

COVID-19 Incidentally Detected on PET/CT During Work-up for Locally Advanced Head and Neck Cancer

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Abstract. *Aim: To describe the incidental detection of COVID-19 disease on positron-emission tomography/computed tomography (PET/CT) in a patient with cancer despite initial negative swab by polymerase chain reaction (PCR). Case Report: Clinical and radiographic data were obtained from the electronic medical record. Nasopharyngeal swabs were obtained and evaluated for COVID-19 by the Food and Drug Administration-approved reverse transcription-PCR assays. On radiographic examination, PET/CT was consistent with COVID-19-related pneumonia not seen on prior imaging. Initial nasopharyngeal swab 2 days after PET/CT imaging was negative for COVID-19. Subsequent repeat swab 10 days later was positive for COVID-19, while the patient was febrile on screening assessment. The patient remained COVID-19-positive until 1 month after abnormal PET/CT imaging. Conclusion: PET/CT can be sensitive for early COVID-19 detection, even in the setting of a negative confirmatory PCR test. This highlights the importance of continued patient surveillance and use of appropriate personal protective equipment to minimize COVID-19 transmission.*

The novel coronavirus disease (COVID-19) has led to a global pandemic and public health crisis. The majority of individuals who become infected develop mild respiratory illness. However, there is increasing evidence suggesting patients with cancer may be at an elevated risk for development of more severe disease (1). For patients undergoing radiation therapy, several guidelines

have been published to minimize the risk of potential exposure for both providers and patients (2-5). While non-urgent radiation treatment of select cancer cases can be delayed, there remain cancer sites where postponing treatment will lead to detrimental outcomes (*e.g.* head and neck, cervical, or endometrial cancer) (6, 7). At our Institution in New York, testing for COVID-19 was recently adopted as standard practice prior to initiation of radiation treatment. While there are prior reports at other institutions of COVID-19 being incidentally detected on cone beam computed tomography (CT), confirmation occurs typically with subsequent polymerase chain reaction (PCR) (8, 9). In this brief communication, we share our experience of a patients with locally advanced head and neck cancer with COVID-19 incidentally detected on positron-emission tomography/computed tomography (PET)/CT, who was initially negative on nasopharyngeal swab.

Case Report

Clinical data. Clinical information was extracted from the electronic medical record. Data were de-identified prior to publication in compliance with the Health Insurance Portability and Accountability ACT. The need for written informed consent was waived.

PET/CT imaging. All imaging was performed on the same PET/CT scanner (Gemini TF TOF; Philips Medical Systems, Amsterdam, the Netherlands). Prior to image acquisition, the patient was asked to fast for 4 hours prior to intravenous administration of a weight-adjusted dose of ¹⁸F-fluorodeoxyglucose (FDG). Images from the base of the skull to the mid-thigh were acquired with a spatial resolution of 5 mm in the center of field of view. A low-dose CT scan was used for non-uniform attenuation correction. All imaging was evaluated by Board-certified nuclear medicine physicians.

Novel coronavirus PCR assay. Nasopharyngeal and oropharyngeal swabs were analyzed for the presence of COVID-19 virus using the Hologic Panther Fusion real-time

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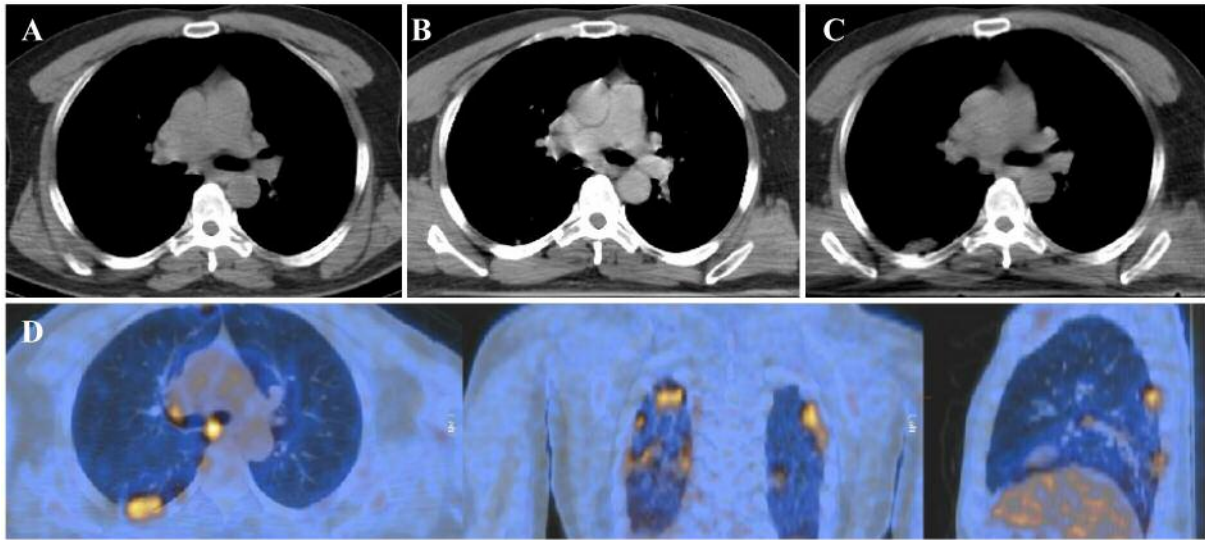


Figure 1. ^{18}F -Fluorodeoxyglucose-avid pulmonary opacities incidentally discovered on positron-emission tomography computed tomography (PET/CT). A: Axial view of low-dose CT scan, 1 month prior to PET/CT. B: Axial view of CT scan 12 days prior to PET/CT. C: Axial view of low-dose CT scan from PET/CT. D: Fused images from PET/CT scan.

RT-PCR SARS-COV-2 assay which has received Emergency Use Authorization from the Food and Drug Administration for the qualitative detection of nuclear acid from swab specimens suspected of bearing COVID-19.

Presentation. A 60-year-old obese male presented with a history of hypertension and recent diagnosis of stage II human papillomavirus-mediated (p16+) squamous cell carcinoma of the right tonsil, with staging positron-emission tomography (PET)/CT imaging demonstrating increased uptake in the right tonsil and bilateral cervical lymphadenopathy. In addition, FDG-avid irregular opacities within both lungs and mediastinal hilar foci were observed, concerning for an infectious or inflammatory process. Of note, the patient had previously been unable to complete a PET/CT a month prior due to claustrophobia; bilaterally opacities were not observed on the low-dose CT part at that time (Figure 1).

The patient denied any symptoms of upper respiratory infection on initial consultation and follow up tele-visit. He was living with his wife and denied any recent sick contacts. He did not have a history of smoking or alcohol abuse and did not have any major medical comorbidities. Given the high prevalence of COVID-19 in the New York City area, 5 days after suspicious PET/CT scan, he was sent for nasopharyngeal swab PCR testing, which was negative.

He was planned for definitive treatment with concurrent radiation therapy and weekly cisplatin. On his first day of radiation treatment, 10 days after the negative PCR test, he was found to be febrile on screening assessment before entry into the Radiation Oncology Department. He therefore was sent for

a repeat nasopharyngeal swab 15 days after the suspicious PET/CT findings, which was positive for COVID-19. Another repeat PCR test 12 days later remained positive. He eventually tested negative 33 days after his suspicious PET/CT scan.

Discussion

This is, to our knowledge, one of the first reports of COVID-19 disease in the United States with abnormal PET/CT findings detected prior to eventual PCR confirmation of COVID-19. There have been prior reports from China and Italy of the feasibility of PET/CT imaging for COVID-19 detection, although initially misidentified as thoracic metastases or detected incidentally on routine surveillance imaging (10-12). In general, the diagnostic utility of CT imaging played an important role for the early diagnosis of COVID-19 in China, in part due to its increased sensitivity compared to PCR and lack of availability for widespread nasopharyngeal testing (13). The sensitivity of current laboratory PCR testing for COVID-19 is estimated to be approximately 70% and does not differ significantly between symptomatic and asymptomatic cases (14). In the United States, implementation of rapid COVID-19 testing and minimizing unnecessary healthcare staff exposures have prompted current Centers for Disease Control and Prevention recommendations for confirmation of suspected COVID-19 diagnosis through PCR (15).

We and others have recently reported that patients with cancer have higher mortality and are at increased risk for severe COVID-19 (16, 17). This may be partially explained

by prior thoracic radiation, which has been demonstrated to be associated with worse outcome (18). The consequences of continuing radiation therapy during an active COVID-19 infection are still unknown.

Our current practice in a highly endemic area is to postpone treatment for non-urgent cases until resolution of symptoms for at least 1 week in combination with two negative nasopharyngeal swabs obtained 24 hours apart. This case highlights the importance of applying all available clinical information for patients at high risk for COVID-19 and for continued patient surveillance with use of appropriate personal protective equipment to minimize COVID-19 transmission. It is unclear if the initial swab was negative due to a low viral load within the nasal carriage, or potentially to improper sampling. However, given the high clinical suspicion from abnormal radiographic findings, routine vital assessments were performed daily on treatment, enabling for detection of symptomatic disease to prompt repeat testing.

Conclusion

PET/CT findings can be sensitive for early COVID-19 detection, potentially even prior to detectable nasal viral carriage. PCR swabs have been reported to have poor sensitivity with relatively high false-negative rates. Radiographic studies, if available, may provide further clinical insight in the setting of early COVID-19 infection and should not be discounted even in the setting of a negative PCR swab. This highlights the importance of continued patient surveillance and use of appropriate personal protective equipment to minimize COVID-19 transmission.

Conflicts of Interest

None.

Authors' Contributions

A.M. and R.K conceived of the original idea. All Authors provided critical feedback and helped revise the article.

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