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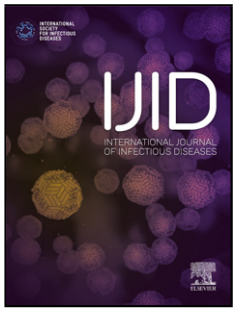

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PII: S1201-9712(20)30741-4

DOI: https://doi.org/10.1016/j.ijid.2020.09.026

Reference: IJID 4609

To appear in: *International Journal of Infectious Diseases*

Received Date: 10 August 2020

Revised Date: 9 September 2020

Accepted Date: 11 September 2020

Please cite this article as: { doi: https://doi.org/

Destructive pulmonary fibrosis after severe COVID-19 pneumonia

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Keywords: COVID – 19 pneumonia. Pulmonary fibrosis. Pulmonary cavity

Case presentation

A 65-year-old man was admitted to the intensive care unit (ICU) of Tenon hospital, an University-teaching hospital in Paris, France, for a severe confirmed COVID-19 pneumonia. He had a history of diabetes. In the preceding week, the patient developed fever (39°C), cough and shortness of breath. A chest computed tomography (CT) scan showed bilateral ground glass opacities with alveolar consolidation (Figure 1A) predominant in the lung periphery as usually reported in COVID-19 pneumonia (Chung et al. 2020; Jajodia et al. 2020). Advanced life support was administered including lung-protective ventilation, prone positioning and vasoconstrictors. Empirical antimicrobial therapy was initiated, in association with hydrocortisone. Infusion of Tocilizumab was administered (Zhang et al. 2020). After initial improvement, the patient's condition worsened. A second CT scan was performed on day 20, showing the extent of the right upper lobe lesions with crazy paving pattern (Figure 1B). Multiple organ failure persisted. Two episodes of ventilator-associated pneumonia (VAP)

were treated on day 16 (*Citrobacter koserii*) and day 40 (*Achromobacter xyloxidans*). Pulmonary fibrosis with bronchiectasis and cavitation developed in the right upper lobe (Figure 1C). A bronchoalveolar lavage revealed macrophagic alveolitis. Fifty-four days after admission, the patient died of persisting multiple organ failure.

Acute cavitary lung lesions are usually related to mycobacterial, parasitic, fungal or bacterial infection, particularly *Saphylococcus aureus, Pseudomonas aeruginosa* and other Gram negative bacilli. In our case despite VAP due to *Citrobacter koserii* and *Achromobacter xyloxidans*, this hypothesis is unlikely because neither radiological changes nor signs of necrotizing pneumonia were present on successive chest x-rays. Other cause of lung cavitation such as autoimmune disorder or genetic mutations were not investigated but the speed of the development of cavitary lesion in a few days was considered atypical. In the last hypothesis, although interleukin 6 (IL-6) inhibitor-induced interstitial lung disease has already been described, cavitation related to tocilizumab has not been reported, thus it should be reported as a related side adverse event.

Severe COVID-19 pneumonia may progress to pulmonary fibrosis (George et al. 2020) related to diffuse alveolar damage but the association with lung cavitation is uncommon and may significantly impair outcome (Chen et al. 2020).

Authors' contributions

All authors had access to the data and a role in writing the manuscript.

Funding

No specifc funding was available for generation of this manuscript.

Compliance with ethical standards

Consent was obtained from the relative.

Disclosure of interest

The authors declare that they have no competing interest.

Acknowledgements

We would like to thank Pr. François Cornelis for the selection and formatting CT images.

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Figure 1. Follow-up chest computed tomography scan of 65-year-old man with confirmed COVID-19 pneumonia.
(A) Coronal chest computed tomography scan showing evolution of the right upper lobe with initial normal pulmonary parenchyma on admission (day 1, arrow). (B) Ground-glass opacity at day 20 (arrow). (C) Fibrosis formation with traction bronchiectasis and cavitation at day 40 (arrow).