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Case report

Double thumb sign in a case of epiglottitis[☆]

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ABSTRACT

Epiglottitis is a potentially life-threatening condition that requires quick and accurate diagnosis. The gold standard for diagnosis is for laryngoscopic visualisation of the epiglottis. However, this may not be well-tolerated in a patient with impending airway collapse, and lateral neck radiographs may support the diagnosis. The thumb sign is a recognized radiological feature of epiglottitis. We present a case of a 57-year-old gentleman with epiglottitis, whose lateral neck radiograph had the interesting feature of a double thumb sign. In spite of the significant airway oedema, he was conservatively managed with subsequent full recovery. The objective of this case report is to highlight the severity of airway narrowing with this radiological finding of double thumb sign, to alert the clinician to have closer monitoring or to consider artificial airway support.

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Introduction

The thumb sign is a well-known radiological feature in epiglottitis in which the epiglottic shadow appears thickened and rounded on a lateral neck radiograph. The radiological features of epiglottitis were described as early as 1963 by Poole and Altman [1]. Podgore described the thumb sign in 1976 [2] as an aid to diagnose epiglottitis in children.

We present a case with an interesting finding of a double thumb sign on lateral neck radiograph in a 57-year-old patient with epiglottitis with epiglottic and arytenoid oedema.

Case report

A 57-year-old gentleman presented with the main complaint of fever and sore throat for 2 days, associated with dysphagia, odynophagia and breathlessness in supine position. He had no recent history of foreign body ingestion or dental procedures. He had a history of ischemic heart disease, diabetes mellitus, hyperlipidaemia, hypertension and was a smoker of 20 pack-years.

On examination, he had a hoarse voice and had a soft inspiratory stridor. Despite this, he was able to speak in full

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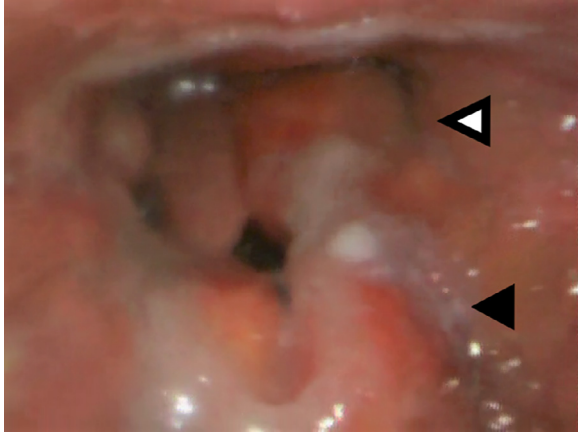


Fig. 1 – Day 1: time of presentation. Flexible fiberoptic nasoendoscope view of the larynx. Omega shaped epiglottic swelling (black arrow) and arytenoid oedema (white arrow). Aryepiglottic fold swelling is also seen between the epiglottis and arytenoids

sentences and breathe comfortably without use of accessory muscles. His transcutaneous oxygen saturation was 99% on room air. He had a fever of 37.7C. Oral examination was unremarkable. Nasoendoscopy revealed oedematous and erythematous epiglottis and arytenoids (Fig. 1). The glottis could not be visualised beyond the significant supraglottic swelling. There was saliva pooling in the pyriform fossae. Base of tongue was normal and no parapharyngeal medialisation or retropharyngeal bulge seen.

Lateral neck X-ray (Fig. 2.1) showed a sizeable supraglottic swelling with an appearance of two thumbs - at the level of the epiglottis anteriorly, and a projection posteriorly from the posterior pharyngeal wall. The patient's inflammatory markers were elevated with a total white cell count 25,100 per microliter and C-reactive protein 177 mg/L.

Sputum cultures grew commensal respiratory flora and was not subtyped due to presence of epithelial cells suggestive of contamination.

In view of the extent of his epiglottic swelling, the patient was counselled for intubation, with a possibility of tracheostomy, to secure his airway. However, as he was clinically



Fig. 2.1 – Day 1: time of presentation. Lateral neck X-ray showing the double thumb sign with epiglottic (black arrow) soft tissue shadow and aryepiglottic fold (white arrow.)



Fig. 2.2 – Day 1: time of presentation. Measurement of the width of epiglottis at its base (31.85mm,) and aryepiglottic folds (18.82mm.)

comfortable despite the severity of the scope findings, he declined intubation and opted for close monitoring in high dependency. He was started on intravenous Augmentin 1.2g 8 hourly and dexamethasone 8mg 8 hourly.

Patient was kept nil-by-mouth and overnight, was re-examined every 2-3 hours with nasoendoscopy. Epiglottitis improved and the patient remained comfortable and saturating well throughout. The dexamethasone and adrenaline nebulisations were tailed down as his progress improved.

Patient was restarted on oral feeding on day 3 of admission. By day 9 of admission, the epiglottic oedema was improving on nasoendoscopy, but had not completely resolved. A contrasted Computer Tomography (CT) neck was performed in view of the protracted course of recovery. This revealed oedema of the epiglottis and aryepiglottic folds bilaterally, but no abscesses or abnormal masses were seen (Fig. 4).

The patient was discharged on day 9 of admission after the scan. He was reviewed regularly in the outpatient clinic. On the 3rd week of review, the swelling had completely resolved.

Discussion

Epiglottitis, also known as supraglottitis, is a cellulitic change involving supraglottic structures. Its rapid progression may result in life-threatening airway compromise. It is most commonly caused by *Haemophilus influenzae*, but since widespread public vaccination after 1995, alternate pathogens such as *Streptococcus pneumoniae* and *Streptococcus pyogenes* are more commonly implicated [3].

It is postulated that epiglottic oedema arises from inflammation in the potential space between the squamous epithelial and cartilaginous areas of the epiglottis, which is rich in blood and lymphatic vessels. Hence, swelling in this location can increase rapidly and can involve the entire supraglottis. The subglottis is spared as oedema does not extend beyond the vocal cords, due to the presence of tightly bound epithelium [4].

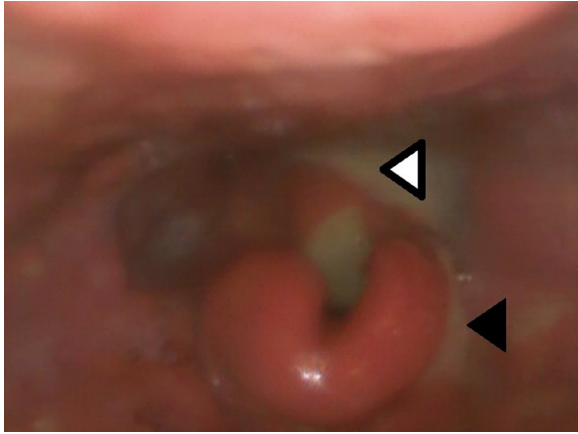


Fig. 3 – Day 7 of admission. Epiglottis (black arrow) and arytenoid swelling (white arrow) improved but had not completely resolved. There was also pooling of secretions seen

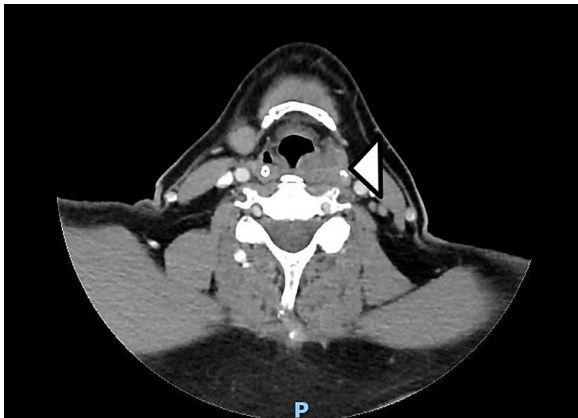


Fig. 4.1 – Day 9 of admission. Axial cut of the CT-scan showing left arytenoid swelling (white arrow.)

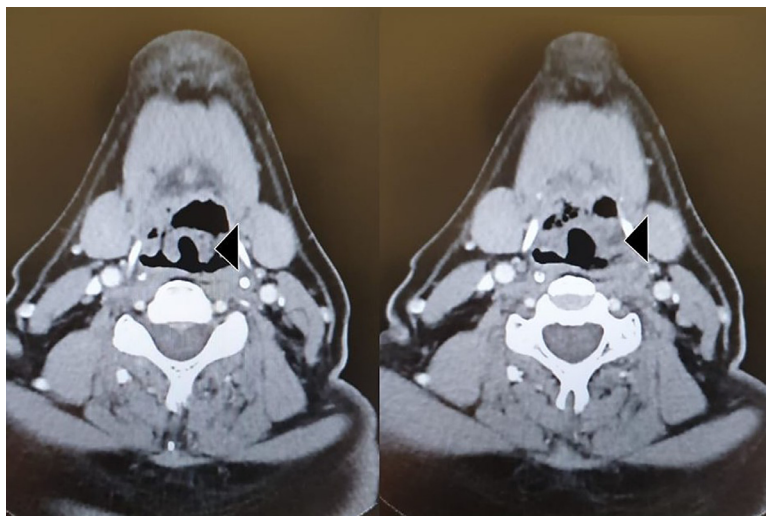


Fig. 4.2 – Day 9 of admission. Axial cuts of the CT-scan showing epiglottic oedema (black arrows.)

Airflow obstruction is multifactorial, contributed by upper airway oedema, epiglottis position and aspiration of secretions.

The narrowing of the airway at the level of the supraglottis leads to a Venturi effect and as a consequence of the Bernoulli principle, there can be further indrawing of the supraglottic structures, that can obstruct an already tight airway further. An epiglottis positioned more posteroinferiorly due to oedema of its lingual surface can also have a ball-valve effect [5], obstructing airflow on inspiration but not on expiration.

The gold standard of diagnosis is visualisation of the supraglottic structures via direct or indirect laryngoscopy. However, this must be avoided or done with extreme caution in patients with impending airway distress, especially in a fretful child.

Imaging modalities may be used to aid the diagnosis if laryngoscopy is not readily available or not well tolerated by the patient. These include lateral neck X-ray and Computer tomography scan.

'Thumb sign' and 'vallecula sign' are characteristic radiologic findings of epiglottitis on lateral neck X-ray. The thumb sign is a rounded thickening of the epiglottic shadow on a lateral neck x-ray, giving it the appearance of an adult sized thumb [6]. The vallecula sign is the absence of a deep, well-defined vallecula [7].

In a series of 260 patients, Kim et al [8] described 47.7% of patients had both a combination of epiglottitis and aryepiglottic fold inflammation on lateral neck X-ray, which was equal to the number of patients with isolated epiglottic inflammation. Only 1.9% of patients had isolated aryepiglottic fold or arytenoid cartilage inflammation in the absence of epiglottic swelling.

In cases with isolated arytenoiditis [8], soft tissue swelling over the arytenoids and aryepiglottic fold can be seen on the lateral neck x-ray as a soft tissue shadow between the oesophagus and larynx.

Schumaker et al [9] concluded in a retrospective examination of lateral neck X-rays that an epiglottic width greater than 8mm and aryepiglottic folds more than 7mm is highly suspicious of epiglottitis in an adult patient.

The presence of both epiglottic and aryepiglottic fold swelling gives an appearance of the double thumb sign (Fig. 2.1) the anterior thumb being the epiglottic shadow, and the posterior thumb being the arytenoid shadow. As shown on our patient's lateral neck radiograph (Fig. 2.2) the measurements of the epiglottic and aryepiglottic fold are more than the above-mentioned thresholds (measuring 31.85mm and 18.82mm respectively.)

We postulate that the presence of the double thumb sign demonstrates the severity of the supraglottic airway narrowing which should alert the clinician to have increased vigilance in monitoring the patient's airway, and have a low threshold for intubation for airway protection.

Conclusion

The double thumb sign in epiglottitis is suggestive of both epiglottic and aryepiglottic fold involvement and suggests more extensive airway oedema and narrowing than with thumb sign alone. The clinician should approach these cases with heightened vigilance and consider early airway protection. Further research is required to see if this sign can be used as a clinical predictor for severity, outcome, or need for airway intervention.

Fig. 3, Fig. 4.1., Fig. 4.2.

Patient consent

Written consent was obtained from the patient for scientific use.

REFERENCES

- [1] Poole CA, Altman DH. Acute epiglottitis in children. *Radiology* 1963;80:798–805. doi:10.1148/80.5.798.
- [2] Podgore JK, Bass JW, Wagner Y, Cohen N. Letter: The “thumb sign” and “little finger sign” in acute epiglottitis. *J Pediatr* 1976;88(1):154–5. doi:10.1016/s0022-3476(76)80754-8.
- [3] Guardiani E, Bliss M, Harley E. Supraglottitis in the era following widespread immunization against haemophilus influenzae type B : Evolving principles in diagnosis and management. 2010;:2183-2188. doi:10.1002/lary.21083
- [4] Feigin and Cherry's *Textbook of Pediatric Infectious Diseases - 8th Edition*. Accessed March 23, 2021. Available at: <https://www.elsevier.com/books/feigin-and-cherrys-textbook-of-pediatric-infectious-diseases/unknown/978-0-323-39281-5>
- [5] *Textbook of Pediatric Emergency Medicine, 5th edition*: 9780781750745: Medicine & Health Science Books @ Amazon.com. Accessed March 23, 2021. Available at: <https://www.amazon.com/Textbook-Pediatric-Emergency-Medicine-5th/dp/0781750741>
- [6] Ducic Y, Hebert PC, Maclachlan L, Neufeld K. Description and evaluation of the vallecula sign : A new radiologic sign in the diagnosis of adult epiglottitis. 1997;:1-6.
- [7] Vetter TR. Acute airway obstruction due to arytenoiditis in a child with juvenile rheumatoid arthritis. Published online 1994:1198-1200.
- [8] Kim KH, Kim YH, Lee JH, et al. Accuracy of objective parameters in acute epiglottitis diagnosis: A case-control study. *Medicine* 2018;97(37):e12256. doi:10.1097/MD.00000000000012256.
- [9] Schumaker HM, Doris PE, Birnbaum G. Radiographic parameters in adult epiglottitis. *Ann Emerg Med* 1984;13(8):588–90. doi:10.1016/S0196-0644(84)80279-6.