

Case Report

Imaging in calcific tendinitis of linea aspera: A case report and review of literature

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ABSTRACT

Linea aspera, the osseous ridge in the upper posterior femur, offers attachment to multiple muscles and tendons forming a fibroentheses. Deposition of calcium hydroxyapatite crystal and subsequent inflammation leads to tendinitis and calcification. This process is relatively rare at linea aspera but is a cause of pain and movement restriction. Radiographs are many times misleading as the linea aspera irregularity and calcific proliferation mimic irregular periosteal reaction associated with surface bone malignancies. MRI and CT are complementary and problem-solving. Awareness of the specific location and imaging features aids in the diagnosis of this condition which is frequently managed by a conservative approach avoiding the need for invasive procedures like biopsy for diagnosis. This case report depicts classical imaging features of this entity on multiple modalities.

Keywords: Linea aspera, Tendinitis, Magnetic resonance imaging, Computed tomography, Ultrasonography

INTRODUCTION

Calcific tendinitis or tendonitis is a self-limiting condition of unknown etiology caused by deposition of calcium hydroxyapatite crystals in tendons and at the enthesis. The shoulder joint is commonly involved with overall incidence and incidence of radiologically apparent cases being 3% and 7%, respectively.^[1,2] There is a predilection for the middle-aged female population. A similar condition affecting the linea aspera is rare but commonly presents with osseous involvement, unlike other locations where the calcification is predominantly confined to the tendons.^[3] This unusual feature creates a diagnostic dilemma as imaging shows cortical irregularities, marrow edema resembling surface malignancies. This case reports a similar scenario and highlights imaging appearances on various modalities awareness of which enables a conservative approach and avoids the need for biopsy for diagnosis.

CASE REPORT

A 55-year female presented with 2 weeks of the left upper thigh pain. The pain was continuous and nagging in nature. Hip joint movements were unrestricted. There was no history of injury or fever. As a part of the initial evaluation, anteroposterior and lateral radiographs of the left femur with hip joint were acquired. Radiographs showed focal cortical irregularity, amorphous calcification along the posteromedial aspect spanning the proximal femur better demonstrated on the lateral view [Figure 1]. No fractures were seen. Adjacent fat planes were not displaced or obliterated. No obvious soft-tissue component was made out. On radiographs, the possibility of stress fracture-related periosteal reaction or surface malignancy was considered and

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further evaluation was requested. Ultrasonography (USG) demonstrated focal cortical irregularity and overlying muscle edema and thin fluid layering [Figure 2]. No solid mass or increased vascularity was demonstrated. On MRI examination, focal bony proliferation was noted along with periosteal and marrow edema in the posterior aspect of the upper femur with edema extending into the focal muscle attachments – gluteus maximus, adductors, and vastus lateralis [Figure 3]. No soft-tissue component was seen. CT correlation confirmed focal thickening and cortical irregularity of proximal linea aspera – a bony ridge in the posterior femur [Figure 4]. Based on the imaging features, a diagnosis of acute calcific tendinitis of linea aspera was made. The patient was managed with NSAIDs, rest, and cold packs. Presently the patient is symptom-free and suggested image-guided steroid injection or needling of the calcium if symptoms recur on further follow-ups.

DISCUSSION

Linea aspera is a “Y”-shaped longitudinal bony ridge present on the posterior aspect of the upper femur and offers attachment to multiple muscles and tendons [Figure 5]. From medial to lateral, it offers insertion to vastus medialis, medial intermuscular septum, adductor brevis, adductor longus, adductor magnus, the short head of biceps femoris, posterior intermuscular septum, vastus lateralis, and vastus intermedius. The cranial most portion gives attachment to the gluteus maximus and is separately termed as gluteal tuberosity.^[4]

Calcific tendinitis is a condition of uncertain etiology wherein a particular form of calcium (apatite) deposition within the tendon incites inflammation. The various stages include pre-calcification, calcific, and post-calcific phases.^[5] The pre-calcification stage is generally asymptomatic. The

calcific stage further has formative, resting, and resorptive phases with the latter most phase corresponding to maximum inflammation and hence the symptoms. Post-calcific stage is usually pain free with the disappearance of calcium deposit with replacement by fibrosis. Histopathology shows amorphous calcifications, cystic changes, varying degrees of stromal fibrosis, chronic inflammation, histiocytic proliferation, chondroid metaplasia, reparative new bone, and multinucleated giant cells.^[6]

Calcific tendinitis of linea aspera/gluteal tuberosity has slightly different pathophysiology and presentation as it

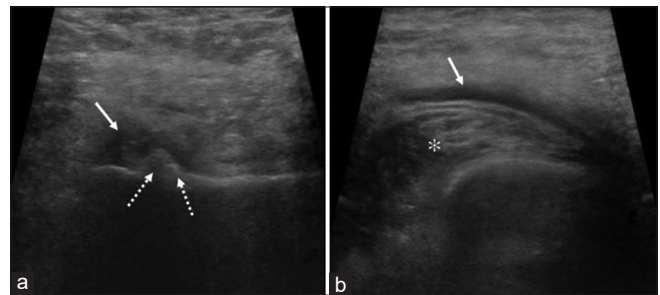


Figure 2: A 55-year-old female with upper thigh pain. Focused ultrasonography of the upper posterolateral thigh at the site of pain shows bony irregularity (dotted arrow) with adjacent hypoechoic soft tissue (white arrow in a), surrounding echogenic muscles (* in b), and thin fluid layering (white arrow in b).

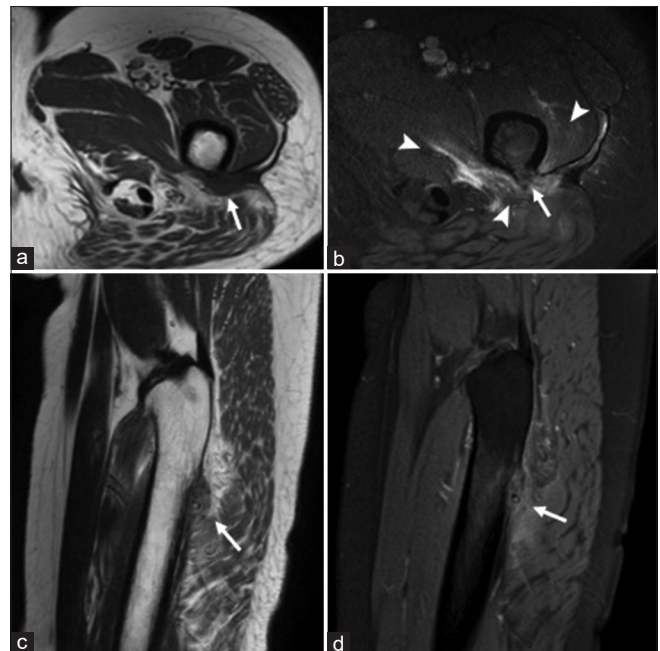


Figure 3: A 55-year-old female with upper thigh pain. T2 and PD in axial sections (a and b) and sagittal sections (c and d) show focal bony proliferation (white arrow), peri-osseous edema, subtle marrow edema, and edema within the muscles attaching to linea aspera – gluteus maximus, adductors, and vastus lateralis (arrowheads).

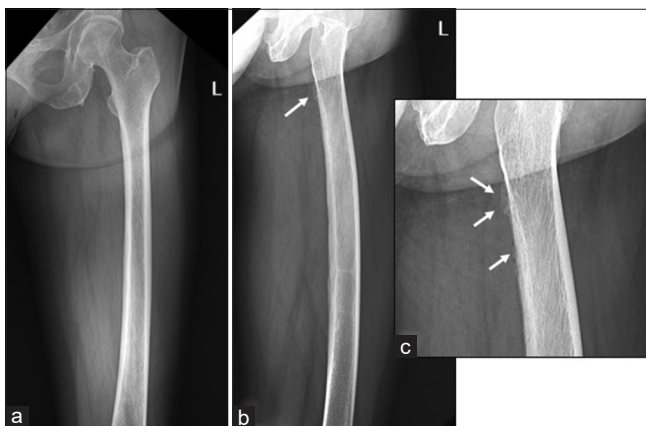


Figure 1: A 55-year-old female with upper thigh pain. (a) AP and lateral (b) radiograph of the left femur shows a focal cortical thickening and irregularity on the posteromedial aspect (white arrows), (zoomed on “c” showing additional areas).

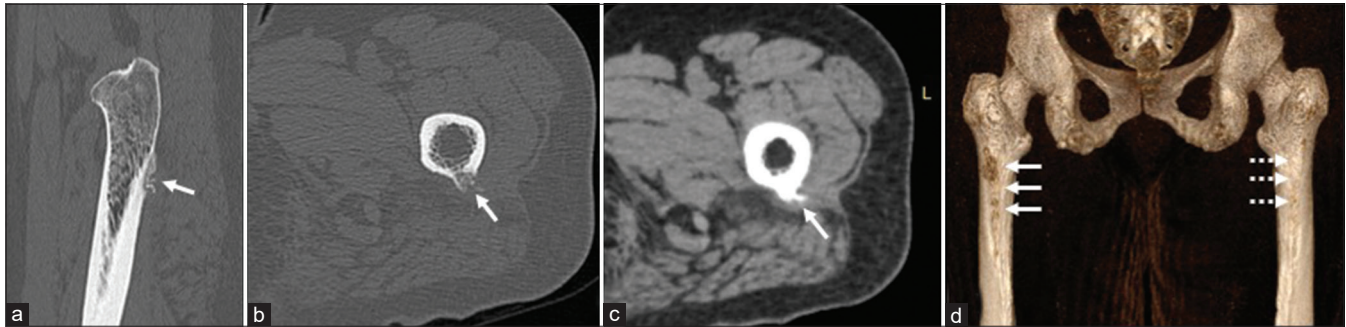


Figure 4: A 55-year-old female with upper thigh pain. (a-c) Coronal oblique and axial CT in bone window and soft-tissue windows show focal cortical irregularity, bone proliferation along the gluteal tuberosity and linea aspera, soft-tissue thickening. (d) Volume rendering of bilateral femurs posterior aspect shows thickening and irregularity along the linea aspera (solid white arrows). Dotted white arrows represent normal linea aspera for comparison.

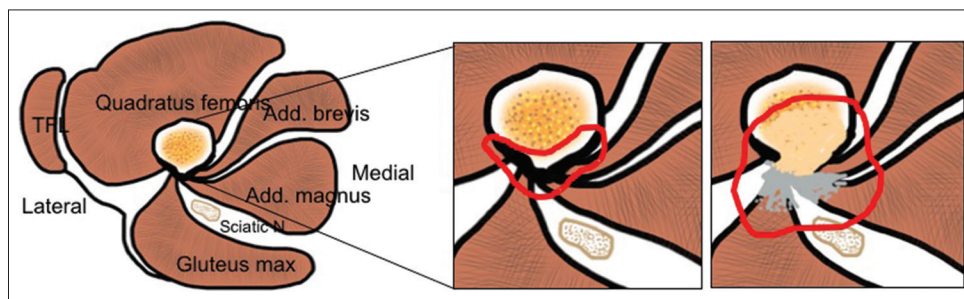


Figure 5: A 55-year-old female with upper thigh pain. Illustration of muscle attachments to linea aspera – thickened ridge on the posterolateral femur along with abnormal calcifications and marrow involvement.

is commonly associated with osseous involvement. The proposed reasons include a combination of enthesitis (secondary to traction or seronegative arthropathy) and calcific tendinitis resulting in cortical irregularity, enthesophyte formation, and marrow edema.^[4] The other possibility is due to inflammation and hypervascularity of large muscle mass incited by crystal deposition resulting in adjacent osseous resorption accompanied by strong mechanical forces together causing cortical and marrow changes.^[6] Similar osseous changes have been described in humerus at tuberosities and at pectoralis major attachment.^[6]

Radiographs are the initial imaging tool and can show faint curvilinear calcifications referred to as “comet-tail” close to the cortex. Various other forms of calcification include amorphous, “flame”-like and globular patterns. Tangential views are necessary to characterize the type of calcification. Focal cortical thickening, irregularity, and cystic changes can be seen. Radiographs alone often redirect the physician in suggesting possible surface malignancies such as juxtacortical osteosarcoma as the calcification can mimic irregular periosteal reaction or a tumorous bone formation.^[3,6,7] On USG, cortical irregularity and adjacent muscle edema can be appreciated. The presence of any associated soft-tissue component can be assessed. Calcium deposits appear as

amorphous, curvilinear, or rounded hyperechoic areas with posterior acoustic shadowing. Acute inflammation can show some vascular signal on Doppler.

CT is a very useful modality as it is sensitive to calcium detection, characterization, and location. It can also ascertain the continuity of calcium with muscle, tendon, cortex, and medulla. The calcifications generally conform to the shape of the tendon or muscle and are hence seen as curvilinear or “comet-tail” shaped. Amorphous, stippled forms are also described. Gluteus maximus muscle is more commonly involved than adductors. Cortical erosions and focal sclerosis can be documented. Small soft-tissue components and inflammation are often missed on CT.^[3,4,6-8] MR offers advantages in evaluating the inflammation, associated soft tissue, and marrow edema.^[3,6] Paradoxically, the presence of marrow edema on MR directs to a more sinister process such as neoplasm, and often a combination of imaging along with detailed clinical information is necessary to avoid invasive procedures.^[9] On bone scintigraphy, focal eccentric cortical uptake is seen.^[6]

Some articles describe spontaneous resolution of the calcification though exact incidence is not known.^[4] Treatment is usually conservative with physiotherapy, local hot or cold compressions, and NSAIDs. Image-guided

steroid injection and needling of the calcium deposits are an option for non-responding cases. Extracorporeal shock wave therapy is suggested by few authors. Surgery is rarely indicated.^[10]

CONCLUSION

Calcific tendinitis of linea aspera though rare in occurrence poses a diagnostic challenge due to frequent osseous involvement mimicking more sinister pathology. Imaging features, especially CT and MR, are quite characteristic and often complimentary.

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.

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