

Original Article

Incidental findings on a Tc99m-SESTAMIBI parathyroid scan post COVID-19 vaccination

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Abstract: We present a case of abnormal findings on a Tc99m-Sestamibi parathyroid scan, post COVID-19 vaccination. The patient is a 48-year-old female presenting for evaluation of hyperparathyroidism who received the mRNA-1273 Moderna (ModernaTX, Inc.) vaccine seven days prior to the scan. The patient is right hand dominant and reported no traumatic events, inflammation, infection, or extraneous use of the left arm. The patient did report "soreness" of the extremity starting approximately 24 hours post injection which continued to the time of the study.

Keywords: Tc99m-Sestamibi increased uptake, COVID-19 vaccination

Figure 1A, 1B: Initial and delayed anterior planar images. 48-year-old healthy female, with no pertinent past medical history, presented for a parathyroid scan due to incidental hypercalcemia, elevated PTH and decreased vitamin D identified on her yearly exam blood work, indicating suspected hyperparathyroidism. The patient was injected with Tc-99m Sestamibi, intravenously, in the right antecubital fossa, followed by acquisition of planar and SPECT/CT images from the base of the skull to the diaphragm. The initial (A, 15 minutes post injection) planar image demonstrates abnormal increase in radiotracer uptake in the region of the inferior right thyroid lobe. There is also very subtle asymmetric radiotracer uptake in the proximal left upper extremity. The delayed (B, 2 hours post injection) anterior planar image demonstrates persistent abnormal radiotracer uptake in the region of the inferior right thyroid lobe. The subtle asymmetric radiotracer uptake in the proximal left upper extremity has become more obvious on the delayed image.

Figure 2A-D: Anterior and posterior MIP images, axial SPECT/CT fused and CT only images. A subsequent SPECT/CT was acquired from the base of the skull through the thorax. The maximum intensity projection (MIP) (A, anterior; B, posterior MIP) continues to illustrate the abnor-

mal persistent focal radiotracer uptake in the region of the inferior right thyroid lobe, which on fused images (not shown) corresponds to a soft tissue density most compatible with a parathyroid adenoma. The MIP images also continue to illustrate the asymmetric diffuse increase in radiotracer uptake in the proximal left upper extremity. Axial fused SPECT/CT image (C) and CT only (D) images localize the increased radiotracer activity to the muscle, particularly the deltoid and infraspinatus muscles (arrows) without anatomical abnormalities. After review of the images the patient was examined and found to have discomfort in the left upper extremity which had been present for approximately 7 days. The discomfort had started after receiving her COVID-19 vaccination, which was administered, intramuscularly, in the left deltoid. At the time no additional images were warranted and the patient was instructed to make an appointment with her general practitioner if the discomfort increased or did not subside over the following week. Over the following weeks prior to her focused parathyroidectomy the discomfort resolved, and no additional imaging studies had been conducted.

To date multiple case reports have reported hypermetabolic lymph nodes on F-18 FDG PET/CTs post COVID-19 vaccination contributing the

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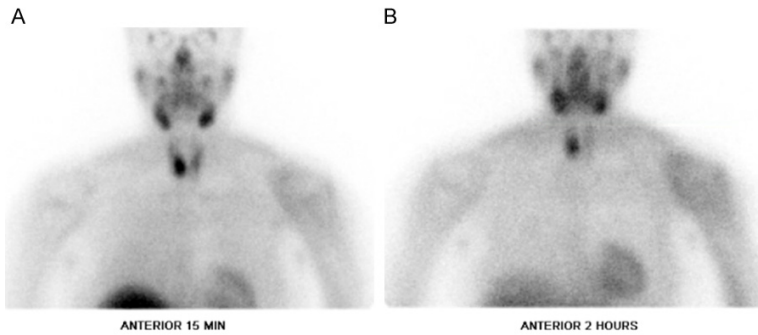


Figure 1. A, B. Initial and delayed anterior planar images.

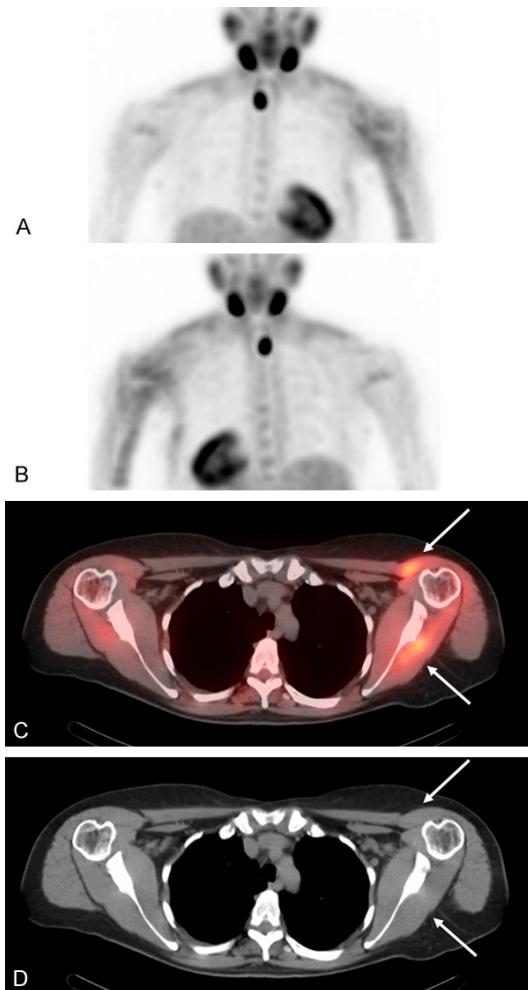


Figure 2. A-D. Anterior and posterior MIP images, axial SPECT/CT fused and CT only images.

increased uptake to inflammation [1-4]. In the context of Tc-99m Sestamibi, it has been well established that this tracer is retained in the mitochondria in a variety of cells, such as myocytes. This tracer has shown increase in activity

in areas of increased perfusion, increased mitochondria concentration and increased metabolic activity [5]. Previous papers have also illustrated extracardiac abnormal increased Tc-99m Sestamibi due to a multitude of malignant as well as benign conditions such as breast cancer, lung carcinoma, acute pulmonary emboli, iatrogenic microemboli, sarcoidosis, pneumonia, tuberculosis, contamination, and injection site [6-8].

In a search of the literature, there has not been a reported case of increased Tc-99m Sestamibi muscular uptake post COVID-19 vaccination or other vaccinations to date. This increased uptake may be due to an increase in the perfusion and vascular permeability, an increased presence of mitochondria rich cells such as macrophages and fibroblasts, or an increase in the metabolic activity of the muscles and/or inflammatory cells [5]. With the lack of increased radiotracer activity in the lymph nodes, an increase in perfusion and vascular permeability is favored to be the mechanism of increased activity. Though this is an interesting incidental finding, the significance of clinical impact remains relatively low other than to be aware of the potential finding and avoid additional unnecessary tests.

Disclosure of conflict of interest

None.

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