

Saved by the Bougie

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ANNALS CASE

You are finishing an overnight shift in a rural, single-coverage emergency department (ED) when the triage nurse suddenly warns, “Doc, we have a sick one here.” Within seconds, in comes a 500-plus-pound woman in severe respiratory distress. An emesis bag near overflowing with fresh blood matches the extensive bloodstains on her shirt, chin, and lower lip. She quickly begins receiving monitoring, and 2 large-bore intravenous lines are inserted. Her vital signs are, well, yikes! Her oxygen saturation is 83% and she is markedly hypotensive, tachycardic, and tachypneic. Although she has diminished breath sounds bilaterally, bedside ultrasonography reveals a curious lack of sliding on her left lung. Emergency medical services reports a history of chronic obstructive pulmonary disease and a right-sided lung mass located inconveniently close to the right pulmonary artery. After administering a nonrebreather mask to the patient, you realize 4 things: first, this patient likely has a left-sided pneumothorax and requires an emergency decompression; second, she needs to be intubated...and it will be difficult; third, the massive hemoptysis may be from erosion of the lung cancer into the right pulmonary artery, which means her left main bronchus should be selectively intubated; and fourth, Hickam’s dictum (the patient can have as many diseases as they darn well please) wins here, so Occam, put your razor away! As you begin to wrap your

head around the idea of placing a chest tube through copious adipose tissue, performing a difficult intubation, and somehow manipulating the endotracheal tube into the left main bronchus, you suddenly breathe a sigh of relief as you spot a familiar and incredibly helpful object on the wall.

THE GUM ELASTIC BOUGIE

The gum elastic bougie is traditionally used as an endotracheal tube introducer. It is composed of a 60-cm 10- to 15-French stylet with a coude tip angled at 30 to 40 degrees, and, contrary to its name, the bougie is neither elastic nor made of Big League Chew. When direct laryngoscopy is performed, the large diameter of the traditional endotracheal tube can obstruct the visual field, which can complicate tube passage and lead to increased frustration when the inevitable observer or attending physician asks, “What do you see?” Luckily, its angled coude tip allows the bougie to be passed under the epiglottis and through more anteriorly located vocal cords. When an inadequate Cormack-Lehane view is all you have, a bougie can provide a lifesaving conduit for endotracheal tube placement. Additionally, the smaller diameter of the bougie, half the size of a size 7.5 endotracheal tube, results in less visual obstruction during intubation, as well as the ability to navigate a very small or swollen trachea (Figure). It is therefore no surprise that use of the bougie is increasingly popular.¹⁻⁸ A number of studies have demonstrated increased first-pass success rates in both human studies and cadaveric models when the bougie is used as an adjunct.⁹⁻¹² Seems like a bougie could really be literally a lifesaver. Next, how does one actually use the thing?

HOW-TO GUIDE FOR BOUGIE-ASSISTED ENDOTRACHEAL INTUBATION

To enhance control of the stylet, hold the bougie at its midpoint and insert it along the side of the mouth rather than directly midline. This allows better control of the tip as the bougie is rotated in the vertical plane. Indications



Figure. The bougie has a much smaller diameter than an endotracheal tube (size 8.0 shown).

that the bougie is in the trachea include feeling the “bumps” of the anterior tracheal rings (if the bougie tip is directed in the correct, midline, anterior position) and the “stop” at approximately 24 to 40 cm as the bougie comes into contact with the carina or smaller airways. Esophageal placement should not elicit either of these findings. Although these classically taught mechanisms for tactile feedback can be helpful, they have low sensitivity and tube placement should be confirmed by other means.¹³ These tactile clues can be particularly useful in the case of a bleeding airway because fluid can impede visualizing the glottis. After bougie position has been confirmed, leave the laryngoscope in the oropharynx as the endotracheal tube is placed over the bougie. Premature removal of the laryngoscope may allow the tongue to fall posteriorly and obstruct passage of the endotracheal tube. If there is possible laryngeal or tracheal injury, caution should be used because the coude tip of the bougie may migrate outside the airway.

Classic bougie use understood, but this patient needs her potential tension pneumothorax fixed before intubation.

BOUGIE-ASSISTED THORACOSTOMY

Clearly, her girth limits the success rate of needle thoracostomy. For chest thoracostomy, it may be

challenging to locate the tract because of generous adipose tissue. If that is the case, a bougie can help! After a tract is formed, the pleura has been punctured, and a finger has swept 360 degrees in the intrathoracic space, guide the bougie along the inserted finger into this space. Subsequently, pass the thoracostomy tube over the bougie and remove the bougie from the catheter and chest. This should prevent you from the oh-so-embarrassing placement of a chest tube in the subcutaneous space. Data on this technique are lacking and have been applied only to sheep and nonobese human cadavers thus far.^{14,15}

Thanks to that bougie, the thoracostomy goes well and her blood pressure improves just in time for another episode of massive hemoptysis. With her pressure tanking, she becomes less responsive. On initial direct laryngoscopy, there’s way too much blood and redundant tissue to see anything useful. Although a bougie may help with blind intubation, given its tactile clues for the trachea, her oxygen saturation is troublingly low. Looks like a cricothyrotomy is the only option. If only a bougie could help here! But wait...

BOUGIE-ASSISTED CRICOTHYROTOMY

After both the vertical and horizontal incisions have been made over the cricothyroid membrane and palpation of the posterior cricoid cartilage confirms the tract, the bougie can be placed into this tract before insertion of either a tracheostomy tube or an endotracheal tube. Use of the bougie not only simplifies the procedure but also often allows more rapid and accurate insertion of a definitive airway.¹⁶ With a gloved finger placed in the tract, guide the bougie alongside your finger while feeling for the tracheal rings. Take caution not to advance the bougie too forcefully because bronchial perforation can occur.¹⁷ Also be careful not to rely too heavily on the sensation of a “holdup at the carina” because the bougie may also catch when placed into a false passage.¹⁸ After the bougie has been placed, advance a size 6.0 endotracheal tube or tracheostomy tube over the bougie, taking care not to advance the endotracheal tube too deeply.

Let’s check our progress. Tube thoracostomy...check. Cricothyrotomy...check. Selective aeration of the left lung? Bougie please!

BOUGIE-ASSISTED SELECTIVE ENDOBRONCHIAL INTUBATION

In patients with massive hemoptysis or a terrifying red abyss of an airway, the bougie may be helpful in

selectively intubating the “good lung” before the patient is placed in a lateral decubitus position. Although blindly shoving the endotracheal tube in a few centimeters past normal depth may be a fairly successful method for selectively intubating the right main bronchus, left-sided single lung intubation can be far more difficult. Without double-lumen endotracheal tubes or bronchoscopy in the ED, the bougie can assist providers in selective endobronchial intubation.¹⁹ After inserting the bougie into the airway with the coude tip directed superiorly, turn it 90 degrees counterclockwise for left mainstem intubation or 90 degrees clockwise for right mainstem intubation. If an endotracheal tube is placed first, the bougie can be introduced through the endotracheal tube and then rotated to choose either the right or left mainstem bronchus. Once resistance is encountered, the endotracheal tube can be passed over the bougie and the bougie can then be removed. Chest radiograph can confirm correct tube position.

CASE CONCLUSION

After pulling a bougie out of each pocket (you always come prepared), you successfully and skillfully perform a left-sided bougie-assisted chest tube followed by a smoothly performed bougie-assisted cricothyrotomy. Then you knock it out of the park with a bougie-assisted left mainstem bronchus selective intubation. The patient is placed in a right lateral decubitus position and then rapidly transferred upstairs for definitive management of her massive hemoptysis. Now that you’re a bougie master, you’ll be even more prepared for your next morbidly obese, massive hemoptysis patient with a tension pneumothorax in need of a cricothyrotomy.

TAKE-HOME POINTS

- The gum elastic bougie is a lengthy flexible catheter that is useful as an endotracheal tube introducer during either video or direct laryngoscopy.
- Other potential uses of the bougie include the following:
 - Knife-finger-bougie technique during emergency cricothyroidotomy
 - Tube thoracostomy in obese patients
 - Selective endobronchial intubation
 - Blind digital intubation²⁰
 - Endotracheal tube exchange

Q: What do you do when the Kleenex needs to be intubated?

A: Put a little bougie in it.

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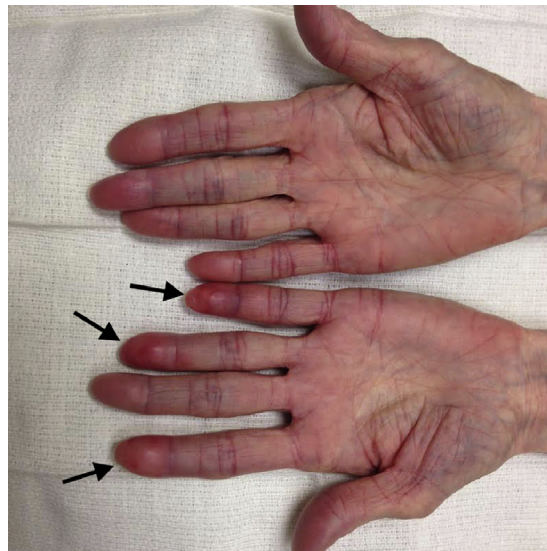
REFERENCES

1. Bair AE, Laurin EG, Schmitt BJ. An assessment of a tracheal tube introducer as an endotracheal tube placement confirmation device. *Am J Emerg Med.* 2005;23:754.
2. Jabre P, Combes X, Leroux B, et al. Use of gum elastic bougie for prehospital difficult intubation. *Am J Emerg Med.* 2005;23:552.
3. Kidd JF, Dyson A, Latto IP. Successful difficult intubation. Use of the gum elastic bougie. *Anaesthesia.* 1988;43:437.
4. Latto IP, Stacey M, Mecklenburgh J, et al. Survey of the use of the gum elastic bougie in clinical practice. *Anaesthesia.* 2002;57:379-384.
5. Niven AS, Doerschug KC. Techniques for the difficult airway. *Curr Opin Crit Care.* 2013;19:9-15.
6. Rai MR. The humble bougie...forty years and still counting. *Anaesthesia.* 2014;69:199-203.
7. Henderson JJ, Popat MT, Latto IP, et al. Difficult Airway Society guidelines for management of the unanticipated difficult intubation. *Anaesthesia.* 2004;59:675-694.
8. Reis Lde A, Reis GF, Oliveira MR, et al. [Bougie]. *Rev Bras Anesthesiol.* 2009;59:618-623.
9. Brazil V, Grobler C, Greenslade J, et al. Comparison of intubation performance by junior emergency department doctors using gum elastic bougie versus stylet reinforced endotracheal tube insertion techniques. *Emerg Med Australas.* 2012;24:194-200.
10. Walsh R, Cookman L, Luerssen E. Comparison of intubation performance by emergency medicine residents using gum elastic bougie versus standard stylet in simulated easy and difficult intubation scenarios. *Emerg Med Australas.* 2014;26:446-449.
11. Gataure PS, Vaughan RS, Latto IP. Simulated difficult intubation. Comparison of the gum elastic bougie and the stylet. *Anaesthesia.* 1996;51:935-938.
12. Driver B, Dodd K, Klein LR, et al. The bougie and first-pass success in the emergency department. *Ann Emerg Med.* 2017;70:473-478.
13. Shah KH, Kwong BM, Hazan A, et al. Success of the gum elastic bougie as a rescue airway in the emergency department. *J Emerg Med.* 2011;40:1-6.
14. Gottlieb M, Nakitende D, Kimball D, et al. Bougie-assisted tube thoracostomy placement: a novel technique. *Am J Emerg Med.* 2016;34:101-102.
15. Beer RG, Grimmer WG, Fraser JF. Appraisal of the endotracheal tube as an alternative to the intercostal catheter. *Emerg Med Australas.* 2010;22:573-574.
16. Hill C, Reardon R, Joing S, et al. Cricothyrotomy technique using gum elastic bougie is faster than standard technique: a study of emergency medicine residents and medical students in an animal lab. *Acad Emerg Med.* 2010;17:666-669.

17. Prabhu A, Pradhan P, Sanaka R, et al. Bougie trauma—it is still possible. *Anaesthesia*. 2003;58:811-813.
18. Marson BA, Anderson E, Wilkes AR, et al. Bougie-related airway trauma: dangers of the hold-up sign. *Anaesthesia*. 2014;69:219.
19. Gottlieb M, et al. Utilization of a gum elastic bougie to facilitate single lung intubation. *Am J Emerg Med*. 2016.
20. Rich JM. Successful blind digital intubation with a bougie introducer in a patient with an unexpected difficult airway. *Proc (Bayl Univ Med Cent)*. 2008;21:397.

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