Severe COVID-19 Pneumonia of Single Transplant Lung Sparing Native Fibrotic Lung

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The clinical and imaging presentation and outcomes of lung transplant recipients with coronavirus disease 2019 (COVID-19) pneumonia vary widely, with very few patients reported in the literature, especially single lung transplant recipients.[1] We report a case of severe COVID-19 pneumonia of single transplant lung sparing native fibrotic lung, as evidenced on both radiological and histopathological evaluation.

A 68-y-old man with a history of idiopathic pulmonary fibrosis who had received a single right lung orthotopic lung transplant 1 y prior was transferred from an outside hospital for worsening shortness of breath, cough, and loss of taste after testing positive for COVID-19. At baseline, the transplant lung had no evidence of acute rejection as evidenced by histopathologic evaluation of transbronchial biopsies performed at 3 and 6 mo.

The patient's maintenance immunosuppressive drugs (including prednisone, mycophenolate mofetil, and tacrolimus) were adjusted, and the patient was started on dexamethasone and remdisivir. The patient's oxygenation and hemodynamic stability rapidly deteriorated, ultimately requiring intubation and vasopressor support within 4 d, and the patient was transferred to our facility for a higher level of care.

Initial chest radiograph showed new patchy and confluent opacities in the right pulmonary allograft compared with the baseline radiograph obtained 2 wk prior, with no significant change in the fibrotic changes in the native left lung (Figure S1, SDC, http://links.lww.com/TP/C299). The patient's hospital course was complicated by renal failure with acidemia and volume overload treated with continuous renal replacement therapy and *Enterococcus faecalis* bacteremia treated with broad-spectrum antibiotics.

Because of clinical concerns for pulmonary embolism, a computed tomography angiography study was obtained, which although not showing any signs of pulmonary embolism, confirmed the unilateral findings of acute lung injury seen on chest radiographs (Figure S2, SDC, http://links.lww.com/TP/C299).

The patient's clinical status rapidly deteriorated with treatment-resistant hemorrhagic shock despite multiple vasopressors, aggressive transfusions, and stress-dose steroids (50 μg fludrocortisone). After a total 2-wk intensive care unit admission, the patient ultimately expired, and an autopsy was performed per the family's request.

The autopsy showed a heavy right allograft lung with diffuse alveolar damage (DAD) and no evidence of bacterial infection or rejection (Figure S3, SDC, http://links.lww.com/TP/C299). The native left lung showed fibrotic changes without evidence of superimposed infection, including no DAD.

Ground-glass opacities from COVID-19 pneumonia can be difficult to detect in native fibrotic lungs and to distinguish from developing fibrotic changes. In the largest multicenter cohort study of COVID-19 pneumonia in lung transplant recipients to date, Messika et al[1] showed that out of 7 patients with single lung transplant, only 1 patient showed bilateral abnormalities on imaging. Diffuse ground-glass opacities are an indeterminate feature of COVID-19 pneumonia but are a typical finding seen in DAD and associated with a worse prognosis.[2-5] There are a few possible explanations for the atypical unilateral presentation in our case. First, the issue may be related to the allograft lung, wherein there may be an inability to produce the necessary antigen-specific adaptive immune response in the acute phase mediated by severe acute respiratory syndrome coronavirus 2–specific $CD4^+$ and $CD8^+$ T cells to prevent severe COVID-19 infection.[6] Second, the atypical presentation may be explained by an absence of the necessary blood flow, lymphatic drainage, and functional endothelium in the native fibrotic lung to develop the necessary immune response to COVID-19, whereas the functional allograft lung is exposed to the majority of the insult and able to develop a severe immune response.

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The availability of short-term baseline radiological studies and histopathologic correlation in our case allowed for diagnosis of COVID-19 pneumonia involving a single allograft lung and sparing fibrotic native lung, which may be an uncommon, yet previously unrecognized, presentation of COVID-19 pneumonia. Further studies are needed to determine the frequency of this finding and what significance it has in our understanding of COVID-19 immunology in patients with lung transplants.

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