



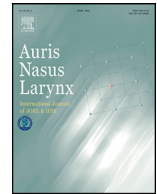
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Case Report

COVID-19 Omicron variant-induced laryngitis

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ABSTRACT

Objectives: The COVID-19 omicron variant has a low affinity for the lower respiratory tract. However, upper respiratory tract symptoms, such as nasal discharge and sore throat, characterize the infection with this variant. Therefore, in laryngeal stenosis, disease severity assessment through blood oxygen saturation has not been useful.

Methods: We report the case of “omicron laryngitis” in a 59-year-old male who visited the ear, nose, and throat (ENT) clinic with complaints of a sore throat and difficulty in swallowing saliva that persisted for a day.

Results: Laryngoscopy revealed severe swelling of the transglottic region and exudates on the larynx. He was then diagnosed with COVID-19 and subjected to emergency tracheostomy for airway management. Until the emergence of the omicron variant, COVID-19 showed mainly lower airway and mild upper airway inflammatory features. However, upper airway stenosis should be suspected in cases presenting with “muffled speech,” “dysphagia,” “severe pain on swallowing,” and “inspiratory dyspnea or stridor.”

Conclusion: Therefore, laryngeal and pharyngeal evaluation using a flexible laryngoscope under appropriate infection control measures is necessary, considering the possibility of progression to fatal laryngeal stenosis, as noted in this case.

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Introduction

COVID-19 has been an ongoing pandemic for more than two years since its first report in Wuhan, China, in 2019. During this period, the SARS-CoV-2 has undergone frequent mutations, causing repeated waves of infections. Until mid-2021, COVID-19 infection was characterized by lower respiratory tract infections, such as fever and cough, with olfactory or

taste disturbances. However, rhinitis, pharyngitis, and laryngitis were uncommon. In November 2021, the emergence of B.1.1.529 variant (omicron) was first reported in South Africa. Subsequently, it spread quickly worldwide, replacing the delta variant. Compared with previous variants, the omicron variant showed milder lower respiratory tract symptoms and olfactory or taste disturbances; however, upper airway symptoms, such as sore throat, rhinorrhea, or sneezing, were reported more frequently [1].

Therefore, this study reports a case of COVID-19-induced severe subglottic laryngitis requiring emergency tracheostomy under local anesthesia. We also discussed problems encountered in “omicron laryngitis” treatment.

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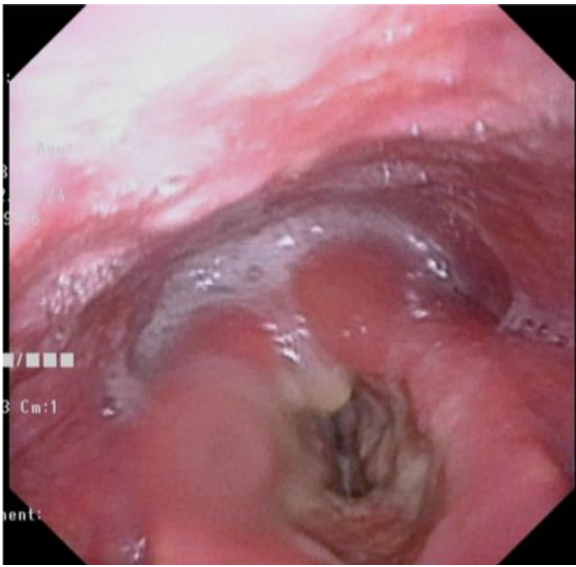


Figure 1. Laryngoscopic findings. The larynx and hypopharynx displayed erythema and edema with salivary retention, reflecting dysphagia. Swelling and erosion formed from the glottis to the subglottis, and the airway was constricted.

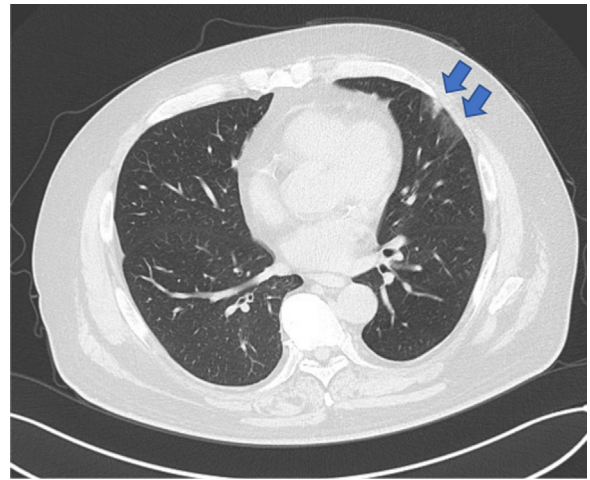


Figure 2. Chest CT scan showed peripheral ground glass opacities in the right S6 and left S5 (arrows), indicating COVID-19 pneumonia.

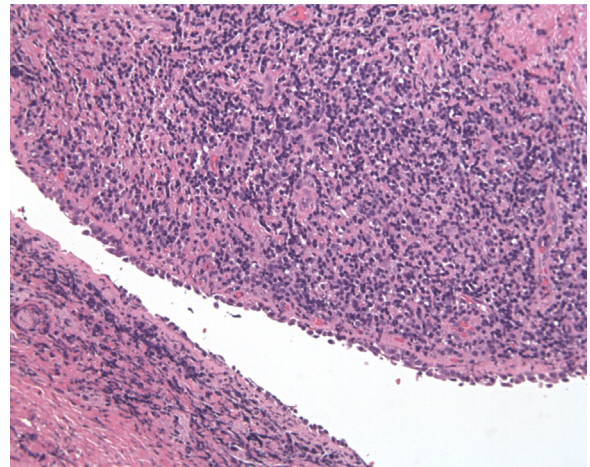


Figure 3. Histopathological findings. The subepithelial stroma showed stratified inflammatory cell infiltrates comprising neutrophils, lymphocytes, and plasma cells.

Case report

A 59-year-old man visited the ENT clinic with complaints of sore throat and severe difficulty in swallowing even saliva that persisted for a day. Laryngoscopy revealed severe swelling of the transglottic region and exudates on the larynx (Figure 1). He was diagnosed with COVID-19 after a positive antigen test. The attending physician was concerned regarding the risk of upper airway obstruction and called an ambulance to rush the patient to our hospital. His medical history included diabetes and hypertension, and his body mass index was 32 (168 cm, 90 kg). At the first hospital visit, his vital signs were as follows: blood pressure, 159/103 mmHg; body temperature, 37.2°C; and blood oxygen saturation, 98%. He also had difficulty in swallowing saliva and was frequently spitting saliva. Furthermore, chest computed tomography scan revealed peripheral ground glass opacities in the right S6 and left S5 (Figure 2). Hence, he was administered remdesivir, dexamethasone, and a ceftriaxone (CTRX) infusion. However, on the next day, the patient showed worsening dysphagia and experienced dyspnea in the supine position. Therefore, we assessed the larynx and found airway stenosis caused by severe edema of the subglottic mucosa. Thus, emergency tracheostomy was performed under local anesthesia. Considering that the patient was obese and had a short neck and as neck extension was difficult owing to dyspnea, the subcutaneous massive fat was resected to expose the anterior cervical muscles; however, it was still difficult to expose the tracheal cartilage. Hence, we removed the cricothyroid cartilage and opened the window between the cricothyroid ligaments to secure the airway (cricotracheostomy). Histopathological examination revealed prominent inflammatory changes in the cricothyroid ligament (Figure 3). With continued administration of remdesivir, dexamethasone, and CTRX, inflammation

diminished, and the tracheostoma was closed on postoperative day 10.

Discussion

The number of cases of acute severe pharyngolaryngitis with upper airway stenosis caused by the omicron variant is rapidly increasing. Before the emergence of the omicron variant, COVID-19 symptoms mainly included lower respiratory tract symptoms, such as fever and cough. However, since the emergence of the omicron variant, inflammatory upper respiratory tract symptoms, such as nasal discharge, sore throats, and sneezing, have been reported [1]. Otorhinolaryngological results included minor pharyngeal findings, as reported in patients diagnosed with COVID-19 in Japan as of November 2020 [2]. However, Piersiala et al. [3] reported a case series of 20 patients with COVID-19 manifesting severe acute odynophagia who were referred from a single Swedish ENT emergency facility since the occurrence of the omicron variant. All patients showed severe erythema of the hypophar-

ynx and larynx, with edema of the hypopharynx in six cases and ulceration or secretion in two cases. Additionally, four patients required hospitalization. In Japan, multiple cases of COVID-19-induced upper airway stenosis along with related acute laryngitis have been reported to the Japanese Society of Otorhinolaryngology-Head and Neck Surgery in late February 2022. Similarly, our hospital had treated approximately 4,000 patients with COVID-19 by the end of February 2022 and no cases of upper airway stenosis requiring medical attention were observed in our hospital; however, after the occurrence of the omicron variant, four cases of laryngeal stenosis, including the present case, required hospitalization. Notably, the omicron variant is prone to cause severe laryngitis, resulting in fatal upper airway stenosis.

Acute airway stenosis is the most urgent and life-threatening condition; in patients suffering from this condition, an acute decrease in blood oxygen saturation indicates immediately fatal airway obstruction. This principle is also true in COVID-19 cases. However, the severity of COVID-19 cases is still primarily judged based on pneumonia symptoms, which are determined by measuring blood oxygen saturation levels [4]. Cases of upper airway stenosis with laryngitis wherein blood oxygen levels have not yet decreased, such as the present case, are diagnosed as mild COVID-19 and are, consequently, ineligible for hospitalization or emergency transport. Unfortunately, while awaiting treatment, these cases could be fatal because of airway obstruction. In hamsters presenting with respiratory tract infections caused by the omicron variant, the upper respiratory tract, not the lower, was relatively intact [5], suggesting an increase in upper respiratory tract involvement, as opposed to a decrease in severe pneumonia. In cases presenting with “muffled speech,” “dysphagia,” “severe pain on swallowing,” and “inspiratory dyspnea or stridor,” upper airway stenosis should be suspected. Hence, physicians need to evaluate the larynx and pharynx using a flexible laryngoscope under appropriate infection control measures.

During acute inflammation with upper respiratory tract stenosis, such as in this case, the systemic administration of corticosteroid, which has strong anti-inflammatory properties, is the first choice for symptomatic treatment. However, corticosteroids are not recommended in COVID-19 cases that do not require oxygen therapy [4]. Therefore, symptoms indicating upper airway stenosis should be carefully observed. Failure to immediately detect laryngeal stenosis delays the timing of steroid administration, resulting in severe consequences. If upper airway obstruction is already a concern during presentation or if the stenosis progresses despite steroid administration, emergency airway management is required.

Emergency airway management strategies include tracheostomy, cricothyrotomy, and tracheal intubation. All these methods of COVID-19 treatment are aerosol-generating procedures that carry a high risk of infection for healthcare workers; hence, they must be performed under thorough infection control measures [6]. Although tracheostomy is a familiar technique for airway management performed by otolaryngologists, it should be conducted by a skilled surgeon to minimize infection risk in healthcare workers. Moreover, obe-

sity and aging are serious COVID-19 risks. In more severe cases, surgical airway management is required for mechanical ventilation or for securing the airway against upper airway stenosis; however, obesity or low larynx position caused by aging leads to difficulty in accessing the trachea. In a cricotracheostomy, which is a surgical procedure proposed by Kano et al., the anterior portion of the cricoid cartilage is removed, thereby preventing postoperative stenosis and maintaining the tracheostoma in a satisfactory condition [7]. This technique approaches the trachea at a higher level than that in a tracheostomy; therefore, the thyroid need not be processed and it is easier to access the trachea. Therefore, cricotracheostomy is extremely useful in cases where tracheostomy is difficult to execute due to obesity or low larynx position. On the other hand, cricothyrotomy is a different and emergency procedure performed when tracheotomy or tracheal intubation is difficult. However, the destruction of the cricoid cartilage can result in postoperative subglottic stenosis, and a tracheotomy should be performed immediately after this procedure as a form of airway maintenance. Furthermore, tracheal intubation for upper airway stenosis can worsen airway obstruction because of sedation or irritation during intubation, resulting in ventilation failure and increased infection risk among healthcare workers due to increased irritation during intubation compared with tracheostomy [6]. Therefore, even when tracheal intubation is conducted, tracheostomy should be performed early, considering the secondary damage to the larynx and trachea caused by intubation.

Conclusion

In this study, we reported the case of COVID-19 laryngitis requiring emergency tracheostomy due to the risk of upper airway obstruction. With the prevalence of the omicron variant, there is an increase in the number of cases of acute laryngitis with the risk of airway obstruction. Therefore, laryngoscopy is necessary, and steroid administration/airway management should be considered when symptoms suggest a risk of airway obstruction in COVID-19 cases.

Declaration of Competing Interest

The authors declare no conflicts of interest associated with this manuscript.

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