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Lung decortication for spontaneous hydropneumothorax in post COVID patients: A case series

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ABSTRACT

Hydropneumothorax is an abnormal collection of air and fluid in the pleural space. As it is a rare complication of COVID-19 pneumonia, we report a case series of spontaneous hydropneumothorax converted to pus collection that was resistant to medical management and treated as decortication and pleurectomy.

1. Introduction

A hydropneumothorax is the concurrent presence of a pneumothorax and a pleural effusion in the pleural space. Development of spontaneous hydropneumothorax is a complication of post-COVID-19 pneumonia due to rupture of small airway. We present a case series of four patients who had mild respiratory symptoms in the acute phase of COVID-19 pneumonia. These patients were managed with low oxygen support in the hospital or managed in the outpatient setting, but later developed spontaneous hydropneumothorax after recovery from COVID-19 pneumonia.

1.1. Case 1

A 34-year-old man with no known comorbidities developed a fever, cough, and chest discomfort five months ago, for which he was admitted to the hospital and tested COVID positive. He was on oxygen support with a facemask at 10 L/min for 5 days, then gradually shifted to room air and kept for observation for 5 days. Then he was discharged from the hospital. After one month of post-covid recovery, patient developed a cough with expectoration and chest discomfort on exertion, treatment continued conservatively for 10 days and patient discharged from hospital symptoms free. Patient again presented in OPD with the complain of cough with expectoration and chest discomfort on exertion, treatment continued conservatively for 10 days and patient discharged from hospital symptoms free. Patient again presented in OPD with the complain of cough with expectoration, he underwent evaluation and was diagnosed with left-sided hydropneumothorax (Fig. 1). Medical management started along with intercostal drainage (ICD), and broad-spectrum antibiotics, patient was discharged with ICD in situ with advise to visit in OPD after a week, but symptoms were not relieved. After 15 days he also developed secondary bacterial infections and developed empyema thoracis, resistant to medical treatment. The patient came to our hospital, and the diagnosis was supported by radiological findings as well. His baseline routine investigations were notable for the total leucocyte count of 14000 cu/mm, his Hb of 9.2 gm%, urea-22 mg/dl, serum creatinine-0.6 mg/dl, and PT/INR-0.80. On examination left sided air entry was significantly decreased and SpO2 was 94% on room air. HRCT of the thorax revealed irregular reticular opacities with patchy areas of ground-glass opacities in bilateral parenchyma as well as left hydropneumothorax with bronchopleural fistula. Based on the imaging findings of left hydropneumothorax and bronchopleural fistula, with a multidisciplinary approach, the team decided to perform a left lung decortication. After obtaining informed consent, the patient was brought to the operating room where general anaesthesia was induced. A double lumen endotracheal tube was placed to facilitate lung isolation. Surgery was started with Fio2 0.50 as one lung was isolated. Intra-operative findings were dense adhesions all around the lung, thickened visceral pleura, thickened parietal pleura adherent to the chest wall, through open thoracotomy approach peeling off visceral pleura and parietal pleurectomy done, after achieving hemostasis two chest drains placed anteriorly and posteriorly in chest cavity.

During the operation patient was desaturated twice with high peak airway pressures, which were managed with bronchodilator puffs, increased oxygen concentration (FiO2 1.0), and high-pressure support. After surgery patient was having poor respiratory efforts and not maintaining adequate tidal volume so patient was transferred to the intensive care unit and then extubated twelve hours later after successfully weaning from ventilator. Postoperative course was uneventful.

List of abbreviations: ICD, intercostal drainage; HRCT, high resolution computed tomography scan; AFB, acid fast bacilli.

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and patient was discharged from ICU after 3 days. Chest drain was removed after 6 days.

1.2. Case 2

An 18-year-old previously healthy female with no significant past medical history came to our hospital with complaints of chronic cough on and off and gradual weight loss for 5 months. She had a history of positive COVID test five months prior to presentation. She was in home isolation for 10 days and managed conservatively without any oxygen support. She came COVID test negative after 10 days. After 2 months of COVID recovery, she developed cough with expectoration, an evening rise in body temperature, and weight loss. She was found to be acid-fast bacilli (AFB) positive and was on antitubercular drugs. There is not significant history any contact for tuberculosis. HRCT revealed right hydropneumothorax with a component of empyema along with the post-covid fibrotic changes of the right side upper and lower lobe (Fig. 2). The patient was managed medically, and inter-costal drain insertion was done to drain out the collections, but because of persistent symptoms, surgical management was advised as right lung decortication. She was operated on under general anaesthesia with a double-lumen tube. Intraoperative findings were dense adhesions all around the lung, thickened visceral pleura, thickened parietal pleura adherent to the chest wall, with thoracotomy pleurectomy done. During surgery, the patient once became hypotensive because of blood loss nearly 2000ml, which was managed with crystalloids and blood transfusions. Otherwise, surgery was uneventful and the patient was successfully extubated. There was no air leak following surgery.

1.3. Case 3

A 38-year-old man otherwise healthy with no significant past medical history (hypertension, diabetes, tuberculosis) developed a fever and cough four months prior to presentation. He was diagnosed with COVID-related viral pneumonia. He was treated with oxygen support at 10 L/ min through a face mask for 15 days, followed by nasal prongs for a further 10 days with other supportive treatments, and was discharged from the hospital symptom free. After one month of discharge, he developed pansinusitis and was diagnosed with mucormycosis of the sinuses. He was treated with injections of amphotericin B for 15 days. After 2 months of COVID recovery, he developed a cough with expectoration and weakness. For these symptoms, he again visited a hospital and underwent a full workup with a HRCT scan of the thorax, which revealed right-sided hydropneumothorax with bronchopleural fistula and collapse consolidation of the underlying right lung parenchyma (Fig. 3). With multidisciplinary discussion, right-sided decortication was planned. His routine investigations were within normal limit. Through thoracotomy decortication and pleurectomy were done with fistula repair under general anaesthesia. The surgery was uneventful and the patient was successfully extubated. There was no air leak following surgery.
extubation. Patient was hemodynamically stable and got shifted from ICU after 4 days in a satisfactory condition.

2. Discussion

Lung decortication is a surgical procedure that removes the restrictive layer of fibrous tissue overlying the lung, chest wall, and diaphragm and allows the lung to expand. The primary indication of decortication is fibrothorax because of chronic empyema thoracis (pyogenic and tubercular), haemothorax and pleural thickening due to inflammatory conditions like rheumatoid arthritis and tumours like malignant mesothelioma.1-5 Contraindications to decortication, as bronchial stenosis is an absolute contraindication to performing a decortication procedure. These patients additionally require resection of the stenosed segment and bronchial anastomosis apart from decortication of the severely diseased lung. Other contraindications to decortication include patients who have hemodynamic instability, coagulation disorders, multiorgan failure, and poor general status are require optimisation before the procedure.

As far as the COVID-19 related pathophysiology is concerned, the unusual combined presence of microvascular damage and interstitial fibrosis may reflect endothelial damage by SARS-CoV-2 predisposing to a chronic state of microvascular damage, low-grade inflammation, and secondary infections leading to empyema thoracic or bronchopleural fistula. The explanation for this pathology is multifactorial. Cyst formation in areas of disease was first noted as a radiological consequence of COVID-19 soon after the first outbreak and has been corroborated by other studies revealing radiological progression from areas of consolidation to bullae.6,5 Previous reported cases have found that cyst formation is not restricted to patients receiving only positive-pressure ventilation, suggesting that barotrauma alone cannot be the sole cause of pneumothorax.6 We report a case series of patients who presented with pleural empyema nearly five months after the initial COVID-19 infection. For the group of symptomatic patients, 80% experience mild symptoms like a fever and cough. Approximately 20% of patient’s symptoms progress to severe and critical diseases like acute respiratory distress syndrome and multi-organ failure, which leads to death.7 Spontaneous pneumothorax was again reported as a complication of a severe acute respiratory syndrome with an incidence of 1.7% in hospitalised patients who required oxygen therapy.8 Another case series reported that surgical treatment, even though a high-risk procedure, for COVID-19 mechanically ventilated patients who developed hydro-pneumothorax and pleural empyema later is a modality where the chest drainage approach was not successful in relieving the symptoms.9 This case series highlights the possibility of spontaneous hydro-pneumothorax and superadded infections that lead to unresolving lung consolidation and empyema thoracis, which is a life-threatening condition that requires urgent considerations.

3. Conclusion

Here, we reported the case series of spontaneous pneumothorax with COVID-19 to include non-intubated patients, which shows that it occurs even in patients with no pre-existing lung disease or who do not require positive-pressure ventilation during COVID treatment. Our study aims to describe the clinical characteristics of patients with these pathologies and consider whether the development of spontaneous pneumothorax is a late sequela after COVID recovery and can complicate the course of disease, so follow up of COVID recover patients is necessary.

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Contributions

Contributor-1:- Concepts, Manuscript preparation, Manuscript editing
Contributor-2:- Manuscript review, Literature search

Ethics declarations

Ethics approval and consent to participate.

Ethical approval is not required for the publication of this case reports.

The patient was informed about the procedure, and a written informed consent was obtained.

Consent for publication

Written permission/consent of the patient for the purpose of publication in an educational medical journal was obtained from the patient.

Declaration

This article not presented.

Declaration of Competing Interests

No competing interest.

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