

LETTER TO THE EDITOR

SARS-CoV-2 as a mimicker of pulmonary metastasis in osteosarcoma

To the Editor:

Osteosarcoma is the most common malignant bone tumor in children and adolescents. It often metastasizes to the lungs necessitating close monitoring with dedicated pulmonary imaging. We report the case of a 15-year-old male with osteosarcoma who was found to have new concerning lung nodule on posttherapy scans in the setting of SARS-CoV-2, which resolved on subsequent computed tomography (CT) imaging 1 month later.

A 15-year-old male with localized osteosarcoma of the left proximal humerus was treated as per AOST0331 with ifosphamide replacing cisplatin due to baseline hearing loss. He underwent limb salvage surgery and had greater than 95% necrosis. He completed adjuvant chemotherapy and end of therapy scans demonstrated no evidence of disease in May 2020. He was monitored closely with CT scans of his chest every 3 months, which did not demonstrate pulmonary metastasis. A routine CT scan in January 2021 demonstrated a new 1.7 cm ground glass nodule within the right lower lobe (Figure 1A) and a new 4 mm ground glass nodule within the right upper lobe (Figure 1B), both of which were suspicious for metastatic disease. At that time, he also had a positron emission tomography (PET) scan that was notable for new right lower lobe pulmonary nodule with moderate fluorodeoxyglucose (FDG) uptake and a sub-centimeter right upper lobe pulmonary nodule, which was not avid but thought to be below the level of PET resolution (Figure 1C). When seen in clinic to review these findings, he endorsed a runny nose for 2 weeks and anosmia for 3 days prior to presentation. A nasopharyngeal swab done at that time was positive for SARS-CoV-2. Due to the high likelihood of the lung nodules being due to COVID-19, a watch and wait approach was considered. A CT scan of the chest 1 month later demonstrated no evidence of the previously seen lung nodules (Figure 1D). PET scan was notable for resolution of the previously seen pulmonary nodules.

Osteosarcoma is the most common malignant bone tumor in children, with approximately 400 new cases annually. At the time of diagnosis, the majority of patients present with microscopic metastasis, and approximately 15% present with clinically detectable lung metastasis. The most commonly reported CT finding is a single or multiple pleural-based nodules with lung parenchymal metastasis.¹ Despite multimodal therapy with chemotherapy and surgical resection, recurrence still occurs in approximately 30%–40% of patients with 80% of relapse to the lungs.² In a single-center study, the overall incidence of

developing pulmonary metastasis at 5 years was 28% irrespective of age.³

COVID-19, a highly infectious disease caused by the SARS-CoV-2 virus, was declared a global pandemic in January 2020. Although reverse transcriptase polymerase chain reaction (RT-PCR) of viral nucleic acid has been regarded as the reference standard, CT scan of the chest has been favored in adults with symptomatology and a negative RT-PCR, with a sensitivity of 98%.^{4,5} In the adult literature, CT imaging findings vary depending on when in the course of the disease images are obtained. Ground glass opacities are described as the most common imaging finding with occurrences as high as 98%.⁶ Other findings appreciated include reticular pattern, air bronchogram, airway and pleura changes, pulmonary edema or fibrosis, and vascular enlargement.⁷ Nodules measuring less than 3 cm in diameter are an atypical, but described, phenomenon in the setting of viral pneumonia in adults.⁷ Contrary to adults, pediatric patients with COVID-19 do not always present with respiratory symptomatology. Symptoms are typically milder among children and findings were not often evident on chest X-rays.⁸ In a study evaluating chest CT scans of pediatric patients with confirmed COVID-19, typical manifestations included unilateral or bilateral subpleural ground-glass opacities, and consolidations with surrounding halo sign.⁸ Additionally, the lesions on chest CT lagged behind clinical symptoms and remained present even after two consecutive negative RT-PCR tests.⁸

As oncologists, when we see a new lesion on screening imaging, we are tasked with careful evaluation. Utilizing multiple imaging modalities is particularly useful, as this helps us delineate the lesion more completely. While we compile a broad differential, concern for recurrence or relapse is always at the top of the list. Our patient's chest CT findings were highly suspicious for disease recurrence, as he had a new pulmonary nodule visible on chest CT with concurrent FDG avidity demonstrated on PET scan. However, considering his complete clinical picture allowed us to better delineate the underlying etiology of the new lesions, while vigilantly monitoring for disease recurrence. We share this case to highlight a potential confounder on screening chest CT for patients with sarcoma during the COVID-19 pandemic.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

Rachel Offenbacher 

Lara Fabish

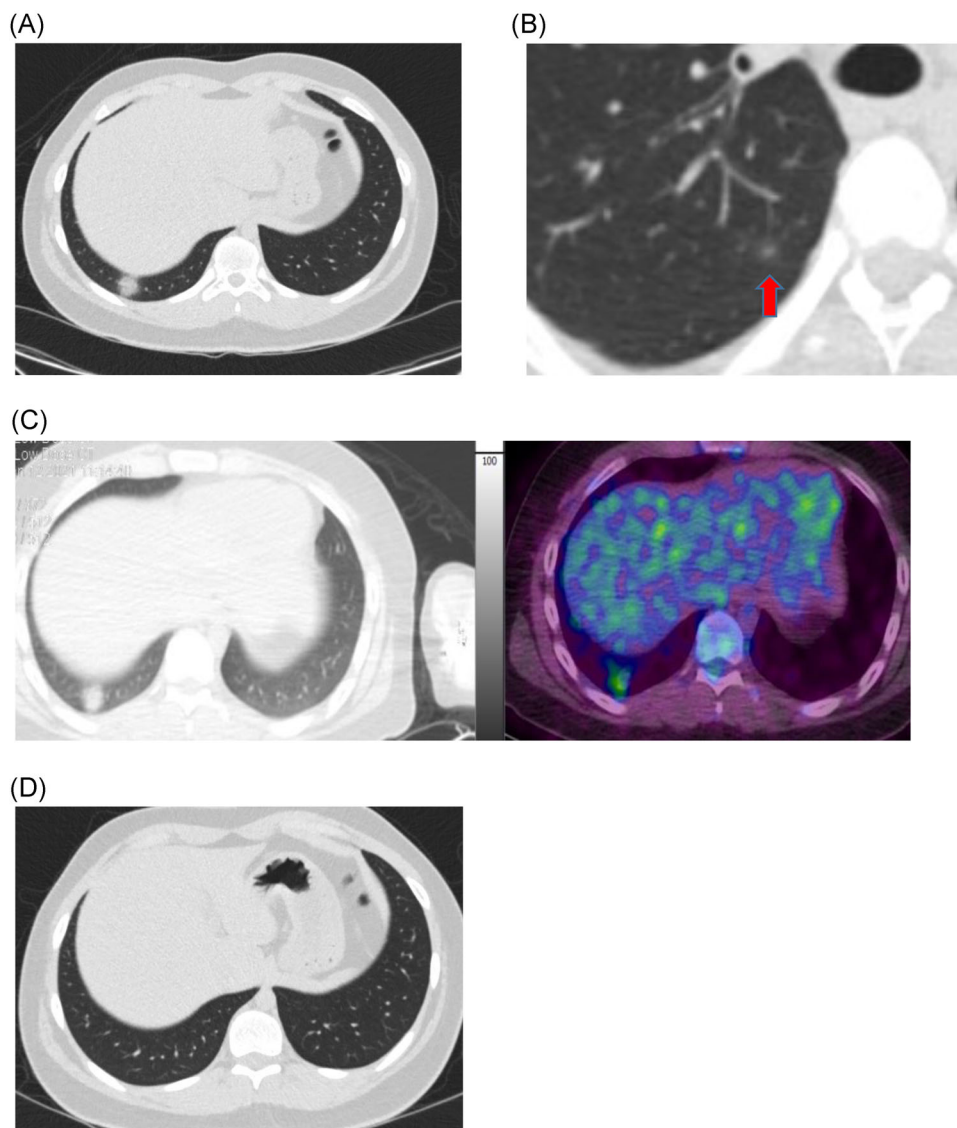


FIGURE 1 (A) Computed tomography (CT) chest demonstrating new 1.7 cm ground glass nodule within the right lower lobe. (B) CT chest demonstrating new 4 mm ground glass nodule (demonstrated by arrow) within the right upper lobe. (C) Positron emission tomography (PET)/CT done with CT chest (A and B) demonstrating new right lower lobe pulmonary nodule with moderate fluorodeoxyglucose (FDG) uptake, suspicious for metastasis. (D) CT chest demonstrating resolution of the previously seen ground glass nodule

Alissa Baker

David M. Loeb 

Division of Pediatric Hematology, Oncology and Cellular Therapy,
Department of Pediatrics, Albert Einstein College of Medicine, Children's
Hospital at Montefiore, Bronx, New York, USA

Correspondence

Rachel Offenbacher, Division of Pediatric Hematology, Oncology and
Cellular Therapy, Department of Pediatrics, Albert Einstein College of
Medicine, Children's Hospital at Montefiore, 3411 Wayne Ave., 9th
Floor, Bronx, NY 10467, USA.
Email: roffenba@montefiore.org

ORCID

Rachel Offenbacher  <https://orcid.org/0000-0002-5211-6457>

David M. Loeb  <https://orcid.org/0000-0002-7319-5000>

REFERENCES

1. Rastogi R, Garg R, Thulkar S, Bakhshi S, Gupta A. Unusual thoracic CT manifestations of osteosarcoma: review of 16 cases. *Pediatr Radiol*. 2008;38:551-558.
2. Bielack SS, Kempf-Bielack B, Delling G, et al. Prognostic factors in high-grade osteosarcoma of the extremities or trunk: an analysis of 1,702 patients treated on neoadjuvant cooperative osteosarcoma group protocols. *J Clin Oncol*. 2002;20:776-790.
3. Aljubran AH, Griffin A, Pintilie M, Blackstein M. Osteosarcoma in adolescents and adults: survival analysis with and without lung metastases

- [published correction appears in *Ann Oncol*. 2021 Mar;32(3):424]. *Ann Oncol*. 2009;20(6):1136-1141.
4. Xie X, Zhong Z, Zhao W, Zheng C, Wang F, Liu J. Chest CT for typical coronavirus disease 2019 (COVID-19) pneumonia: relationship to negative RT-PCR testing. *Radiology*. 2020;296(2):E41-E45.
 5. Huang P, Liu T, Huang L, et al. Use of chest CT in combination with negative RT-PCR assay for the 2019 novel coronavirus but high clinical suspicion. *Radiology*. 2020;295(1):22-23.
 6. Li K, Wu J, Wu F, et al. The clinical and chest CT features associated with severe and critical COVID-19 pneumonia. *Invest Radiol*. 2020;55(6):327-331.
 7. Ye Z, Zhang Y, Wang Y, Huang Z, Song B. Chest CT manifestations of new coronavirus disease 2019 (COVID-19): a pictorial review. *Eur Radiol*. 2020;30(8):4381-4389.
 8. Xia W, Shao J, Guo Y, Peng X, Li Z, Hu D. Clinical and CT features in pediatric patients with COVID-19 infection: different points from adults. *Pediatr Pulmonol*. 2020;55(5):1169-1174.