Case Report: A 29-Year-Old Pregnant Woman at 24 Weeks of Gestation Presenting with Laryngotracheitis and COVID-19 Due to the R.1 Variant of SARS-CoV-2

Yoshihito Tanaka
Kojiro Hirano
Eriko Sekino
Toshikazu Shimane
Hitome Kobayashi

1 Department of Otorhinolaryngology, Showa University School of Medicine, Tokyo, Japan
2 Head and Neck Oncology Center, Showa University, Tokyo, Japan
3 Department of Oral and Maxillofacial Surgery, Division of Oral Oncology, Showa University School of Dentistry, Tokyo, Japan

Patient: Female, 29-year-old
Final Diagnosis: COVID 19 infection • laryngotracheitis
Symptoms: Cough
Medication: —
Clinical Procedure: —
Specialty: Infectious Diseases
Objective: Unusual clinical course

Background: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was discovered in December 2019 in Wuhan, China. Coronavirus disease (COVID-19) mainly presents with lower respiratory tract symptoms. On the other hand, laryngotracheitis or croup shows barking cough and it is rare in adults. There were no reports of laryngotracheitis with COVID-19 in pregnant women. We report the case of a pregnant woman at 24 weeks of gestation presenting with acute laryngotracheitis and COVID-19 due to the R.1 variant of SARS-CoV-2.

Case Report: A 29-year-old previously healthy woman at 24 weeks of gestation presented with hoarseness and sore throat without fever, of 1-day duration. Although she was treated by her primary care physician with nebulized epinephrine, her symptoms did not resolve. She came to our hospital the same day. On arrival at our department, she was tachypneic and had a 95% oxygen saturation. She had stridor and barking cough. Laryngeal endoscopy revealed edema under the vocal cords. She was hospitalized urgently. SARS-CoV-2 polymerase chain reaction (PCR) testing was positive and the E484K mutation was confirmed. She was treated with oral and inhaled corticosteroids. Two days after admission, her symptoms were improved. She was discharged 10 days after admission. Edema under the vocal cords was completely improved 24 days after discharge. There were no adverse effects on the pregnancy.

Conclusions: COVID-19 laryngotracheitis has a more severe disease course than other causes, especially in pregnancy. COVID-19 laryngotracheitis should be used corticosteroids to treatment. Prednisolone is recommended for laryngotracheitis with COVID-19 during pregnancy.

Keywords: Croup • Endoscopy • Pregnancy • SARS-CoV-2 Variants

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/937834
Background

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was discovered in December 2019 in Wuhan, China, as a novel coronavirus (2019-nCoV) [1]. Coronavirus disease (COVID-19) mainly presents with lower respiratory tract symptoms. These include fever, dyspnea, coughing, and chest tightness. These symptoms can rapidly progress to acute respiratory distress syndrome [2]. However, COVID-19 can also cause symptoms related to the upper respiratory tract, such as stuffy nose, sore throat, and dyssomnia [3].

On the other hand, laryngotracheitis or croup shows sudden onset of barky cough, hoarse voice, inspiratory stridor and respiratory distress [4] and it is rare in adult [5]. Laryngotracheitis or croup is mainly caused by parainfluenza virus 1. However, many other viruses have also been implicated, including the influenza virus, respiratory syncytial virus, measles virus, adenovirus, and rhinovirus [6]. Recently, there were a few reports for laryngotracheitis or croup with COVID-19 [7,8], but none for pregnant women yet. This report presents the case of a 29-year-old pregnant woman at 24 weeks of gestation presenting with acute laryngotracheitis and COVID-19 due to the R.1 variant of SARS-CoV-2. Informed consent was obtained from the patient for the publication of this case report.

Case Report

A 29-year-old previously healthy woman at 24 weeks of gestation presented with hoarseness and sore throat without fever of 1-day duration. She had no history of intubation, general anesthesia, and instrumentation of airway. Although she was treated by her primary care physician with nebulized epinephrine, her symptoms did not resolve. Therefore, she was advised to seek treatment at a hospital, and she came our hospital the same day. On arrival at the Department of Otorhinolaryngology and Head and Neck, she was tachypneic (20 breaths/min) and had a 95% oxygen saturation. She had stridor at rest and barking cough. The patient did not have wheezing or a blanching maculopapular truncal rash. Laryngeal endoscopy revealed edema under the vocal cords (Figure 1). She was hospitalized urgently and treated with oral corticosteroids (prednisolone 0.5 mg/kg) and inhaled corticosteroids (beclomethasone dipropionate). The SARS-CoV-2 antigen test was positive on the first day at the hospital. Polymerase chain reaction (PCR) testing was performed using the SARS-CoV-2 Detection Kit-N2 set (NCV-102) and mutations were detected by TaqMan SARS-CoV-2 Mutation Panel. Both were performed by our hospital laboratory. Two days after admission, the PCR test was positive for SARS-CoV-2, and for the mutation E484K 4 days after admission. It was negative for the mutation N501Y. Pango lineage was R.1. Two days after admission, her symptoms improved, and the stridor resolved. Oxygen saturation improved to 98%. Therefore, we reduced the oral corticosteroid dose. The patient was discharged 10 days after admission. Edema under the vocal cords was completely improved 24 days after discharge (Figure 2), which was 34 days after she came to our hospital. There were no adverse effects on the pregnancy.

Figure 1. Image of the larynx on arrival. Edema was found under the vocal cords (arrowheads). V.C. – vocal cords.

Figure 2. Image of the larynx 24 days after discharge (34 days after arrival). Edema was improved by administration of prednisolone. V.C. – vocal cords.
**Discussion**

This case is laryngotracheitis in a pregnant woman due to the R.1 variant of SARS-CoV-2.

This case shows that severe laryngotracheitis can be caused by SARS-CoV-2 and it is treatable by corticosteroids, and prednisolone is especially recommended in pregnant women.

All patients who are admitted to our hospital receive an antigen test and a nasopharyngeal PCR test at the same time. This is because PCR test take time to produce results, so isolation cannot be done in time with PCR testing alone. If it is positive at the time of the antigen test, patients are managed in a private room, and if negative, they are isolated by a curtain until the PCR test result is available. Thus, we could find this case. SARS-CoV-2 is a new etiology of laryngotracheitis or croup. SARS-CoV-2 should be tested for if the patient has laryngotracheitis or croup.

Pediatric croup with COVID-19 was reported to have a more severe course than with other viruses [7]; they tried nebulized racemic epinephrine and oral corticosteroids, but 2 of 3 cases did not resolve immediately. Our case had severe laryngotracheitis that also did not resolve immediately. In addition, the E484K variant is more lethal than the wild-type and N501Y variants [9]. Our patient was also pregnant, and pregnancy increases the risk of severe disease due to SARS-CoV-2 infection [10]. Thus, the patient was considered ill enough to be admitted to the hospital, although she was previously healthy. Another report of laryngotracheitis due to SARS-CoV-2 was in a 52-year-old woman with a history of hypertension, type 2 diabetes mellitus, dyslipidemia, and Sheehan syndrome [8]. Her symptoms were severe enough to require oxygen administration, which was not needed in our case. This difference might be due to the presence or absence of underlying diseases.

Laryngotracheitis or croup is mainly treated by corticosteroids [11]. Epinephrin is effective for the acute signs of croup [12]. In our case, the laryngotracheitis did not resolve immediately with nebulized epinephrine, but was successfully treated with corticosteroids. Previous reports [7,8] used corticosteroids to treat laryngotracheitis or croup with COVID-19 and they were effective, as in our case. This shows that laryngotracheitis or croup with COVID-19 is treatable by corticosteroids, just like croup caused by other infections. The COVID-19 treatment guidelines created by the National Institutes of Health recommend corticosteroids, especially dexamethasone, for patients who are mechanically ventilated or require oxygen [13]. Our case did not require oxygen but the symptoms were improved by corticosteroids. Dexamethasone is generally used to treat COVID-19, but our patient received prednisolone due to the issue of placental transfer [14]. Therefore, we found that prednisolone is effective in COVID-19 laryngotracheitis, as is dexamethasone. Prednisolone is recommended for pregnant patients with laryngotracheitis and COVID-19.

**Conclusions**

We described a case of SARS-CoV-2 infection in a pregnant patient with laryngotracheitis. Our report shows the need to test for SARS-CoV-2 infection in patients with stridor. Laryngotracheitis or croup with COVID-19 has a more severe disease course than with other etiologies. Corticosteroids should be use for the treatment of laryngotracheitis with COVID-19. Pregnancy is a risk for deterioration. Prednisolone is recommended for laryngotracheitis with COVID-19 during pregnancy due to its placental transfer.

**Department and Institution Where Work Was Done**

Department of Otorhinolaryngology Showa University School of Medicine, Tokyo, Japan.

**Declaration of Figures’ Authenticity**

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

**References:**

1. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020;395(10223):497-506
2. Rodríguez-Morales AI, Cardona-Ospina JA, Catíliz-Pérez-Ocampo E, et al. Clinical, laboratory and imaging features of COVID-19: A systematic review and meta-analysis. Travel Med Infect Dis. 2020;34:101623
3. Vaira LA, Deliana G, Fois AG, et al. Objective evaluation of anosmia and ageusia in COVID-19 patients: Single-center experience on 72 cases. Head Neck. 2020;42(6):1252-58
4. Ortiz-Alvarez O. Acute management of croup in the Emergency Department. Paediatr Child Health. 2017;22(3):166-69
5. Patel JJ, Kitchin E, Pfeifer K. A narrowing diagnosis: A rare cause of adult croup and literature review. Case Rep Crit Care. 2017;2017:9870762
6. Cherry JD. Clinical practice. Croup. N Engl J Med. 2008;358(4):384-91
7. Venn AMR, Schmidt JM, Mullan PC. Pediatric croup with COVID-19. Am J Emerg Med. 2021;43:287.e1-e3
8. Alhedarthy AA, Murad IS, Aldabal N. Acute laryngotracheitis caused by COVID-19: A case report and literature review. Int J Surg Case Rep. 2022;94:107074
9. Khan A, Zia T, Suleman M, et al. Higher infectivity of the SARS-CoV-2 new variants is associated with K417N/T, E484K, and N501Y mutants: An insight from structural data. J Cell Physiol. 2021;236(10):7045-57
10. Zambrano LD, Ellington S, Strid P, et al. Update: Characteristics of symptomatic women of reproductive age with laboratory-confirmed sars-cov-2 infection by pregnancy status – United States, January 22-October 3, 2020. MMWR Morb Mortal Wkly Rep. 2020;69(44):1641-47
11. Gates A, Gates M, Vandermeer B, et al. Glucocorticoids for croup in children. Cochrane Database Syst Rev. 2018;8:CD001955

12. Westley CR, Cotton EK, Brooks JG. Nebulized racemic epinephrine by IPPB for the treatment of croup: A double-blind study. Am J Dis Child. 1978;132(5):484-87

13. National Institutes of Health. Corona virus 2019(COVID-19) treatment guidelines. Accessed on 21 December 2021. https://www.covidtreatmentguidelines.nih.gov

14. Gerald GB, Rojer KF, Craig VT, et al. Drugs in pregnancy & lactation: A reference guide to fetal and neonatal risk. 11th ed. Lippincott Williams & Wilkins; 2017