


Evaluation of fibroblast activation protein-specific PET/CT in a patient with post-COVID pneumonitis

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Abstract

Coronavirus disease 2019 (COVID-19) often leads to a spectrum of pulmonary complications, including interstitial lung disease (ILD) with the potential for fibrotic sequelae. Assessing the presence of ongoing active inflammation versus established residual fibrosis as a result of lung parenchymal injury and repair in these patients is a clinical challenge. Better understanding of the disease process is crucial for guiding appropriate therapeutic strategies. We aim to investigate the use of positron emission tomography / computer tomography (PET/CT) scans and their role in diagnosing interstitial pneumonitis (IP) post COVID infections.

KEYWORDS

coronavirus disease 2019, interstitial lung disease, progressive Fibrosing interstitial lung disease

INTRODUCTION

Coronavirus disease 2019 (COVID-19) often leads to a spectrum of pulmonary complications, including interstitial lung disease (ILD) with the potential for fibrotic sequelae.¹ Assessing the presence of ongoing active inflammation versus established residual fibrosis as a result of lung parenchymal injury and repair in these patients is a clinical challenge. Better understanding of the disease process is crucial for guiding appropriate therapeutic strategies. To date, High-Resolution Computer Tomography (HRCT) is the mainstay to establish diagnosis of ILD but this modality is not capable of determining tissue remodelling.² ⁶⁸Ga-fibroblast activation protein inhibitor-46 positron emission tomography / computer tomography (⁶⁸Ga-FAPI-46 PET/CT) has been used previously to navigate active inflammation and degree of fibrosis present in ILD conditions.³ We aim to investigate the use of ⁶⁸Ga-FAPI-46 PET/CT and their role in diagnosing progressive fibrosing interstitial lung disease (F-ILD) post COVID infections.

CASE REPORT

We present the case of a 50-year-old female patient with a background of childhood asthma. Patient presented with acute respiratory failure following an episode of severe COVID pneumonitis in February 2021, necessitated a five-week admission to the intensive care unit (ICU) for mechanical ventilation. Upon her recovery, the patient underwent a comprehensive rehabilitation program but continued to require long-term oxygen therapy.

On follow up, her exercise capacity was reduced, she was able to do 100 m on her 6-min walk test (6MWT) with a BORG breathlessness score of 7 out of 10 and desaturating to 87%. While spirometry demonstrated normal values, a significant reduction in diffusion capacity was noted (52% of predicted value). HRCT demonstrated fibrotic changes bilaterally in the upper lobes (Figure 1).

Two years later, our patient underwent a ⁶⁸Ga-FAPI-46 PET/CT which demonstrated no fibroblast activity within the lung parenchyma but remaining fibrotic scar tissue was evident (Figure 2). Following ongoing rehab, the patient's

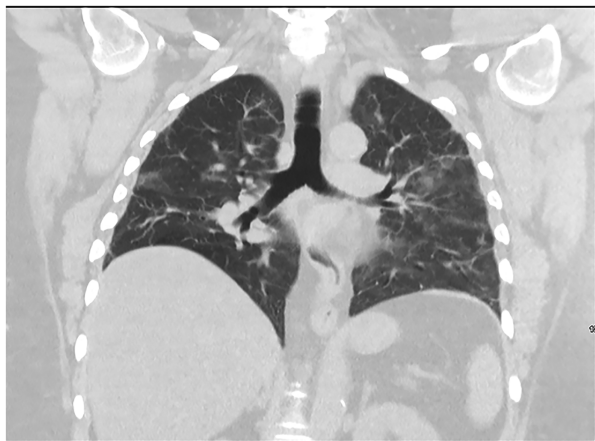


FIGURE 1 Coronal CT Thorax imaging demonstrates lung scarring.

clinical condition displayed a notable improvement and subsequently, was able to wean off oxygen therapy. The diffusion capacity on follow up remained stable at 58% predicted.

DISCUSSION

This case underscores the applicability of ^{68}Ga -FAPI-46 PET/CT as a valuable tool in assessing fibroblast activation in pathological processes such as ILD. The local concentration of the tracer was measured through drawing a Region of Interest (ROI) around the fibrotic scar tissue and determining the SUVmax (the value of the pixel with the highest intensity). As quiescent fibroblasts usually show a low expression of FAP, the FAPI PET/CT displays a good lesion to background ratio for pathologic processes.⁴ A significant FAPI positive lesion in our case report was regarded as a tracer uptake above the background.

In a pilot study from the university of Erlangen, conducted in 2021, the value of the FAPI PET/CT in the diagnostic process of patients with ILD could be demonstrated.⁵ In this study, it was shown that fibroblast activation, measured in vivo in the ^{68}Ga -FAPI-46 PET/CT correlates with fibrotic activity and disease progression in the lungs with systemic sclerosis-associated ILD. Therefore, a positive FAPI PET/CT scan at baseline, reflecting the process of fibroblast activation on a molecular level, was associated with the progression of the disease irrespective of the extent of involvement on HRCT scan and the forced vital capacity at baseline.

We require better understanding of post viral F-ILD⁶ in our post pandemic era. We were reassured that our patient is unlikely to have a progressive fibrosing process as demonstrated radiologically and by her clinical course. Further research is warranted to refine the assessment of ^{68}Ga -FAPI-46 PET/CT scans in different interstitial pneumonitis anomalies and validating it as a diagnostic tool.

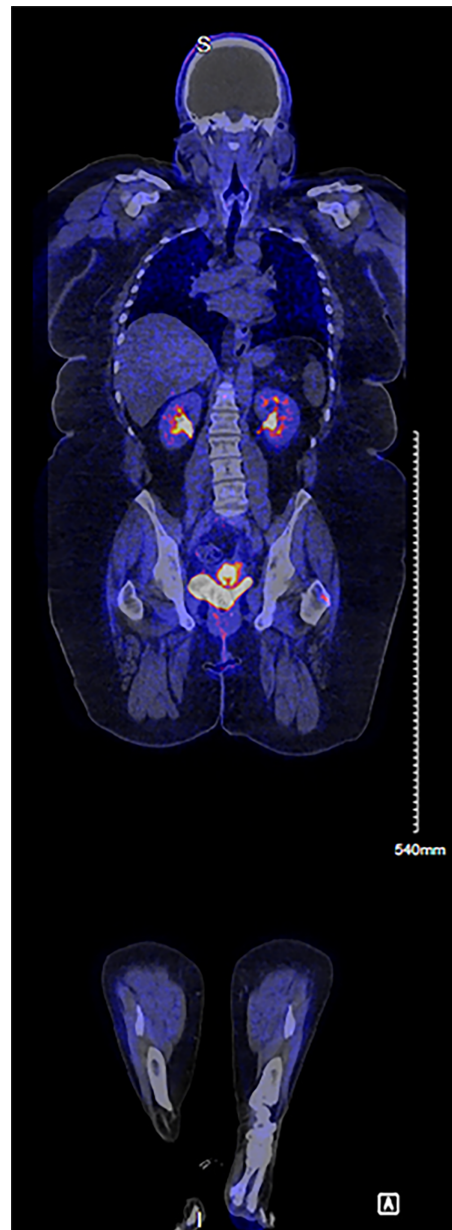


FIGURE 2 Coronal FAPI PET imaging demonstrates no fibroblast activity but remaining lung scarring.

CONFLICT OF INTEREST STATEMENT

None declared.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ETHICS STATEMENT

The authors declare that appropriate written informed consent was obtained for the publication of this manuscript and accompanying images.

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