Bilateral Lymphadenopathy After COVID Vaccine in ^{18}F-Choline PET/MRI Performed for Hyperparathyroidism

Ali Kibar, MD, Fuad Aghazada, MD, Sertac Asa, MD, Rabia Lebriz Uslu Besli, MD, and Kerim Sonmezoglu, MD

Abstract: We describe a case of a 56-year-old woman with primary hyperparathyroidism. ^{18}F-Choline PET/MRI revealed incidental bilateral axillary lymphadenopathy with mild-moderate increased ^{18}F-choline uptake. The patient had her first and third doses of COVID-19 vaccines from the left arm and second dose of vaccine from the right arm before PET examination.

Key Words: hyperparathyroidism, COVID vaccine, ^{18}F-choline, PET/MRI, lymphadenopathy

(*Clin Nucl Med* 2023;48: e149–e150)

Received for publication August 15, 2022; revision accepted September 12, 2022.
From the Department of Nuclear Medicine, Istanbul University-Cerrahpaşa, Cerrahpaşa Faculty of Medicine, Istanbul, Turkey.
Conflicts of interest and sources of funding: none declared.
Correspondence to: Ali Kibar, MD, Department of Nuclear Medicine, Istanbul University-Cerrahpaşa, Cerrahpaşa Medical Faculty, Kocamustafapasa St, 34098 Fatih, Istanbul, Turkey. E-mail: ali.kibar@iuc.edu.tr.

ISSN: 0363-9762/23/4803–e149
DOI: 10.1097/RLU.0000000000004454

REFERENCES

1. Cetani F, Marcocci C, Torregrossa L, et al. Atypical parathyroid adenomas: challenging lesions in the differential diagnosis of endocrine tumors. *Endocr Relat Cancer*. 2019;26:R441–R464.
2. Duan K, Gomez Hernandez K, Mete O. Clinicopathological correlates of hyperparathyroidism. *J Clin Pathol*. 2015;68:771–787.
3. Sukan A, Reyhan M, Aydin M, et al. Preoperative evaluation of hyperparathyroidism: the role of dual-phase parathyroid scintigraphy and ultrasound imaging. *Ann Nucl Med*. 2008;22:123–131.
4. Cuderman A, Senica K, Rep S, et al. ^{18}F-Fluorocholine PET/CT in primary hyperparathyroidism: superior diagnostic performance to conventional scintigraphic imaging for localization of hyperfunctioning parathyroid glands. *J Nucl Med*. 2020;61:577–583.
5. Uslu-Beşli L, Sonmezoglu K, Teksoz S, et al. Performance of F-18 fluorocholine PET/CT for detection of hyperfunctioning parathyroid tissue in patients with elevated parathyroid hormone levels and negative or discrepant results in conventional imaging. *Korean J Radiol*. 2020;21:236–247.
6. Lezaic L, Rep S, Sever MJ, et al. ^{18}F-Fluorocholine PET/CT for localization of hyperfunctioning parathyroid tissue in primary hyperparathyroidism: a pilot study. *Eur J Nucl Med Mol Imaging*. 2014;41:2083–2089.
7. Rep S, Hocevar M, Vaupotic J, et al. ^{18}F-choline PET/CT for parathyroid scintigraphy: significantly lower radiation exposure of patients in comparison to conventional nuclear medicine imaging approaches. *J Radiol Prot*. 2018;38:343–356.
8. Evangelista L, Ravelli I, Magnani F, et al. ^{18}F-choline PET/CT and PET/MRI in primary and recurrent hyperparathyroidism: a systematic review of the literature. *Ann Nucl Med*. 2020;34:601–619.
9. Nawwar AA, Searle J, Singh R, et al. Oxford-AstraZeneca COVID-19 vaccination induced lymphadenopathy on [^{18}F]choline PET/CT-not only an FDG finding. *Eur J Nucl Med Mol Imaging*. 2021;48:2657–2658.
10. Schroeder DG, Jang S, Johnson DR, et al. Frequency and characteristics of nodal and deltoid FDG and ^{11}C-choline uptake on PET performed after COVID-19 vaccination. *AJR Am J Roentgenol*. 2021;217:1206–1216.
11. Albano D, Volpi G, Dondi F, et al. COVID-19 vaccination manifesting as unilateral lymphadenopathies detected by ^{18}F-choline PET/CT. *Clin Nucl Med*. 2022;47:e187–e189.
12. Ah-Thiane L, Ferrer L, Maucherat B, et al. Vaccine-related lymph nodes: the emerging pitfalls of ^{18}F-fluorocholine and ^{68}Ga-PSMA-11 PET/CT in the era of COVID-19 vaccination. *Clin Nucl Med*. 2022;47:575–582.
13. Cohen D, Krauthammer SH, Wolf I, et al. Hypermetabolic lymphadenopathy following administration of BNT162b2 mRNA Covid-19 vaccine: incidence assessed by [^{18}F]FDG PET-CT and relevance to study interpretation. *Eur J Nucl Med Mol Imaging*. 2021;48:1854–1863.

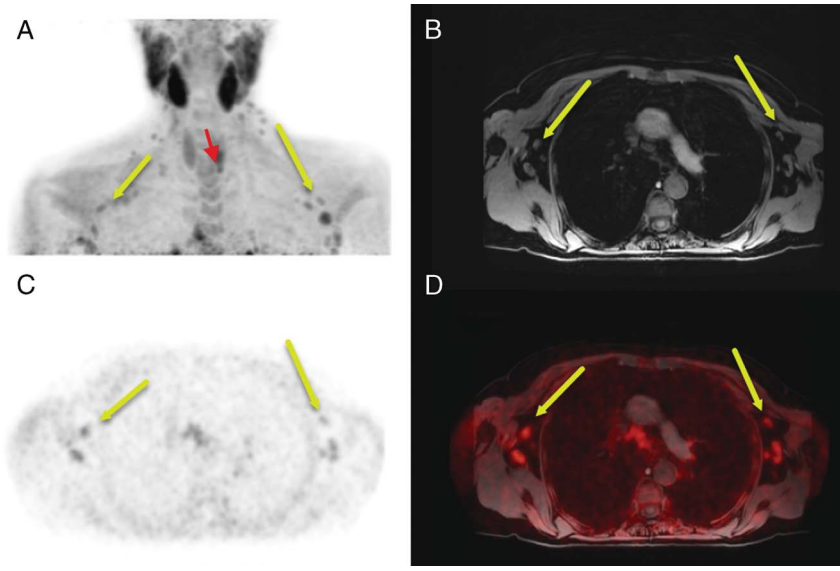

FIGURE 1. Hyperparathyroidism is a common entity in clinical practice; it is the third most common endocrinological disorder.[1] The most common cause of primary hyperparathyroidism is parathyroid adenoma. Most of the adenomas occur sporadically.[2] ^{99m}Tc-MIBI scintigraphy and ultrasound yield over 85% sensitivity and specificity.[3] If these tests occur to be negative, second-line imaging may be performed. ^{18}F-Choline (FCH) PET yields over 90% sensitivity for parathyroid adenoma detection and superior to conventional imaging methods[4–6]; other than that, FCH has lower radiation exposure to patients and shorter acquisition time than Tc-MIBI.[7,8] In this patient, PTH adenoma was detected at the left inferior of the thyroid gland (red arrow in **A**), which is surgically excised and pathologically proven afterward. Ipsilateral axillary lymphadenopathy can be incidentally detected after mRNA vaccination in FCH PET/CT[9–12] and in FDG PET/CT.[12,13] However, our patient had 2 inactivated COVID-19 vaccines (4 and 3 months before examination) and 1 mRNA vaccine (1 month before examination) before PET scan; her FCH PET images show bilateral axillary lymphadenopathy (yellow arrows), which is an unusual presentation. There was no other clinical cause for lymphadenopathy. MIP image (**A**), T1-LAVA MRI image (**B**), PET image (**C**), and PET/MRI fusion image (**D**).