A Case of Coronavirus Infection Incidentally Found on FDG PET/CT Scan

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Abstract: We present a highly suspicious case of COVID-19 infection, incidentally found on ^{18}F -FDG PET/CT images. Patient was scanned on February, 25, 2020, when COVID-19 outbreak was unrecognized in our country. She admitted having recent occasional dry cough and fever. A retrospective review of her clinical and laboratory data was strongly suggestive for diagnosis of COVID-19 infection. PET/CT images demonstrated hyper-metabolic diffuse ground glass opacities in both lungs with bilateral nodules. There was no evidence of pleural effusion or prominent mediastinal or hilar lymphadenopathy. Radiologists must be aware of COVID-19 presentations on PET/CT scan images during COVID-19 outbreak.

Key Words: FDG PET/CT, diagnosis, COVID-19

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REFERENCES

1. Zhu N, Zhang D, Wang W, et al. A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med*. 2020;382:727–733.
2. Coronavirus disease 2019 (COVID-19) Situation Report – 51. World Health Organization (WHO). Available at: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200311-sitrep-51-covid-19.pdf?sfvrsn=1ba62e57_4.
3. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020;395:497–506.
4. Chen N, Zhou M, Dong X, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet*. 2020;395:507–513.
5. Chung M, Bernheim A, Mei X, et al. CT imaging features of 2019 novel coronavirus (2019-nCoV). *Radiology*. 2020;295:202–207.
6. Qin C, Liu F, Yen TC, et al. ^{18}F -FDG PET/CT findings of COVID-19: a series of four highly suspected cases. *Eur J Nucl Med Mol Imaging*. 2020.
7. Prabhu M, Raju S, Chakraborty D, et al. Spectrum of ^{18}F -FDG uptake in bilateral lung parenchymal diseases on PET/CT. *Clin Nucl Med*. 2020;45:e15–e19.
8. Jacobson FL, Tarascio JN, Fox SW. Can PET/CT help manage ground glass nodules? *J Surg Oncol*. 2018;117:457–458.

FIGURE 1. The patient is a 56-year-old woman with unremarkable medical history. She had recent intermittent fever and dry cough. Her primary care physician requested a plain chest x-ray, which revealed nodules in her left upper lung zone, and after discussion with her physician, she decided to proceed with standard whole-body FDG PET/CT scan for further evaluation. MIP image demonstrates diffuse inflammatory process in both lungs, as well as hypermetabolic spleen. Subsequent laboratory tests revealed mild leukopenia with WBC count of 1500. She also had increased CRP (13.5 mg/L) and ESR (55 mm/h) levels, and search for known respiratory pathogens was negative. Unfortunately, SARS-CoV-2 nucleic acid testing (polymerase chain reaction) was not available at the time. The outbreak of acute respiratory disease caused by new coronavirus of zoonotic origin (SARS-CoV-2), which is officially called COVID-19 by the World Health Organization, is now a global health threat.¹ According to World Health Organization statistics, Iran is unfortunately the third most infected country by coronavirus following China and Italy.² Common clinical manifestations of COVID-19 include fever, cough, shortness of breath, myalgia, and fatigue.^{3,4} FDG PET/CT images demonstrate diffuse inflammatory pattern in both lungs. There is diffuse ground glass opacities (GGOs) with associated metabolic activity in both lungs, most prominent in the lungs periphery. There are also few hypermetabolic nodules, more prominent in the left lung. There is no evidence of prominent and hypermetabolic mediastinal or hilar lymph nodes. There is also no evidence of pleural effusion. Another prominent feature of patient's PET scan is diffuse hypermetabolic spleen, which may be related to underlying severe inflammatory process due to COVID-19.⁵ Recently, FDG PET/CT scan findings in COVID-19 has been discussed in a case series including 4 patients.⁶ In accordance with recently published cases, our case demonstrated peripheral GGOs and consolidative/nodular opacities in both lungs, all of which with high FDG uptake. Although bilateral involvement of the lung parenchyma may be present in several benign and malignant lung diseases, tumors presenting as GGOs are unlikely to be FDG avid.^{7,8} The high FDG uptake that characterized COVID-19 pulmonary infection reflects a significant inflammatory process.⁶ COVID-19 infections usually do not seem to be accompanied by lymphadenopathy, and no obvious nodal enlargement was evident in our case. However, lymphadenopathy was reported in 3 of 4 cases in Qin et al⁶ case series. Although ¹⁸F-FDG PET/CT cannot be routinely used in an emergency situation and is generally not recommended for infectious diseases, our current findings demonstrate that PET/CT scan interpreters must be aware of imaging manifestations of COVID-19 and refer suspicious cases to the appropriate authorities during disease outbreak. Therefore, imaging findings in addition to clinical and laboratory data are the cornerstone for COVID-19 diagnosis and treatment initiation when resources are limited. It is clear that FDG PET/CT scan has no role in diagnosis and workup in COVID-19 patients, but FDG PET/CT scan interpreters must be aware of COVID-19 presentations on FDG PET/CT scan images, especially in countries involved with COVID-19 outbreak.