A case report of subglottic pyogenic granuloma and review of treatment considerations

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ABSTRACT

Patient is a 48 year old male smoker with schizophrenia, who was admitted for severe lower extremity burns. He was intubated for 20 days in the setting of cardiovascular arrest and respiratory failure and underwent tracheotomy. During fiberoptic endoscopic evaluation of swallowing, a subglottic nodule was noted, confirmed on CT as a left paramedian subglottic soft tissue mass. Patient underwent direct laryngoscopy, biopsy, and steroid injection. Pathology demonstrated pyogenic granuloma. Limited case reports and small case series of laryngeal pyogenic granuloma exist in the literature, primarily in adult patients and of the false and true vocal folds. Potential predisposing factors have included trauma, intubation, smoking, pregnancy, and reflux. Management includes excision, KTP and CO2 laser, steroid injection, systemic steroid, and reflux management. Recurrence is reported in a minority of cases.

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Background

- Pyogenic granulomas or lobular capillary hemangiomas (LCH) are defined histologically by hyperplastic lobular capillary proliferation in a background of fibromyxoid tissue.[1,2]
- The pathophysiology of LCH is not well-understood. They are thought to arise in response to an imbalance in angiogenic stimuli, as evidenced by upregulation of angiogenic factors (e.g. VEGF) and pathways in these lesions.[2]
- LCHs typically arise in the skin and in nasal or oral mucosa. However there are infrequent reports of laryngeal LCH.

The Case

Presentation

A 48 year-old male smoker was brought to the emergency department for fourth degree burns from a fall onto the subway electrical third rail. In the emergency department he arrested and, after resuscitation efforts, had return of spontaneous circulation. However he had persistent respiratory failure that required a prolonged 20-day intubation and ultimately tracheotomy.

Initial otolaryngologic evaluation

Otolaryngology was consulted 3 weeks after extubation for evaluation of a laryngeal lesion noted on fiberoptic endoscopic evaluation of swallow. Findings at that time:

- Exam: Size 8 tracheostomy tube in place. Breathing comfortably on room air, tolerating speaking valve with strong voice
- Laryngoscopy: Small, irregular posterior subglottic nodule. Mobile vocal folds (Figure 1a)
- CT obtained 1 week later: Left, paramedian nodular subglottic soft tissue mass (Figure 2)

Management

The lesion was thought to be granulation tissue in setting of prolonged intubation. Our initial recommendations consisted of reflux management and surveillance of the lesion.

Interval exam **4 weeks later** demonstrated persistence of the lesion. Additionally the patient was having discomfort with tracheostomy tube capping and mild stridor when supine and capped. The decision was made to take the patient to the operating room for **direct laryngoscopy, biopsy and debulking, and triamcinolone injection.**

Final surgical pathology showed **lobular capillary hemangioma or pyogenic granuloma.**

Interval exam **another 4 weeks later** demonstrated **resolution of the lobular mass** (Figure 1b). Patient was decannulated without issue prior to discharge.

Figure 1. Laryngoscopy. (Right) Initial laryngoscopy. (Left) Laryngoscopy after debulking, steroid injection

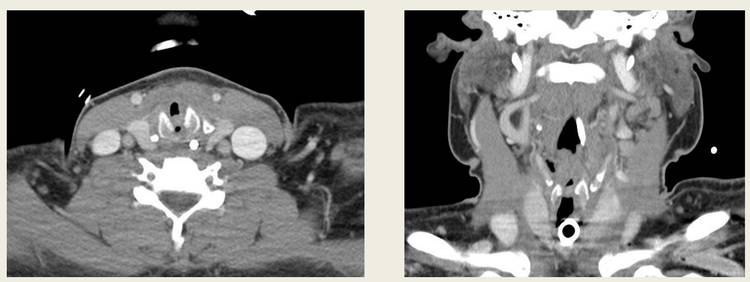

Figure 2. Imaging. CT neck with contrast 1 week after visualization of lesion on scope

Discussion

Clinical and histologic features

LCH are benign vascular lesions defined by lobular capillary organization. They grow quickly and reach maximal size over a period of a few weeks. The background composition of the lesion shifts from inflammatory to fibromyxoid as the lesion matures. Lesions may also have surface ulceration or erosion early on, which can mucosalize with maturation.[3]

Described presentations of laryngeal LCH include dyspnea, upper airway obstruction, dysphonia, and hemoptysis across age groups and sexes.

A confounding differential diagnosis is granulation tissue, and in early studies of LCH in the aerodigestive tract, some argued that LCH should by definition be atraumatic and do not occur in the larynx.[4] However subsequent reports have proven the presence of laryngeal LCH, some with antecedent trauma and others without.

Pathophysiology

Though the pathophysiology is not well-elucidated, proposed etiologies of laryngeal LCH include antecedent trauma (intubation, blunt trauma, phonotrauma), infection, preexisting arteriovenous malformations, and hormonal change.[1,3,5–7]

Management

The mainstay of LCH management is excision of the lesion – either with cold steel or with laser [potassium-titanyl-phosphate (KTP) laser and carbon dioxide laser].[1,5,7–9] Cryoablation has also been described for tracheal LCH.[10] Most reports describe no recurrence after excision.

In light of LCH's histologic features and proposed pathophysiology, we investigated other management considerations:

- **Beta blockers**: A study of beta adrenergic receptor expression in various vascular lesions showed that there is weak expression of these receptors in LCH compared to strong expression in infantile hemangiomas.[11] There is some evidence that oral and/or topical beta blocker may be effective for skin and ophthalmic LCH.[12,13] However the evidence in airway LCH is less clear. In a case series examining oral propranolol use in pediatric laryngeal vascular lesions, a lesion that was later found to be LCH did not respond to initial maximal propranolol treatment, whereas infantile hemangiomas in the series responded well.[14] However, in a report of recurrent tracheal LCH, systemic propranolol was speculated to have prevented another recurrence after excision of the recurrent lesion, suggesting perhaps an adjunctive role.[15]
- **Steroids**: There is scant explicit discussion of steroid use in laryngeal LCH. In a case series of neonatal laryngeal LCH, authors describe use of intraoperative topical steroid in one patient, held against the raw mucosa after excision, without comment on efficacy. Systemic steroids are noted to be ineffective in treating LCH.[9,14]
- **Hormone modulation**: Immunohistochemical studies of LCHs have demonstrated hormone receptor expression.[16] An immunohistochemistry study of laryngeal LCH specifically found that estrogen and progesterone receptors are not expressed in these lesions.[17]
- Other considerations discussed in the literature include placing patients on **antireflux** regimens after excision and preparing adequately for **tenuous airway management**, both obstructive and hemorrhagic, for larger lesions.[7,17]

References

1. Wang RY, Quintanilla NM, Chumpitazi BP, Gitomer S, Chiou EH, Ongkasuwan J. Pediatric Tracheal Lobular Capillary Hemangioma: A Case Report and Review of the Literature. Laryngoscope. 2021;131(8):1729-1731.
2. Prakash S, Bihari S, Wiersema U. A rare case of rapidly enlarging tracheal lobular capillary hemangioma presenting as difficult to ventilate acute asthma during pregnancy. BMC Pulm Med. 2014;14:41.
3. Chawla M, Stone C, Simoff MJ. Lobular Capillary Hemangioma of the Trachea. J Bronchology Interv Pulmonol. 2010;17(3):238-240.
4. Fechner RE, Cooper PH, Mills SE. Pyogenic Granuloma of the Larynx and Trachea: A Causal and Pathologic Misnomer for Granulation Tissue. Archives of Otolaryngology - Head and Neck Surgery. 1981;107(1):30-32.
5. Hanick AL, Meleca JB, Billings SD, Bryson PC. Pyogenic granuloma of the larynx: A rare cause of hemoptysis. Am J Otolaryngol. 2019;40(2):331-333. doi:10.1016/j.amjoto.2018.10.014
6. Lai S, Kelleher K, Sataloff RT. Vocal fold granuloma: the "ball-valve" phenomenon. Ear Nose Throat J. 2000;79(11):836.
7. Garrett MM, Lee WT. Obstructing pyogenic granuloma as a result of blunt laryngeal trauma. Otolaryngology–Head and Neck Surgery. 2007;136(3):489-490.
8. Hijazi LO, Asiri M, Al Mahdi MJ, Pharaon M. Pyogenic granuloma of the larynx. J Surg Case Rep. 2022;2022(7):rjac299.
9. Walner DL, Parker NP, Kim OS, Angeles RM, Stich DD. Lobular Capillary Hemangioma of the Neonatal Larynx. Arch Otolaryngol Head Neck Surg. 2008;134(3):272.
10. Chen E, Yu X, Zhang R, Wang P, Ying K. A large tracheal capillary hemangioma treated with interventional bronchoscopy. Respir Med CME. 2011;4(2):60-61.
11. Chisholm KM, Chang KW, Truong MT, Kwok S, West RB, Heerema-McKenney AE. β-Adrenergic receptor expression in vascular tumors. Mod Pathol. 2012;25(11):1446-1451. doi:10.1038/modpathol.2012.108
12. Ebrahimi Z, Mahdi Z, Khairi AA, et al. Oral propranolol and topical timolol in the treatment of post-burn pyogenic granuloma: Two cases and a review of the literature. Clin Case Rep. 2022;10(11).
13. Jaiswal H, Patidar N, Shah C, Singh R, Jain E, Piyush P. Topical timolol 0.5% as the primary treatment of ophthalmic pyogenic granuloma: A prospective, single-arm study. Indian J Ophthalmol. 2021;69(5):1155-1160
14. Truong MT, Perkins JA, Messner AH, Chang KW. Propranolol for the treatment of airway hemangiomas: a case series and treatment algorithm. Int J Pediatr Otorhinolaryngol. 2010;74(9):1043-1048.
15. Gipsman AI, Treat JR, Piccione J. Rare airway tumor in a previously healthy adolescent successfully treated with endoscopic resection and oral propranolol. Pediatr Pulmonol. 2023;58(7):2142-2144.
16. Whitaker SB, Bouquot JE, Alimario AE, Whitaker TJ. Identification and semiquantification of estrogen and progesterone receptors in pyogenic granulomas of pregnancy. Oral Surgery, Oral Medicine, Oral Pathology. 1994;78(6):755-760.
17. Marrinan MS, Myssiorek D, Fuchs A, Wasserman P. Laryngeal pyogenic granulomas do not express oestrogen or progesterone receptors. J Laryngol Otol. 2001;115(10):798-801.