

Supraglottitis

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A 39-year-old woman presented with a severe sore throat and difficulty swallowing that started after exposure to several dogs.

Case

A 39-year-old woman, previously in good health, presented to the ED with a chief complaint of severe sore throat, which she said had begun approximately 4 hours prior and was rapidly worsening. She thought her voice sounded muffled, and said she was now having difficulty swallowing her saliva. The patient denied fever but did admit to chills. She experienced onset of shortness of breath 30 minutes prior to arrival to the ED.

The patient stated that she was a house painter and had been working in the home of someone who had several dogs. While not previously allergic to animals, the patient was concerned exposure to the dogs might have contributed to her symptoms. Regarding her social history, the patient admitted to daily consumption of beer, but denied smoking cigarettes. She had no known drug allergies.

On physical examination, the patient was afebrile. Her vital signs were: heart rate, 125 beats/min; blood pressure, 137/74 mm Hg; and respiratory rate, 18 breaths/min. Oxygen saturation was 99% on room air. Overall, the patient appeared anxious and exhibited mild inspiratory stridor. Ex-

amination of the eyes and ears were normal. There was no obvious inflammation or swelling of the posterior pharynx; the tongue was normal; there was no swelling of the floor of the mouth; and the uvula was midline and without swelling.

The patient was noted to having difficulty handling her secretions. She exhibited full range of motion of her neck. Her trachea was tender upon palpation but without jugular venous distension or lymphadenopathy. The cardiac examination was significant for tachycardia with a regular rhythm and without murmurs, rubs, or gallops; the pulmonary examination was normal except for transmitted upper airway sounds. The patient's abdominal, dermatological, and neurological examinations were all normal.

Based on the examination findings, the differential diagnosis included allergic reaction, angioedema, epiglottitis, and retropharyngeal abscess. An intravenous (IV) line was placed and blood was drawn for laboratory evaluation, which included a complete blood count, basic metabolic panel (BMP), and a quantitative pregnancy test. Given the patient's history, the emergency physician (EP) was most concerned for an allergic reaction, and administered epinephrine

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0.5 mg (1:1,000) intramuscularly (IM) in the mid-anterolateral thigh, in addition to methylprednisolone, 125 mg; diphenhydramine, 25 mg; and famotidine, 20 mg IV.

A portable soft-tissue lateral radiograph of the neck was obtained. Radiology services interpreted the film as showing “prominent prevertebral soft tissues and epiglottitis. Retropharyngeal abscess or inflammation, potentially complicated with epiglottitis, has to be considered. Recommend computed tomography (CT) scan of the neck to further evaluate” (Figure 1).

At this point, the patient appeared relatively stable and without progression of symptoms. Since there was the possibility of an infectious etiology, she was given piperacillin/tazobactam, 4.5 g IV. Since the patient was able to tolerate being placed in the supine position, she was taken to radiology services for a CT scan of the neck with IV contrast, which was interpreted by radiology services as “findings consistent with a retropharyngeal abscess extending from C2 to C7” (Figure 2).

Laboratory evaluation results were significant for an elevated white blood cell count (WBC) of $14.8 \times 10^9/L$, but without a left shift; BMP results were within normal limits, and the pregnancy test was negative.

Based on these findings, otolaryngology services were consulted. The consulting otolaryngologist sprayed oxymetazoline and tetracaine into both of the patient’s nostrils and performed a flexible fiberoptic nasopharyngolaryngoscopy. During the procedure, a significant amount of diffuse supraglottic edema was noted, but no posterior pharyngeal wall edema.

Based on the presence of stridor, difficulty managing secretions, and significant amount of supraglottic edema, the patient was taken to the surgical suite for urgent airway control. She was given dexamethasone, 10 mg IV, and after some difficulty, the anesthesiologist orally intubated the patient with a 7.0-mm endotracheal tube. Examination during the procedure noted diffuse supraglottic edema but no other ab-



Figure 1. Soft-tissue lateral neck X-ray image demonstrates prominent prevertebral soft tissues and epiglottitis. This should prompt consideration of retropharyngeal abscess/inflammation or epiglottitis, and computed tomography scan of neck.



Figure 2. Computed tomography scan of the neck with contrast demonstrates prevertebral swelling consistent with retropharyngeal abscess extending from C2 to C7.

normalities.

The patient was transferred to the intensive care unit (ICU) and treated with IV piperacillin/tazobactam and dexamethasone. While in the ICU, the patient became extremely agitated and combative. After further inquiry into the patient’s social history, the patient’s husband reported that his wife drank 12 to 13 beers nightly.

The patient required treatment for alcohol withdrawal with IV benzodiazepines, sedation, and physical restraints. By hospital day 9, she was extubated and tolerated fluids by mouth. On hospital day 10, her mental status had returned to baseline, her WBC was within normal limits, and she no longer complained of difficulty swallowing. The patient was discharged home on hospital day 11 with a final diagnosis of supraglottitis and alcohol withdrawal, and she was given a prescription for amoxicillin/clavulanate. Unfortunately, she did not return for her follow-up appointments.

Discussion

While the incidence of pediatric epiglottitis has decreased since the introduction of the *Haemophilus influenzae* type b (Hib) vaccine in 1985, adult epiglottitis continues to represent a potentially life-threatening condition whose incidence has remained constant over the past several decades.^{1,2} The incidence of supraglottitis in adults is now 2.5 times greater than the incidence in children.^{3,4}

Throat pain, dysphagia, odynophagia, and muffled voice are common complaints of adults presenting to the ED with supraglottitis.

Several important differences exist in the presentation and management of adults who present with inflammation of the epiglottis as compared to children. Children commonly present with an acute onset of symptoms, and due to their smaller and more pliant airway anatomy, they often experience stridor and respiratory distress.^{3,5} The inflammation in children is typically confined to the epiglottis and aryepiglottic folds, while in adults the inflammation can affect not only the epiglottis, but also supraglottic structures such as the pharynx, uvula, and aryepiglottic folds. For this reason,

in adults the condition is often referred to as “supraglottitis.”^{2,6} Adults with supraglottitis most likely present in their 30s, 40s, and 50s, while children present between the ages of 2 and 5 years old.^{1,3,7} In adults, men more commonly present with supraglottitis than women.^{1,2} Cigarette smokers and patients with hypertension, diabetes mellitus (DM), chronic obstructive pulmonary disease, or human immunodeficiency virus/AIDS are at increased risk for supraglottitis.^{3,4} The mortality rate for adults with supraglottitis ranges from 1.2% to 7.1%.³

Etiology

Prior to the use of the Hib vaccine, Hib was the most common cause of epiglottitis, and remains so for children.¹ Currently, the most common cause of supraglottitis in adults is Group A beta-hemolytic *Streptococci*.² Other etiologies include other bacteria (*Haemophilus influenzae*, *Streptococcus pneumoniae*, *Staphylococcus aureus*, *Pseudomonas* species, *Klebsiella pneumoniae*, *Pasteurella multocida*, *Neisseria* species), viruses (herpes simplex, varicella, parainfluenza), trauma, and thermal injuries.^{1,4,5,8}

Signs and Symptoms

Throat pain, dysphagia, odynophagia, and muffled voice are common complaints of adults presenting to the ED with supraglottitis.^{2,7} Fever is usually, but not always, present; the complaint of cough, however, is rare.^{2,3,4} Other less frequent complaints include hoarseness and drooling. Adults can also present with cervical lymphadenopathy, anterior neck tenderness, and cellulitis of the neck and chest.^{2,4} In general, the more severe cases will progress rapidly over a few hours. Due to the larger anatomy in adults, they are more likely than children to experience a gradual progression of symptoms, and supraglottitis will be missed on the initial presentation in up to 50% of adults.^{3,4} Stridor or respiratory compromise does occur in a minority of adult patients with supraglottitis. The

need for artificial airway support (ie, endotracheal intubation, cricothyroidotomy) in adults ranges from 6.6% to 16%.^{9,10}

Making the Diagnosis

The gold standard for diagnosing supraglottitis is direct laryngoscopy.^{3,4} This point is emphasized in our case report, since the CT scan was concerning for a retropharyngeal abscess, and not supraglottitis. The examination of the oropharynx is generally safer and better tolerated in adults compared to pediatric patients, since airway compromise is much less likely. On occasion, inflammation, erythema, and edema of the epiglottis, aryepiglottic folds, or arytenoid cartilages can be observed.⁵ More commonly, the supraglottic structures are not visualized, and the posterior oropharynx appears relatively normal. This should serve as a clue for possible supraglottitis.

In suspected cases of adult supraglottitis without emergent airway compromise, lateral soft-tissue radiographs can be obtained to look for the “thumb sign,” indicating a swollen epiglottis. In adult supraglottitis, the width of the epiglottis is usually greater than 8 mm.¹¹ Other abnormal radiographic findings include arytenoid and aryepiglottic fold enlargement, thinning of the airway, and an increase in size of the prevertebral space. Plain film sensitivity rates range from 38% to 98%.

Complete blood count and throat cultures are not particularly helpful in adult cases. Blood cultures, while only about 30% sensitive in adults, should be considered as supraglottitis can result in secondary infection in the central nervous system, lungs, and surrounding structures.^{3,5}

If available, otolaryngology services should be consulted to evaluate the airway, and IV antibiotics, such as a third-generation cephalosporin (eg, ceftriaxone, cefotaxime), should be initiated to include coverage of Hib.³ If methicillin-resistant *S aureus* is a concern, vancomycin should be added. Clindamycin or metronidazole should

also be given if anaerobes are suspected.^{4,7} The location for performing the nasopharyngeal laryngoscopy varies, depending on the patient's age (ie, pediatric vs adult), severity of symptoms, presence of airway compromise, and local practice and custom.

Advanced imaging studies (CT scan or magnetic resonance imaging) can help identify the presence of an abscess and delineate the extent of the infection, but are not indicated in the early diagnosis and management of suspected adult supra-

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glottitis.⁴ As our case demonstrates, CT is neither highly sensitive nor specific for the diagnosis of epiglottitis. The role of ultrasound in the evaluation of suspected epiglottitis is still being developed. One recent study compared 15 healthy volunteers with 15 patients diagnosed with epiglottitis by an otolaryngologist using laryngoscopy.¹² A statistically significant difference was observed in the anteroposterior diameter of the epiglottis at the midpoint and both lateral edges between the study subjects and healthy volunteers.¹² While there was overlap in the ranges for the midpoint, there was no overlap in both lateral edges between the two groups.¹²

Treatment

The vast majority of adult cases of supraglottitis are managed medically without airway intervention. Patients presenting with a rapid onset of symptoms and in respiratory distress or with stridor, drooling, or cya-

nosis, should be managed with early airway intervention. The use of corticosteroids is controversial, and has not been proven beneficial in any prospective trials.^{1-4,6,7,13}

Admission to a critical care unit is indicated initially, even in patients who are not intubated, as they can experience delayed airway compromise with progression of the infection and edema.¹³

Complications

Abscess formation is a serious complication of supraglottitis, is present in up to 30% of cases, and is more likely to be seen in adults than in children.¹³ Since the adult larynx and surrounding tissues are larger than in children, often the infection is present longer, which allows for an abscess to develop. The risk of abscess formation is increased in patients with DM or those in whom a foreign body is present.

Numerous organisms have been isolated from supraglottic abscesses in adults, and in addition to incision and drainage, anti-

biotics covering both gram-positive organisms and anaerobes should be initiated.⁵ The presence of a supraglottic abscess increases the need for emergent intubation.¹³ In addition, a supraglottic abscess increases the mortality rate to 30%.³ Other complications from supraglottitis include mediastinitis, cervical adenitis, meningitis, and pneumonia.^{4,5}

Conclusion

While the incidence of epiglottitis in the pediatric patient population has fallen, the incidence in adults remains relatively stable. Clinicians should consider supraglottitis in the differential diagnosis of adults presenting with severe sore throat, dysphagia, or stridor. While airway compromise in adults is uncommon, it does occur. Soft-tissue lateral neck radiographs can help make the diagnosis, but the gold standard remains laryngoscopy. All patients should be started on IV antibiotics and admitted to the ICU initially for airway watch.

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