

(CASE REPORT)



Intraosseous lipoma of the calcaneus: A case report and review of the literature

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Abstract

Intraosseous lipoma of the calcaneus is a rare benign primary tumor. It presents a problem of differential diagnosis with solitary lytic image on standard radiography. CT and MRI can reveal the fatty nature of these lesions. The appearance is typical for stage 2 lipomas achieving the cockade sign, although stage 3 may require pathological verification.

Keywords: Intra osseous lipoma; Calcaneus; Cockade sign; CT; MRI.

1. Introduction

The development and occurrence of primary tumours in the calcaneus are rare. Intraosseous lipoma is a benign tumour, the diagnosis of which can be incidental in imaging or most often following pain during exercise.

We report the case of a calcaneal lipoma in a 45-year-old patient who presented with pain in the right foot after running.

2. Case report

A 45-year-old man, with no noticeable history, presented with plantar pain in the right heel, which occurred after physical exertion following a race. Physical examination revealed swelling of the soft parts of the plantar tissue, without inflammatory signs.

A standard X-ray showed a well-defined osteolytic lesion of the neck of the calcaneus, with regular contours. This lesion has a discreetly opaque center and a thin sclerotic rim surrounds it, without cortical interruption or periosteal reaction (figure 1). CT scan showed an attenuation value of -88 HU corresponding to fatty tissue (figure 2a), and an isodense center with nodular calcification, all creating a cockade appearance (figure 2b, 2c).

MRI confirmed the fatty content in hypersignal T1 (figure 3a), suppressed on the DP FAT-SAT sequence (figure 3b). The center corresponding to the necrosis is hypointense T1 with a hypersignal in DP FAT-SAT.

These findings are consistent with a stage 2 intraosseous lipoma of the calcaneus.

3. Discussion

Intraosseous lipoma accounts for around 0.1% to 2.5% of all benign bone tumours and is most common in adults, with a slight male predominance. [1]

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It originates in bone marrow cavities and is defined by the proliferation of mature adipocytes in the absence of hematopoietic cells and bony trabeculae. However, the pathogenesis remains poorly understood; some authors consider it a benign primary tumour, while others attribute it to remodeling secondary to trauma, infection or bone infarction. [1]

According to Milgram, bone lipomas exhibit three evolutionary stages histologically [2]:

- Stage 1: the lesion contains normal adipocytes with no additional anomalies.
- Stage 2: the lesion contains normal adipocytes, calcifications, and necrotic alterations.
- Stage 3: extensive calcifications, cystic changes, and adiponecrosis.

Most bone lipomas are solitary, occurring in 71% of cases in the lower limbs, preferentially located in the calcaneus (32% of cases), and metaphysis of long bones (upper end of the femur in 20% of cases) [1, 3]. It is mostly located around the base of the neck at the neutral triangle of the calcaneus. [4, 5]



Figure 1 Plain x-ray of the foot in profile view showing a partially lucent formation with an opaque centre and a well-limited oval shape. There is no evidence of cortical rupture or periosteal reaction.



Figure 2 CT scan of the foot in sagittal planes, soft tissue window (a) and bone window (b, c) showing a lytic, well-limited formation with fatty content (-88 HU). A thin sclerotic rim surrounds it and it contains a nodular calcified center. This appearance creates the “cockade sign”.

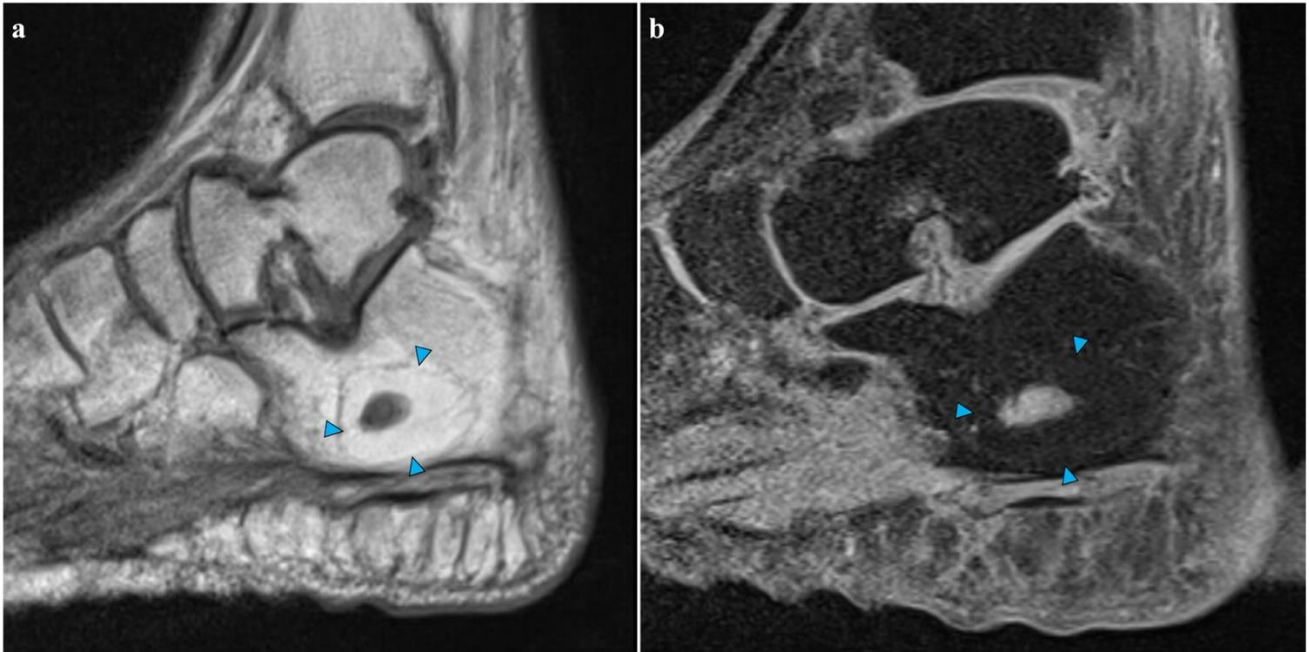


Figure 3 MRI in sagittal T1 (a) and DP fat sat (b) sequences, showing the fatty component of the calcaneal formation in hypersignal T1 and hyposignal on the sequence with fat saturation. The center of the lesion is in hyposignal T1 and hypersignal DP FS, corresponding to an adiponecrotic nidus.

On imaging, it may be discovered incidentally or following moderate pain, often attributed to an articular cause. Plain radiography is the first modality of investigation and reveals a well-limited osteolytic lesion with geographic pattern and sclerotic margins, sometimes with central single or ring-like calcifications. An expansion and thinning of the adjacent cortical bone are also possible. [1, 4, 5]

CT and MRI confirm the fatty nature of the lesion and specify the location, extension, and possible pathological fracture: the density measurement with CT finds a low attenuation value [5], typically between -30 UH and -120 UH.

On MRI, Stage 1 lipoma appears as a homogeneous T1 and T2 hypersignal, completely suppressed on short-time inversion recovery sequence (STIR) or other fat-saturated sequences. This stage of lipoma can be mistaken for a simple cyst on plain radiography. In this case, CT and MRI confirm the liquid nature of the latter. [3]

Stage 2 lipomas are characterised by the presence of the necrotic nidus, which is frequently central, exhibits hyposignal T1 and fat-saturated T2 hypersignal on MRI in addition to annular calcifications that are hyperdense on CT and hypointense on MRI: this appearance is typical for calcaneus lipoma and achieves the cockade sign. [5]

Stage 3 lipomas have bony septa, cystic changes and thickening of the peripheral sclerosis, without signs of local aggressiveness. The bony trabeculae are resorbed, distinguishing this stage from bony infarcts [3]. Differential diagnoses may include non-ossifying fibroma, aneurysmal bone cyst, fibrous dysplasia, giant cell tumour or chondroid tumours: in this case, a biopsy with histological verification may be necessary to confirm the diagnosis [3].

4. Conclusion

The radiological appearance of intraosseous lipomas depends on their stage of development. Stage 2 is the easiest form to diagnose. Stages 1 and 3 have differential diagnoses. Knowledge of the locations and typical aspects guides the diagnosis.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

- [1] Eyzaguirre E, Liqiang W, Karla GM, Rajendra K, Alberto A, Gatalica Z. Intraosseous lipoma. A clinical, radiologic, and pathologic study of 5 cases. *Ann Diagn Pathol.* 2007 Oct;11(5):320-5. doi: 10.1016/j.anndiagpath.2006.09.006. Epub 2007 Aug 17. PMID: 17870016.
- [2] Milgram JW. Intraosseous lipomas. A clinicopathologic study of 66 cases. *Clin Orthop Relat Res.* 1988 Jun;(231):277-302. PMID: 3131056.
- [3] Campbell RS, Grainger AJ, Mangham DC, Beggs I, Teh J, Davies AM. Intraosseous lipoma: report of 35 new cases and a review of the literature. *Skeletal Radiol.* 2003 Apr;32(4):209-22. doi: 10.1007/s00256-002-0616-7. Epub 2003 Mar 12. PMID: 12652336.
- [4] Yan L, Zong J, Chu J, Wang W, Li M, Wang X, Song M, Wang S. Primary tumours of the calcaneus. *Oncol Lett.* 2018 Jun;15(6):8901-8914. doi: 10.3892/ol.2018.8487. Epub 2018 Apr 13. PMID: 29928329; PMCID: PMC6004727.
- [5] Weinfeld GD, Yu GV, Good JJ. Intraosseous lipoma of the calcaneus: a review and report of four cases. *J Foot Ankle Surg.* 2002 Nov-Dec;41(6):398-411. doi: 10.1016/s1067-2516(02)80087-4. PMID: 12500792.