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Letter to Editor

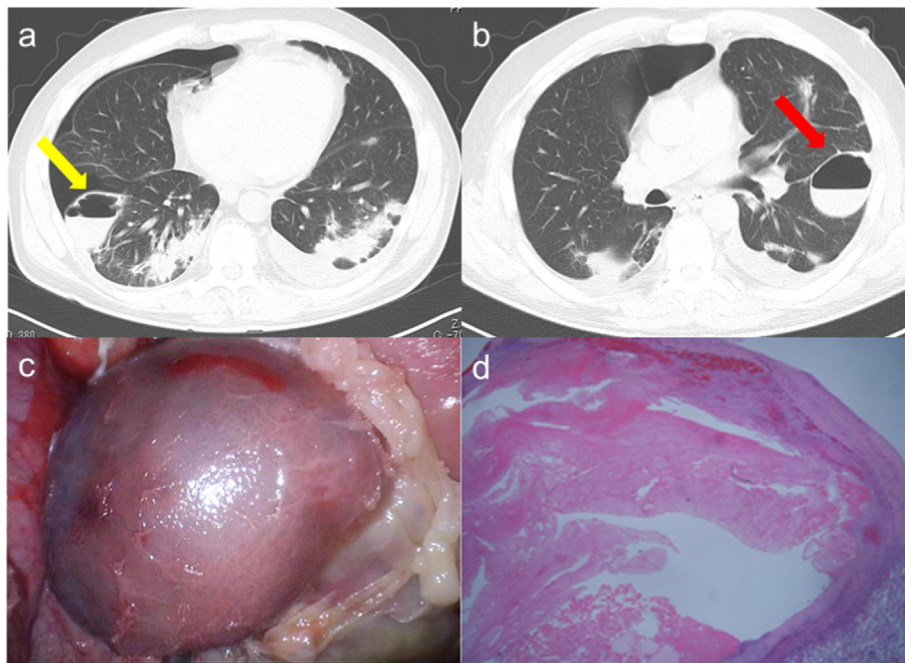
## Pyopneumothorax induced by rupture of pneumatocele after COVID-19: A case report

To the editor,

COVID-19 pneumonia can be accompanied by complications such as pneumothorax, pneumomediastinum, pleural effusion, pneumatocele, and empyema. Although these COVID-19 complications are relatively uncommon, they increase mortality and morbidity.<sup>1</sup> Pneumatocèles are round-shaped cystic changes of the lung parenchyma. The cause of a pneumatocele may be infectious or non-infectious. Infected pneumatoèles may be caused by bacterial or viral infection. In contrast, non-infected pneumatoèles are caused by trauma, surgery, mechanical ventilation including continuous positive airway pressure and long-term administration of corticosteroids.<sup>2</sup> Furthermore, intense inflammatory reactions and corticosteroid therapy during COVID-19 can be additional causes.<sup>3</sup>

Here we would like to share a rare case of a newly developed pneumatocele after COVID-19 infection that ruptured, producing

pyopneumothorax. A 55-year-old man was treated as moderate COVID-19 pneumonia with remdesivir and corticosteroid. A month after the onset of COVID-19, moderate pneumothorax on the right, bilateral pulmonary cysts with fluid collection located in right segment 8 and left segment 9 respectively, and pleural effusion were detected on chest computed tomography (Fig. 1a and b). He was diagnosed with bilateral pleurisy and right pneumothorax. The chest drain tube was placed in the right thoracic cavity, and antibiotic therapy was administered with hospitalization. However, during hospitalization, rupture of the pneumatocele in the right lung caused pyopneumothorax; therefore, he underwent thoracoscopic surgery on the right lung. Additionally, since he was an airplane pilot, thoracoscopic resection of the pneumatocele in the left lung was performed. Intraoperatively, there was loose adhesion throughout the entire thoracic cavity, and the pneumatocele was detected in segment 8 (Fig. 1c). Pathological findings showed inflammation of the lung parenchyma and pleura with lymphocyte



**Fig. 1.** Representative image from the computed tomography scan. Pulmonary cyst located in right segment 8 (yellow arrow), and moderate pneumothorax in right lung. (a) Pulmonary cyst located in left segment 9 (red arrow). (b) Intraoperative photograph showing the pneumatocele in the segment 8 of the right lower lobe. (c) Pathological image showing subpleural pulmonary cysts with endogenous hemorrhage. (d).

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infiltration and subpleural pulmonary cysts with endogenous hemorrhage (Fig. 1d). Phlegm culture detected *staphylococcus aureus* and *streptococci*, and bacterial cultures of pleural effusion and blood were negative. His postoperative course was uneventful and was discharged on the 8th day after the second surgery.

Several cases with pneumatoceles after COVID-19 were reported thus far. In this case, in addition to COVID-19 infection and long-term corticosteroid use, the phlegm cultures were positive for *Streptococci* or *Staphylococcus aureus*, which could contribute to the formation of pneumatocele. Approximately 85% of pneumatoceles resolve spontaneously.<sup>4</sup> However, some patients with pneumatoceles complicated by infection, pneumothorax, or pneumomediastinum require additional therapy. Although antibiotic therapy or percutaneous drainage is often performed initially, some patients who fail to respond to conservative treatment require surgical resection. Lobectomy or pneumectomy are mainly performed to completely remove the infected area and prevent postoperative complications due to the presence of dense adhesions or uncomplicated fissures caused by inflammation.<sup>5</sup> However, since the pneumatocele in this case was located in the lateral segment, we opted to perform partial resection to preserve pulmonary function.

Herein, this case suggests that pneumatoceles with associated pneumothorax and empyema can even occur in patients after COVID-19 infection without a history of positive pressure ventilation, and thoracoscopic resection can be effectively performed.

#### Declaration of competing interest

None declared.

#### Acknowledgements

Not applicable.

#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.asjsur.2022.07.142>.

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Hanako Koda

Department of Surgery, National Center for Global Health and Medicine, Tokyo, Japan

Department of General Thoracic Surgery, National Center for Global Health and Medicine, Tokyo, Japan

Ryusuke Sumiya\*

Department of General Thoracic Surgery, National Center for Global Health and Medicine, Tokyo, Japan

Hideki Miyazaki

Pathology Division of Clinical Laboratory, National Center for Global Health and Medicine, Tokyo, Japan

Satoshi Nagasaka

Department of General Thoracic Surgery, National Center for Global Health and Medicine, Tokyo, Japan

\* Corresponding author. Department of General Thoracic Surgery, National Center for Global Health and Medicine, 1-21-1 Toyama, Shinjuku-ku, Tokyo, 162-8655, Japan.  
E-mail address: [rsumiya@hosp.ncgm.go.jp](mailto:rsumiya@hosp.ncgm.go.jp) (R. Sumiya).

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