


Bilateral Spontaneous Pneumothorax as Manifestation of COVID-19: Case Report

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ABSTRACT

Introduction: Spontaneous pneumothorax occurs when part of the lung collapses and air accumulates in the pleural space. The cause of spontaneous pneumothorax is unclear, but this condition may increase the risk of death, particularly if it progresses to tension pneumothorax. COVID-19 is primarily a respiratory disease and may present with various pulmonary manifestations, including rare and severe complications. **Case:** A 48-year-old woman presented with dyspnea, fever, cough, nausea, and fatigue. Initial rapid antibody testing for SARS-CoV-2 was negative. Chest radiograph demonstrated an avascular area in the right lateral hemithorax with medial lung collapse, consistent with right spontaneous pneumothorax. Oxygen therapy and chest tube insertion were performed. Follow up chest x-ray showed resolution of the right pneumothorax, however, a new pneumothorax developed on the left side. Nasopharyngeal and oropharyngeal swab testing for SARS-CoV-2 was reported positive a few days later, after the patient had died. **Discussion:** The occurrence of bilateral spontaneous pneumothorax in this patient suggests lung involvement related to COVID-19 infection. Recognition of atypical pulmonary manifestations is essential, particularly when initial screening tests are negative. **Conclusion:** COVID-19 can manifest as spontaneous pneumothorax, including bilateral involvement. Early recognition is important to reduce morbidity and mortality.

Keywords: Case report, COVID-19, spontaneous pneumothorax, tension pneumothorax.

ABSTRAK

Pendahuluan: Pneumotoraks spontan terjadi ketika sebagian paru kolaps dan udara terkumpul di rongga pleura. Penyebab pneumotoraks spontan belum diketahui secara pasti, namun kondisi ini dapat meningkatkan risiko kematian, terutama apabila berkembang menjadi *tension pneumothorax*. COVID-19 merupakan penyakit infeksi saluran pernapasan yang dapat menimbulkan berbagai manifestasi paru, termasuk komplikasi yang jarang dan berat. **Kasus:** Seorang wanita berusia 48 tahun datang dengan keluhan sesak napas, demam, batuk, mual, dan kelelahan. Pemeriksaan awal menggunakan uji cepat antibodi SARS-CoV-2 menunjukkan hasil negatif. Pemeriksaan rontgen dada memperlihatkan area avaskular pada hemitoraks kanan lateral dengan paru kolaps medial, sehingga ditegakkan diagnosis pneumotoraks spontan kanan. Pasien mendapatkan terapi oksigen dan dilakukan pemasangan *chest tube*. Pemeriksaan rontgen ulang menunjukkan pneumotoraks kanan telah teratasi, namun ditemukan pneumotoraks baru pada sisi kiri. Beberapa hari setelah pasien meninggal dunia, hasil pemeriksaan usap nasofaring dan orofaring SARS COV-2 dilaporkan positif. **Pembahasan:** Terjadinya pneumotoraks spontan bilateral pada pasien ini menunjukkan adanya keterlibatan paru yang berkaitan dengan infeksi COVID-19. Manifestasi paru yang tidak lazim perlu diwaspadai, terutama pada kondisi dengan hasil skrining awal yang negatif. **Simpulan:** COVID-19 dapat bermanifestasi sebagai pneumotoraks spontan, termasuk pneumotoraks bilateral. Pengenalan dini penting untuk menurunkan morbiditas dan mortalitas. **Edgar David Sigarlaki, Nur Chandra Bunawan, Nasya Amalia, Annisa Dian Harlivasari, Cathleen Kenya, Yoni Vanto, Hardijatmo Muljo Nugroho. Pneumotoraks Spontan Bilateral pada Kasus COVID-19: Laporan Kasus.**

Kata Kunci: Laporan kasus, COVID-19, pneumotoraks spontan, *tension pneumothorax*.

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INTRODUCTION

COVID-19 is a pathogenic viral infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which was first reported from Wuhan in December 2019 and become global pandemic disease declared

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by World Health Organization on 11th March 2020.[1,2] Several clinical feature can occur in COVID-19 patients, either as pulmonary or extrapulmonary manifestation.[3] Pulmonary presentation in COVID-19 may range from upper respiratory tract infection (URTI), cough, sore throat, pneumonia, to acute respiratory distress syndrome (ARDS).[4] Rare and lethal manifestations can occur, one of which is spontaneous pneumothorax (SP).[5,6] Recognizing spontaneous pneumothorax as a presentation of COVID-19 is difficult especially during the early pandemic when the reverse transcriptase-polymerase chain reaction (RT-PCR) swab test was still limited. This report presented a case of COVID-19 with bilateral SP during the early pandemic.

CASE

A 48-year-old woman was brought to the emergency department in early 2019 due to shortness of breath one hour prior to admission. Patient already had cough, fever, nausea, and general weakness for seven days. Previous medical history were unremarkable except for hypertension. There is no history of traveling abroad and close contact with COVID-19 patients.

The patient appears breathless, normotensive with blood pressure of 134/80 mmHg, temperature of 37°C, pulse rate of 108 x/minute, respiration rate of 28 x/minute, and oxygen saturation (SpO2) of 91% on room air. Auscultation of right hemithorax revealed decreased breath sound and percussion on right hemithorax revealed hyperresonance compared to the left hemithorax. Other physical examinations were normal. Blood test result on admission was shown in **Table** below. On radiological examination, there was an avascular area in the right hemithorax with medial lung collapse **(Figure 1).**

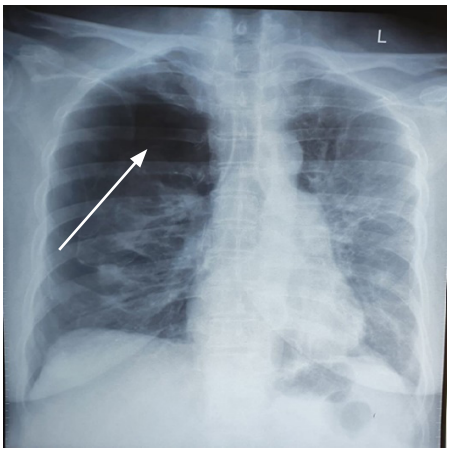

Photo documentation by Asrina.

Figure 1. Chest x-ray at admission**;** avascular area in the right hemithorax with medial lung collapse **(arrow).**

The patient was diagnosed with suspect Covid-19 with right pneumothorax. The treatment was Ringer Lactate IV drip, oxygen 3 L/minute with nasal cannule, levofloxacin 750 mg 1 x/day IV, paracetamol 500 mg 3 x/day PO. Nasopharyngeal and oropharyngeal swab was performed on admission.

Patient's condition suddenly deteriorated in the isolation room. The oxygen saturation was decreased to 64% with 15 L/minute non-rebreathing mask. Water sealed drainage (WSD) was performed on the right hemithorax, afterwards the breathing improved, oxygen saturation was increased to 94% with 10 L/minute of simple mask. Ceftriaxone 2 g 1 x/day IV, ketorolac 30 mg 1 x/day IV, ranitidine 50 mg 1 x/day IV, acetylcysteine 200 mg 3 x/day PO and ipratropium bromide 0.5 mg and salbutamol sulfate 2.5 mg nebulization 3 x/day were also given.

Follow-up chest x-ray after water sealed drainage (WSD) placement showed resolution of the right pneumothorax, however, infiltrates were observed in the right lung along with a newly developed left pneumothorax **(Figure**

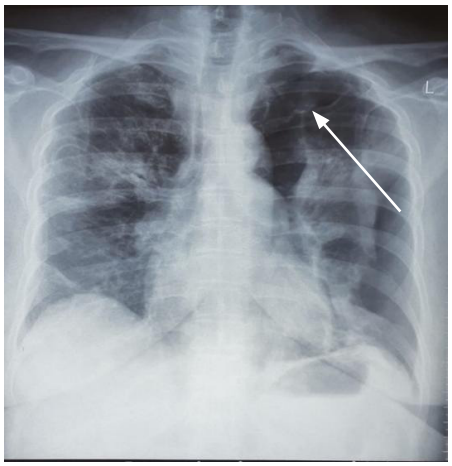

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Figure 2. Chest x-ray after WSD**;** infiltrates in right lung with a new left pneumothorax (**arrow**).

Table. Laboratory findings on admission.

Parameter (Normal Range)	Results
Hemoglobin (12–16 g/dL)	13.3
Haematocrit (37%–47%)	39.4
White Cells (5–10 x10^3 g/µL)	10.5
Platelets (150-400 x10^3 g/dL)	373
Red Blood Cells (3.7–4.7 x10^6 g/dL)	4.66
Neutrophil Segment (50%–70%)	76
Lymphocyte (25%–40%)	15
Random blood glucose (80–140 mg/dL)	122
Ureum (10–50 mg/dL)	53
Creatine (0.5–0.9 mg/dL)	1.07
AST (< 42 mg/dL)	30
ALT (< 37 mg/dL)	17
ESR (< 15 mm/hour)	75
Rapid COVID-19 Antibody (Negative)	Negative
NRL (< 3.13)	5.07
ALC (< 1,500)	1.575

Abbreviations: AST: *Aspartate aminotransferase*; ALT: Alanine Aminotransferase; ESR: Erythrocyte sedimentation rate; NLR: Neutrophil-to-lymphocyte ratio; ALC: Absolute lymphocyte count.


2). Placement of a second chest tube in the left hemithorax was planned. Unfortunately, patient's condition worsened, the respiratory rate was increased to 36 breaths/minute with decreased of oxygen saturation to 81% with 15 L/minute of NRM. The patient was apneic and deceased before the second chest tube placement. A few days later, the RT-PCR result was positive for SARS- CoV-2.

DISCUSSION

Several cases of COVID-19 pneumonia with pneumothorax have been reported,[5] this case presents with probable COVID-19 pneumonia and right pneumothorax with clinical manifestation of shortness of breath, desaturation, decreased breath sound and hyperresonance in the right lung supported by chest x-ray results. Unfortunately, a new pneumothorax in the left lung was developed. The pneumothorax in this case might be developed via lung injury caused by COVID-19 pneumonia.[5] This case was in the early pandemic, when diagnostic tools for COVID-19 was still limited. Clinical symptoms, together with neutrophil-to-lymphocyte ratio (NLR), absolute lymphocyte count (ALC), and chest x-ray findings, were used as COVID-19 screening tools for all patients. Patients with elevated NLR, decreased ALC, or radiographic evidence of pneumonia were classified as suspected COVID-19 cases and subsequently underwent RT-PCR swab testing.[7] This patient had a high NLR result of 5.07 but a normal ALC of 1.575 and a chest x-ray result of right pneumothorax. RT-PCR swab test gave positive results a few days after the patient succumbed.

A systematic review conducted by Agrafiotis, *et al*., includes 36 studies. This study discusses spontaneous pneumothorax in otherwise healthy patients with no underlying lung disease and without invasive mechanical ventilation before or after diagnosis of pneumothorax. The majority of the patients in this study (59%) had never smoked. The mean time of the onset of symptoms to the diagnosis of pneumothorax was 17.1 days; the mean time for the diagnosis of the second pneumothorax in case of bilateral sequential pneumothorax was 29.6 days. Majority of patients (66%) were treated with chest tube thoracostomy, most resulted in a complete resolution.[8]

Quincho Lopez, *et al*., assessed 9 COVID-19 cases with pneumothorax complication. The mean age was 52 years old. Each patient has different comorbidities, such as smoker, hypertension, ischemic heart disease, childhood asthma, HIV, chronic pulmonary disease, and coronary artery bypass. Majority of patients had early symptoms of fever, cough and respiratory distress. The onset of symptoms until pneumothorax diagnosis was varied from 5 to 34 days. Four cases resolved with invasive ventilation such as intubation and orotracheal intubation. Another 4 cases of resolved cases treated with chest tube. One case treated with high-flow nasal cannule.[9]

Cases of COVID-19 pneumonia with pneumothorax are rare, with prevalence of 1%.[6] The underlying mechanism of pneumothorax in this case was unclear; COVID-19 can develop into severe pneumonia leading to ARDS. COVID-19 is characterized radiographically by ground glass opacity, evolving into consolidative changes and in late stages of the disease, fibrotic changes.[10] Severe lung injury and diffuse alveolar damage were thought to contribute to the mechanism of spontaneous pneumothorax in complicated severe acute respiratory syndrome (SARS).[11]

The current theories regarding pathogenesis of pneumothorax in unventilated COVID-19 patients is that alveolar injury caused by COVID-19 infection increases risks of alveolar rupture.[12] Pro-inflammatory cytokines released as a host immune response to SARS-CoV-2 caused inflammation in the pulmonary parenchyma and subsequent parenchymal damage thus causing air leaks. Air leak can also be resulted from rupture of marginal alveoli, thus the air leaks to the pulmonary interstitium and mediastinum, which progressed to pneumothorax.[13–15]

Up to two-thirds COVID-19 patients who need critical care require mechanical ventilation.[16] This procedure appears to be a major risk factor for pneumothorax[17] as it can lead to over distention of the alveoli, which can damage the existing ones, resulting in a pneumothorax. There is a high risk of developing a tension pneumothorax, a condition that may need urgent tube thoracostomy.

With the limited information available and the novelty of this virus at that time, it is critical to further educate physicians to identify populations at higher risk, such as risk for pneumothorax. This will enable a faster and more efficient care according to established practice guidelines to minimize morbidity and mortality.

CONCLUSION

COVID-19 can manifest as spontaneous pneumothorax. Our report here highlights pneumothorax as a deadly complication and the importance of recognizing high-risk patients and managing accordingly. Early diagnosis and treatment is very important to reduce morbidity and mortality.

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