Case Report

Severe Hypercalcemia Related to Silicone Granulomas, as Discovered by FDG-PET

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Abstract

Silicone injected for cosmetic purposes can provoke an inflammatory granulomatous response. In turn, silicone granulomas can lead to hypercalcemia, which is a rare, though potentially life-threatening condition. Hypercalcemia is a nonspecific laboratory finding with many potential etiologies. It may be difficult for clinicians to diagnose silicone-induced hypercalcemia, since the history of cosmetic silicone injections may not be elicited from the patient. Positron emission tomography using F-18-fluorodeoxyglucose (FDG-PET) can be used to evaluate patients with unexplained hypercalcemia as a means of searching for an occult malignancy or granulomatous process. FDG-PET findings may be the initial and perhaps only indication of silicone granulomas as the cause of hypercalcemia. Nuclear medicine physicians should have a low threshold for suggesting this diagnosis, particularly in the setting of unexplained hypercalcemia. This case report highlights the value of FDG-PET in diagnosing silicone granuloma-induced hypercalcemia.

Key words: *FDG-PET, granuloma, hypercalcemia, hypermetabolism, silicone*

Introduction

Silicone has been used to enhance soft tissues for cosmetic purposes in numerous countries over the past several decades.[1] Though originally thought to be biologically inert, silicone can stimulate an inflammatory granulomatous response. Similar to other granulomatous processes, such as sarcoidosis, silicone granulomas can be associated with hypercalcemia. However, silicone granuloma-induced hypercalcemia appears to be a rare entity, with only a few cases reported in the literature.[1-5]

Positron emission tomography using F-18-fluorodeoxyglucose (FDG-PET) may be the imaging modality used to evaluate patients with unexplained hypercalcemia, particularly when searching for an occult malignancy. Granulomatous processes can be hypermetabolic on FDG-PET, especially if there is active inflammation.[6,7]

Patients may not view cosmetic silicone injections as a medical procedure and they may not relate their current complaints to the more remote injections. Therefore, the history of silicone injections may not be communicated to clinicians. The nuclear medicine physician may be the first to suggest the diagnosis of silicone granuloma-induced hypercalcemia based on FDG-PET, despite an otherwise exhaustive multidisciplinary work-up. This case report highlights the utility of FDG-PET in diagnosing silicone granulomas as a cause of severe hypercalcemia.

Case Report

A 57-year-old female presented for evaluation and management of severe hypercalcemia of unknown etiology. Calcium levels were as high as 18 mg/dL (normal range 8.9–10.1 mg/dL), with associated low parathyroid hormone levels. The patient noted muscle aches and a 30 pound weight loss, but was otherwise asymptomatic. There was no clinical evidence to suggest sarcoidosis, a connective tissue disease, or an infectious etiology.

FDG-PET was performed due to concern for a granulomatous process or occult malignancy with a paraneoplastic response. This demonstrated diffuse hypermetabolism [maximum standardized uptake value (SUV) 6.9] with associated soft tissue nodularity in the gluteal subcutaneous fat

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bilaterally [Figure 1]. Inflammation of silicone granulomas was reported as the most likely diagnosis based on imaging features.

After further discussion with the patient, a clinical history of prior silicone injections in the buttocks for cosmetic purposes was elucidated.

An ultrasound-guided biopsy of a right buttock nodule [Figure 2] yielded organizing fat necrosis with foreign body giant cell reaction, consistent with silicone granuloma.

Systemic steroids were initiated and a follow-up FDG-PET was performed after 6 months. This showed interval decrease in hypermetabolism and extent of the gluteal subcutaneous silicone granulomas bilaterally, with maximum SUV 4.0 [Figure 3]. Serum calcium also decreased into normal range. Hypercalcemia subsequently returned when systemic steroids were discontinued; hence, low-dose systemic steroids were reinitiated indefinitely.

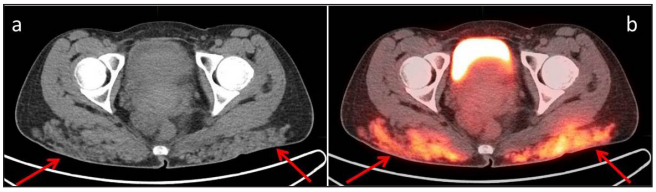

Figure 1: Representative axial computed tomography (CT) (a) and fused PET/CT (b) images from initial FDG-PET demonstrate confluent soft tissue nodularity with diffuse hypermetabolism in the gluteal subcutaneous fat bilaterally (arrows)

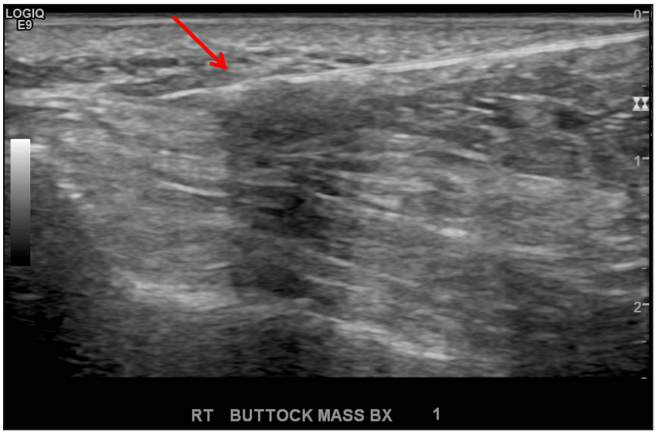

Figure 2: Ultrasound image obtained during biopsy of a right buttock subcutaneous soft tissue nodule documents the biopsy needle in the targeted nodule (arrow)

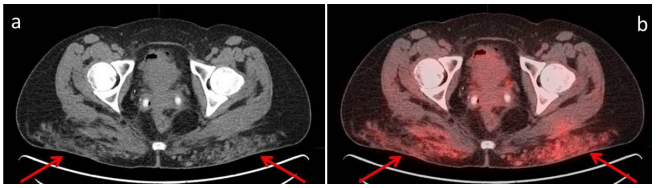

Figure 3: Representative axial CT (a) and fused PET/CT (b) images from follow-up FDG-PET demonstrate interval improvement with decreased hypermetabolism and decreased extent of soft tissue nodularity of the buttocks bilaterally (arrows)

Discussion

Hypercalcemia is a nonspecific finding with many potential etiologies. Granulomatous processes, such as sarcoidosis, are well-recognized causes of hypercalcemia. Despite this known association, only a few cases of severe hypercalcemia related to silicone granulomas have been previously reported.[1-5] Hypercalcemia is thought to be due to excess calcitriol production by macrophages in the granulomas, leading to increased intestinal absorption of calcium.[1,2,8]

FDG-PET may be used to evaluate patients with unexplained hypercalcemia, particularly when searching for an occult malignancy. It is well-established that granulomatous processes, including silicone granulomas, can be hypermetabolic on FDG-PET.[6,7]

Hypermetabolic soft tissue nodules detected in specific locations on FDG-PET may be the initial indication of underlying silicone granulomas, as clinicians may be unaware of a patient's history of cosmetic silicone injections.

Though a rare entity, silicone granuloma-induced hypercalcemia is an important diagnosis that can be made by FDG-PET imaging. Nuclear medicine physicians should have a low threshold for suggesting this diagnosis, particularly in the setting of unexplained hypercalcemia.

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Conflicts of interest

There are no conflicts of interest.

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