

# Necrotizing pneumonia due to *Pseudomonas aeruginosa* secondary to severe COVID-19 pneumonia

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## Abstract

Necrotizing pneumonia (NP) is a severe form of lung disease with a high mortality rate. Although NP generally occurs as a complication in community-acquired pneumonia, our case illustrates that NP can occur as a secondary infection even if the clinical course of COVID-19 pneumonia is favorable, particularly in intubated patients.

## Case Images

### Necrotizing pneumonia due to *Pseudomonas aeruginosa* secondary to severe COVID-19 pneumonia

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A 60-year-old man was admitted to our hospital with a 7-hour history of dyspnea. On admission, his vital signs were as follows: blood pressure, 90/56 mmHg; heart rate, 112 beats/min; body temperature, 40.5; respiratory rate, 32 breaths/min; and oxygen saturation, 88% on 15 L/min oxygen via a reservoir mask. He was diagnosed with severe COVID-19 pneumonia, confirmed by polymerase chain reaction testing, intubated and admitted to the intensive care unit the diagnosis of severe COVID-19 pneumonia. Computed tomography (CT) of the chest showed bilateral diffuse ground-glass opacities primarily in the upper lobes and consolidation in the lower lobes (Figure 1a-c), but no evidence of pulmonary embolism on contrast-enhanced CT. The patient was treated with remdesivir (200 mg loading dose on day 1, followed by 100 mg daily for up to 9 additional days), dexamethasone (6.6 mg/day), and baricitinib (4 mg/day) for 10 days, according to the current recommendations for COVID-19 management. He gradually recovered and was afebrile with a stable respiratory condition after completing 10 days of treatment. However, on hospital day 12, he developed a fever (39.8) and recurrent respiratory distress. Chest CT revealed new multifocal consolidations with thick-walled cavitation in both lungs (Figure 1d-f) and he was diagnosed with necrotizing pneumonia (NP). We

immediately started tazobactam/piperacillin (18 g/day), but the patient died the next day. Sputum and two sets of blood cultures obtained on hospital day 12 confirmed *Pseudomonas aeruginosa*. However, the tip of the central venous catheter culture revealed no organism and transthoracic echocardiography showed no obvious vegetation of the heart valves.

Necrotizing pneumonia is a severe form of lung disease including necrosis of lung parenchyma with the formation of abscesses and cavitation and has a high mortality rate.<sup>1</sup> NP occurs as a complication in 0.8% of cases of community-acquired pneumonia.<sup>2</sup> The most common pathogens are *Staphylococcus aureus* and *Streptococcus pneumoniae*.<sup>3</sup> In patients with COVID-19 pneumonia on invasive mechanical ventilation, the incidence of NP ranges from less than 0.5%<sup>4</sup> to 4.5%, and *Klebsiella pneumoniae* and *P. aeruginosa* are the most common pathogens.<sup>5</sup> A retrospective study reported NP was diagnosed at a median of 27 days after COVID-19 symptom onset.<sup>5</sup>

This case illustrates that NP can occur as a secondary infection even if the clinical course of COVID-19 pneumonia is favorable, particularly in patients on invasive mechanical ventilation.

### Author contribution

J.H. contributed to writing and editing of the manuscript. N.M. contributed to conceptualization. N.A. and H.M. contributed to supervision and validation.

### Consent for publication

Written informed consent was obtained from the patient's family for the publication of this case report and the accompanying images.

### Conflict of interest

All the authors have declared no competing interests.

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### Figure legend

**Figure 1.** Course of the patient's COVID-19 pneumonia and necrotizing pneumonia due to *Pseudomonas aeruginosa*. (a-c) Chest computed tomography findings on admission showing bilateral ground-glass opacities in the upper lobe, and bilateral consolidation in the lower lobe of both lungs. (d-f) Chest computed tomography findings on hospital day 12 showing multiple thick-walled cavities with patchy shadows and ground-glass opacities detected as new findings, with near-complete resolution of the bilateral ground-glass opacities and consolidation detected on admission.

