

Case Report

All that illuminates on radionuclide imaging is not a metastatic lesion: Role of complementary imaging

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ABSTRACT

Radionuclide imaging is a non-invasive modality based on tracer physiology widely utilized in the diagnosis, staging, therapeutic evaluation, and monitoring of metastatic disease in a spectrum of malignancies. Calcific tendinopathy is a well-recognized disorder related to the deposition of calcium hydroxyapatite crystals within tendons. We describe a patient with urothelial carcinoma of the bladder revealing increased uptake at the left hip on ^{99m}Tc labeled methylene diphosphonate scintigraphy suggesting a metastatic lesion. Cross-sectional imaging with magnetic resonance imaging confirmed the accurate diagnosis of calcific tendinopathy of gluteus maximus insertion. This case report highlights the importance of a thorough clinical evaluation and complementary imaging in assessing benign pathologies which may mimic metastatic bone lesions.

Keywords: Bladder urothelial carcinoma, Calcific tendinopathy, Gluteus maximus, Radionuclide imaging, Magnetic resonance imaging

INTRODUCTION

A bone scan is commonly used for staging of malignancies. There are a plethora of causes for increased uptake. Calcific tendinopathy is a condition due to the abnormal deposition of calcium hydroxyapatite crystals in tendons and peri-articular soft-tissue structures. Although the exact etiology is not known, the development of calcium hydroxyapatite crystals deposition is believed to be due to tissue hypoxia, reduced oxygen tension resulting in cartilaginous metaplasia and secondary mineralization.^[1] Characteristically affecting the rotator cuff tendons of the shoulder, it can be asymptomatic or symptomatic in patients and also has been noted at unusual sites such as the elbow, wrist, knee, and hip to name a few.^[2]

However, its imaging features may mimic a metastatic lesion and this case report highlights the dilemma that a clinician can face.

We describe a case of increased uptake in calcific tendinopathy of the gluteus maximus at its insertion in a 71-year-old female with carcinoma of the bladder and review the literature.

CASE REPORT

A 71-year-old female underwent a ^{99m}Tc-labeled methylene diphosphonate (^{99m}Tc-MDP) three-phase bone scan to assess her insidious onset pain in the left lower ribcage. It had appeared over 4 weeks and

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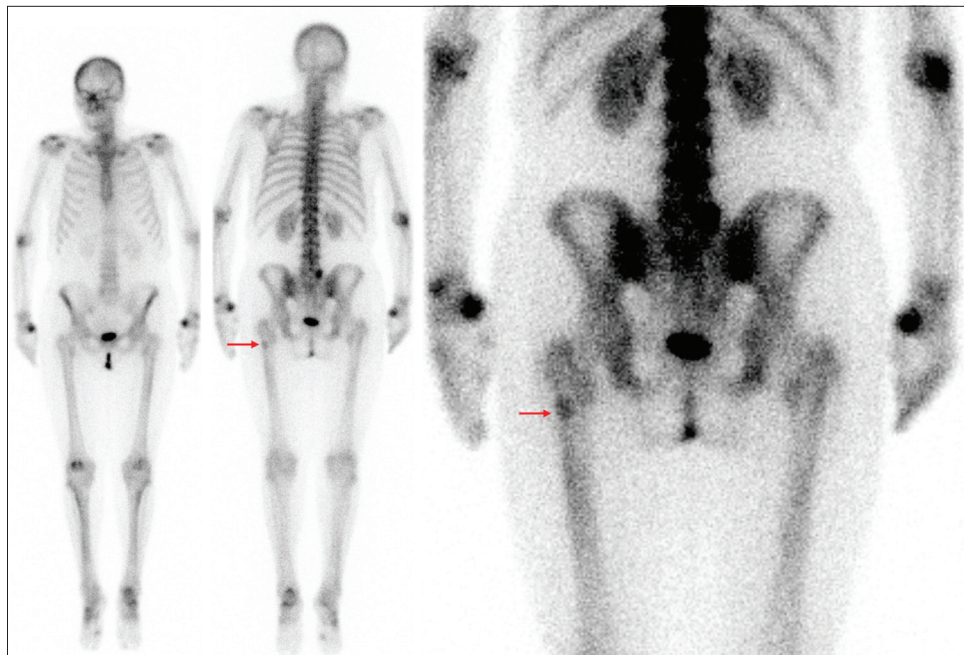


Figure 1: Bone scan showing increased uptake in the left proximal femur (arrow).

she denied any injury or fall. She was being monitored in the urology department for non-metastatic urothelial carcinoma of her bladder which was diagnosed and treated 3 years ago. With her background of bladder carcinoma, a ^{99m}Tc -MDP was undertaken to rule out metastatic disease which revealed a solitary focus of increased radiotracer uptake in the left proximal femora [Figure 1] on the posterior projection of the bone scan. An anteroposterior and lateral radiograph of the left proximal femur did not reveal any obvious bony lesions [Figure 2]. A high index of suspicion of a “tumor mimic” lead her to undergo magnetic resonance imaging (MRI). MRI revealed a T1 isointense and T2 hypointense focus involving the gluteus maximus tendon at its insertion suggestive of calcific tendinopathy. There was fluid and edema around the insertion of the gluteus maximus on fluid-sensitive sequences [Figure 3]. Clinical examination revealed no significant abnormalities. As the patient was not symptomatic, she was reassured about the findings and no specific treatment was given.

DISCUSSION

Radionuclide imaging plays a crucial role in the diagnosis, staging, treatment planning, and surveillance of patients with urothelial carcinoma of the bladder as with other cancers.^[3]

Traditional scintigraphy with ^{99m}Tc -MDP is a highly sensitive method in detecting osseous abnormalities and is the standard of care in the evaluation algorithm of patients with suspected metastatic disease.^[4] However, a lack of specificity and diagnostic accuracy can lead to erroneous diagnosis or misinterpretation.^[5]



Figure 2: Anteroposterior (a) and lateral (b) radiographs of the left hip and femur did not reveal any calcification.

Calcific tendinopathy, also known as calcific tendinitis, is a well-known disorder of unknown etiology. It is commonly seen around the shoulder (supraspinatus/rotator cuff tendons) and the hip joint.^[6] Although these can be asymptomatic with a self-limiting course, symptomatic calcific tendinitis at unusual sites (hip, knee, wrist, and elbow) has been reported in the literature.^[7] Calcific tendinitis is a cell-mediated disease

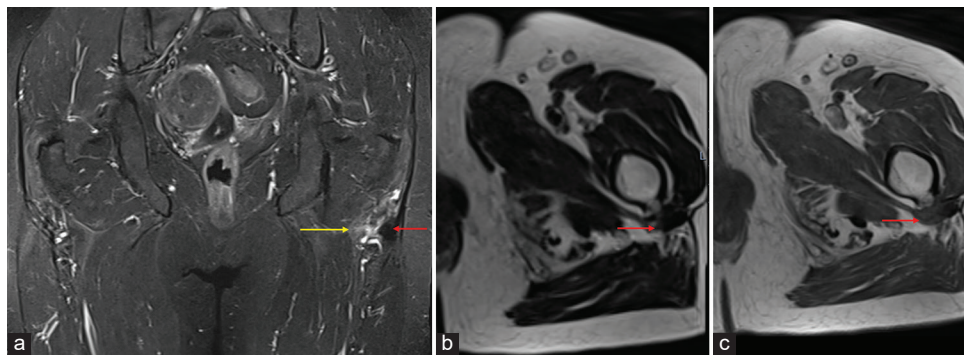


Figure 3: Short tau inversion recovery coronal (a), T1 (b), and T2 (c) showing calcification in relation to the insertion of the left gluteus maximus (red arrow) with mild edema (yellow arrow).

passing through four stages of development, leading to fibrocartilaginous metaplasia and secondary mineralization which is subsequently resorbed in the resorptive phase by phagocytosis.^[1] Crystal deposition incites an inflammatory response with increased tissue metabolism and activated inflammatory cells which are possibly responsible for the increased uptake of tracer on nuclear imaging.^[8] A typical clinical picture is characterized by spontaneous onset, pain in the affected joint with referred pain, and spontaneous resolution. Radiologically, it can cause a diagnostic dilemma with findings such as calcification, subperiosteal formation of bone, and bone erosions illuminating as a metastatic “hot spot” on traditional ^{99m}Tc-MDP bone scans. Cross-sectional imaging with ultrasound and MRI plays a crucial role in reaching the appropriate diagnosis and initiating management. Computer tomography (CT) is useful to visualize calcification in doubtful cases.

Calcific tendinopathy demonstrating uptake on nuclear imaging studies mimicking malignancy has been well documented in the literature. Low and Toms in a systemic narrative review analyzed 55 case reports of calcification along the linea aspera which included calcific tendinopathy or enthesopathy of gluteus maximus and adductor muscles. They found that all 17 patients who had nuclear imaging demonstrated uptake in the region of abnormality.^[9] Similarly, Van Damme *et al.*, in a case series, described the uptake of tracer in the bone scan in five patients with gluteus maximus calcific tendinitis.^[10] In line with these reports, our case highlights that calcific tendinopathy may demonstrate uptake on nuclear imaging and mimic malignancy. Other described causes of false-positive uptake in the similar region are stains/avulsion injuries, bursae, and enthesopathy.^[8]

As our patient was asymptomatic, she was reassured about the findings and no specific treatment was given. In symptomatic cases, it can be treated by ultrasound-guided steroid injection with or without barbotage.

Learning points

1. Nuclear medicine imaging applies radiotracer physiology in non-invasive evaluation, diagnosis, staging, treatment, and monitoring of spectrum of malignancies
2. Calcific tendinopathy can mimic a malignant pathology on nuclear medicine imaging
3. Scintigraphy techniques should be used in conjunction with anatomic imaging such as CT or MRI to confirm the diagnosis in such a patient.

CONCLUSION

This case highlights that calcific tendinopathy may demonstrate increased uptake on nuclear imaging and mimic malignancy. We want to emphasise the importance of using additional imaging modalities like MRI or CT to accurately diagnose abnormalities detected on bone scan.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Herman J, Le Goff B, De Lima J, Brion R, Chevalier C, Blanchard F, *et al.* Pro-inflammatory effects of human apatite crystals extracted from patients suffering from calcific tendinopathy. *Arthritis Res Ther* 2021;23:131.
2. Iyengar KP, Yusta-Zato JA, Botchu R. Calcific tendinopathy of the pronator quadratus muscle: A rare site and cause of ulnar sided wrist pain. *J Clin Orthop Trauma* 2022;32:101968.

3. Bagheri MH, Ahlman MA, Lindenberg L, Turkbey B, Lin J, Cahid Civelek A, *et al.* Advances in medical imaging for the diagnosis and management of common genitourinary cancers. *Urol Oncol* 2017;35:473-91.
4. Jabeen N, Rasheed R, Rafique A, Murtaza G. The established nuclear medicine modalities for imaging of bone metastases. *Curr Med Imaging Rev* 2019;15:819-30.
5. Agrawal A, Purandare N, Shah S, Rangarajan V. Metastatic mimics on bone scan: "All that glitters is not metastatic". *Indian J Nucl Med* 2016;31:185-90.
6. Siegal DS, Wu JS, Newman JS, Del Cura JL, Hochman MG. Calcific tendinitis: A pictorial review. *Can Assoc Radiol J* 2009;60:263-72.
7. Archer BD, Friedman L, Stilgenbauer S, Bressler H. Symptomatic calcific tendinitis at unusual sites. *Can Assoc Radiol J* 1992;43:203-7.
8. Sopov V, Bernstine H, Stern D, Yefremov N, Sosna J, Groshar D. Spectrum of focal benign musculoskeletal 18F-FDG uptake at PET/CT of the shoulder and pelvis. *AJR Am J Roentgenol* 2009;192:1029-35.
9. Low SB, Toms AP. Calcification of the linea aspera: A systematic narrative review. *Eur J Radiol Open* 2019;6:101-5.
10. Van Damme K, De Coster L, Mermuys K, Van den Eeckhaut A, Walgraeve N, De Geeter F. Bone scan findings in calcific tendinitis at the gluteus maximus insertion: Some illustrative cases. *Radiol Case Rep* 2017;12:168-74.

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