



Case report

Case report: Epiglottitis in the setting of COVID-19

Connor Smith^a, Olivia Mobarakai^a, Syeda Sahra^{b,*}, Joshua Twito^b, Neville Mobarakai^b^a Touro College of Medicine, NY, USA^b Staten Island University Hospital, Staten Island, NY, USA

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ABSTRACT

Epiglottitis is an uncommon, potentially fatal infection of the epiglottis that can lead to complete upper airway obstruction. Isolated pathogens are usually nasopharyngeal bacteria, most commonly *Haemophilus influenzae* type b (Hib). While the incidence of epiglottitis has diminished significantly over the years due to widespread vaccination against Hib, the proportion of epiglottitis caused by other pathogens has increased. In this report, we introduce an unseen presentation of acute epiglottitis associated with severe acute respiratory distress syndrome–coronavirus2 (SARS-CoV-2), who presented to the emergency department with throat pain and odynophagia that quickly resulted in respiratory distress. Clinicians should be aware of airway edema's concomitant presence in patients with acute epiglottitis and COVID-19 and maintain a low threshold for intubation. The rapidly progressive nature of COVID-19 and its complications may preclude intubation later on in the patient's clinical course, potentially necessitating an emergent surgical airway.

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Introduction

Novel severe acute respiratory syndrome–coronavirus 2, also known as coronavirus disease 19 (COVID-19), is a rapidly progressive respiratory illness that can present with a constellation of complications both within and without the respiratory tract. Epiglottitis, defined as inflammation of the epiglottis and surrounding supraglottic structures [1], is one such complication that has rarely been reported in the literature thus far [2]. Epiglottitis is associated with various pathogens, including bacteria, viruses, and fungi [3]. In this report, we present one of the few known cases of COVID-19-associated epiglottitis.

Case description

A 43-year-old Caucasian male with a past medical history of hypertension and a recent diagnosis of COVID-19 by PCR 4 days prior presented to our emergency department with the complaint of worsening dysphagia and hoarseness of voice for one day. The patient developed a mild sore throat one day before admission with subsequent worsening of his throat pain overnight associated

with tongue swelling and vocal changes. The patient denied any difficulty breathing, fever, chills, cough, chest pain, nausea, vomiting, and recent travel. He admitted to being a former smoker but quit over ten years ago. He denied excessive alcohol or intravenous drug abuse. His hypertension had been well controlled with Losartan for the past two years and he has never had any reaction. He denied any family history of angioedema.

Upon arrival to the emergency room, the patient's temperature was 37.6 °C, blood pressure was 139/91 mm Hg, heart rate was 112 beats per minute, respiratory rate was 18 breaths per minute, and oxygen saturation was 99 % on room air. The patient was able to speak in full sentences, though with obvious muffling of his voice. Physical examination was significant only for tenderness to the left neck. No abdominal pain, rash or pruritis was observed. He had a BMI of 24.9 kg/m². He denied any new medications or changes to his diet. Recent labs were remarkable for WBC of 4.70 K/uL. In the E. D., the patient received 6 mg push of IV decadron, 50 mg push of IV diphenhydramine, a one-time dose of racemic epinephrine aerosol (2.25 % 0.5 mL), and a one-time infusion of tranexamic acid IVPB. A flexible fiberoptic laryngoscope demonstrated submucosal edema and erythema of the epiglottis with surrounding secretions. The patient was started on Ceftriaxone 2gm IV for suspected acute epiglottitis.

Computed tomography soft tissue neck with IV contrast (Fig. 1) revealed thickening of the epiglottis and epiglottic folds with submucosal edema involving the hypopharynx with mild narrowing of the airway.

* Corresponding author at: Department of Internal Medicine, Hofstra School of Medicine, Staten Island University Hospital, 475-Seaview Avenue, Staten Island, NY 10305, USA.

E-mail address: ssahra@northwell.edu (S. Sahra).

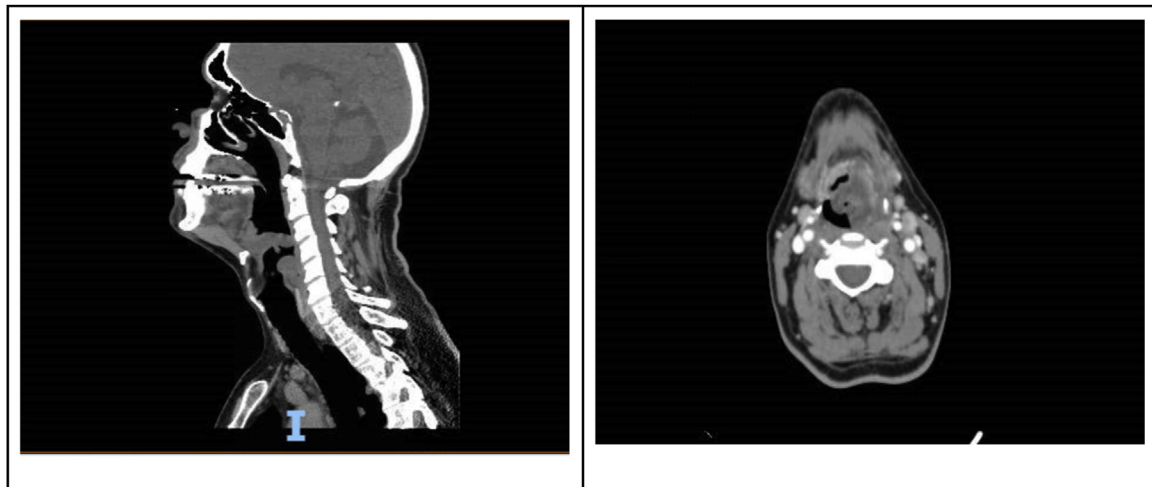


Fig. 1. C.T. of the head and neck on the day of admission, sagittal and axial views.

The patient was immediately taken to the OR for airway management via endotracheal intubation with subsequent admission to the ICU for monitoring.

IV Decadron and Rocephin and were continued following admission to the ICU. COVID-19 antibodies, as well as blood cultures, were negative. Inflammatory markers were unremarkable, including; procalcitonin of 0.10 ng/mL, ferritin of 152 μ g/L, CRP of 0.51 mg/L, and D-dimer of 169 ng/mL. A diagnosis of COVID-19 was re-confirmed by PCR. The patient was started on Remdesivir. He received a single loading dose of Remdesivir 200 mg IV, followed by Remdesivir 100 mg IV once-daily maintenance dose for days two through five of his hospital stay. On day two of his ICU admission, the patient had cuff leaks and was fighting the ventilator. A decision was made to extubate the patient. Bedside laryngoscopy repeated on days three and four of his hospital stay demonstrated persistent erythema and edema of the epiglottis. The patient was continued on Rocephin, Decadron, and Remdesivir. On day five, the patient demonstrated significant clinical improvement. His course of Remdesivir was completed as an inpatient, and he was discharged home with a nine-day course of Vantin. Complement C4 was not obtained as there was no clinical evidence of Angioedema. He followed up with ENT one week after his discharge and reported complete resolution of his symptoms.

Discussion

COVID-19 infiltration of the respiratory tract has been linked to the binding of ACE2 receptors on the respiratory epithelium via glycoprotein spikes [4]. Notably, the epiglottis and vocal folds are the only respiratory tract structures that lack these receptors in high density [5]. Additionally, the protease is known as *transmembrane protease/serine subfamily member 2* (TMPRSS2) has been linked to an enhanced viral entry in COVID-19. Unlike the ACE2 receptor, TMPRSS2 is widely expressed in the entire larynx, including the epiglottis [6]. It has been demonstrated that density of ACE2 receptors varies from individual to individual [7]. Therefore, it is plausible that this patient is expressing abnormally high levels of ACE2 on the surface of his epiglottic epithelium, allowing for the full synergistic effect of ACE2 and TMPRSS2 receptors in facilitating COVID-19 viral entry.

Rather than true infectious epiglottitis, COVID-induced angioedema may offer an alternative explanation for the airway swelling observed in this patient. ACE is responsible for degrading

bradykinin; the peptide thought to cause angioedema [8]. Use of ACE inhibitor medications in susceptible individuals may cause angioedema of the face and larynx, leading to respiratory compromise, not unlike epiglottitis. COVID-19 viral glycoproteins bind to ACE2 receptors in the airway, causing downregulation of the ACE protein, leading to angioedema through the same mechanism [4]. While plausible, this theory is challenged by the lack of facial swelling characteristic of angioedema and a lack of patient or family history of the disease.

It is impossible to say with 100 % certainty that COVID-19 caused the epiglottic inflammation in this patient. Apart from angioedema, superinfection with a bacterial pathogen remains a possibility, and indeed the patient improved after five days of IV antibiotics and COVID-19 therapy. However, as discussed in the case description, clinical and laboratory signs point away from a bacterial etiology. For a certainty, this report portrays the strongest association to date between COVID-19 infection and acute epiglottitis because it concerns a patient with positive PCR at the time of diagnosis and a lack of comorbid conditions (i.e., no obesity or tobacco use).

This report stands distinct from the two previous known cases of COVID-19-related epiglottitis for one crucial reason: the need for intubation and mechanical ventilation. COVID-19-induced respiratory failure, often complicated by acute respiratory distress syndrome (ARDS), has frequently required intubation and ventilator support [9]. Separately, severe epiglottitis cases can result in near-complete obstruction of the upper airway, necessitating intubation in these patients as well. Combining these two airway-compromising forces creates a situation in which respiratory therapy for the patient becomes both supercritical and exceedingly challenging. Despite these difficulties, this patient's intubation course was relatively uncomplicated, suggesting that standard therapy for COVID-19 was sufficient to resolve the symptoms. In the face of an ever-evolving global pandemic, we hope that this report offers insight for other providers who find themselves managing cases of severe airway impairment in COVID-19 positive patients.

Ethics approval and consent to participate

The case report and manuscript were reviewed with Research Department and Ethics Committee. No experimental intervention was performed, and any specification of guidelines, legislations, or permissions were not required.

Consent for publication

The patient was contacted during the hospital stay and after discharge. Consent was obtained over the telephone for the use of patient data, images, and blood work for the publication of the case for purely educational and research purposes to which the patient and family agreed. No identifying information usage was explained. Written consent was not obtained due to the patient's limited visitations to outpatient clinics for follow-up.

Availability of data and materials

Patient-specific data were obtained from hospital electronic medical records of Northwell Health, and patient identifying information was cropped.

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Author's contributions

- Manuscript written and data obtained by S.C., O.M. and S.S.
- Proofreading and literature review done by N.M. and J.T.

Declaration of Competing Interest

The authors report no declarations of interest.

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