

Surgical treatment of complex post -COVID tracheal stenosis. A case report

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Case Report

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Background:

The SARS-COV 2 disease has caused a global health crisis that does not appear to end soon. Although the majority of infected patients develop mild symptoms, it is estimated that approximately 88% of patients admitted to the intensive care unit for COVID require invasive mechanical ventilation and receive ventilatory support for an average of 18 days. Tracheal stenosis is a life-threatening condition, that usually arises as a result of orotracheal intubation or secondary to tracheostomy. It has long been postulated that ischemia secondary to intubation is the main cause of scarring in patients with tracheal stenosis. We describe a case of double tracheal stenosis in a post-COVID patient that was successfully managed surgically.

KEYWORDS:

COVID-19, tracheal stenosis, tracheoplasty, bronchoscopy, tracheal stent.

The COVID-19 pandemic has caused a global health crisis.¹ Recent reports have described a large number of patients who have recovered from COVID after being in the intensive care unit (ICU) with orotracheal intubation and presenting with severe upper airway complications.² These factors have resulted in a significant number of patients with complex subglottic and tracheal stenoses, requiring multiple interventions.³ Approximately 88% of patients treated in the ICU for COVID-19 require mechanical ventilation and orotracheal intubation for an average of 18 days. In these patients, the suggested management strategy is to delay tracheostomy until the patient has cleared the infection and no longer needs to be prone. This practice indicate that patients remain intubated for approximately 3-4 weeks, increasing the risk of tracheal stenosis.⁴ Additionally, injuries are more complex, with a higher prevalence of tracheoesophageal fistula, tracheomalacia, vocal cord paralysis.⁵ Before the pandemic, laryngotracheal stenosis occurring in 9% of patients with invasive mechanical ventilation however, during the COVID-19 pandemic, the rate of stenosis after mechanical ventilation has increased.⁶ In the pre-COVID era, tracheostomy was performed between 7-14 days of intubation. In the COVID era, tracheostomy is typically delayed for more than two weeks due to high mortality, aerosolization precautions, and the need to prone the patient for prolonged periods.²

Post intubation stenoses occur approximately 4-6 weeks after tracheal trauma. In COVID patients, stenosis symptoms can be mistaken for post-disease recovery.¹ The prevalence is higher in men, with the average age ranging from to 30-51 years.⁵

In terms of management, the recurrence rate reported for complex stenoses after bronchoscopic dilation is 90%, and failure following tracheoplasty is 10%. Tracheal dilation should be used only as a bridge to surgical treatment in symptomatic patients. In complex stenoses, tracheal resections can be performed up to 4-6 cm, but are not recommended for longer stenoses due to high anastomotic complication rates.⁴

Case report

A 50-year-old male with a history of type 2 diabetes mellitus and systemic hypertension developed severe COVID-19 pneumonia which required advanced airway management with orotracheal intubation for 11 days. The patients was discharged without complications. A month later, he experienced progressive dyspnea, productive cough, and stridor. Bronchoscopy revealed double tracheal stenosis. He underwent dilation on two occasions before the surgical approach was decided, involving tracheal resection and anastomosis two months later. Surgery was performed via a sternotomy (Figures 1-2). Two

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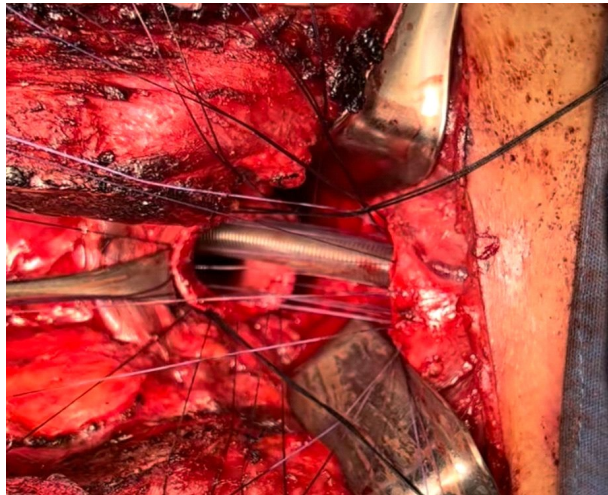


Figure 1. Surgical approach via a sternotomy.

weeks postoperatively, dehiscence of the anterior face of the proximal anastomosis was noted, requiring the placement of a covered 16/40 tracheal stent and achieving adequate control and hospital discharge (Figures 3-4). The stent was removed one month later without complications. Currently, the patient is undergoing outpatient follow-up without respiratory symptoms or stridor.

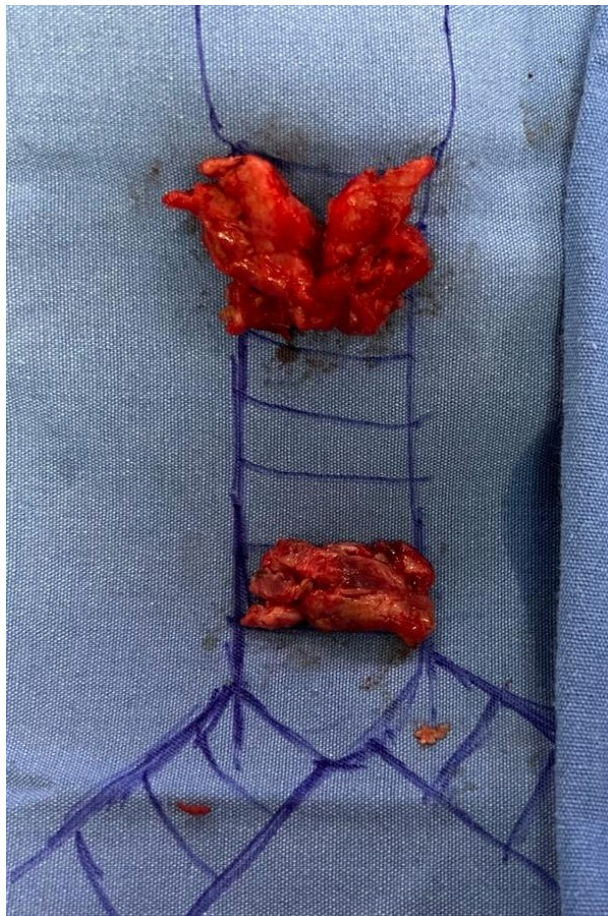


Figure 2. Tracheal rings resected, showing both stenoses.



Figure 3. Integral distal anastomosis.

Discussion

Tracheal stenosis is a life-threatening condition and in the context of the COVID-19 pandemic, an increase in the incidence of these and other upper airway complications has been reported.

As reported in the literature, most patients with post-COVID stenosis are men, between their third and fifth decade of life⁵ as was the case with our patient. They also present with multiple comorbidities, with obesity and diabetes mellitus considered the most frequently associated.³ Our patient began experiencing tracheal stenosis symptoms one month after hospital discharge, which is the average reported in the literature¹. Unlike existing studies on post-COVID tracheal stenosis, our patient required orotracheal intubation for 11 days, whereas the reported average is typically 18 - 30 days.^{1,4,6}



Figure 4. Tracheal stent covering proximal anastomosis.

The case presented here involves complex stenosis, similar to most COVID-19-related stenoses. In a study cohort, Palacios et al. found that the most frequent location of stenosis was the middle third of the trachea (55.6%), followed by the upper third (44.4%). In this cohort, 84% had stenosis between 1-4 cm in length, and 88.9% had Cotton-Myer III stenosis.⁵

Our patient required two dilations before the surgical procedure; the average number of dilations described in the literature is usually 2-4 dilations.^{1,2,4} In a descriptive cross-sectional study conducted between March 2020 and April 2021, Beyoglu et al. compared patients with post-intubation stenosis due to COVID with non-COVID patients and concluded that tracheal resection and anastomosis can be performed safely and successfully in patients with complex stenoses related to this disease.

Conclusion

We present the case of a patient with complex tracheal stenosis, characterized by double stenosis. These types of stenoses are challenging because of the low incidence of such cases, and there are no established guidelines on the best approach. Post-COVID tracheal stenosis, although complex as in the case presented here, can benefit from surgical treatment, however, it is important to have the infrastructure and resources to manage possible complications.

Conflicts of interests

The authors of this article declare no conflicts of interest.

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