Emphysematous Epiglottitis in an Immunocompromised Adult with Unusual Pathogens: A Case-Based Literature Review

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Elena Tangtra – patient contact, research and manuscript writeup
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Written informed consent for the case to be published (including images, case history and data) was obtained from the patient for publication of this case report, including accompanying images.

ETHICAL STATEMENT / HUMAN AND ANIMAL RIGHTS
Not applicable

ABSTRACT

Emphysematous epiglottitis is a rare, potentially life-threatening complication of acute epiglottitis, characterized by gas-forming infection of the epiglottis. While commonly associated with pediatric populations, epiglottitis can also occur in immunocompromised adults and may present atypically. We report a case of a 57-year-old man with poorly controlled Type 2 diabetes mellitus and end-stage renal failure who initially presented with typical symptoms of epiglottitis. Flexible laryngoscopy revealed a swollen epiglottis with overlying pustules. Computed tomography (CT) of the neck demonstrated gas loculi within the epiglottis, consistent with emphysematous transformation and abscess formation.

The patient underwent urgent airway protection via fiber-optic intubation followed by incision and drainage of the abscess. Cultures yielded Streptococcus parasanguinis and Candida albicans. Following targeted antimicrobial therapy and corticosteroids, the patient made a full recovery. This case highlights the diagnostic value of CT in detecting emphysematous epiglottitis and emphasizes the need for radiologists to recognize this rare but emergent condition, particularly in high-risk patients.

CASE REPORT

BACKGROUND

Emphysematous epiglottitis is a rare, life-threatening variant of acute epiglottitis characterized by gas formation within the epiglottic tissue due to gas-producing organisms. While epiglottitis is more commonly seen in children, its incidence in adults—especially those who are immunocompromised—has been rising. Conditions such as poorly controlled diabetes mellitus, end-stage renal disease, and chronic infections can predispose individuals to aggressive, atypical infections.

This condition is seldom reported in the literature, with even fewer cases documenting the isolation of uncommon pathogens such as Streptococcus parasanguinis and Candida albicans. Early recognition through CT imaging is essential to guide airway protection and timely surgical intervention. This case adds to the limited body of evidence by describing emphysematous epiglottitis in an immunocompromised adult and reviewing similar reported cases to underscore diagnostic and therapeutic considerations for radiologists and clinicians.

CASE REPORT

A 57-year-old ethnic Chinese male with a medical history significant for end-stage renal failure, type 2 diabetes mellitus (DM), and chronic hepatitis B presented to the Otolaryngology department with a three-day history of odynophagia, cough, phlegm, and fever. He had a fever with a temperature of 38.2°C. He had a slightly muffled voice, but no stridor or drooling.

Flexible fiber-optic laryngoscopy revealed a diffusely pale and edematous epiglottis, as well as swelling of the right aryepiglottic fold with overlying pustules (Figure 1). The patient was initially managed conservatively with intravenous (IV) amoxicillin/clavulanic acid. However, flexible laryngoscopy findings on day two showed clinically worsening epiglottic edema. An urgent computed tomography (CT) neck performed showed gas loculi within the epiglottis with surrounding inflammatory changes suggesting emphysematous epiglottitis with abscess (Figure 2).

The patient underwent incision and drainage of the epiglottic abscess. A transverse mucosal incision made across the lingual aspect of epiglottis released pus and turbid fluid. The swab culture from the pus grew Streptococcus parasanguinis and Candida aspergillus. Histopathological examination of the right aryepiglottic cyst wall was consistent with necroinflammation, with fungal elements present. Blood cultures did not yield any growth.

Postoperatively, his recovery was complicated by hyperglycaemia with ketosis that eventually resolved after intravenous (IV) insulin and fluids. The patient was given IV Dexamethasone 4mg for one day duration- a short course taking into account the patient's risk of hepatitis B flare and hyperglycaemia. Antimicrobial regimen was subsequently switched to IV Clindamycin based on culture sensitivity results.

Repeat direct laryngoscopy two days after abscess drainage revealed significant improvement in epiglottic edema (Figure 3). He continued to improve symptomatically and was subsequently extubated and discharged one week later with two weeks of oral Clindamycin. At 4-week clinic follow-up, there was complete resolution.

DISCUSSION

Aetiology and demographics

Acute emphysematous epiglottitis is a rare complication of epiglottitis with an incidence of less than 3% [1]. Epiglottitis is known to affect children particularly toddlers however there is a recent decrease in the incidence of the disease in children as a result of widespread use of Haemophilus influenzae (HiB) vaccine. The disease continues to be relatively common and potentially life-threatening in adults with a mortality rate ranging between 4 to 7% [2]. This is mainly due to delay in recognition of the condition in adults [1].

A comparative analysis of previously published cases (Table 1) shows that the majority of patients with emphysematous epiglottitis are adult males with comorbidities, most notably DM. Our case aligns with this pattern, reinforcing the hypothesis that hyperglycemia-induced immune compromise [3] plays a pivotal role in disease susceptibility.

Unlike most prior cases, our patient's culture yielded Streptococcus parasanguinis and Candida albicans, rare pathogens in epiglottitis. Streptococcus parasanguinis is a Viridans group bacterium most commonly found in the oral cavity, causing dental plaque and endocarditis, but is also associated with complications in type 1 and type 2 DM [4].

While most published cases required incision and drainage (I&D), clinical outcomes were favorable across all reported cases with appropriate airway management and antimicrobial therapy.

Imaging findings

Initial radiological investigation usually consists of a lateral neck radiograph which may show a classic 'thumb sign' indicating a swollen epiglottis. This sign was absent in our patient's radiograph although laryngoscopy demonstrated epiglottic hyperemia, redness and swelling. Surprisingly, lateral neck radiographs have approximately a 12% false negative rate [5] resulting in a discrepancy between radiographic and endoscopic findings. Other radiographic features of epiglottitis include vallecula sign, thickened aryepiglottic fold and ballooning of hypopharynx. Patients with acute odynophagia, even with a negative lateral neck radiograph, should therefore receive early laryngoscopy to facilitate timely diagnosis.

The presence of gas loculi within the epiglottis is an uncommon finding in acute epiglottitis. According to Rohrbach et al. [6], the presence of submucosal emphysema may progress rapidly due to the additional mass effect from edema and entrapped gas loculi. CT scan is useful in assessing degree of airway compromise and differentiating emphysematous epiglottitis from uncomplicated acute epiglottitis (Table 2).

Differential diagnosis

Table 3 provides an overview of imaging differentials for acute supraglottic swelling. Conditions such as retropharyngeal abscess and angioneurotic edema can mimic epiglottitis on imaging but often present with distinct clinical or radiographic features. For instance, retropharyngeal abscess typically shows rim-enhancing fluid collections in the prevertebral space, while angioneurotic edema may involve diffuse soft tissue swelling without infectious signs. Recognizing these distinctions is vital, as management strategies differ substantially.

Treatment and prognosis

As outlined in the summary table, emphysematous epiglottitis is an exceedingly rare entity, accounting for

approximately 3% of epiglottitis cases. Male predominance and diabetes mellitus appear to be common predisposing factors. While adult epiglottitis carries a reported mortality of 4–7% [2], emphysematous variants may pose a higher risk due to rapid airway compromise, although no separate mortality data exists. Prompt airway protection, abscess drainage, and tailored antimicrobial therapy remain central to successful outcomes.

Summary

Emphysematous epiglottitis is a rare but serious complication of acute epiglottitis in adults, with Type 2 DM as a key predisposing factor. This case illustrates the importance of recognizing gas loculi within the epiglottis on CT imaging as a key radiologic feature of this condition, which necessitates timely airway protection and surgical drainage. Radiologists play a critical role in early detection, especially in patients with atypical progression or immunosuppressed state. Integration of clinical history with cross-sectional imaging significantly improves diagnostic accuracy and patient outcomes.

TEACHING POINTS

Emphysematous epiglottitis is a rare, life-threatening variant of epiglottitis characterized by gas loculi within the epiglottis, most often seen in males with comorbidities in particular diabetes mellitus. Early CT imaging is essential for diagnosis, airway protection, and timely surgical intervention.

QUESTIONS

Question 1: Which of the following is the most common risk factor for acute emphysematous epiglottitis in adults?

Answer choice 1: Chronic obstructive pulmonary disease (COPD)

Answer choice 2: Type 2 diabetes mellitus

Answer choice 3: Smoking

Answer choice 4: Hypertension

Answer choice 5: Chronic kidney disease

Correct Answer: 2) Type 2 diabetes mellitus

Explanation: [Type 2 diabetes mellitus is a well-established risk factor for epiglottitis due to impaired immune response.] Hyperglycemia can suppress leukocyte function, increasing susceptibility to infections.

Question 2: What imaging feature strongly suggests the presence of emphysematous epiglottitis?

Answer choice 1: "Thumb sign" on lateral neck X-ray

Answer choice 2: Thickened aryepiglottic folds on CT

Answer choice 3: Gas loculi within the epiglottis on CT

Answer choice 4: Ballooning of the hypopharynx

Answer choice 5: Air-fluid levels in the pyriform sinuses

Correct Answer: 3) Gas loculi within the epiglottis on CT

Explanation: [The presence of gas loculi (air pockets) within the epiglottis is a hallmark of emphysematous epiglottitis] and indicates the presence of gas-producing bacteria.

Question 3: What is the primary goal in managing a patient with epiglottic abscess and emphysematous epiglottitis?

Answer choice 1: Empirical broad-spectrum antibiotic therapy

Answer choice 2: Immediate surgical drainage without airway protection

Answer choice 3: Securing the airway through intubation or tracheostomy

Answer choice 4: Short-course oral corticosteroids

Answer choice 5: Outpatient observation with oral antibiotics

Correct Answer: 3) Securing the airway through intubation or tracheostomy

Explanation: [The most critical step in managing epiglottic abscesses and emphysematous epiglottitis is securing the airway, as these conditions can rapidly lead to life-threatening obstruction.]

Question 4: Which of the following is **NOT** an imaging differential of epiglottitis?

Answer choice 1: Retropharyngeal abscess

Answer choice 2: Peritonsillar abscess

Answer choice 3: Angioneurotic edema

Answer choice 4: Laryngotracheobronchitis (Croup)

Answer choice 5: Thermal epiglottitis

Correct Answer: 4) Laryngotracheobronchitis (Croup)

Explanation: Croup primarily affects children and is characterized by [subglottic airway narrowing (steeple sign on X-ray)]. It is not a direct imaging differential of epiglottitis, which typically involves supraglottic inflammation. Other options can mimic epiglottitis on imaging.

Question 5: Which of the following pathogens is **least likely** to cause epiglottitis?

Answer choice 1: *Haemophilus influenzae*

Answer choice 2: *Streptococcus pneumoniae*

Answer choice 3: *Streptococcus pyogenes*

Answer choice 4: *Candida albicans*

Answer choice 5: *Staphylococcus aureus*

Correct Answer: 4) *Candida albicans*

Explanation: [*Candida albicans*, a fungal pathogen, is not a typical cause of epiglottitis, though it may colonize the oropharynx, especially in immunocompromised patients.]

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FIGURES

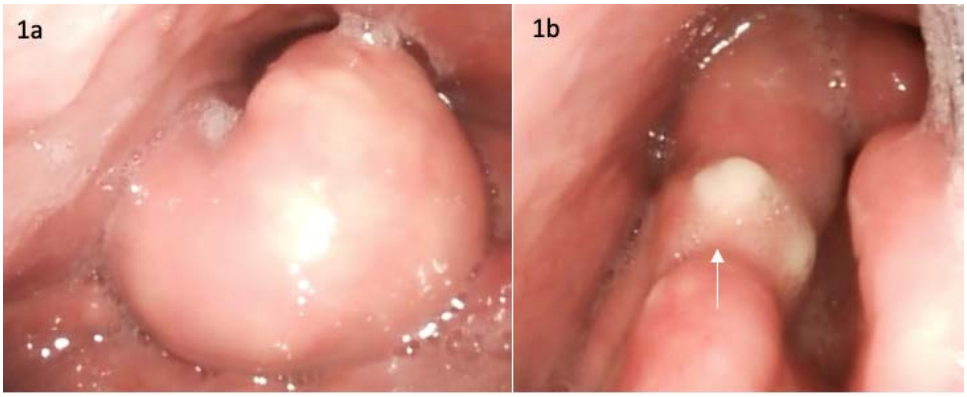

Figure 1: Images from flexible laryngoscopy showed (a) Diffuse edema of the epiglottis and (b) blister-like lesions filled with pus which represents bulbous pustules in the right aryepiglottic fold.

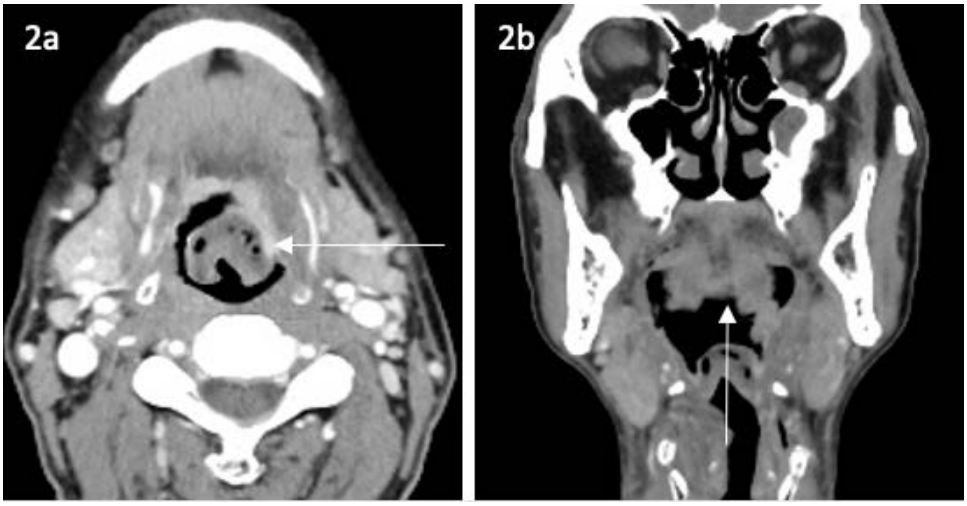

Figure 2: A 57-year-old man presented to the ED with persistent fever and odynophagia that did not improve with antibiotics. (a) Axial and (b) coronal contrast-enhanced CT images showed multiple gas loculi within the epiglottis, suggestive of a gas-forming infection with surrounding inflammatory soft tissue changes.

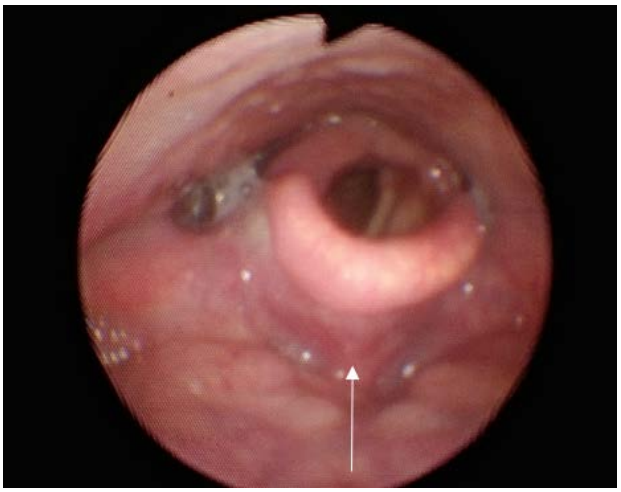

Figure 3: Four weeks after endoscopic drainage and antibiotic treatment, laryngoscopic image showed significant reduction in supraglottic swelling and resolution of pus-containing pockets in the aryepiglottic fold.

Table 1: Summary of reported cases of adult emphysematous epiglottitis in the literature

First author, year	Age (y)/ gender	PMH	Imaging	Micro-organisms	Medical treatment	I&D	Outcomes
Klcova,2011 [7]	65/M	NIDDM, Chemo for sarcoma, smoking 20 years	Xray, CT	α hemolytic strep pyogenes	Vanco, no dexa	I&D	Discharged after 3 wks
Chang, 2013 [8]	32/M	Unknown	Xray: thumb sign, CT: swollen with gas	Strep pneumoniae	AB, 3d dexa on adm (unknown dosage)	No I&D	Improved after 3d
Rohrbach, 2016 [6]	59/M	Unknown	CT: gas loculi	Unknown	Ampic, dexa 6mg x 6h (after I&D)	I&D	Rvd 3 wks
Our current case, 2021	57/M	NIDDM, ESRF, Hepatitis	CT: Swollen with gas loculi	Strep parasanguinis, Candida albicans	Clinda, Dexa 4mg x 6h for 24h after I&D	I&D	Improve after 3 wks
Tan S, 2022 [9]	36/M	DM, obesity, syphilis, HIV+	Xray: thumb sign, CT: swollen, gas, narrowing laryngopharynx	β hemolytic strep Fungal, AFB, Pneumocystis jiroveci	Dexa on adm, Vanco, cefzo, clinda (latter switched to Pip-Tazo, TSM)	Intubated, BAL, No I&D	Rvd after 4 wks
Sunyecz 2023 [10]	37/F	A&D, smoking 10-12 years	CT: Swollen, gas loculi	Prev mel, F. necroph	Vanco, cefzo, mtronz, dexa 8 mg x 8h (for 48h after I&D)	I&D	Rvd 3 wks

AB: antibiotics, adm: admission, A&D: anxiety and depression, AFB: Acid-fast bacilli, Ampic: Ampicillin, cefzo: ceftriazone, Clinda: clindamycin, CRF: chronic renal failure, Dexa: dexamethasone, F: female, F. necroph: Fusobacterium necrophorum, h: hour, I&D: incision and drainage, M: male, mtronz: metronidazole, NIDDM: Non-insulin dependent diabetes mellitis, Pip-Tazo; piperacillin-tazobactam, PMH: pre-existing medical history, Prev Mel: Prevotella melaninogenica, Rvd: resolved, strep: streptococcus, TSM: trimethoprim-Sulfamethoxazole, Vanco:vancomycin, wks: weeks, y:years

Table 2: Summary of key features of emphysematous epiglottitis

Etiology	In adults, pathogens are variable with multiple possible pathogens including Strep. Pneumoniae, β-hemolytic streptococci and Strep. pyogenes.
Incidence	Emphysematous epiglottitis is rare complication occurring in 3% of cases.
Gender ratio	More often in men than women
Age predilection	Unknown
Risk factors	Type 2 Diabetes Mellitus
Treatment	Securing the airway. Drainage of abscess if present.
Prognosis	Mortality of epiglottitis in adults is estimated at 4-7% [11]. This may be higher in emphysematous epiglottitis due to rapid airway compromise but there are no reported numbers.

Table 3: Differential diagnosis of emphysematous epiglottitis

Differential diagnosis	Plain radiograph	CT	Distinguishing features
Bacterial tracheitis	Loss of definition of the trachea with linear filling defect (membrane/plaques) within it	Rarely performed	Clinical history: Older and more ill than patients with croup
Thermal epiglottitis	Thumb sign	Radiographic features are indistinguishable from infectious epiglottitis.	Clinical history: hot beverage, smoke inhalation, inhalation of illicit drugs. Physical examination may show intraoral burns. Epiglottic cultures are negative or show normal oropharyngeal flora.
Retropharyngeal abscess	Increased thickness of the prevertebral soft tissue	Rim-enhancing prevertebral collection which may contain locules of gas.	Imaging features on CT are pathognomonic.
Angioneurotic edema	Diffuse thickening of tongue, upper airway and larynx.	Similar findings as plain radiograph	Clinical history: sudden onset of swelling triggered by an allergen such as food, medications (like ACE inhibitors), insect stings or environmental factors.
Laryngeal diphtheria	Severe subglottic narrowing with a “membrane” visible.	Edema of pharynx and larynx Enhancement of waldeyer ring Reactive lymphadenopathy	Clinical history: Lack of diphtheria immunization Physical exam: White exudates in the pharynx which may extend to larynx and trachea.

KEYWORDS

Emphysematous epiglottitis, Thumb sign, Type 2 Diabetes Mellitus

ABBREVIATIONS

DM = Diabetes Mellitus