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Intraosseous Lipoma of the calcaneus: A rare and often missed cause of chronic heel pain

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Abstract
Intraosseous Lipoma is one of the rarest benign bone tumours formed by mature adipose tissue. The incidence has been reported to be less than 0.1% of all primary bone tumors. Cases have been reported in the tibia, fibula, metatarsals and calcaneus. The differential diagnosis of an intraosseous lipoma in the calcaneus include plantar fasciitis, retrocalcaneal bursitis, gout, aneurysmal bone cyst, unicameral bone cyst, osteoblastoma, stress fracture etc. Herein, we reported a 58 year old female who presented with chronic right heel pain. She was being treated conservatively with no relief in symptoms. On initial evaluation, calcaneal X-rays revealed an expansile unicameral lytic lesion. The diagnosis was confirmed as calcaneal lipoma on CT scan and magnetic resonance imaging and further on biopsy. The patient underwent curettage and bone grafting with synthetic bone graft substitute under spinal anaesthesia. On a 3-month postoperative follow-up, the patient returned to full ambulation. 6-months postoperative radiographs demonstrated satisfactory remodelling and consolidation of the graft. The purpose of this article is three fold: a) Firstly, to emphasise the possibility of bony lesions like calcaneal lipomas as a rare cause of chronic heel pain as opposed to the usual suspects which are mostly of soft tissue origin. b) Secondly, how including plain radiographs in the initial evaluation of these patients could easily diminish missed and delayed diagnosis of these lesions. c) And thirdly, to discuss the treatment rationale based on symptoms, site and size of the lesion.

Keywords: Intraosseous lipoma, Calcaneus, Bone tumour, Heel pain, Bone graft.

Introduction
Heel pain is a common presentation at any outpatient clinic. Heel pain may originate from either bone or the surrounding soft tissues with tendo Achilles tendinitis and plantar fasciitis being the two most common causes. We report a case of intraosseous lipoma of the calcaneus presenting with chronic right sided heel pain. This tumour constitutes 0.1% of benign bone tumors with 8% prevalence in the calcaneus. [1]. The low incidence can be attributed to the fact that a vast majority of these cases are asymptomatic and, therefore go undiagnosed. [2]. The differential diagnosis of an intraosseous lipoma in the calcaneus includes plantar fasciitis, retrocalcaneal bursitis, gout, stress fracture, unicameral bone cyst, aneurysmal bone cyst, osteoblastoma, enchondroma, chondromyxoid fibroma, nonossifying fibroma, giant cell tumor, chondroblastoma, fibrous dysplasia and chondrosarcoma. Intraosseous lipomas are most commonly found in the lower extremity. The prevalence is found to be higher in patients aged 30-60 years. [2]. When symptomatic, the most frequent presentation is a localized dull pain with soft tissue edema surrounding the heel and ankle. [3]. Radiologically, the tumor is commonly found plantar to the angle of Gissane. [4] On plain radiographs they present as a radiolucent lesion with thin, well-defined margins. Magnetic resonance images will show a signal intensity similar to that of normal fat tissue on T1 and T2-weighted sections. [5] Most asymptomatic cases can be managed conservatively, because these tumors sometimes regress spontaneously. Surgical excision with or without bone grafting and fixation is reserved only for symptomatic lesions and the ones with the risk of impending pathological fractures. [6]

2. Case Presentation
A 58-year-old female presented to the outpatient clinic at our Institute with complaints of right posterior heel pain, on and off since about 10 years. The pain was most severe during the morning hours and was triggered by prolonged standing and walking and relieved by rest and nonsteroidal anti-inflammatory drugs. The pain was associated with swelling over the ankle and foot. There was no complaint of paraesthesia in the foot. She had no history of trauma, or any other form of injury to the heel. She had a medical history significant for insulin-dependent diabetes and hypertension since about 10 years, with history of occasional smoking and allergy to Ampicillin.
Physical examination revealed no significant local swelling. There was mild tenderness on palpation over the posterior and medial aspect of the heel. The ankle and subtalar joint had full range of motion. The patient had been diagnosed with plantar fasciitis and was being treated conservatively with footwear modifications, foot intrinsic muscle exercises and gastrocnemius and plantar fascia stretching exercises and nonsteroidal anti-inflammatory drugs. However, the patient observed no improvement in symptoms in spite of a prolonged course of

conservative treatment. Laboratory reports were unremarkable with moderately elevated ESR of 24 mm/hr.

The patient was referred for X-rays (anteroposterior and lateral views). X-ray revealed a unicameral expansile, lytic lesions with sclerotic margins [Fig. 1]. Sclerotic margins with no cortical erosions around the lesion in the right heel were noted on computed tomography (CT) scan [Fig. 2]. The patient was also subjected to MRI which showed a well-defined T1/T2 hyperintense lesion measuring approximately 40x18x25 mm seen in the anterior and mid part of the calcaneus with suppression on STIR images – suggestive of calcaneal lipoma [Fig. 3]. The MRI did not reveal any inflammation in the plantar fascia, and there was no atrophy in the digiti minimi (against tarsal tunnel syndrome) or any infective lesion. Therefore, based on these clinical and radiological findings, the diagnosis of intraosseous calcaneal lipoma was established.

The patient underwent right calcaneal intraosseous lipoma excision, curettage and bone grafting with synthetic bone graft substitute under spinal anaesthesia. Considering the anatomical site and size of the lesion, there was a low probability for articular surface collapse and occurrence of calcaneal fracture. Therefore, no prophylactic fixation was undertaken. The procedure went well without any postoperative complications. The immediate postoperative X-ray was satisfactory [Fig. 4]. Histopathological examination showed mature adipose tissue with delicate fibrous septae and no atypical cells/ lipoblasts further confirming the diagnosis [Fig. 5]. The patient returned to full ambulation by the third month postoperatively. Consequently, 6-months postoperative radiographs demonstrated satisfactory remodelling and consolidation of the graft [Fig. 6].

3. Discussion

On plain radiographs, an intraosseous lipoma presents as an osteolytic lesion with marginal sclerosis. The central calcification when present, corresponds histologically to localized infarction and necrosis. [7] Typically a CT scan shows a well circumscribed, non-expansile, osteolytic lesion with negative Hounsfield units, with values corresponding to subcutaneous fat. [8] MRI reveals a homogeneous high intensity signal on T1 sequences and low intensity on fat suppression, similar to those of the subcutaneous tissue. [9] This combined characteristic radiological presentation may suffice to accurately diagnose an intraosseous lipoma in most cases.

The treatment of an intraosseous calcaneal lipoma should be decided on an individual basis. Most authors agree that asymptomatic intraosseous lipomas of the calcaneus can be managed with watchful waiting. [10] Surgical treatment is reserved for patients with persistent pain related to the lesion, or indeed large lesions. [10] However it should be well understood that in many cases the origin of the pain might be the ankle or the subtalar joint or an unrelated local soft tissue pathology and not the lesion itself.

Pogoda et al [11] in a series of 50 calcaneal bone cysts in 47 patients tried to establish an association between the size of the lesion and the risk of developing subsequent pathological fractures. The authors proposed a “critical size”, occupying the entire distance from the medial to the lateral cortex and at least 30% of the anteroposterior dimension. They concluded that cystic lesions exceeding this critical size should be managed surgically and supplemented with internal fixation. However, the low incidence of pathological fractures associated with calcaneal lipomas can be explained by the hypothesis that the presence of a cavity at this normally anatomically hypodense area is less significant for bone strength and only rarely leads to fractures under physiological loading.

4. Figures

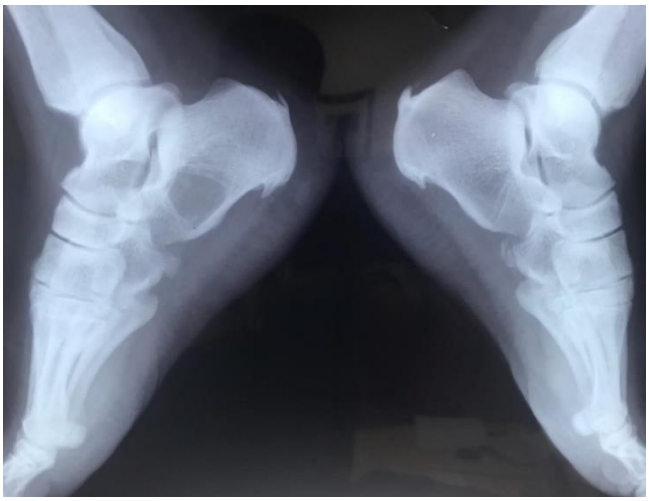

Fig 1: Bilateral heel X-ray showing an osteolytic lesion in the right calcaneus with sclerotic margins.

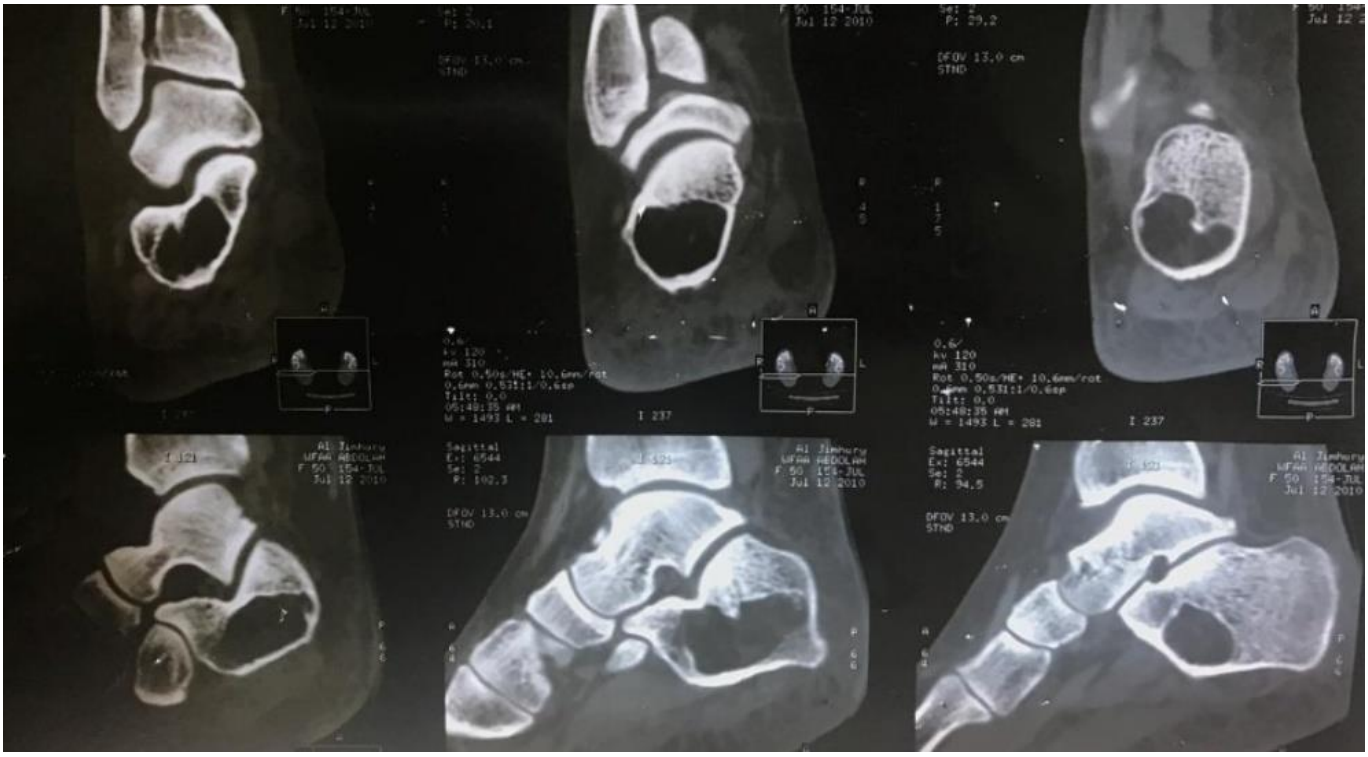

Fig 2: CT scan images showing a well circumscribed, non-expansile, osteolytic lesion with negative Hounsfield units

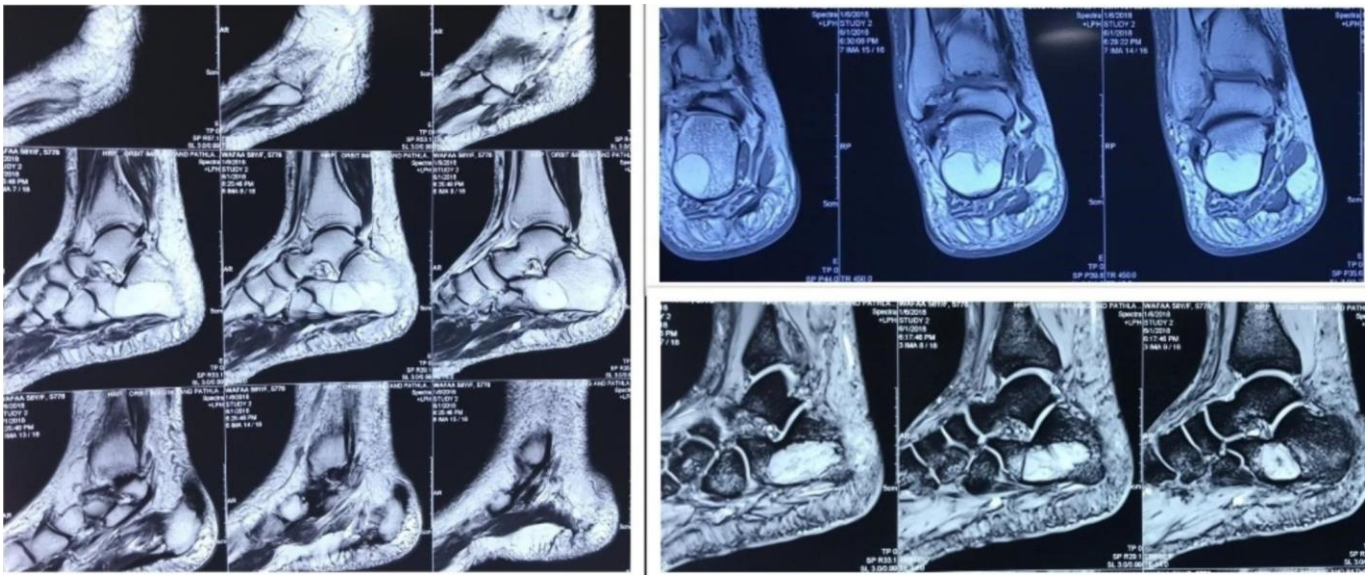

Fig 3: MRI images showing a well-defined T1/T2 hyperintense lesion in the anterior and mid part of the calcaneus with suppression on STIR images

Fig 4: Immediate postoperative radiographic images

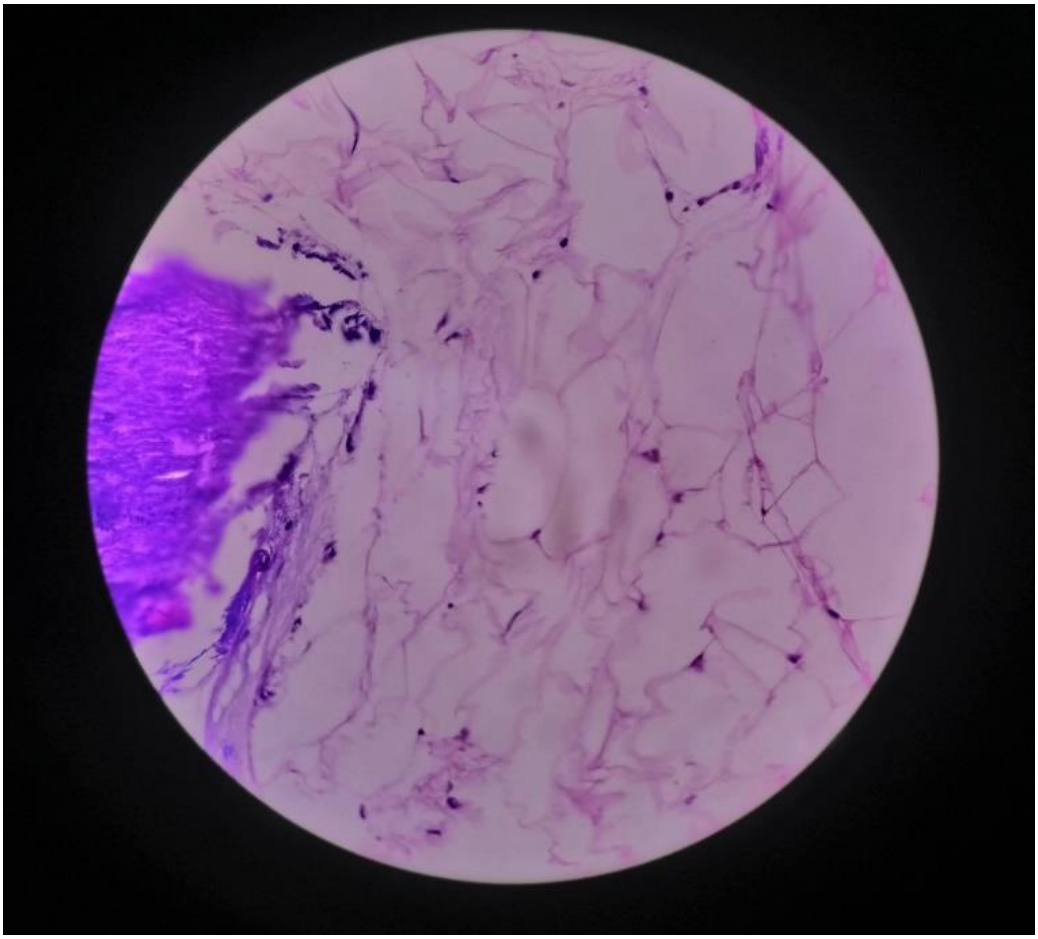

Fig 5: Histopathological images showing mature adipose tissue with fibrous septae

Fig 6: Radiographic images on 6 months follow up

5. Conclusion

We suggest X-ray examination of all patients presenting with chronic heel pain in order to rule out differential diagnosis other than plantar fasciitis, tendo Achilles tendonitis, etc. In patients diagnosed with unilateral lipoma of the calcaneus, involvement of the contralateral side must always be ruled out. Treatment should be individualized based on the patient's symptoms, the location and the size of the lesion and the possibility of an impending pathological fracture.

6. References

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