Abstract

Objective: To develop a low-cost task simulator for peritonsillar abscess drainage, in order to help new residents gain familiarity with the instrumentation and essential steps involved in the procedure.

Methods: A latex moulage fashioned from a plaster mold was constructed to replicate an oropharynx with a unilateral tonsillar abscess. The moulage with a pseudo-abscess was secured behind a 2.5” PVC pipe and horizontally mounted. Participants were given a series of tasks to expose, anesthetize, aspirate, and drain the abscess.

Results: Initial impressions were favorable that the models sufficiently replicated the tasks requisite for draining a peritonsillar abscess. Completion of the simulated task required bimanual dexterity and comfort with use of headlight and instrumentation within an enclosed space similar to that required in the real situation. The anatomy of the oropharyngeal moulage was thought to be adequate. Cost of the construct and initial model is less than 10 dollars, with subsequent models much less than 25 cents to produce.

Conclusion: Production of a low-cost task simulator for drainage of a peritonsillar abscess is feasible and may provide a reasonably realistic environment to allow residents to practice and develop this skill. Further study is needed to formally assess face, construct, and content validity of this simulator for teaching and assessment of procedural competency.

Methods and Materials

Peritonsillar abscess (PTA) model construction was performed by a team of otolaryngologists and simulation center staff (Figure 1). A 2” (7.0 mm) length of 2.5” (6.4 cm) diameter PVC pipe was used to represent the oral cavity. A hole was drilled into the lateral aspect of the PVC to allow for introduction of a camera. A clay mold was sculpted to create the “negative space” of the oral cavity. Indentations were made in the mold representing the uvula, normal tonsil, and a right-sided infected tonsil. A “positive” latex moulage was created by applying layers of liquid latex over the mold. Each layer was allowed to dry before the application of the next layer. Three thin layers of flesh colored latex were used to create adequate support. Once dry, a large rubber band served the latex moulage to posterior end of the PVC pipe. Abscess liquid was made from sugar-free vanilla pudding and non-refrigerated coffee creamer mixed to the proper consistency. A small latex balloon filled with 3 cc in a 3mm piece of foam. The foam created a subsunalus space to separate the lateral moulage from the balloon abscess. The abscess and foam were secured with packing tape to the posterior aspect of the moulage. Lips were constructed using layers of latex molded over a plaster model. This was secured to the anterior end of the PVC pipe with a round clamp. A tongue borrowed from a simulator model was secured inside the PVC pipe with Velcro.

To hold the simulator, a 3” rubber cap lined with foam tape was mounted on to a vertically oriented piece of plywood (Figure 2). The completed PTA construct was placed into the rubber cap. A flexible GI endoscope was passed through the side-wall hole of the PVC pipe. An endoscopic tower was attached to the scope to enable video recording.

Participants of the study consisted of faculty members, residents, and rotating medical students in the Department of Otolaryngology. Each member was given the same instructions and an instruction sheet about the steps to follow to drain the abscess. Their ability to use a headlight to expose the oropharynx, use a tongue blade to anesthetize the posterior oropharynx, aspirate, and incise the abscess was recorded.

Following the procedure, a 13-question survey was supplied to evaluate the simulator, and volunteers were asked to grade their experience on a five-point Likert scale (Questions below). Questions focused specifically on the ability of the trainer to replicate tasks requisite for PTA drainage, as well as general questions about the value of a PTA task simulator. Level of training and number of abscesses were also included in the questionnaire.

Results

Participants felt the tasks were appropriate and accurate in simulating draining a PTA. It teaches the basic principles necessary to approach a patient, visualize, anesthetize, and attempt to drain an abscess. All agreed that this trainer helps develop bimanual dexterity and use of a headlight. All but one participant agreed or strongly agreed that this simulation helps with learning to anesthetize the oropharynx and aspirate and incise the abscess.

However, our questionnaire indicated that many felt the moulage does not represent the posterior oropharynx accurately (50%). This led some (33.3%) to be unsure how well this simulator would help with competency in draining PTAs. Participants wanted more accurate anatomy, such as posterior pillars, a more accurate uvula and “feet” when incising the oropharyngeal tissues. In spite of this, participants still felt (63.3%) the skills are represented well with this simulator. We feel these results come from using a lower fidelity model with a latex model, whereas some desired complete fidelity.

This model provides a low-cost construct for training younger resident techniques for draining a PTA. Cost of the construct and initial model is approximately 10 dollars, with subsequent models less than 25 cents to create, given only the abscess, foam, and latex moulage need to be replaced.

Simulators and task trainers are becoming an important aspect of training new residents\(^1\). It allows physicians to be exposed to new situations and procedures in a safe manner. Simulators also allow for practice of techniques to develop skills necessary to more effectively operate. Transoral PTA drainage is a very common procedure performed by otolaryngologists and other medical professionals. There is a steep learning curve given the need for adequate exposure and experience when residents first perform this procedure. Younger residents may not see their first PTA until on call, when they need to safely drain the abscess. Proper technique, adequate visualization, anesthetizing, and drainage of the abscess are all important techniques that need to be learned to consistently and safely drain an intraoral abscess. The techniques mastered in draining a PTA can also extend into other transoral cases where use of headlight, exposure, and bimanual dexterity is required.

Conclusions

The role for simulators in resident training continues to expand and the demand for low-cost, but valid, models is increasing. The creation of a low-cost PTA simulator can provide increased training, especially to younger residents, regarding safe technique for draining the abscess. This model provides a low-cost, reusable, and safe method for training otolaryngology residents competencies needed for draining PTAs. Further research needs to be performed regarding the face, content, and construct validity of this simulator, which is currently underway.

References