Delayed Diagnosis of Postintubation Tracheal Stenosis due to the Coronavirus Disease 2019 Pandemic: A Case Report

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Tracheal stenosis is an uncommon but severe problem after long-term intubation. Here, we report a patient who came from a containment zone of coronavirus disease 2019 (COVID-19) and presented with complaints of breathlessness and cough. She was suspected to have an infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Later, she developed type 2 respiratory failure and carbon dioxide narcosis because of delay in diagnosis of severe, near-complete postintubation tracheal stenosis due to over suspicion of COVID-19 during the current pandemic. (A&A Practice. 2020;14:e01269.)

GLOSSARY

ABG = arterial blood gas; **COVID-19** = coronavirus disease 2019; **CT** = computed tomography; **ETT** = endotracheal tube; **Fio₂** = fraction of inspired oxygen; **ICMR** = Indian Council of Medical Research; **Paco₂** = partial pressure of carbon dioxide; **Pao₂** = partial pressure of oxygen; **RT-PCR** = reverse transcription-polymerase chain reaction; **SARS-CoV-2** = severe acute respiratory syndrome coronavirus 2

Postintubation tracheal stenosis is a rare event, and its incidence is estimated to be 4.9 cases per million per year.¹ In this article, we report a case of severe, near-complete tracheal stenosis after previous endotracheal intubation for 7 days. The patient developed type 2 respiratory failure and carbon dioxide narcosis because of delay in diagnosis due to over suspicion of coronavirus disease 2019 (COVID-19) during the current pandemic.

The patient has provided written consent to publish this case report.

CASE PRESENTATION

A 28-year-old woman presented with complaints of acute exacerbation of dyspnea over the past 4 days. She had a history of breathlessness for the past 10 days associated with cough without expectoration. Based on these symptoms, she was suspected to have an infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), especially as she was from a containment zone of COVID-19. A containment zone is a geographical area wherein

large number of COVID-19 patients or contacts are present.² She was isolated in a COVID-19 suspected ward and treated with hydroxychloroquine and azithromycin orally and intravenous hydration. During her stay in the isolation ward, her symptoms gradually worsened. The reverse transcription-polymerase chain reaction (RT-PCR) test for SARS-CoV-2 took 10 hours to come and it was negative.

The patient was moved to the intensive care unit with severe ventilatory distress, altered consciousness, and tachycardia. On chest auscultation, there was bilateral wheeze. Arterial blood gas (ABG) showed type 2 respiratory failure with an arterial partial pressure of carbon dioxide (Paco₂) 95 mm Hg with respiratory acidosis and arterial partial pressure of oxygen (Pao₂)/fraction of inspired oxygen (Fio₂) ratio of 360 mm Hg. Endotracheal intubation was attempted with an endotracheal tube (ETT) of 7 mm internal diameter, but resistance was met at 1–2 cm beyond the vocal cords and the ETT could not be passed. Further intubation attempts failed even with smaller sized ETT. We suspected postintubation tracheal stenosis because of the patient's history of previous intubation for acute respiratory distress syndrome secondary to pancreatitis 2 months back. The patient was ventilated through a supraglottic device after administering intravenous sedative drugs. Emergency tracheostomy was performed by an otolaryngologist, and the patient was put on mechanical ventilation. After some time, an ABG analysis revealed Paco₂ of 44 mm Hg. The patient gradually regained consciousness and became oriented with a Glasgow Coma Score of 15.

Contrast-enhanced computed tomography (CT) of the neck and thorax was done once the patient was stable and breathing spontaneously via tracheostomy. It showed marked tracheal narrowing for a length of 2.58 cm with non-visualization of the lumen at the C7-T1 level (Figures 1 and

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Accepted for publication June 10, 2020.

Funding: None.

The authors declare no conflicts of interest.

All the authors were involved in the management of the patient, and contributed to and approved the manuscript.

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DOI: 10.1213/XAA.0000000000001269

Figure 1. CT (sagittal section) of neck and thorax showing severe tracheal stenosis of 2.8cm at the level of C7-T1. A indicates anterior; AIIMS, All India Institute of Medical Sciences; CECT, contrast-enhanced computed tomography; CT, computed tomography; P, posterior; S, sagittal; Se, spin echo; T, tesla; WL, window level; WW, window width.

2A–C). The CT was done to rule out COVID-19 as the sensitivity of single RT-PCR is low.³

DISCUSSION

In our hospital, the Indian Council of Medical Research (ICMR) strategy is followed to screen and test suspected coronavirus patients.⁴ According to ICMR guidelines, patients from hotspot areas with symptoms are COVID-19 suspected and have to be tested by RT-PCR for coronavirus. Our patient met these criteria because she had shortness of breath with cough. Therefore, she was isolated for testing and suspected to have COVID-19.

The usual symptoms of postintubation tracheal stenosis are gradual onset dyspnea and nonproductive cough.⁵ This patient from a COVID-19 containment zone presented with dry cough and dyspnea and was mistakenly diagnosed with COVID-19. She was kept in the isolation ward for 1 day with severe dyspnea due to tracheal stenosis. Because of delayed diagnosis, the patient developed type 2 respiratory failure and carbon dioxide narcosis.

Postintubation tracheal stenosis is a rare event after endotracheal intubation with the use of high-volume, low-pressure cuff ETT. The incidence of postintubation tracheal stenosis is 6%–21%, but only 1%–2% become symptomatic because the tracheal lumen has to be narrowed >30% to result in dyspnea.^{6,7} Before the use of high-volume, low-pressure cuff ETT, the incidence of stenosis after intubation was higher.

Other factors that contribute to tracheal stenosis are cuff pressure, ETT size relative to the tracheal lumen, duration of intubation, hemodynamics during intubation, movement of the tube, age, sex, ETT material, and the use of steroids.⁸ The minimum duration of intubation after which tracheal stenosis has been reported is 24 hours.⁹ Postintubation tracheal stenosis occurs as a result of fibrotic tracheal scarring after tracheal mucosal ischemia triggered by a compromise in the blood supply to the mucosa by compression from the ETT cuff.¹⁰ The recommended ETT cuff pressure is between 25 and 30 mm Hg. Type 4 stenosis of the airways occurs with extreme

Figure 2. CT images showing severe tracheal stenosis. A, CT scan showing patent laryngeal lumen, (B) pinpoint tracheal stenosis (near-complete obstruction of the lumen), and (C) patent tracheal lumen with a tracheostomy tube in situ at the level below the tracheal stenosis. CT indicates computed tomography.

lumen narrowing (>90%), with a length of over 1 cm.¹¹ In the present case, the tracheal lumen was stenosed to such an extent that stridor was absent due to very low airflow.

The definitive diagnosis of tracheal stenosis is done with bronchoscopy. A CT scan can give precise information regarding the site, level, and severity of obstruction. Treatment is surgical or by alternative methods like bronchoscopic balloon dilation or laser coblation.¹² Because of the COVID-19 pandemic, the definitive procedure for this patient's tracheal stenosis will be done later.

If this patient had presented outside of the pandemic, the diagnosis of postintubation tracheal stenosis would have likely been made sooner and tracheostomy may have been avoided.

CONCLUSIONS

The concern of COVID-19 led to a delay in the diagnosis of postintubation tracheal stenosis in our patient who developed type 2 respiratory failure and carbon dioxide narcosis. ■

ACKNOWLEDGMENT

The authors thank Dr Shashi Meena from the Department of Radiology, AIIMS, Jodhpur, for helping in reporting radiographical image of this case.

DISCLOSURES

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