Post COVID 19 Lung Parenchymal Disease Management Experience with Follow up Outcomes in Qatar: A Case Series

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ABSTRACT:

Background: COVID-19 has resulted in one of the worst global pandemics in recent history. Post COVID 19 interstitial lung disease is a significant concern in COVID-19 survivors. It is a disabling clinical condition for the patients and a burden on the healthcare system. With the passage of time and subsequent different waves of COVID 19 across the globe, post-COVID 19 sequelae of lung diseases can be debilitating.

Case Series: We report case series of three patients with persistent hypoxia post-COVID 19, raising concerns for interstitial lung disease in Qatar. We shared our experience of the patient's clinical course, complications, and outcomes in post-COVID 19 sequelae of lung parenchymal disease. The patients were followed up during and after treatment until recovery or discharge from the hospital.

Conclusion: Through our case series, we want to highlight few points. First, the approach and management strategy of post-COVID 19 lung parenchymal disease patients is individualized. Sequelae of Post COVID 19 interstitial lung disease do not follow the same course during the follow-up period, and outcomes may differ. Two different entities are reported with regards to post-COVID 19 lung parenchymal disease. Post-COVID 19 fibrotic lung disease and fibrotic-like lesions follow different clinical courses, management strategies, and outcomes. Therefore, further studies for categorization of post-COVID 19 lungs parenchymal disease and adequate follow-up at regular time intervals are required.

Key points:

1- Post COVID 19 lung fibrosis disease as a major concern and burden on health care.
2- Lack of management guidelines and recommendations.
3- Need of further studies and patient follow up

CASE PRESENTATIONS:

Case 1: A 40-year-old healthy gentleman presented with fever, cough, and shortness of breath for two days and diagnosed with COVID-19 associated severe pneumonia. He was intubated due to COVID 19 ARDS. He received treatment based on local guidelines and was later extubated. He remained hypoxic and HRCT done as shown in fig 1a:

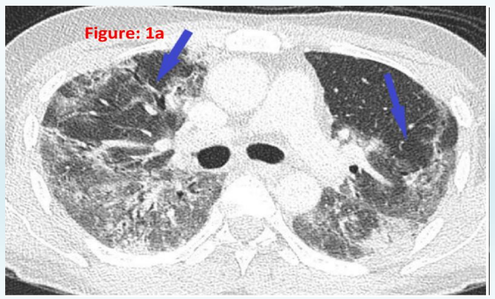

Figure 1a: High Resolution Chest CT Correlating with COVID-19 Related Pulmonary fibrosis

Case 2:

A 46 years old gentleman with a past medical history of type 2 diabetes mellitus, hypertension, and end-stage renal disease post renal graft rejection, presented to the hospital with fever, myalgias and shortness of breath correlated with complicated severe COVID-19 pneumonia that required endotracheal intubation and mechanical ventilation. Later he was extubated but had persistent hypoxia and underwent tracheostomy. He was given steroids for 4 weeks and underwent pulmonary rehabilitation with successful decanulation.

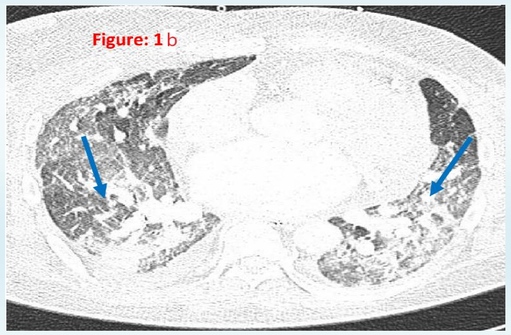

Figure 1b: High Resolution Chest CT indicative of Fibrotic Changes in the Lung Parenchyma

Case 3: A 48 years old gentleman without any past medical history presented to the hospital with fever, cough, headache, nausea, abdominal pain and shortness of breath for 5 days He tested positive for COVID-19 RT-PCR. However, he had persistent hypoxia up to 6 weeks post negative SARS-CoV-2 PCR requiring high flow nasal cannula. He underwent HRCT and it revealed post COVID 19 fibrotic lung disease. He was treated for a shorter duration with steroids and pirfenidone, later discharged on 1-2 liter/min O2 through nasal cannula and remained stable.

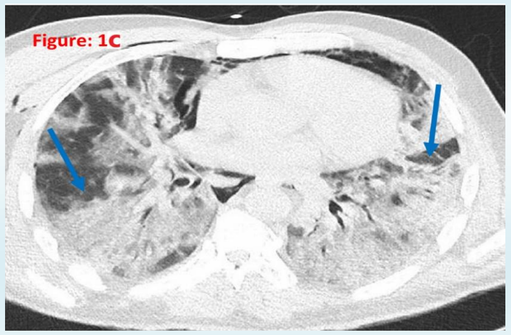

Figure1c: HRCT showing extensive fibrotic changes correlated with COVID-19 associated interstitial lung disease pattern

Table 1. Summarizing the cases CT images, treatment and follow up outcomes

Cases	Oxygen requirements at presentation	CT Image	Duration	Treatment	Follow up clinical status
1	Mechanical ventilation	Interstitial thickening at the lower lobes, with septal fibrosis and ground-glass opacities	63 days, 20 days under ICU care	**Initial:** IV tocilizumab, IV Methylprednisolone **Post extubation:** Prednisolone oral 40mg daily with tapering dose over 3 weeks Pulmonary rehabilitation therapy	Off oxygen for 2 months, however afterwards traveled back to his country.
2	Mechanical ventilation	Ground glass opacities involving the peripheries and bases of the lungs with bronchiectasis changes and honeycombing patterns in evolution.	Still admitted	**Initial:** IV tocilizumab; IV steroids; Anakinra **Post-extubation** Prednisolone oral 40mg daily 40mg prednisolone daily with tapering dose over 4 weeks; Pulmonary rehabilitation	Post tracheostomy closure stable and on oral steroids with pulmonary rehabilitation therapy.
3	High flow nasal cannula with 60% FiO_2	Diffuse ground-glass opacities and diffuse parenchymal involvement with fibrosis and septal thickening with alveolar wall destruction correlating with interstitial lung disease post COVID-19	Total 3 months hospital stay	**Initial:** IV tocilizumab; IV methylprednisolone; Anakinra; Azithromycin Remdesivir **Post-extubation** IV methylprednisolone 60mg twice daily for 2 weeks, and was switched to oral prednisolone 40mg with tapering dose; Pirfenidone 267 mg three times daily	Discharged on nasal cannula 1-2 l/min oxygen on Pirfenidone

DISCUSSION

COVID-19 has created one of the worst economic, social and healthcare disaster in the recent global history. In post COVID 19 sequelae of recovered cases, more than a third of the patients are at risk of developing fibrotic lung function abnormalities. 47% of the patients had impaired gas transfer measured by diffusing capacity of the lungs for carbon monoxide and 25% had reduced total lung capacity (1). Post COVID 19 follow-up studies of the survivors have revealed acute "fibrotic-like "changes in the lungs which later on resolved, while some of them may have persistent fibrotic changes leading to interstitial lung disease in the long run. There are different suggested mechanisms such as cytokine release storm, systemic inflammation leading to alveolar wall damage, drug induced pulmonary toxicity and mechanical ventilation associated high airway pressure and hyperoxia induced lung injury leading to lung damage (1,2).

Considering the underlying systemic inflammation and cytokine release cascade in cases of post COVID 19 pulmonary fibrosis, steroids, interleukin-6 inhibitors, interleukin-1 inhibitors such as anakinra, antifibrotic agents such as nintedanib and pirfenidone and investigational humanized monoclonal antibody drugs such as sarilumab and canakinumab are being considered (4-6). Meanwhile, pulmonary rehabilitation also possess a potential role in this clinical state (7).

CONCLUSION:

As we are heading towards different waves of COVID 19 across the globe, it is expected to see a large number of post COVID 19 sequelae of lung parenchymal disease cases that may improve with the passage of time with supportive management like pulmonary rehabilitation therapy or progress to permanent lung damage requiring oxygen. It is likely that a new entity of post COVID 19 interstitial lung disease may be introduced. It will be a challenge in the long run that may require further criteria and categorization for management purposes. We strongly advise close follow up at regular intervals and monitoring of such patients:

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Figures and legends:

1a: A high-resolution chest CT showing extensive ground-glass opacities at the peripheral and subpleural regions with fibrotic changes shown with blue arrows.
1b: HRCT findings suggestive of diffuse fibrotic changes in the lung parenchyma as shown with blue arrows.
1c: CT chest showing extensive fibrosis of lung parenchyma and subpleural fibrosis, findings coinciding with COVID 19 associated interstitial lung disease.

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