

## Bronchoscopic treatment of bronchopleural fistula due to COVID-19

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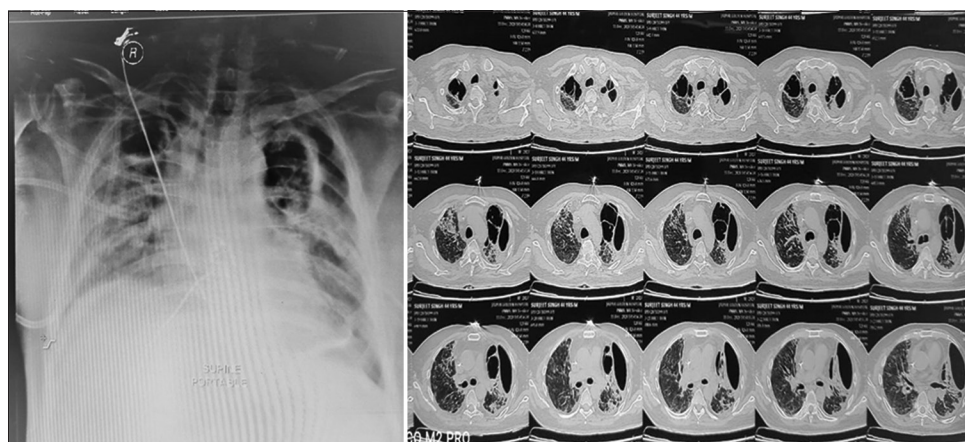
The coronavirus (COVID-19) disease, with flu-like symptoms in its mild form, causes a diffuse involvement of both lungs in most of the patients with moderate to severe disease. One of the complications, seen in such patients is the development of a pneumothorax.<sup>[1]</sup> This is particularly difficult to treat if it persists due to a bronchopleural fistula (BPF). Definitive treatment of these cases with surgery is often difficult as they have bilateral lung involvement and are hypoxic. In similar cases, bronchoscopic occlusion of the leaking segment has been described including some innovative techniques.<sup>[2-6]</sup> However, none of these procedures have been done in COVID-19 patients. We present one such case where we were successful in treating the BPF by bronchoscopic treatment.

A 44 years old, diabetic and hypertensive male, was referred to us with complaints of cough, left-sided chest pain and shortness of breath. He was being treated in another hospital for COVID-19 pneumonia complicated by a left-sided pneumothorax for the last two months. He had an intercostal tube drain (ICD) in place, with a persistent large air leak, and was sent to us for definitive treatment.

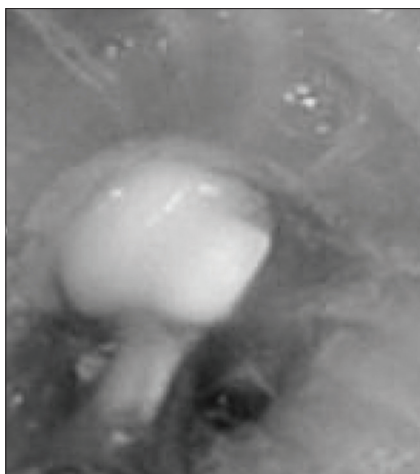
At the time of presentation, the patient was conscious but tachypnoeic with a respiratory rate of 32 and oxygen saturation (SPO<sub>2</sub>) of 79% on room air. Chest examination revealed absent breath sounds on the left side. He was admitted to the intensive care unit (ICU) and had to be supported with non-invasive ventilation (NIV) despite a BPF, due to his inability to maintain oxygen saturation by other means including a high flow nasal cannula (HFNC). His initial investigations showed a high total leucocyte count (TLC) of 33,000/mm<sup>3</sup>, so he was put on broad-spectrum antibiotics. Imaging including a computed tomography (CT) scan showed

a partially expanded left lung with a pneumothorax and an ICD in situ. The lungs on both sides showed residual infiltrates of the COVID-19 and also bullae in both apices [Figure 1a and b]. A trial of slow negative suction to the intercostal tube was tried but failed. Over the next few days, due to the supportive measures above, his oxygen requirement gradually decreased, and he could be taken off NIV. However, the large air leak persisted. In view of clinical improvement, definitive treatment was planned. Surgery seemed too risky due to bilateral diseased lungs, so a bronchoscopic intervention, to occlude the bronchus leading to the leaking segment, was planned under general anaesthesia.

After taking a high-risk informed consent, the patient was given general anaesthesia and ventilated with a laryngeal mask airway (LMA). After an initial examination with a therapeutic video bronchoscope, a 6F Fogarty balloon was passed through the working channel into the left lung and serial balloon occlusion of the different segments was done. The leak was finally localised to the upper division of the left upper lobe after which it was decided to seal the upper division. An endoscopic Watanabe spigot (EWS) size 5, was held with a rat tooth forceps, after passing it through the working channel of the bronchoscope. The bronchoscope and the EWS, were together, carefully passed through the LMA into the left main bronchus. The EWS was then deposited at the opening of the upper division and then manipulated and pushed into the apical segment (LB2) [Figure 2]. Once the spigot was in place, the adjacent LB1 and the LB3 segments were sealed with n-butyl cyano-acrylate glue instilled through thin catheters to make sure that whole of the upper division was sealed off. The procedure was deemed finished when the ICD showed that the air leak had stopped completely.



**Figure 1:** (a) Xray chest with left pneumothorax. (b) CT scan with left side pneumothorax and bilateral apical bullae



**Figure 2:** EWS in left upper lobe apical segment

Negative suction was reapplied to the ICD and continued for another day. A repeat chest imaging showed resolution of pneumothorax. To prevent a recurrence, pleurodesis was done with talc slurry through an ICD tube. Post pleurodesis, the chest X-ray showed no pneumothorax [Figure 3]. The ICD was removed on the subsequent day. He was discharged and an X-ray after 4 weeks showed no evidence of pneumothorax. Supplementary oxygen was discontinued and the patient restarted normal activity. The patient has been advised to return after a year for a repeat bronchoscopy and removal of the EWS.

This case report of bronchoscopic occlusion of a persistent BPF with a EWS and glue, in a COVID-19 patient, shows that a non-surgical approach can be successful. As has been reported in a large series, about 1% of severe COVID-19 patients developed unilateral and sometimes bilateral pneumothoraces, with or without pneumomediastinum.<sup>[1]</sup> Some of these patients have been difficult to treat due to BPF, persistent respiratory failure and lack of a surgical option. The above approach may be tried in selected cases to overcome this dreaded complication.

#### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

#### Conflicts of interest

There are no conflicts of interest.

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**Figure 3:** X-ray chest after bronchial occlusion and pleurodesis, showing complete resolution of pneumothorax

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