Low Cost, Easy-to-Replicate Myringotomy Tube Placement Simulation Model

Nicole Molin M.D.[1], Jerlon Chiu B.S.[2], Benjamin Liba M.D.[1], Glenn Isaacson M.D.[1]

1. Departments of Otolaryngology, Head and Neck Surgery and Pediatrics, Lewis Katz School of Medicine, Temple University, Philadelphia, PA, USA
2. University of Connecticut School of Medicine, Farmington, CT, USA

Background

- Myringotomy tube (MT) placement is technically challenging and has many known complications, especially in hands of trainees
- Simulation training is a cost effective way to familiarize surgical residents prior to live patient training[1]
- Current simulation models for MT placement exist but can be expensive, hard to reproduce, or lack resemblance to the real life procedure [2,3,4]
- We present a MT insertion simulation model that is low-cost and easy to replicate and resembles the anatomy of MT placement

Materials

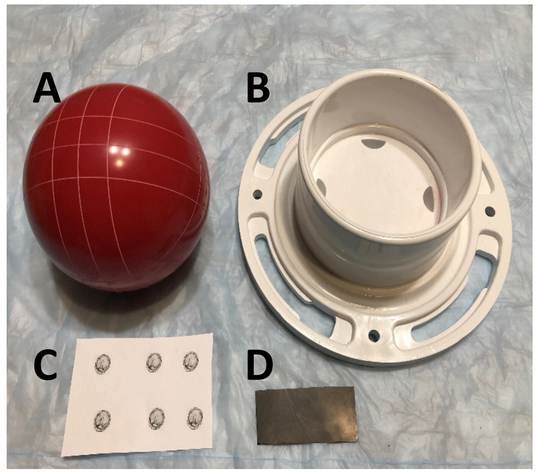


Figure 1 A-D: Materials needed to construct this model (total cost $35 USD)

1A. 4.5 inch diameter soft resin composite bocce ball

1B. Base – 4'' PVC closet flange with plastic ring (sold in the plumbing aisle of most hardware stores)

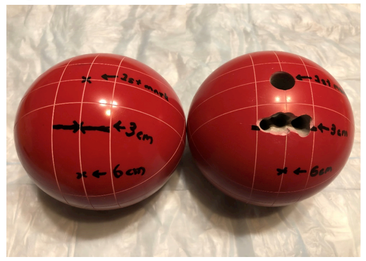
1C. Newspaper or tracing paper with printed or ink stamped tympanic membrane (included)

1D. Any sturdy plastic/wooden slide (about 3cm x 6cm)

Methods

Constructing the Model

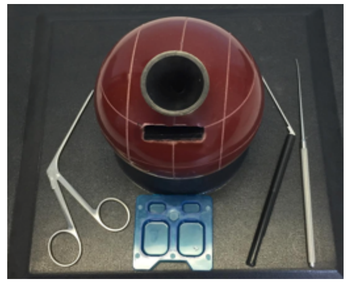
Figure 2A-D: Steps to construct the model.



2A. Make your measurements and drill the holes with a hand drill or drill press

2B. Drill a hole in your plastic slide

2C. Load tympanic membrane onto slide

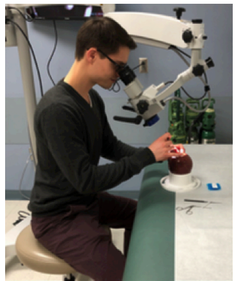


2C. Finished model

Efficacy

- The efficacy of the model was tested on 10 volunteer medical students, performance was evaluated before and after 30 minutes of practice with the model.[5]
- Practicing on the model for 30 minutes led to statistically significant improvement in MT skill scores and decreased time to place a MT tube ($p<0.05$)
- Anecdotally, residents show greater confidence, manual dexterity and performance in the operating room with MT placement after practicing on the model

A



B

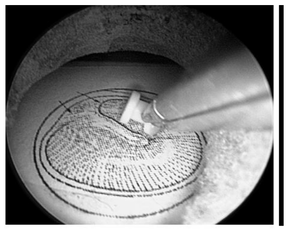


Figure 3: (A) Model in use (B) view under microscope

Benefits of the Model

- Angle of simulated TM and EAC are similar to average human EAC and TM (Figure 4)

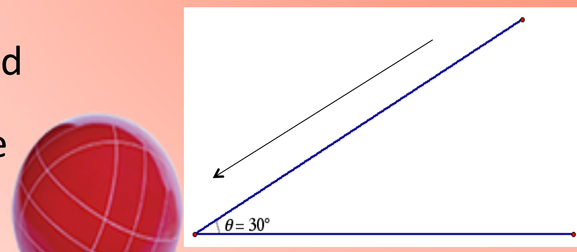


Figure 4

- Round shape of the model allows for practice with head orientation, focusing of the microscope and speculum hand balance (Figure 5)

Figure 5

Conclusions

- This MT placement simulation model is inexpensive and easy to reproduce without special tools or equipment.
- This model is unique in that it allows for practice of MT placement on an anatomically similar target in addition to practice with head orientation and focus of the microscope
- Practice with the model can lead to improvement in performance and confidence in resident surgeons during MT placement

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