INNOVATIONS

The Bubble-Wrap Peritonsillar Abscess Model

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ABSTRACT:

Audience: The bubble-wrap peritonsillar abscess model is designed to instruct PGY 1-4 emergency medicine residents as well as emergency medicine-bound students.

Introduction: Peritonsillar Abscesses (PTA) are frequently encountered in clinical practice. Emergent otolaryngology consultation may not be possible. Emergency physicians must be able to perform needle aspiration of PTA. This procedure is fraught with risk due to the natural proximity of the internal jugular vein and carotid artery to the pharyngeal tonsils. Deliberate practice of clinical procedures can drastically reduce associated complications;[1] however, no simulators are available for this particular purpose. Here we describe a PTA model that can be used to practice PTA drainage by novice learners.

Objectives: At the end of this educational session, learners will be able to: 1) demonstrate needle aspiration of peritonsillar abscesses, 2) discuss the indications, contraindications and complications associated with PTA drainage.

Method: This model uses bubble wrap, zip ties, chicken broth and liquid latex to simulate a peritonsillar abscess. Learners are then able to perform a needle aspiration of the simulated abscess from start to the end with no risk to a live patient.

Topics: Otolaryngology, ENT, peritonsillar abscess drainage, PTA, head and neck, incision and drainage, needle aspiration.

USER GUIDE

Learner Audience:
Medical Students, interns, junior residents, senior residents, faculty

Time Required for Implementation:
This PTA model can be built in batches of 12-36 models. It takes 90 minutes of basic preparation to build. The models must be left overnight for the latex to dry completely.

Learners typically spend about 3-5 minutes in preparing for and executing PTA drainage on these models. Competency is achieved through repetition of procedure. Although each learner is different, in our experience, most learners feel comfortable after three practice runs. Each model affords bilateral PTA drainage and approximately three attempts (latex is self-sealing to an extent).

Recommended Number of Learners per Instructor:
6:1

Topics:
ENT, Peritonsillar abscess drainage, PTA, head and neck, incision and drainage, needle aspiration.

Objectives:
At the end of this educational session, learners will be able to:

1. Demonstrate needle aspiration of peritonsillar abscesses.
2. Discuss the indications, contraindications and complications associated with PTA drainage.

Linked objectives and methods:
The hands-on interactive session allows for a controlled simulated session that provides learners the opportunity to perform a needle aspiration of a peritonsillar abscess.

Recommended pre-reading for instructor:

- Riviello RJ. Otolaryngologic procedures; Tonsil: PTA. Roberts JR, ed. *Clinical Procedures in Emergency Medicine.* 6th ed. Philadelphia, PA: Elsevier/Saunders; 2014:1303-1309.

Learner responsible content (LRC):

- Peritonsillar abscess drainage. HQMedEd. https://hqmeded.com/peritonsillar-abscess-drainage/. Published June 6, 2014. Accessed November 30, 2016.
- Riviello RJ. Otolaryngologic procedures. Roberts JR, ed. *Clinical Procedures in Emergency Medicine.* 6th ed. Philadelphia, PA: Elsevier/Saunders; 2014:1228-1341.

Implementation Methods:
After creation of the model and insertion into an airway trainer, learners are able to perform a needle aspiration of the simulated abscess. This is best if done with an instructor overseeing the drainage. All required materials used for drainage can be present to walk a learner from the start to the end of a peritonsillar abscess drainage.

List of items required to replicate this innovation:

- 1-inch bubble wrap cut in 1-inch x 5-inch strips with bubbles intact (any hardware store)
- 12 6-inch zip-ties, trimmed to fit airway task trainer oral cavity or equivalent (any hardware store)
- Chicken broth (local grocery store)
- 21-gauge hypodermic needle (from any clinical supplies store)
- 6-12 cc syringes
- Cyano-acrylic (crazy) glue (available at any hardware store)
- Liquid latex (available online at https://www.amazon.com/Cinema-Secrets-SL001-Flesh-Latex/
- Acrylic paint
- Scissors
- A disposable paper cup (or airway task trainer).

Approximate cost of items to create this innovation:
The total cost was $72 for a batch of 36 PTA models.

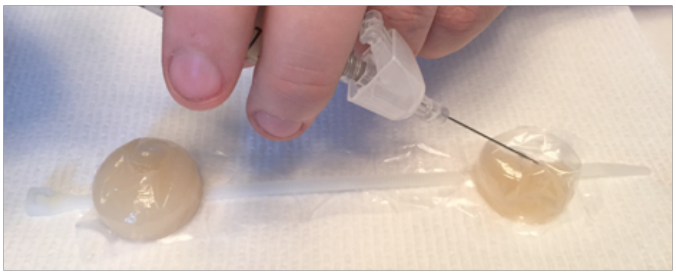
Detailed methods to construct this innovation:
The PTA is assembled by cutting the bubble-wrap in 1-inch x 5-inch strips, keeping the two furthest bubbles intact. A zip-tie is threaded into the strip so as to have a bubble at each end. The bubbles in the middle are carefully snipped out. The two furthest bubbles are filled with chicken broth using the hypodermic needle and syringe. The "pus pocket" thus created is sealed with crazy glue. The entire structure is coated with latex, allowed to dry for 12 hours, and then painted to resemble an inflamed abscess. The structure is compressed and placed inside an airway task trainer or a large disposable plastic cup (to simulate the oral cavity).

These steps are summarized in figure 1 a-f and online at: https://youtu.be/1W0H7t_rEjA

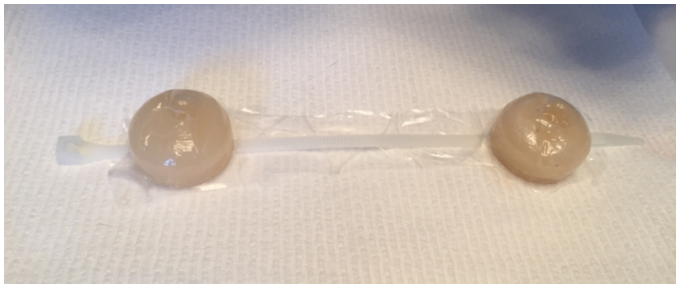
USER GUIDE

Step 1a:
Cut 1 inch bubblewrap into strips, threaded over 6 inch ziptie

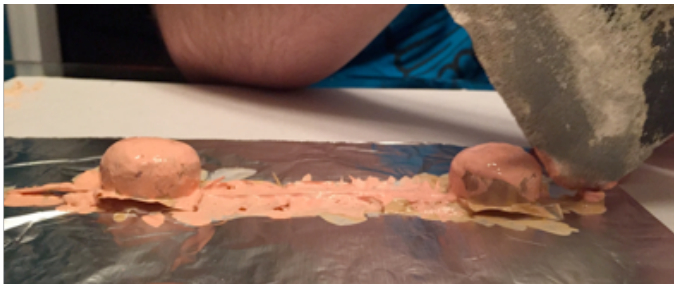
Step 1b:
Inject each airbladder with diluted chicken noodle soup



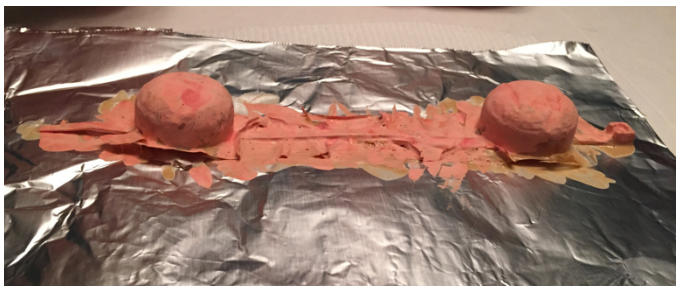
Step 1c:
Site of injection should be sealed with Cyano-acrylic (crazy) glue



Step 1d:
After glue dries, paint on liquid latex



Step 1e:
After liquid latex dries, paint with red to preference



Step 1f:
Place model in U configuration in oropharynx of Airway Task Trainer

Results and tips for successful implementation:

1. Careful re-injection of diluted soup into the pus pocket can permit repeated use of the pocket (up to 2-3 times/pus pocket) because liquid latex has a self-sealing quality.
2. To simulate abscess specific odors, you can add stink bomb liquid to the mixture or simply leave the PTA models out in room temperature for 2-3 days.
3. If using an airway manikin, we recommend using an older model and lining the oral cavity with cling wrap to avoid spillage of soup into task trainer.
4. The PTA pus pocket can also be visualized ultrasonographically for determination of depth from surface.
5. Works best with an airway task trainer.
6. Not advised for anyone with latex allergies. A possible alternative would be Dragon Skin, which is a silicone-

based product, and also available at https://www.amazon.com/Smooth--Dragon-platinum-silicone-rubber.

7. The model was piloted with a group of 36 emergency medicine residents and students. The activity was evaluated by all learners who uniformly found it to be extremely useful for learning and practicing the PTA drainage procedure.

References/suggestions for further reading:

1. Okuda Y, Bryson E, DeMaria S, Jacobson L, Shen B, Levine A, Quinones, J. The utility of simulation in medical education: what is the evidence? *Mt Sinai J Med.* 2009;76(4):330-343. Accessed November 30, 2016. doi: 10.1002/msj.20127
2. Peritonsillar abscess drainage. HQMedEd. https://hqmeded.com/peritonsillar-abscess-drainage/. Published June 6, 2014. Accessed November 30, 2016.
3. Suh JD. Peritonsillar abscess drainage procedures. http://emedicine.medscape.com/article/109290-overview. Accessed November 30, 2016.
4. Riviello RJ. Otolaryngologic procedures. Roberts JR, ed. *Clinical Procedures in Emergency Medicine.* 6th ed. Philadelphia, PA: Elsevier/Saunders; 2014:1228-1341.