

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Deep neck abscess after intubation trauma: a case report ^{☆,☆☆}

Kashyap Kaul, DO, MSc, NREMT^a, Chetan S. Nayak, MD^b, Jessica Jacoby, MS^a,
Kenneth D. Katz, MD^{a,*}

^aLehigh Valley Hospital and Health Network, Department of Emergency and Hospital Medicine, University of South Florida Morsani College of Medicine, Lehigh Valley Campus, 2545 Schoenersville Road, 4th Floor, South Wing, Bethlehem, PA, 18107 USA

^bLehigh Valley Hospital and Health Network, Department of Surgery, University of South Florida Morsani College of Medicine, Lehigh Valley Campus, 2545 Schoenersville Road, 4th Floor, South Wing, Bethlehem, PA, 18107 USA

ARTICLE INFO

Article history:

Received 18 November 2021

Accepted 21 November 2021

Keywords:

Pharyngeal perforation
Endotracheal intubation
Intubation injury
Pyriform sinus perforation
Post-intubation complications

ABSTRACT

Significant injuries from endotracheal intubation are exceedingly rare but can lead to life-threatening complications, such as pharyngeal perforation. This type of perforation can result in abscess formation and airway compromise. Risks for this complication include operator skill and intubation in emergent situations. This case report details a 59-year-old male who underwent elective septoplasty with bilateral nasal turbinate reduction. The procedure required general anesthesia induction and endotracheal intubation. He developed a gradually enlarging right-sided neck mass with associated fevers, neck pain, odynophagia, and dysphonia. He presented to the emergency department on postoperative day 5 and was diagnosed with a right-sided, prevertebral space abscess with airway mass effect secondary to pharyngeal perforation. He was admitted for operative management, intravenous antibiotics, and was successfully treated. While significant injury from endotracheal intubation is rare, it can result in infection and threaten airway patency. Emergency physicians must recognize pharyngeal perforation as a potential source of infection following instrumentation of the pharynx. This case has been reported to increase awareness of the potential for such injury.

© 2021 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license
(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

[☆] Competing Interest: None. The authors have no outside support information, conflicts or financial interest to disclose.

^{☆☆} Informed Patient Consent: Per network IRB guidelines, consent was not obtained from the patient for this case report because no identifying information was provided in this report.

* Corresponding author. K.D. Katz

E-mail address: Kenneth_D.Katz@lvhn.org (K.D. Katz).

<https://doi.org/10.1016/j.radcr.2021.11.062>

1930-0433/© 2021 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Endotracheal intubation (ETI) is a commonly performed procedure, especially in the operating room (OR), intensive care unit (ICU), and emergency department (ED). Approximately 413,000 intubations were performed in the ED alone across the United States in 2018[1]. Although rare, iatrogenic injuries from ETI can be potentially life-threatening. One such complication is perforation of pharyngeal structures [2–8] which can lead to infection with subsequent abscess formation and airway compromise [9]. Infections in this region can also dissect through the deep cervical fascia and into the mediastinum, resulting in life-threatening mediastinitis [10]. We present a case of a patient who sustained pyriform sinus perforation after ETI resulting in abscess and airway compromise.

Case presentation

A 59-year-old man with a history of hypertension, hyperlipidemia, chronic lumbar back pain, and anxiety was evaluated by an otolaryngologist for persistent postnasal drip and congestion symptoms. Outpatient imaging studies and direct visualization revealed a deviated septum and hypertrophy of his nasal turbinates. He subsequently underwent elective surgery for septoplasty and bilateral inferior nasal turbinate reduction. There were no intraoperative complications noted at the time. He had bacitracin impregnated Merocele sponges placed in each naris. The patient followed up on postoperative day (POD) 3 for packing removal, and no objective abnormalities were identified. However, he complained of new right-sided ear, tooth, and throat pain since his procedure. Further outpatient follow-up was scheduled, and he returned to work without restriction.

The patient's symptoms worsened after this appointment. He developed odynophagia, increasing hoarseness, and intermittent fevers. He also noted a gradually enlarging mass on the right side of his neck. His pain progressed, radiating up the right side of his neck to behind his ear and to his right temple. Associated chills and dyspnea on exertion were also reported.

The patient presented to the ED on POD 5 for evaluation of his progressing symptoms. Physical examination demonstrated normal vital signs. Notable findings included a hoarse voice and a tender, erythematous, palpable mass on the right anterolateral aspect of the patient's neck. Auscultation of the mass revealed no bruit or stridor, and pulmonary auscultation was absent of transmitted upper airway sounds.

Laboratory testing was unremarkable. A computed tomography (CT) angiogram demonstrated a mass in the deep tissue of the right neck. (Figs. 1, 2).

The mass extended from the level of the thyroid gland to the superior aspect of the thyroid cartilage. Associated with the mass was diffuse fluid in the deep right neck extending from the inferior aspect of the thyroid gland to the angle of the mandible. The fluid also extended into the hypopharynx, epiglottis, and aryepiglottic folds, with involvement of the prevertebral space. The transverse diameter of the mass measured 24 mm x 37 mm, with a craniocaudal length of 46 mm. The pattern was suspicious for pharyngeal perforation (Fig. 2).

Based on these findings the otolaryngology service was consulted, a regimen of ampicillin/sulbactam was initiated, and the patient was admitted to the ICU. On hospital day (HD) 2, the patient underwent direct laryngoscopy in the OR, revealing a small, healing perforation of the right lateral hypopharyngeal wall with fibrinous, but no purulent, exudate (Fig. 3).

No further intervention was needed to close the perforation. Incision and drainage of the neck abscess was then performed using an external approach. Drainage of



Fig. 1 – A coronal computed tomography (CT) angiogram image demonstrating a mass (arrow) in the deep tissue of the right neck with contrast enhancement of the rim, containing several foci of gas



Fig. 2 – An axial computed tomography angiogram image demonstrating a deep neck mass with multiple foci of gas (arrow) displacing the right carotid space laterally (arrowhead), and the pharynx anteriorly and leftward

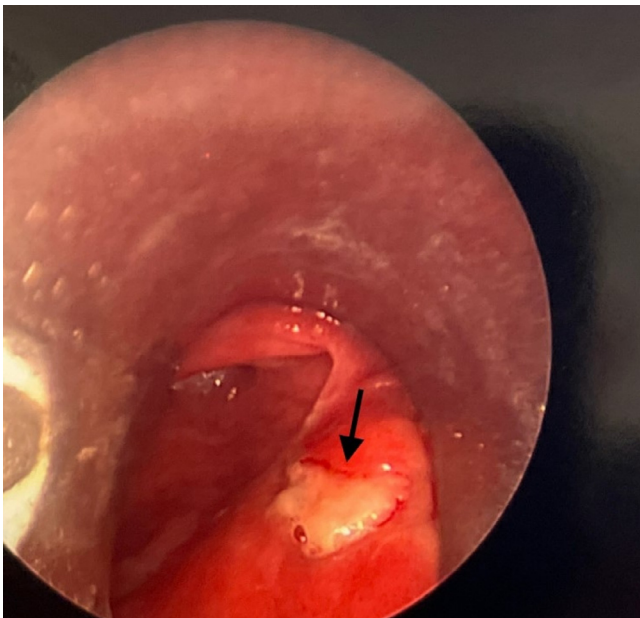


Fig. 3 – Direct laryngoscopy showing a perforation of the right lateral hypopharyngeal wall with fibrinous exudate

approximately 15 mL of purulent material was obtained and sent for culture. The patient tolerated the procedure well. The cultures from the abscess grew *E. coli* (susceptible to ampicillin) and *P. buccae*, so IV ampicillin/sulbactam therapy was continued during admission. He was discharged on HD 7 without any additional complications during the remainder of his hospitalization and was prescribed oral amoxicillin/clavulanate for 10 total days of antibiotic therapy.

Discussion

Perforation of the hypopharynx during intubation is an uncommon but documented complication [11]. Pharyngeal sinus perforation tends to be associated with blunt trauma [12–15] and intubation during emergent situations such as cardiopulmonary resuscitation [3–5]. Intubating inexperience is a risk factor [3,5,6]. When loading an endotracheal tube with a stylet, the stylet should not protrude beyond the end of the tube, to avoid iatrogenic laceration of pharyngeal or tracheal structures [16]. Attempting to pass instrumentation through the pharynx against resistance can also result in significant injury [2,17,18]. This skill is important for emergency medicine physicians to master so they are cognizant of the risk of iatrogenic injury during ETI procedures. It is also important knowledge for all emergency medicine physicians so they can maintain a

high level of suspicion for complications after ETI in postoperative patients. Finally, emergency physicians should be aware of this potential since they may need to intervene urgently to secure the subsequent potential airway compromise.

Treatment of pharyngeal abscesses includes high-dose, IV antibiotic therapy covering both gram-positive aerobes and anaerobes [19]. Appropriate antibiotic choices are penicillins with beta-lactamase inhibitors (eg piperacillin-tazobactam, ampicillin-sulbactam), clindamycin, or high dose penicillin with metronidazole (as penicillin monotherapy would be insufficient coverage) [20]. Incision and drainage by an otolaryngologist is often required for complete resolution of these infections based on the extent of the abscess and degree of airway compromise [19,20].

Conclusions

This case highlights a rare, but potentially life-threatening, iatrogenic complication of pharyngeal perforation during ETI. This type of perforation can lead to infection with subsequent abscess formation and airway compromise. Prompt diagnosis with contrast-enhanced CT, and both early consultation with otolaryngology specialists and administration of antibiotics are paramount.

Author contributions

All authors provided substantial contributions to manuscript content. All authors gave final approval of the version of the article to be published.

Acknowledgments

The authors would like to acknowledge Joanna Schwab, BA for editing and submission assistance.

REFERENCES

- Centers for Disease Control and Prevention. NAMCS and NHAMCS Web Tables [Internet]. Available from: http://www.cdc.gov/nchs/ahcd/web_tables.htm. August 1, 2021.
- Bartlett DS, Grace R, Newell S. Perforation of and intubation through the palatoglossal fold. *Anaesth Intensive Care* 2009;37:481–3 PMID: 19499873. doi:10.1177/0310057x0903700315.
- Stauffer JL, Petty TL. Accidental intubation of the pyriform sinus: a complication of “Roadside” Resuscitation. *JAMA J Am Med Assoc* 1977;237(21):2324–5 PMID: 576927.
- Leong WL, Lim Y, Sia ATH. Palatopharyngeal wall perforation during GlideScope® intubation. *Anaesth Intensive Care* 2008;36(6):870–4 PMID: 19115660. doi:10.1177/0310057x0803600620.
- Levine PA. Hypopharyngeal perforation: an untoward complication of endotracheal intubation. *Arch Otolaryngol* 1980;106(9):578–80 PMID: 7406763. doi:10.1001/archotol.1980.00790330058016.
- Lee TS, Jordan JS. Pyriform sinus perforation secondary to traumatic intubation in a difficult airway patient. *J Clin Anesth* 1994;6(2):152–5 PMID: 8204237. doi:10.1016/0952-8180(94)90017-5.
- Cooper RM. Complications associated with the use of the GlideScope® videolaryngoscope. *Can J Anesth* 2007;54(1):54–7 PMID: 17197469. doi:10.1007/BF03021900.
- Joshi RR, Riley CA, Kacker A. Complication rates following septoplasty with inferior turbinate reduction. *Ochsner J* 2019;19(4):353–6 PMID: 31903059; PMCID: PMC6928672. doi:10.31486/toj.19.0002.
- Komasawa N, Minami T. Difficult airway management in a patient with combined severe deep neck abscess and acute epiglottitis with abscess. *J Clin Anesth* 2014;26(7):581 Epub 2014 Oct 18. PMID: 25439424. doi:10.1016/j.jclinane.2014.05.003.
- Benedetto C, Tanzariello VN, Militi A, Fallica GE, Marco DD, Monaco F, et al. Catastrophic descending necrotizing mediastinitis of the anterior and posterior compartments: a case report. *Radiol Case Rep* 2020;15(10):1832–6 PMID: 32802242; PMCID: PMC7417671. doi:10.1016/j.radcr.2020.07.040.
- Domino KB, Posner KL, Caplan RA, Cheney FW. Airway injury during anesthesia: a closed claims analysis. *Anesthesiology* 1999;91(6):1703–11 PMID: 10598613. doi:10.1097/00000542-199912000-00023.
- Hagr A, Kamal D, Tabah R. Pharyngeal perforation caused by blunt trauma to the neck. *Can J Surg* 2003;46(1):57–8 PMID: 12585799; PMCID: PMC3211670.
- Jacobs I, Niknejad G, Kelly K, Pawar J, Jones C. Hypopharyngeal perforation after blunt neck trauma: case report and review of the literature. *J Trauma* 1999;46(5):957–8 PMID: 10338422. doi:10.1097/00005373-199905000-00033.
- Smith D, Woolley S. Hypopharyngeal perforation following minor trauma: a case report and literature review. *Emerg Med J* 2006;23(1):e7 PMID: 16373792; PMCID: PMC2564152. doi:10.1136/emj.2003.012187.
- Salemis NS, Georgiou C, Alogdianakis E, Gourgiotis S, Karalis G. Hypopharyngeal perforation because of blunt neck trauma. *Emerg Radiol* 2009;16(1):71–4 Epub 2008 Jan 10. PMID: 18188618. doi:10.1007/s10140-007-0699-5.
- Warner MA, Fox JF. Direct laryngoscopy and endotracheal intubation complicated by anterior tracheal laceration secondary to protrusion of preloaded endotracheal tube stylet. *A A Case Rep* 2016;6(4):77–9 PMID: 26513675. doi:10.1213/XAA.0000000000000235.
- Inoki K, Konda K, Katagiri A, Yamamura F, Yoshida H. Successful management of pharyngeal perforation caused by overtube insertion during endoscopic submucosal dissection. *Cureus* 2020;12(5):e8090 PMID: 32542145; PMCID: PMC7292698. doi:10.7759/cureus.8090.
- Onishi T, Onishi Y, Tachibana K, Kasano K, Hachiya S, Muramoto H, et al. Perforation of the hypopharynx after transesophageal echocardiography. *J Echocardiogr* 2014;12(2):71–4 Epub 2014 Apr 22. PMID: 27279053. doi:10.1007/s12574-014-0213-5.
- Walls R, Hockberger R, Gausche-Hill M. Upper Respiratory Tract Infections. *Rosen’s Emerg Med Concepts Clin Pract* 2018;857:70. Available from: <https://libribook.com/ebook/16077/rosens-emergency-medicine-2-volume-set-9th-edition-pdf:70>. August 1, 2021.
- Yee AM, Christensen DN, Waterbrook AL, Amini R. Parapharyngeal abscess with tracheal deviation. *Intern Emerg Med* 2017;12(7):1077–8 Epub 2017 Feb 13. PMID: 28194696. doi:10.1007/s11739-017-1634-8.