

Invasive Fungal Infection in COVID-19–Recovered Patient Detected on ^{18}F -FDG–Labeled Leukocytes PET/CT Scan

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Abstract: Occurrence of invasive fungal infections has gained significant attention during recent times in patients with COVID-19. Patients with severe form of COVID-19, such as those treated in the intensive care unit with prolonged steroid use, are particularly vulnerable to secondary bacterial and fungal infections. Disseminated systemic mycosis is a life-threatening condition, especially in immunocompromised patients. Here, we report a case of a recovered severe COVID-19 patient, who presented with persistent fever. ^{18}F -FDG–labeled leukocyte scan revealed focal accumulation of radiotracer in the small intestine and right lung lower lobe. Subsequently, performed biopsy revealed mucormycosis.

Key Words: WBC-labeled PET/CT scan, invasive fungal infection, leukocyte scan, mucormycosis

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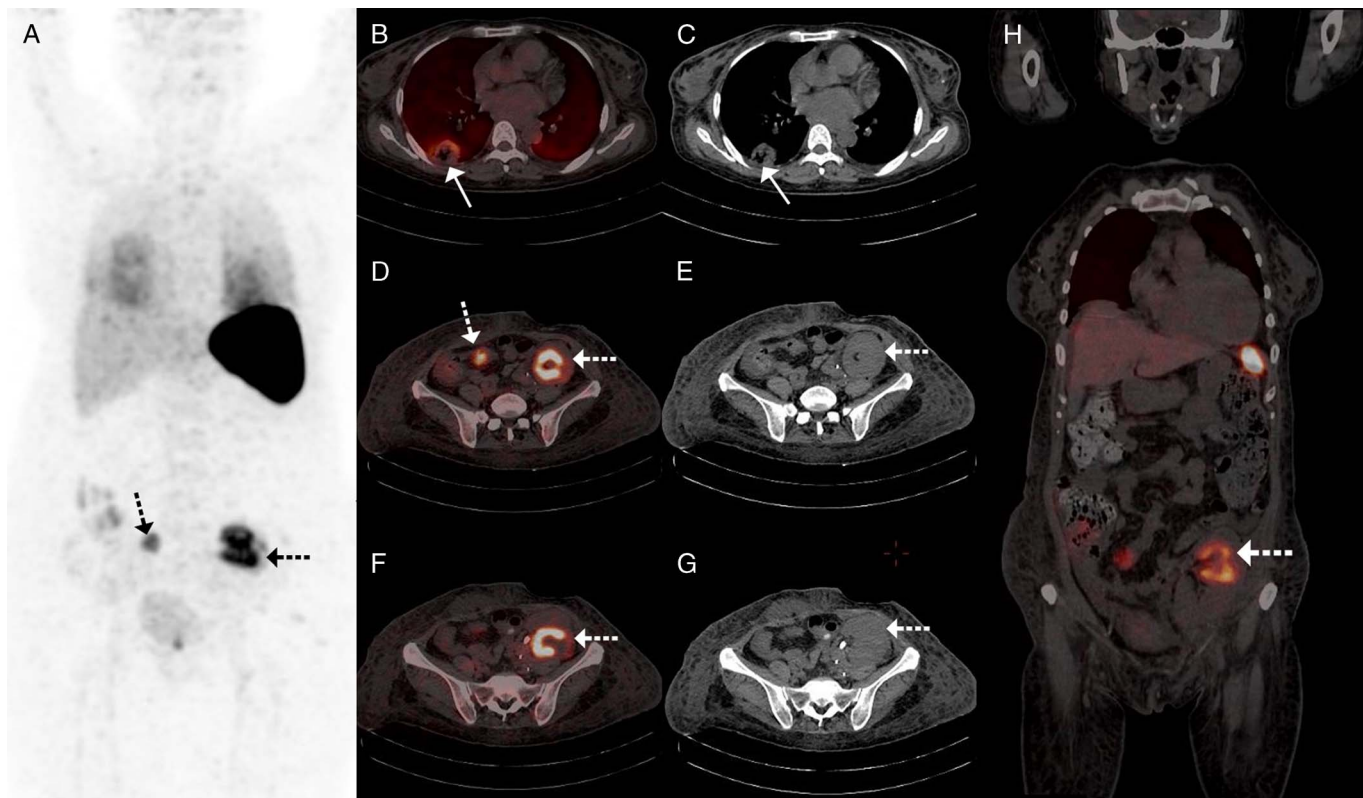


FIGURE 1. A 40-year-old woman presented to the hospital with chief complaint of persistent fever since 15 days. Patient was an old-treated case of severe form of COVID-19 requiring intensive care unit admission and had received high dose of steroid for a duration of 10 days. The patient also had prior history of renal transplant recipient 8 months back. Her blood culture was negative for growth of microorganism during hospital stay. ^{18}F -FDG-labeled leukocytes PET/CT scan (MIP image, A) was performed for detection of occult site of infection, which revealed focal accumulation of radiotracer in a thick-walled fibrocavitary lesion in the posterior basal segment of the right lung lower lobe with perilesional ground glass haziness (B and C, arrow) in terminal ileum and caecum (D–H, dotted arrowhead), suggestive of disseminated infection.

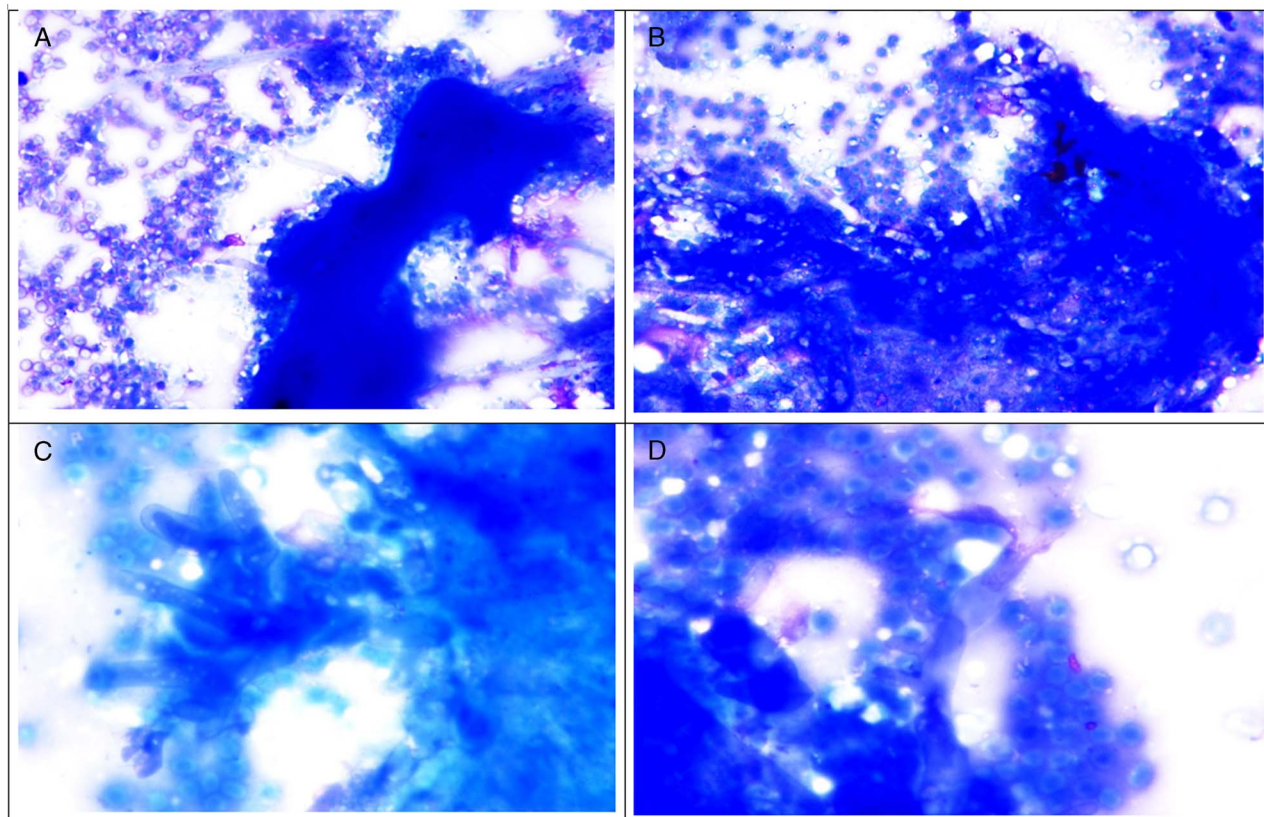


FIGURE 2. Subsequently performed PET/CT-guided biopsy from tracer-avid lesion in terminal ileum demonstrates nonpigmented pauci septate, ribbon-like hyphae (A and B), which were found to be positive for MGG stains ($\times 40$ and $\times 100$, C and D), suggestive of mucormycosis. There is a diverse range of bacterial and fungal infections that may coexist with possible association with a preexisting morbidity (diabetes mellitus, lung disease, postrenal transplant) or may develop as a hospital-acquired infection.¹ Mucormycosis is an emerging life-threatening invasive fungal infection, which has been increasing in recent times in severe form of COVID-19–recovered patients.² Invasive fungal infection often poses a huge diagnostic challenge, especially in immunocompromised patients resulting in significant morbidity and mortality.³ Invasive fungal infection can affect any part of body, and imaging plays a crucial role in its management. PET/CT, as a whole-body imaging procedure, enables the detection of invasive fungal infection at different sites of the body in a single imaging session.⁴ ^{18}F -FDG–labeled autologous leukocytes have been used for the detection of occult acute pyogenic infections.⁵ There is, however, limited experience using FDG-labeled leukocytes for detection of invasive fungal infections. The concept of labeled leukocyte imaging is based on the mechanisms of chemotaxis exerted on activated leukocytes by chemoattractants. The short half-life of ^{18}F -labeled autologous leukocytes actually allows us to visualize neutrophil margination in response to infection rather than neutrophil migration.⁶ The activated leukocytes are also known to express increased glucose transporter proteins on the cell membrane, which in turn leads to focal accumulation of the radiotracer at infected site.⁷ Most pathogenic fungi are susceptible to neutrophil killing, and neutrophils are professional phagocytes of the innate immune system. Neutrophils enter the site of infection after a chemokine gradient engulf and intracellularly toxify the microbe, secrete antimicrobial proteins into the surrounding, or release cytokines to recruit other immune cells.⁸ The index case highlights the utility of ^{18}F -FDG–labeled autologous leukocytes whole-body scan to serve as a powerful diagnostic tool for precise localization of sites of occult fungal infections.