

Osteoid osteoma of the calcaneum: a small painful lesion causing confusing symptoms

Case summary

An 8-year-old girl presented with left ankle pain and limping for 1 month. There was no history of

trauma or febrile illness. Her medical history was unremarkable, and there was no family history of rheumatism. Physical examination revealed mild soft tissue swelling and tenderness over the lateral aspect of the ankle and heel. No skin change, local warmth or focal mass was evident, but the range of ankle movement was limited by pain. The child's symptoms did not improve after treatment with oral paracetamol or a topical heparinoid. Nocturnal pain was present but not typical. Inflammatory arthritis was once suspected. Blood tests revealed only a mildly elevated white cell count ($16.7 \times 10^9 /L$), while the erythrocyte sedimentation rate, levels of C-reactive protein, calcium and phosphate, and various autoimmune markers, as well as liver and renal biochemical test results were normal.

Initial radiographic (Fig 1a) and ultrasonographic examinations of the ankle yielded nil abnormal. Subsequent magnetic resonance imaging showed extensive bone marrow oedema over the calcaneum with adjacent soft tissue changes (Fig 2), so the possibility of osteomyelitis or bone tumour were entertained. Bone scintigraphy showed a diffuse increase in radionuclide uptake over the left foot and ankle centred at the subtalar joint. Gallium scintigraphy showed no supportive evidence of infection or tumour. A diagnosis of subtalar arthritis was made.

A few months passed, but the patient continued walking tip-toe to avoid weight-bearing on her heel. Orthopaedic examination revealed mild swelling around the Achilles tendon insertion, and tenderness of the medial and lateral aspects of



FIG 1. (a) Lateral radiograph taken upon initial presentation. No lesion could be identified. (b) Lateral radiograph taken 5 months later shows a subtle tiny radiolucent lesion at the calcaneum (arrow) posterior to the crucial angle of Gissane



FIG 2. Magnetic resonance imaging (MRI) performed 3 months after onset of symptoms

(a) Sagittal short T1 inversion recovery (STIR), (b) sagittal T1, (c) axial STIR, and (d) axial T1 images are shown. (a, c) The STIR images show extensive bone marrow oedema in the calcaneum and adjacent soft tissue changes. (b, d) The nidus of the osteoid osteoma shows intermediate signal on T1 images, being surrounded by small area of hypointense reactive sclerosis

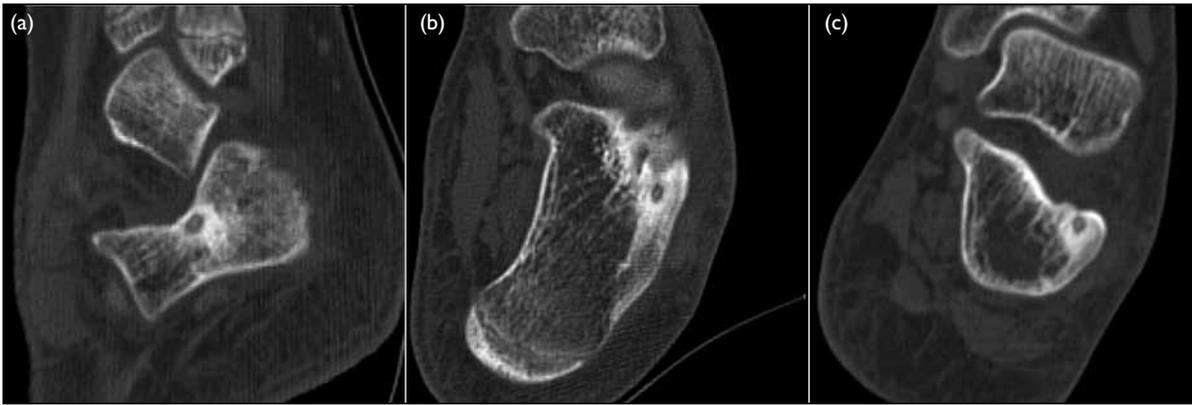


FIG 3. Computed tomographic (CT) study performed 6 months after initial presentation
 (a) Sagittal, (b) axial, and (c) coronal images reveal the small radiolucent nidus of this intra-articular osteoid osteoma. Internal calcification of the nidus is noted. A small area of perinidal reactive sclerosis is evident

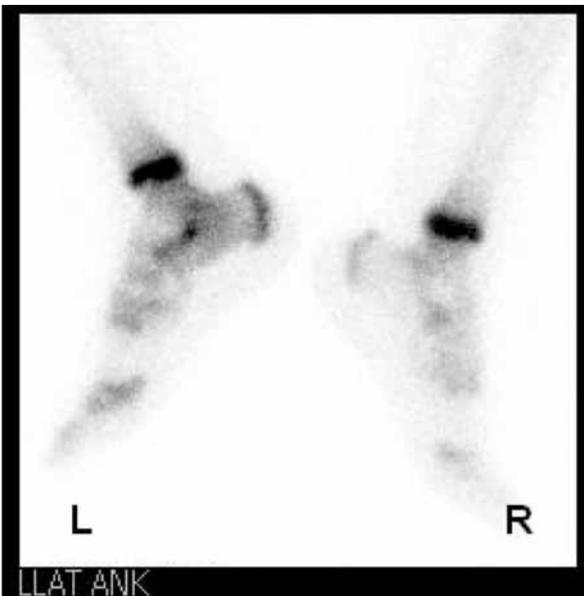


FIG 4. Lateral bone scintigraphy showing a generalised increase in radionuclide uptake over left ankle and hind foot region (centred around the subtalar joint). More intense focal uptake close to the posterior talar facet of the left calcaneum corresponds to the nidus

calcaneum, as well as limited subtalar joint motion. Computed tomography (CT) was arranged for the clinical suspicion of tarsal coalition.

A definitive diagnosis of osteoid osteoma was finally made based on the CT performed 6 months after the initial presentation. A tiny radiolucent nidus (5 mm) with mild perinidal sclerosis was demonstrated over the lateral-superior subcortical aspect of the calcaneum, just posterior to the crucial angle and very close to the subtalar joint capsule (Fig 3). Upon retrospective review, a very subtle lesion was noted on the radiograph taken 5 months after initial presentation (Fig 1b). The focal nidal uptake

on the bone scan image was initially masked by the diffuse subtalar activity, and only became apparent after dedicated adjustment of the window settings (Fig 4).

Discussion

Osteoid osteoma comprises approximately 10% of all benign bone tumours. It is most commonly found in young adults and children, and shows a male predominance.¹ Its occurrence in the foot was reported to account for 4 to 16% of cases, with the talus being the most common site (31-59%). Osteoid osteoma of the calcaneum comprises about 12.5 to 22% of cases involving the foot.² Talar and calcaneal osteoid osteomas are usually subperiosteal or cancellous.

Intra-articular osteoid osteoma refers to any lesion surrounded by or very close to the joint capsule and synovium.^{3,4} These lesions are small and notoriously cause articular pain. Symptoms may precede radiographic changes by many months. Perinidal reactive sclerosis can be minimal or absent, and a small radiolucent nidus can be radiographically occult.^{2,4}

Pain is not necessarily worse at night, and joint pain relieved by salicylates may have other causes.^{3,4} Clinical symptoms are non-specific, and include joint effusion, warmth, tenderness, stiffness, muscle atrophy, joint degeneration, and if chronic, even contracture.^{2,5} Extracapsular periosteal new bone formation and hyperplastic synovitis resembling inflammatory arthritis histologically has been described.^{1,5} Delay in making a definitive diagnosis for up to 5 years with a mean delay of 2 years has been reported.^{3,5} Patients could be misdiagnosed as having inflammatory arthritis, chronic ankle sprain, osteomyelitis, stress fracture, aggressive bone tumour, tarsal coalition, or even hysteria.^{2,5}

The best imaging modality to detect a small nidus is CT, which can also help elicit nidal calcification and perinidal sclerosis. On magnetic resonance imaging, the nidus may show a low/intermediate T1 signal, a variable T2 signal, and variable contrast enhancement^{1,4,6}; presence of extensive bone marrow oedema and adjacent soft tissue changes can be confused with osteomyelitis, stress fracture, monoarthritis, or an aggressive bone tumour. Bone scans are a sensitive means of outlining the symptomatic areas, and usually reveal generalised increased activity around the joint, due to synovitis, hyperaemia or regional osteoporosis. The classical double density sign may be absent.⁶

In conclusion, intra-articular osteoid osteomas (eg in the calcaneum) are difficult to diagnose. Such small bony lesions may manifest as joint disease,

and initial radiographic examinations can be normal. Suspicion should arise when young patients present with chronic joint pain not responding well to usual treatment, and especially when there is nocturnal pain.

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