

Giant lung bulla as a late-onset complication of mild SARS-CoV-2 pneumonia

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Short Report

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Abstract

A 49-year-old caucasian man was admitted to the Emergency Department for shortness of breath and cough. CT imaging showed bilateral a mild COVID-19 related pneumonia treated with O2 therapy and oral corticosteroids. Three weeks after discharge an HRCT find a giant bulla of the inferior lobe. The bulla was resected by VATS and the patient recovered completely.

The development of the giant bulla in short time (less than two months) might be the result of SARS-CoV-2 infection. SARS-CoV-2 related pneumonia and corticosteroid therapy could be responsible for lung remodeling due to diffuse alveolar damage and later interstitial myofibroblastic proliferation.

COVID-19 leads to pulmonary damages, which are still partially unknown and might result in development of bullae. In fit patient surgical treatment can be carried out safely.

Introduction

COVID-19 pandemic spread in the last two years throughout the world with a significant number of deaths.

According to the Centers for Disease Control and Prevention, common symptoms of COVID-19 include fever, cough, shortness of breath, muscle aches and in some cases loss of taste or smell. Gastrointestinal manifestations may include nausea, vomiting, diarrhea and abnormal liver function. Other less common manifestations encompass headaches, dizziness, conjunctivitis, ocular irritation and erythematous rash¹.

In this report, we present the case of a patient who developed a massive lung bulla two months after COVID-19 pneumonia and he was successfully treated with a surgical resection.

Case Report

Written consent was obtained by the patient.

On 8th November 2021, a 49-year-old caucasian man was admitted to the Emergency Department for shortness of breath and cough. He tested positive for SARS-CoV-2 PCR nasal swab, and he was not vaccinated. His past medical history was negative for significant comorbidities, including smoking history. CT imaging showed bilateral diffuse ground-glass areas compatible with a mild COVID-19 related pneumonia. (Fig. 1)

Due to mild symptoms, the patient was discharged home with empiric antibiotic therapy (azithromycin), antithrombotic prophylaxis with low-molecular-weight heparin (LMWH) and anti-inflammatory treatment.

The day after, his family doctor implemented the therapy with oral corticosteroids (prednisone 25 mg per day).

On 12th November the patient returned to the Emergency Department for worsening of dyspnea and cough. Six-minute walking test was positive for desaturation, but the radiological evaluation did not reveal significant changes; the patient was then transferred to the low-intensity COVID-19 unit where he received O₂ therapy and oral corticosteroids (CS), with a notable improvement of respiratory function. On 18th November he was discharged again with prescription of home isolation and corticosteroid.

Three weeks after discharge, a follow-up chest X-ray was performed showing a large pneumothorax; the patient only referred a slight worsening of his dyspnea and he was hospitalized again. A pleural drainage was inserted with no benefit on symptoms and no resolution of pneumothorax. A HRCT showed a large amount of air in the left hemithorax with a differential diagnosis of either a pneumothorax or a giant bulla developing in the fissure between left upper and lower lobes. (Fig. 2)

The patient was therefore transferred to our hospital and on 27th December he underwent a biportal thoracoscopy. During surgery, a giant bulla with a diameter of roughly 10 cm arising from the fissure face of the left lower lobe was discovered. Dense adhesions attached the bulla to the upper lobe and to the chest wall. A diffuse parietal pleural thickening and inflammation was visible, while the remaining lung was macroscopically normal. After gentle dissection, the bulla was resected from the lung parenchyma using an endoscopic stapler. The postoperative course was uneventful; the chest drain was removed on 5th postoperative day and the patient was discharged the following day.

At follow up in outpatients clinic, chest X ray showed a complete re-expansion of the lung; the patient reported a full resolution of symptoms. (Fig. 3)

COMMENT

Late-onset PNX is a common complication of mechanical ventilation due to possible barotrauma on the airway. Thus, pneumothorax and pneumomediastinum have not been uncommon in COVID-19 patients who are treated with invasive ventilation². On the other hand, the development of a bulla is a rare event in COVID-19 patients who have not undergone intubation. In literature, only a few cases have been reported so far. Similarly to our cases, Yasukawa and Murayama reported patients with mild COVID-19 pneumonia, no relevant medical history and no SARS-CoV-2 vaccination. None of the patients underwent mechanical ventilation. In first case³ the patient was treated with medical treatment (remdesivir), convalescent plasma and a chest drain was positioned, while in the second case⁴ the authors do not describe any specific treatment and no surgical procedures were performed. To the best of our knowledge this is one of the first cases describing a bulla resection after COVID-19.

In our patient, it is reasonable to suspect that the development of the bulla is a result of SARS-CoV-2 infection, since no bulla was observed in the first HRCT two months before. Liu et al. linked SARS-CoV-2 infection to lung cystic dystrophy, but the pathophysiology is still unknown⁵. According to Pednekar⁶ SARS-CoV-2 related pneumonia may be responsible for lung remodeling due to diffuse alveolar damage and later interstitial myofibroblastic proliferation; we can speculate that this remodeling of lung parenchyma could be the base for the development of giant bullae.

We also focused our attention on the potential role of corticosteroids in developing bullous dystrophy. Although they have no direct role in damaging lung parenchyma it is well known that corticosteroids cause in a significant reduction of tissue regeneration. Moreover, Rocco et al.⁷ state that prolonged use of corticosteroids for acute alveolar damage reduces elastic properties of lung tissue. Our patient was treated with corticosteroids to counteract the chronic inflammation produced by SARS-CoV-2, but on the other hand it might have delayed the virus clearance⁸. We can therefore hypothesize that corticosteroids might have played a role in increasing SARS-CoV-2 dystrophic action.

Lastly, we can also speculate that vaccination could have prevented the developing of viral pneumonia and possibly the resulting long term complications.

More studies are needed to better understand the connection between COVID-19 pneumonia and long-term pulmonary damages. However, a careful follow-up with chest imaging in these patients is mandatory.

In conclusion, the developing of lung bullae could be a late-onset complication in patients with COVID-19 pneumonia. Surgical approach can be safely proposed based on bulla features and patients' comorbidities.

Although the etiopathology is still unclear, we can hypothesize that SARS-CoV-2 and corticosteroids play a simultaneous impairing role on lung parenchyma.

Declarations

ACKNOWLEDGEMENT

None of the authors has conflict of interest to declare.

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Figures

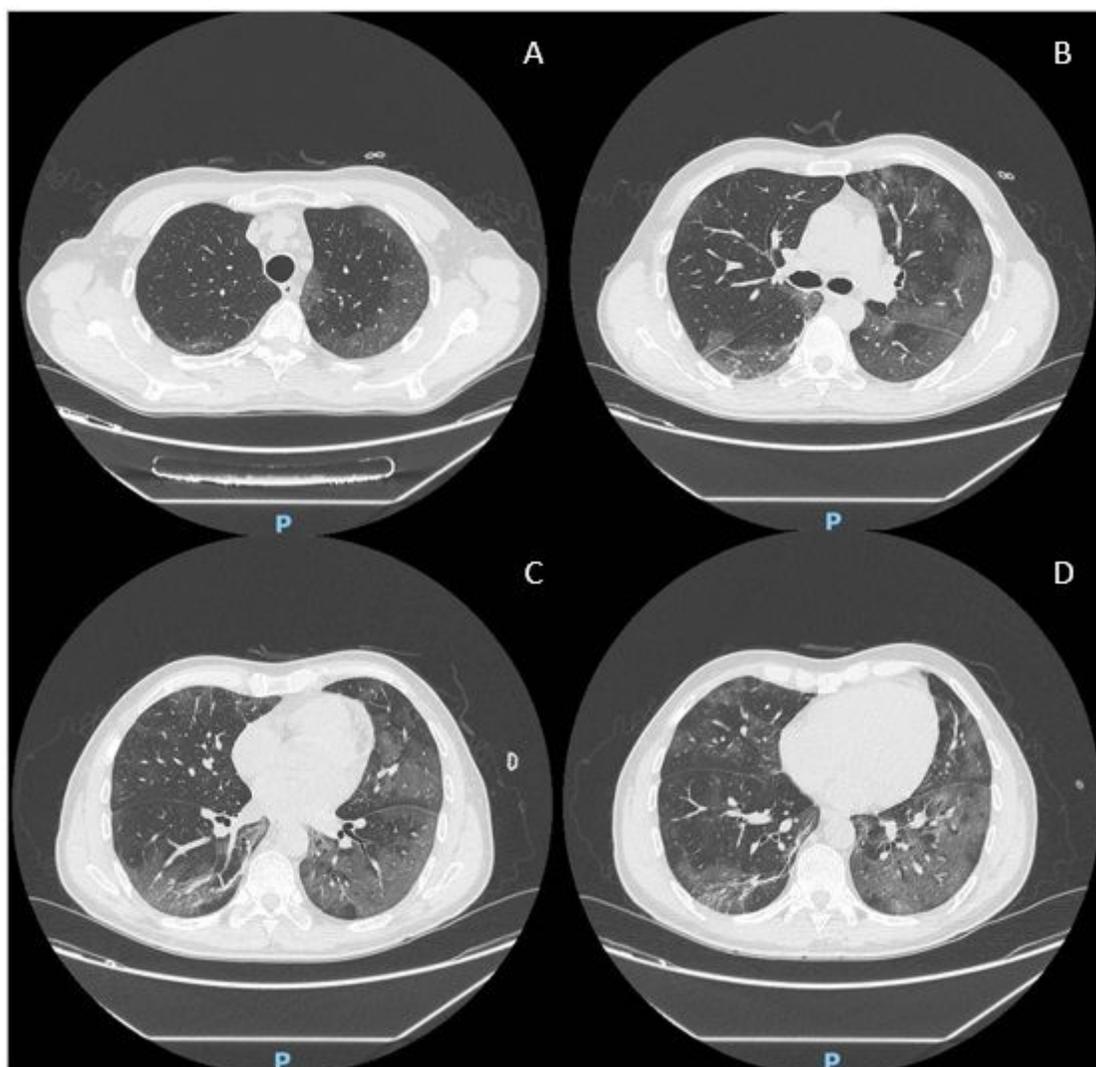


Figure 1

CT scan showing mild COVID-19 pneumonia with no bullae

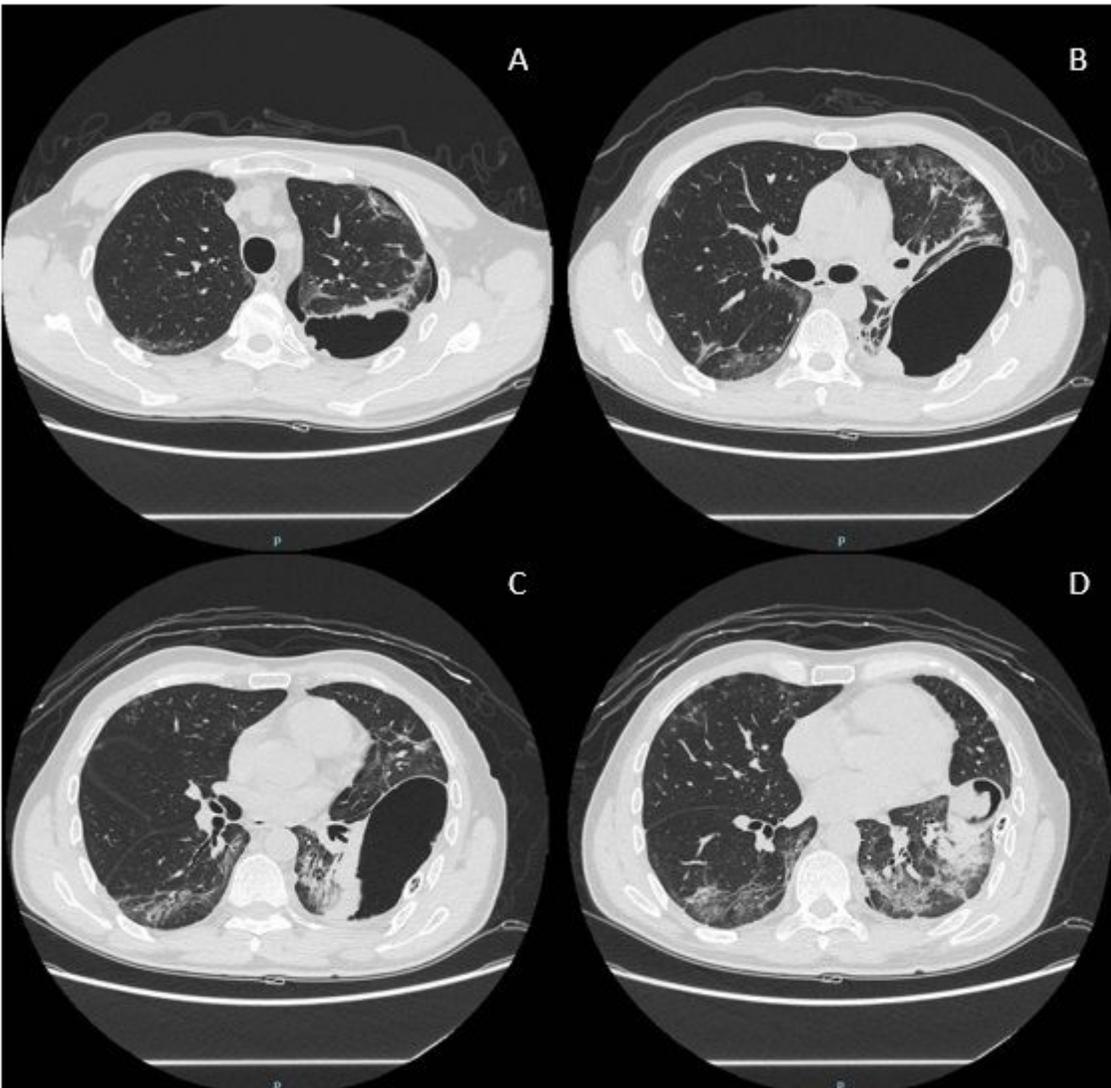


Figure 2

CT scan showing the giant bulla in the fissure between left upper and lower lobes



Figure 3

postoperative chest X-ray