

CASE REPORT

Bilateral vocal fold paresis and glottal bridge synechia in COVID-19

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Key Clinical Message

Bilateral vocal fold paresis (BVFP) is a rare complication in COVID-19 and should be considered as differential diagnosis in COVID-19-patients presenting with dyspnea and stridor. High-dose intravenous corticosteroids can be useful treating COVID-19-related laryngeal edema and vocal fold paresis. This case shows the complexity of laryngeal complications in COVID-19 requiring surgeries and functional therapies.

Abstract

Although COVID-19 is known to affect peripheral as well as cranial nerves, there is a paucity of reports on vocal fold paresis in COVID-19, bilateral vocal fold paresis (BVFP) in particular. We describe a case of BVFP and glottal bridge synechia following COVID-19-pneumonia discussing pathomechanisms and treatment options.

KEYWORDS

bilateral vocal fold paresis, bridge synechia, COVID-19, laryngeal edema

1 | INTRODUCTION

Laryngotracheal complications following mechanical ventilation seem to be more common than in pre-pandemic settings due to high ventilation pressures, long periods of intubation during proning and usage of larger tubes that aim to prevent viral transmission.¹

Nevertheless, a case of glottal bridge synechia in COVID-19 has not been reported yet. Although the affection of peripheral and cranial nerves including a few cases of unilateral vocal fold paresis (UVFP) have been observed in COVID-19-positive patients, the occurrence of bilateral vocal fold paresis (BVFP) in COVID-19 seems to be extremely rare.²

In this case report, we describe a case of BVFP and glottal bridge synechia following mechanical ventilation in COVID-19-pneumonia.

2 | CASE REPORT

A 65-year-old female patient was admitted to the intensive care unit with COVID-19-pneumonia requiring mechanical ventilation. Intubation was performed effortlessly, as the anatomy was classified grade one according to Cormack and Lehane's classification and a videolaryngoscope was used. After 12 days, no longer needing ventilation, the patient was extubated.

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However, due to stridor, a reintubation and tracheotomy were necessary. A week later, the PCR results for COVID-19 were negative. Further treatment was then established at the ENT ward.

A video-endoscopy revealed impaired vocal fold movement (VFM) of both vocal folds, supraglottic edema (Figure 1), and dysphagia with penetration of liquid.

A swallowing and voice therapy was established, and high-dose intravenous corticosteroids were given for 3 days. Consequently, the edema decreased. VFM, swallowing, and breathing improved, enabling decannulation 3 days later. At this point, due to better visibility of the posterior glottis, a bridge synechia between the posterior thirds of the vocal folds, classified as stenosis' grade 1 according to Bogdasarian and Olson's classification, was discovered and removed using CO₂-laser-microlaryngoscopy (Figure 2). Surprisingly, post-operative VFM stayed the same, suggesting BVFP or arytenoid joint fixation. We considered arytenoid joint fixation to be highly unlikely because the intubation was performed effortlessly. Furthermore, we had seen VFM improve after intravenous corticosteroid treatment, which was unlikely to have impacted arytenoid joint fixation.

CT scans of the head, neck, and thorax showed no pathologies in the course of the recurrent nerves. An electromyogram of the larynx confirming BVFP was suggested but was refused by the patient.

A 4-week-follow-up showed no alterations in the resection area and VFM improved. Nevertheless, the patient reported breathing difficulties and new granulation tissue was found in the posterior glottis and trachea. Both lesions were removed using CO₂-laser-microlaryngoscopy. As to be expected, breathing difficulties resolved immediately after the operation. The patient was instructed to take reflux precautions and received 40 milligrams pantoprazole daily as reflux medication in order to prevent further inflammatory reaction in the posterior glottis region. A steroid inhaler had already been prescribed before the operation by the patient's pulmonologist due to impaired

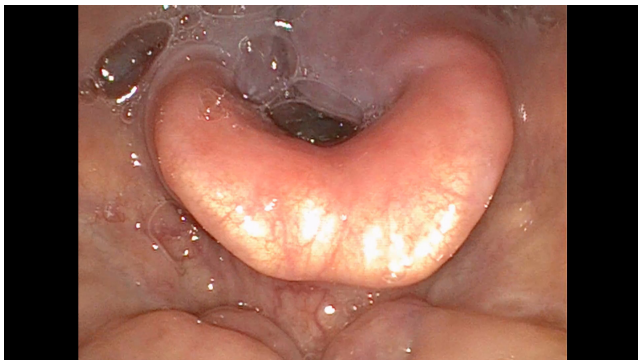


FIGURE 1 Supraglottic edema and penetration of salivary. Endoscopic photo taken before treatment.

lung function. Additionally, saline inhalations and limited vocal use were recommended.

Another 4-week-follow-up showed a recurrence of scar tissue in the posterior glottis. However, VFM had improved and now showed symmetric stroboscopic vibration patterns with slightly reduced opening of the vocal folds. The scar tissue was removed with CO₂-laser-microlaryngoscopy. As limited vocal use did not prevent the recurrence of scar tissue, voice therapy using soft vocal exercises aimed at reducing pressure in the posterior glottis region was established. Further follow-ups over the next 6 months after surgery, showed no recurrence of scar or granulation tissue. Although stroboscopic vibration patterns improved, the opening movement of the vocal folds stayed slightly reduced (Figures 3 and 4).

3 | DISCUSSION

To the author's knowledge, only one case report of BVFP in COVID-19 has been published so far.² Given the fact that laryngeal complications in COVID-19 have been generally attributed to the use of mechanical ventilation in COVID-19-pneumonia, it seems particularly surprising that in that case of BVFP reported by Jungbauer et al., stridor occurred 23 days after successful extubation. The patient in the above mentioned report suffered from dyspnea and inspiratory stridor 2 weeks after discharge from the rehabilitation center. After ruling out other possible causes for vocal cord palsy the authors postulated that COVID-19 had affected the recurrent nerves.

Several reported cases of UVFP in COVID-19 that were treated without intubation³ highlight the importance of discussing other causes than the mechanical in the etiology of BVFP in our patient.

Two mechanisms explaining the neuro-invasive potential of COVID-19 have been postulated⁴:

First, a direct neurotoxic effect of the virus via binding to the ACE 2-receptor in the upper airway mucosa has been proposed.

Second, the heightened immune response triggered by the virus might cause vasculitis as well as „molecular mimicry“ damaging nerves and/or muscles.

Both pathomechanisms support the use of high-dose intravenous corticosteroids in BVFP associated with COVID-19, as corticosteroids are widely used for their anti-inflammatory and immunosuppressant effects.

It has been postulated that inhaled corticosteroids might have a protective effect in COVID-19, reducing viral replication due to a downregulation of ACE2-receptor expression.⁵ That effect might have also contributed to the improvement of laryngeal edema and vocal fold movement in our patient after the use of high-dose intravenous corticosteroids.

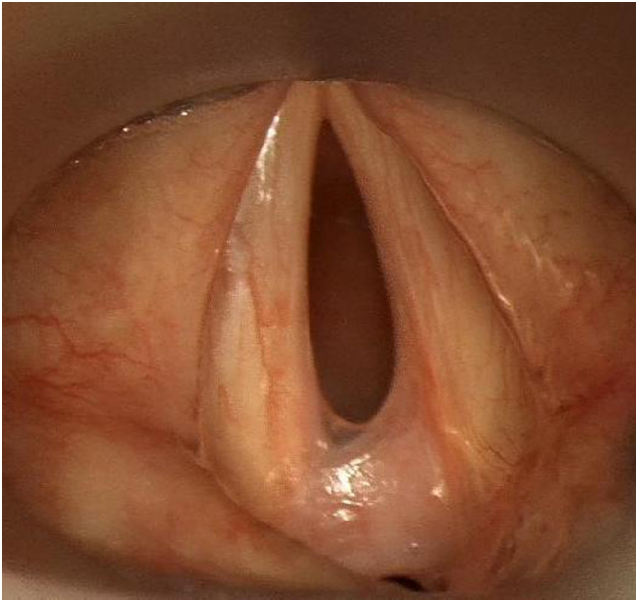


FIGURE 2 Scar tissue between the posterior third of the vocal folds. Note that the scar tissue is only attached to the vocal folds and does not have contact to the interarytenoid or arytenoid region, therefore called “bridge synchia”. Photo taken during the first microlaryngoscopic operation, before CO₂-laser-resection of the scar tissue.



FIGURE 3 Reduced opening of the vocal folds after CO₂-laser-resection of the scar tissue, before voice therapy. Endoscopic photo taken at follow-up 4 weeks after surgery.

4 | CONCLUSION

BVFP is a rare complication in COVID-19 and should be taken into consideration as a differential diagnosis in COVID-19 patients showing dyspnea and stridor.

In addition, we have learned that the use of high-dose intravenous corticosteroids in COVID-19-related laryngeal edema and vocal fold paresis can be a useful treatment option to consider after the host has controlled viral replication.

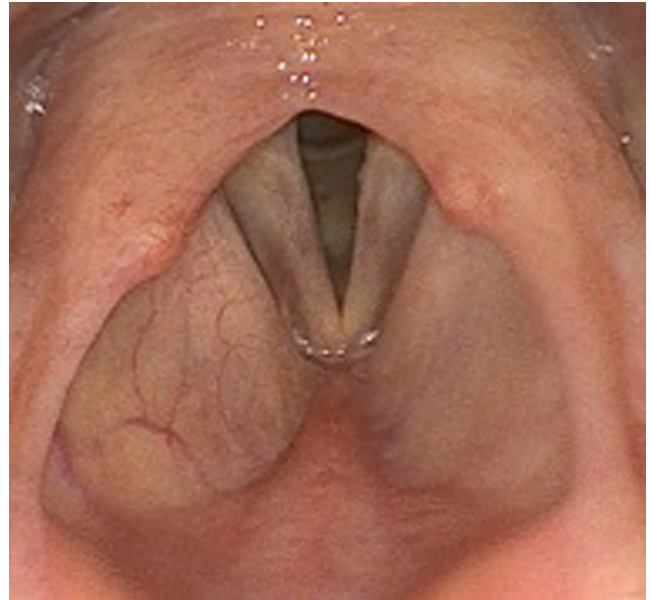


FIGURE 4 Improved opening of the vocal folds after voice therapy. No recurrence of scar tissue. Endoscopic photo taken at follow-up 6 months after surgery.

Our case shows the complexity of laryngeal complications in ventilated COVID-19 patients requiring repeated surgical treatments and functional therapies.

Therefore, in order to ensure favorable outcomes, an early interdisciplinary team approach in the management of COVID-19 patients including ENT- and/or phoniatic specialists and speech pathologists is recommended.

AUTHOR CONTRIBUTIONS

Antonia Tardue-Breiter: Conceptualization; project administration; writing – original draft. **Anna Glück:** Data curation; investigation; writing – review and editing. **Helga Dier:** Data curation; investigation; writing – review and editing. **Georg Mathias Sprinzl:** Supervision; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interests.

DATA AVAILABILITY STATEMENT

None.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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