomy tube placement. This model has been employed successfully by residents and can be created utilizing inexpensive materials.

REFERENCES