[18F]F-choline PET/CT after COVID-19 vaccine: not only a pitfall on 2-[18F]FDG-PET/CT

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Abstract
We report a case of a patient with suspected primary hyperparathyroidism. The [18F]F-choline PET/CT revealed a hyper functioning parathyroid gland posterior to the lower pole of the right thyroid lobe. As coincidental finding some non-enlarged lymph nodes in the left axillary region where seen that showed increased [18F]F-choline uptake. The patient received a COVID-19 vaccination two weeks earlier. This case shows a potential pitfall of [18F]F-choline PET/CT imaging associated with the recent introduction of COVID-19 vaccination.

Case-report
A 71 year old female patient known with osteoporosis was seen at our outpatient clinic. Routine blood tests revealed hypercalcaemia (3.21 millimol per liter).

Upon inquiry she was found to have muscle cramps and high parathyroid hormone (PTH) levels suggestive for primary hyperparathyroidism. In the work-up for parathyroid gland extirpation a dual phase parathyroid scintigraphy was performed following injection of 361 MBq [99mTc]Tc-sestamibi. The single photon-emission computed tomography (SPECT/CT) scan showed faint uptake posterior to the lower pole of the right thyroid lobe. Given the low tracer accumulation, no reliable diagnosis of a parathyroid adenoma could be made. Therefore she underwent

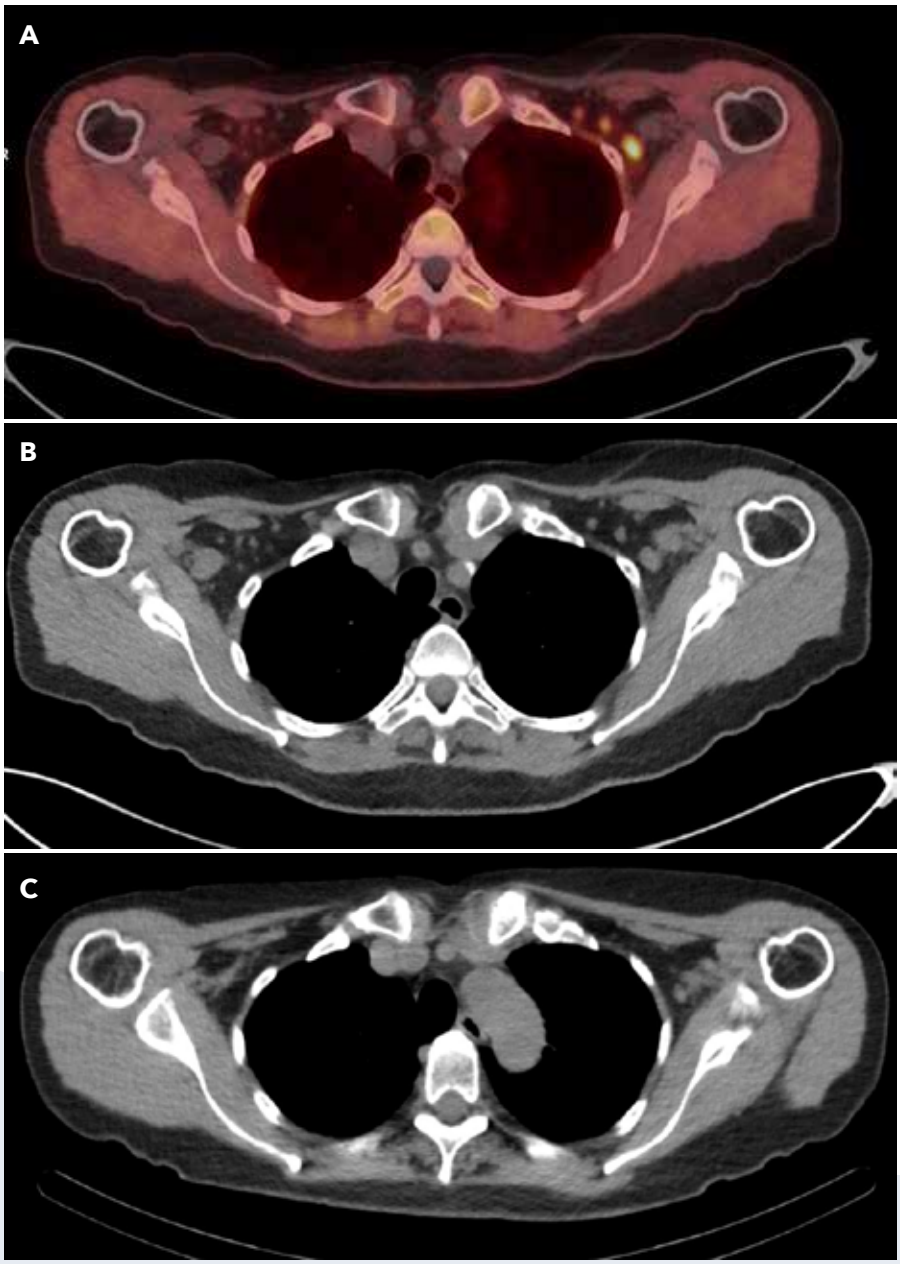

Figure 1. **A.** [18F]F-choline PET/CT trans axial image with focal uptake in left axillary lymph nodes. **B.** Non-contrast low dose CT of the PET/CT showed a few non-enlarged lymph nodes at the left axillary side. **C.** Non-contrast low dose CT of the SPECT/CT two months before showed normal lymph nodes at the left axillary side.

an [18F]F-choline positron emission tomography / computed tomography (PET/CT) two months later. The [18F]F-choline PET/CT revealed a hyper functioning parathyroid gland posterior to the lower pole of the right thyroid lobe.

As coincidental finding there were some non-enlarged lymph nodes in the left axillary region which showed increased [18F]F-choline uptake (figure 1A and B). The native CT images of the SPECT/CT two months earlier didn't show any prominent axillary lymph nodes (figure 1C).

Recently we added a question to our PET/CT questionnaire whether the patient has had a recent COVID-19 vaccination, since axillary (and in some cases cervical) post-vaccine lymphadenopathy is an known pitfall on 2-[18F]FDG-PET/CT (1). The patient had filled in that she had received a COVID-19 vaccination two weeks prior to the [18F]F-choline PET/CT.

In the Netherlands the COVID-19 vaccination programs is being deployed since January 2021. Many high-risk or elderly patients recently had their first or second dose of the vaccine. Non-specific mediastinal and hilar lymph node uptake is already known from [18F]F-choline total-body PET/CT (2). Despite the suggestion that the increased uptake is due to increased cell membrane production, the exact mechanism remains unclear (3).

Although increased 2-[18F]FDG uptake in lymph nodes after COVID-19 vaccination is already known, this case shows a potential pitfall of [18F]F-choline PET/CT imaging associated with the recent introduction of COVID-19 vaccination. It is important to consider recent COVID-19 vaccination as a possible explanation in patients with unilateral axillary lymphadenopathy. Clinical correlation combined with the pre-PET/CT questionnaire in case of unilateral axillary and cervical lymphadenopathy in the setting of recent COVID-19 vaccination could be of additional value.

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