

COVID-19 Patient Associated with Rare Pneumatocele Finding: CT Features and Case Report

Edwin Adhi Darmawan Batubara^{1*}, Christy Amanda¹, Paralam Sinambela², Ricky Triweda³ and Jerry Indra Setiawan⁴

¹General Practitioner, Navy Hospital Mintohardjo, Jakarta, Indonesia.

²Department of Radiology, Navy Hospital Mintohardjo, Jakarta, Indonesia.

³Department of Cardio-Thoracic Surgeon, Navy Hospital Mintohardjo, Jakarta, Indonesia.

⁴Department of Pulmonology, Navy Hospital Mintohardjo, Jakarta, Indonesia.

Authors' contributions

This work was carried out in collaboration among all authors. Author EADB designed the study, wrote the protocol, and wrote the first draft of the manuscript. Author CA managed the analyses of the study. Authors PS, RT and JIS managed the literature searches. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Background and Aim: Coronavirus disease-2019 (COVID-19) has become pandemic across the world, especially in Indonesia. One of the rare complications reported due to COVID-19 is pulmonary pneumatocele. We aim to describe the COVID-19 patient case report with pneumatocele in CT-Scan findings.

Case Report: A 41-year-old man referred to our hospital with fever, dyspnea and a productive cough for seven days before admission. His chest X-ray and CT-Scan showed possible bilateral

*Corresponding author: E-mail: edwinadhii@yahoo.com;

bronchopneumonia due to COVID-19 and confirmed with Polymerase Chain Reaction (PCR) test. In the next two weeks, the second CT-Scan showed the development of pneumothorax dextra and pneumatocele dextra with a diameter of 7,8 cm. On the third follow up, CT-Scan revealed increasing diameter into 9,5 cm and air-fluid levels in pneumatocele. He was diagnosed with infected pneumatocele, and we gave antibiotics. The patient recovered after the twenty-third-day post-admission, then discharged from hospital after twice a negative of nasopharynx swab result and resolution of symptoms.

Conclusion: Pneumatocele is one of the rare abnormality findings in COVID-19 patients. If the clinician suspect pneumatocele finding, the progressivity of disease should be monitored due to the possibility of complicated pneumatocele.

Keywords: COVID-19; pneumatocele; CT-scan features; case report.

1. INTRODUCTION

Coronavirus Disease-2019 (COVID-19) has become pandemic and spreading across the world. In Indonesia, approximately 140.000 already reported positive cases (August 2020), and the numbers are still growing [1]. There are many respiratory tract manifestations in COVID-19 infection with pneumonia as the most common [2]. Pneumatocele can occur due to acute pneumonia complications. The incidence of pneumatocele is infrequent in adults, particularly within COVID-19 infection, which still unestablished [3]. Our hospital registry data revealed only 1 from 276 COVID-19 patients showed pneumatocele in radiology findings. Here we described a rare case of COVID-19 disease with pulmonary pneumatocele.

2. CASE PRESENTATION

A 41-year-old man was referred to our hospital with fever, dyspnea and a productive cough for seven days before admission. He attended a local seminar ten days before a participant was reported as positive COVID-19. Other complaints and underlying disease were denied. There was no previous history of lung disease. On examination, the patient was in full consciousness and having malaise and fatigue. His temperature was 39.2oC, and O2 saturation was 98% at room air. The chest was clear with normal vesicular lung sound. Laboratory findings included leukopenia (3.600/ μ l), lymphocytopenia (19%), Neutrophil-lymphocyte ratio (3.8), and C-reactive protein (CRP) of 9 mg/L (Table 1). Initial chest x-ray feature were suggestive for bilateral bronchopneumonia. Thoracic CT scan was done according to the radiologist recommendation. It demonstrated multifocal peripheral ground-glass opacity at both upper lobes, predominant

multifocal ground-glass opacity and consolidation at the peripheral area of both lower lobes (Fig. 1).

Table 1. First Laboratory results of the patient

Lab examination	Result
Haemoglobin	16.4 g/dl
Hematocrit	46 vol%
White blood count	3600 / μ l
Red blood count	5.52 million / μ l
Platelet	141.000 / μ l
WBC differential:	
Basophils	0 %
Eosinophils	0 %
Neutrophils	72 %
Lymphocyte	19 %
Monocyte	9 %
CRP	9 mg/L

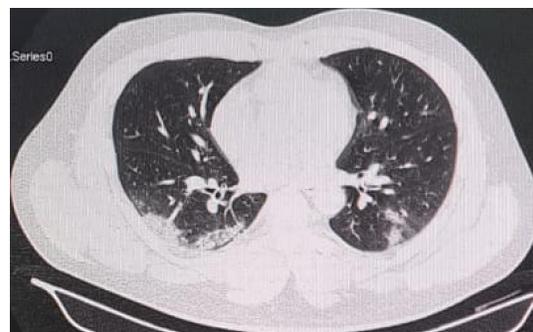


Fig. 1. Axial slice CT-scan without contrast at admission showed bilateral multifocal ground-glass opacity

The result of the nasopharyngeal swab was confirmed with Polymerase Chain Reaction (PCR) as COVID-19 positive, and the patient was transferred to a negative pressure isolation ward.

The patient was given azithromycin, oseltamivir, chloroquine, paracetamol, codeine, and Multivitamin. On the fourteenth day of hospitalization, there was an increased cough intensity without sputum production, followed by chest pain. Respiratory rate was 22/min, O₂ saturation was 97% at room air, and other vital signs were normal. The chest was symmetrically moving, with a decreased lung sound on the right hemithorax, hyper resonance at right-upper-posterior chest. Laboratory results showed leukocyte (7400/ μ l) and lymphocytopenia (17%) (Table 2). Serial Thoracic CT scan demonstrated moderate bilateral bronchopneumonia with reverse halo sign at right lower lobe and improvement of ground-glass opacity at both lower lobes, Right pneumatocele in the posterior side of the superior lobes with a diameter of 7,8 cm, and loculated pneumothorax on the right upper posterior chest (Fig. 2). The patient was clinically in stable condition, Water-sealed-drainage installation was postponed. Serial Thoracic CT scan was planned to evaluate the pneumatocele and pneumothorax.

gave triple antibiotics with cefixime, levofloxacin, and metronidazole. On the twenty-third day after admission, the patient recovered then discharged from hospital after having negative of nasopharynx swab results for two consecutive examinations and resolution of symptoms.



Fig. 2. Axial Slice computed tomography scan revealed pneumatocele and pneumothorax dextra

Table 2. Second laboratory results of the patient

Lab examination	Result
Haemoglobin	15.8 g/dl
Hematocrit	46 vol%
White blood count	7400 / μ l
Red blood count	5.21 million / μ l
Platelet	183.000 / μ l
WBC differential	
Basophils	0 %
Eosinophils	1 %
Neutrophils	74 %
Lymphocyte	17 %
Monocyte	8%



Fig. 3. Chest x-ray evaluation showed bronchopneumonia bilateral and suggestive minimally right pleural effusion

On the following day, foul-smelling breath and sputum streaked with blood arose—vital sign within a standard limit and improvement in chest physical examination. We performed chest x-ray evaluation which showed bilateral bronchopneumonia and suggestive right pleural effusion (Fig. 3). Our radiologist suggested to conduct a third thoracic CT scan study which revealed dominant parenchyma stripe-band — absorption resolution stage, no signs of pneumothorax on the right hemithorax compared to the previous result, pneumatocele on the posterior of upper right lobe with the increased diameter of 9.5 cm and the air-fluid level (Fig. 4). We then diagnosed the patient with infected pneumatocele and performed blood culture. We

3. DISCUSSION

A Pneumatocele is a condition characterized by thin-walled airspace filled with gas in the lung. Pulmonary pneumatocele mostly develops in young children rather than adults. In adults, pneumatocele may develop as sequelae of underlying lung pathology such as acute pneumonia due to bacterial or viral, blunt trauma, mechanical ventilator, and hydrocarbon ingestion [3]. A study from Wu et al., only two from 130 patients, showed pneumatocele findings in CT scan from COVID-19 patients [4]. The development of pneumatocele is due to

obstruction caused by inflammation or injury of the bronchus, leading to a ball valve effect mechanism for air entry and making the distal dilatation of bronchial and alveoli. The air allowed to enter the space and trapped inside. Other theories explained pneumatocele formed by drainage of necrotic lung parenchyma following with enlargement of pneumatocele due to secondary ball-valve effect [3]. In COVID-19 patients, resorption of the consolidation phase may break the alveolar walls and contribute to pneumatocele [2].



Fig. 4. Axial slice computed tomography showed spontaneous resolution of pneumothorax and increased air-fluid level inside pneumatocele

On radiographs, a chest x-ray provides low sensitivity of 24% to diagnose pneumatocele. CT scan examination was preferred because visualization size of small lesions, describe the location, and exclude the differential diagnosis. Pneumatocele can be single, but mostly multiple appeared as a round thin-walled cavitory lesion with or without air-fluid levels [5,6]. Although CT for pneumatocele was not routinely indicated, a non-contrast Chest CT was done for our patient as he had previous uncleared thorax radiology for the COVID-19 examination. In our case, this pneumatocele finding was incidental so we don't do further examination.

Complications, when occur, include tension pneumatocele caused by rapid enlargement of the pneumatocele, pneumothorax, bronchopleural fistula formation, and secondary infection of a pneumatocele indicated by an air-fluid level [5,6]. Our patient developed pneumothorax probably due to ruptured pneumatocele located in subpleural posterior-peripheral segment inferior lobe. We didn't

perform water-sailed-drainage due to clinically stable patient and the size of the pneumothorax. The third CT-scan examination showed spontaneous resolution of pneumothorax also right pneumatocele with increasing diameter and air-fluid level. Therefore, we suspected secondary infection occurs on our patient.

Almost 85% of pneumatocele are asymptomatic and disappear spontaneously within a few weeks without intervention or following treatment of the aetiology causes. [6] First-line management of pneumatocele should be treated with antibiotics. Invasive therapies only considered in complicated pneumatocele patients such as guided percutaneous decompression, transcatheter aspiration, and drainage. Percutaneous drainage is not completely without risk, as this procedure may lead to bronchopleural fistulae. Besides, if percutaneous decompression and drainage therapy failed, surgical procedures like lobectomy or pneumectomy can be performed [3].

4. CONCLUSION

Pneumatocele is one of the rare imaging abnormality finding in COVID-19 patients. As a consequence of the low incidence finding, it is unclear why COVID-19 patients may develop pneumatocele. Follow up of the developing disease should be conducted due to the possibility of pneumatocele complications. Further study needs to be performed to understand the pathophysiology and progression of pneumatocele in COVID-19 patients.

CONSENT

Patient written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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