Ultrasound-guided removal of hypopharyngeal foreign body in the emergency department

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Abstract

Foreign body impaction at the cricopharyngeal level can be a life-threatening emergency. While traditionally, removal of these is performed in the operating room setting, patients with relatively unstable airways or significant discomfort may require immediate extraction to prevent further injury. This is the case of an 85-year-old man who presented to the emergency department in significant discomfort following aspiration of a large partial denture. We report here the first known use of ultrasound in an emergent airway situation to rapidly localize and retrieve an aspirated foreign body.

Keywords

Foreign body aspiration, pharynx, head and neck ultrasound, Glidescope® video laryngoscopy, point-of-care ultrasound, bedside ultrasound

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Introduction

Foreign body aspiration can rapidly result in asphyxia and death. While many of these pass spontaneously, some may impact at the hypopharyngeal level. In adults, this incidence increases steadily and rises rapidly, peaking at 84 years-old.¹ While multiple studies have supported the use of ultrasound to localize a foreign body in skin and soft tissue, few cases have illustrated the use of ultrasound to identify a foreign body specifically aspirated in the pharynx or hypopharynx.^{2–5} Furthermore, when used, these have been described in the operating room setting only.^{6–8} Here, we present the first reported use of ultrasound in the emergency department (ED) to identify and localize an aspirated foreign body, with assisted video laryngoscopic retrieval.

Case report

An 85-year-old male with a past medical history of hypertension, diabetes mellitus type 2 and COPD

presented to the ED after he swallowed a partial denture containing a single tooth. The patient complained of coughing, voice hoarseness, and a strong sensation of pain in the throat at the level of the mid neck. He appeared to be in significant discomfort and had difficulty completing full sentences. No stridor or drooling was noted. The oropharynx was clear with no apparent foreign body visible and with no signs of trauma, erythema, lacerations, abrasions, or edema.

Initial soft tissue lateral and postero-anterior (PA) neck X-rays were performed which were found to be negative for evidence of foreign body. After risks, benefits and the possibility of forced aspiration and emergent intubation were explained to the patient, the

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oropharynx was anesthetized copiously with Cetacaine[®] spray, containing 14% benzocaine, 2% butamben, and 2% tetracaine solution, and the patient was placed supine. Using Glidescope[®] video laryngoscopy (GVL), a brief glimpse was attempted, however, due to increasing pooling of secretions, subsequent patient coughing and concern for laryngospasm, the Glidescope[®] was immediately retracted, the patient was placed in the seated position and a decision was made to use ultrasound to confirm presence of and precisely localize a foreign body.

Using a Zonare Z.One ultrasound machine with a linear 10-5 MHz probe to scan the anterior cervical neck from cephalad to caudal in the transverse plane, a hyperechoic material with posterior shadowing was immediately confirmed at the left hypopharyngeal area, at the level of the cricoid cartilage (Figure 1).

After airway equipment was then prepared and sedation was administered, the patient was placed supine and a reattempt was made to extract the foreign body. Under GVL, a large partial denture was then directly visualized in the left piriform recess extending transversely immediately over the vocal cords and overlying the arytenoids (Figure 2). Given copious secretions at the time of visualization, gentle suction with a soft catheter was also simultaneously performed and improved visualization after suctioning revealed the foreign body had then moved into the proximal pharynx.

Upon placing Magill forceps into the oropharynx to retrieve the foreign body, the patient began to cough vigorously and was seated upright, resulting in the forced expulsion of the partial denture (Figure 3). Resolution of voice hoarseness was noted and the patient described immediate resolution of symptoms. A subsequent fiberoptic scope examination revealed a normal nasopharynx, base of tongue, and epiglottis. The ary-epiglottic fold and arytenoids were noted to be slightly swollen with erythema and a soft diet was recommended upon patient discharge, with otolaryngology follow-up as needed.

Discussion

After children, the elderly pose the highest risk of foreign body aspiration. Additionally, foreign bodies lodged in the head and neck present with particular difficulty given the relative inaccessibility of distal aspects of the pharynx and hypopharynx, which when combined with the potential complications of forced aspiration, perforation, partial or complete airway obstruction and laryngospasm, make the discovery and removal of aspirated foreign bodies particularly precarious.

While traditionally, X-ray is the initial imaging of choice, given its ease and accessibility, nonradiopaque aspirated foreign bodies, however, may fail to be

Figure 1. Transverse B-mode ultrasound image of the left hypopharyngeal area revealing hyperechoic material with posterior shadowing at the level of the cricoid cartilage.

Figure 2. Glidescope[®] video laryngoscopy image of a large partial denture noted in the left piriform recess and extending immediately over the vocal cords and overlying the arytenoids. Arrows indicate the location of denture.

Figure 3. Large partial denture with single tooth involved in foreign body aspiration.

visible, with sensitivities for X-ray ranging from 100% to as low as 45%.^{9–11} Ultrasound has been found to be more sensitive than X-ray particularly in visualizing low radiopaque foreign bodies in facial and oropharyngeal soft tissues. While CT has been found to be the most sensitive of the three imaging modalities in identifying foreign bodies of various materials, ultrasound allows the flexibility of repeat and real time use at the patient bedside, while also allowing use in the patient with a questionably unstable airway, where CT may be not be a feasible option.¹²

To date, while the literature is replete with reports of the sonographic localization of foreign bodies embedded in superficial skin and soft tissue, there remains a scarcity of literature on the use of ultrasound in detecting foreign bodies embedded or aspirated within the complex structures of the head and neck. In a study by Baba et al.,⁷ real-time intraoperative use of ultrasound was used in the excision and removal of a fishbone lodged in the upper esophagus, that was not visible on rigid esophagoscopy.⁷ Smith et al.⁸ also discusses a similar use in the real-time, intraoperative ultrasound-guided retrieval of a fishbone embedded in the tongue.⁸ Some recent case series in the use of bedside sonography also suggest some promise in detecting esophageal food impaction.^{13–15}

This case demonstrates the importance of a controlled airway setting, the ease and flexibility of point-of-care ultrasound in the identification and localization of an aspirated foreign body and the limitations of GVL in the extraction of an aspirated foreign body. Additionally, to the authors' best knowledge, while limited data exists in the use of ultrasound or GVL to detect a foreign body in head and neck soft tissue, there are no previous reports of the concurrent use of ultrasound and GVL in the localization and removal of an aspirated foreign body. Moreover, here we present the first time these two modalities have been used simultaneously in the ED setting.

Declaration of Conflicting Interests

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Ethical approval

All procedures performed involving the patient included in this case report were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Guarantor

NMS.

Contributor

None other.

Informed consent

Written consent from this patient was obtained prior to publication of this case report. Written consent was also obtained for publishing photographs and images prior to publication of this case report.

References

1. National Safety Council. *Choking Prevention and Rescue Tips*. Available at: <http://www.nsc.org/learn/safety-knowledge/Pages/safety-at-home-choking.aspx> (accessed 14 March 2016).
2. Ng SY, Songra AK and Bradley PF. A new approach using intraoperative ultrasound imaging for the localization and removal of multiple foreign bodies in the neck. *Int J Oral Maxillofac Surg* 2003; 32: 433–436.
3. Callegari L, Leonardi A, Bini A, et al. Ultrasound-guided removal of foreign bodies: personal experience. *Eur Radiol* 2009; 19: 1273–1279.
4. Shiels WE II, Babcock DS, Wilson JL, et al. Localization and guided removal of soft-tissue foreign bodies with sonography. *Am J Roentgenol* 1990; 155: 1277–1281.
5. Jacobson JA, Powell A, Craig JG, et al. Wooden foreign bodies in soft tissue: detection at US. *Radiology* 1998; 206: 45–48.
6. Patel M. Foreign body in oesophagus. *Radiopaedia*. Available at: <https://radiopaedia.org/cases/foreign-body-in-oesophagus-1> (accessed 14 March 2016).
7. Baba S, Takizawa K, Yamada C, et al. A submucosal esophageal fish bone foreign body surgically removed using intraoperative ultrasonography. *Am J Otolaryngol* 2014; 35: 268–270.
8. Smith ME, Riffat F, Berman LH, et al. Intraoperative ultrasound to facilitate removal of a submucosal foreign body. *J Clin Ultrasound* 2014; 42: 565–568.
9. Prakash A, Rishi B, Rais P, et al. Role of plain X-ray soft tissue neck lateral view in the diagnosis of cervical esophageal foreign bodies. *Internet J Otorhinolaryngol* 2008; 8: 1–5.
10. Silva AB, Muntz HR and Clary R. Utility of conventional radiography in the diagnosis and management of paediatric airway foreign bodies. *Ann Otol Rhinol Laryngol* 1998; 107: 834–838.
11. Karnawal A, Ho EC and Molony N. Lateral soft tissue neck X-rays: are they useful in management of upper aero-digestive tract foreign bodies? *J Laryngol Otol* 2008; 122: 845–847.
12. Aras MH, Miloglu O, Barutcuoglu C, et al. Comparison of the sensitivity for detecting foreign bodies among conventional plain radiography, computed tomography and ultrasonography. *Dentomaxillofac Radiol* 2010; 39: 72–78.
13. Singleton J, Schafer JM, Hinson JS, et al. Bedside sonography for the diagnosis of esophageal food impaction. *Am J Emerg Med*. Epub ahead of print 11 January 2017. doi: 10.1016/j.ajem.2017.01.008.
14. Simone LA, Orsborn J, Berant R, et al. Point-of-care ultrasonography in the detection of pediatric esophageal food impaction. *Am J Emerg Med* 2016; 34: 763.e1–763.e3.
15. Salmon M and Doniger SJ. Ingested foreign bodies: a case series demonstrating a novel application of point-of-care ultrasonography in children. *Pediatr Emerg Care* 2013; 29: 870–873.