COVID-19 pneumonitis and cystic lung disease, pneumothorax and pneumomediastinum

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CASE PRESENTATION

A 57-year-old man with no medical history and <5 pack-year smoking history presented with dyspnoea. Presentation was 4 days (day 13 from first presentation) post a 9-day admission with COVID-19 pneumonitis (SARS-CoV-2 PCR positive day 0) treated with nasal cannula oxygen and 9 days of dexamethasone. Repeat CXR (day 13) was unchanged and there was no biochemical evidence of bacterial infection. A CT pulmonary angiogram (day 13) showed extensive bilateral predominantly peripheral subpleural cystic areas of consolidation, with admixed ground glass changes consistent with COVID-19 pneumonitis (figure 1A). He remained stable and was discharged.

He re-presented on day 15 with dyspnoea, oxygen saturations of 83% and left-sided pleuritic chest pain. Chest X-ray confirmed left-sided tension pneumothorax, chest drain was inserted, and he improved over 48 hours. Subsequently, he deteriorated with pain and swelling around chest and neck. CT Thorax (day 18) showed pneumomediastinum (figure 2) and increased size of the already formed cysts, which were now fluid filled (black arrow, figure 1B). In addition, there was a new fluid-filled cyst in an area of previous dense consolidation (white arrow, figure 1B).

He was treated conservatively with oxygen through venturi masks and discharged 11 days later (day 29). Follow-up CT Thorax, day 63 from first presentation, showed persisting ground glass changes and improvement in size of the fluid-filled cystic areas (figure 1C). There was complete resolution of pneumomediastinum and pneumothorax. Follow-up on day 84 demonstrated persisting dyspnoea with forced vital capacity (FVC) 4.86 L (97% predicted), transfer factor of the lung for carbon monoxide (TLCO) 5.85 (53% predicted) and carbon monoxide transfer coefficient (KCO) 0.99 (71% predicted).

DISCUSSION

These images show changes occurring in severe COVID-19 pneumonitis across a 4-day period, followed by 5-week follow-up imaging. Radiological appearances of cyst formation secondary to COVID-19 were described early in the COVID-19 pandemic, but with relatively low prevalence. A rare yet under-recognised complication is that these cystic areas may progress to bullae, cavities and pneumothoraces.

Cavities can occur secondary to bacterial or fungal infections and fungal infections may be associated with subpleural cysts and pneumothorax. However, the CRP <10 and procalcitonin of 0.04–0.18 did not support this, though a beta-D glucan was not sent. In this case, COVID-19 pneumonitis may be associated with subsequent cyst formation (rapid increase in cyst size from 1.2 to 5.0 cm (figure 1A, black arrow)), pneumothorax and pneumomediastinum. Possible hypotheses include; first, cyst formation indicates severe inflammation and therefore may be a covariate risk for pneumothorax/pneumomediastinum, second cysts indicate a greater degree of anatomical changes (not visualised on CT) increasing vulnerability to pneumothorax/pneumomediastinum, and lastly the Macklin effect may explain the development of pneumomediastinum.
Primary pneumothorax is unlikely in this case as the patient had no pre-existing lung disease and minimal smoking history. Secondary pneumothorax due to barotrauma from positive-pressure ventilation may be a risk factor for development of pneumothoraces, however, the patient received no positive-pressure ventilation.

CONCLUSION
Despite the global vaccination programme, COVID-19 in its variant forms is unlikely to be eradicated. Patients will continue to require respiratory support. This case demonstrates the importance of identifying the formation of cysts in COVID-19 pneumonitis and appreciating that deterioration in patients may be resultant from pneumothorax or pneumomediastinum.

Contributors
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REFERENCES