

Brodie's Abscess

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Section: Musculoskeletal system

Imaging Technique: Nuclear medicine conventional

Imaging Technique: CT

Imaging Technique: MR

Imaging Technique: MR

Case Type: Clinical Cases

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Patient: 15 years, male

Clinical History:

The imaging features are described of a 15 year old male presenting with pain in the lower leg . Radiographs and CT showed a well-defined metaphyseal lucency abutting the physis . MR imaging also demonstrated extensive bone marrow oedema.

Imaging Findings:

A 15 year old male presented with a 3 month history of pain in his left lower leg . On examination there was tenderness and slight swelling over the distal tibia . He was afebrile . Radiographs showed a well-defined , flame-shaped lucency in the distal tibial metaphysis surrounded by considerable sclerosis (Fig. 1) . Infection was suspected and technetium99 methyldiphosphonate (MDP) scintigraphy performed .This demonstrated markedly increased uptake on all three phases in the distal tibia only (Fig. 2). CT confirmed the presence of a well-defined lucency with surrounding sclerosis in the metaphysis and reformatted images showed its precise relationship to the growth plate (Fig. 3a,b) .A small sequestrum was also demonstrated (Fig. 3c). Magnetic resonance (MR) imaging clearly demonstrated the full extent of the cavity and showed extensive soft tissue changes in the bone marrow which extended into the epiphysis (Fig. 4). Following intravenous gadolinium-DTPA there was marked enhancement of both the margins of the cavity and surrounding soft tissues .There was no joint effusion and only minor changes in the extra-osseous soft tissues . The cavity was surgically drained under general anaesthesia and culture showed staphylococcus aureus . Recovery was uneventful .

Discussion:

Osteomyelitis is usually due to haematogenous spread of infection to bone . Commonest in children and young adults , the metaphysis of a long bone is usually affected reflecting its rich blood supply . The tibia is the commonest site affected (1). In the immature skeleton the physeal plate acts as a barrier preventing the spread of infection to the epiphysis . In infants , blood vessels penetrate the physis (growth plate) allowing infection to extend into or primarily affect the epiphysis (2). An intraosseous or Brodie`s abscess is a complication of subacute osteomyelitis and typically is seen on radiographs as a central , well-defined metaphyseal lucency with surrounding reactive sclerosis . The presence of a channel or tract connecting this lucency to the physis is characteristic (3). Cortical extension results in periostitis and involvement of the extra-osseous soft-tissues . Technetium 99 MDP scintigraphy

demonstrates intense uptake on flow, diffusion and delayed images and is particularly useful in excluding other areas of clinically occult infection . CT more clearly defines the margins of the abscess cavity, the extent of soft tissue involvement and is very sensitive in identifying sequestra . Rarely fat-fluid levels and gas are also demonstrated within the abscess . On MR imaging Brodie`s abscesses appear as well-defined intra-osseous regions of low-to-intermediate signal intensity on T1-weighted images and of high signal intensity on T2-weighted images surrounded by a rim of low signal intensity due to sclerotic bone (4). They are surrounded by extensive changes in the bone marrow which may extend into the extra-osseous soft tissues . The differentiation of soft tissue extension of infection and soft tissue oedema , however , is difficult . Following intravenous gadolinium these soft tissue changes and granulation tissue lining the abscess cavity and associated tracks enhance . Sequestra appear as areas of low signal on all sequences and do not enhance . Although MR imaging is the most sensitive method of diagnosing musculoskeletal infection, it remains non-specific despite the description of several helpful ancillary signs (5). The differential diagnosis of Brodie`s abscess includes bone neoplasms including , particularly when small and cortically located , osteoid osteomas .

Differential Diagnosis List: Brodie`s Abscess

Final Diagnosis: Brodie`s Abscess

References:

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- Grey AC , Davies AM , Mangham DC et al .The `penumbra` sign on T1-weighted MR imaging in subacute osteomyelitis : frequency cause and significance . Clinical Radiology 1998,53,587-592. (PMID:[9744584](#))

Figure 1

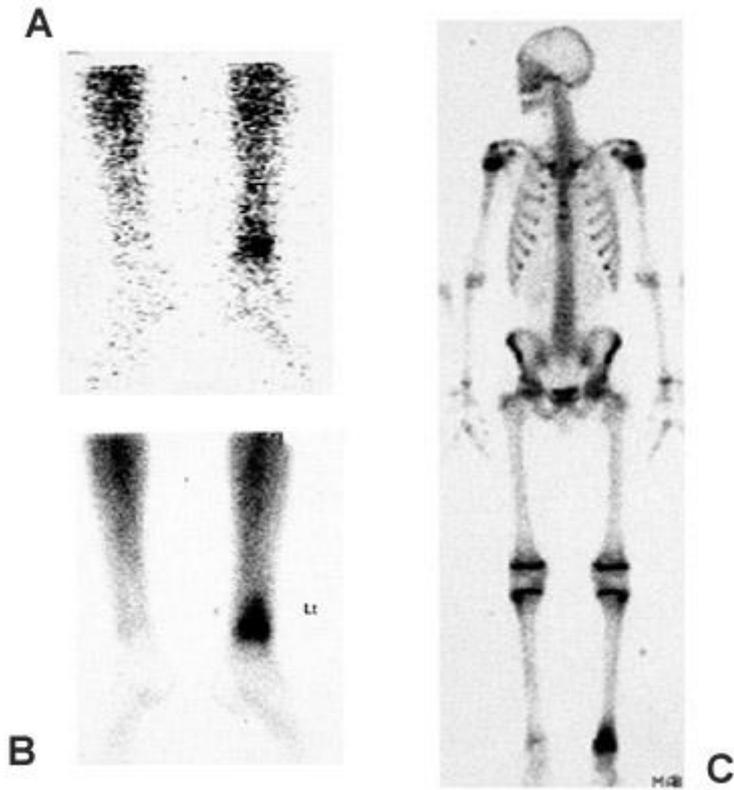
a



Description: AP radiograph of the ankle showing a flame-shaped metaphyseal lucency with surrounding sclerosis. **Origin:**

Figure 2

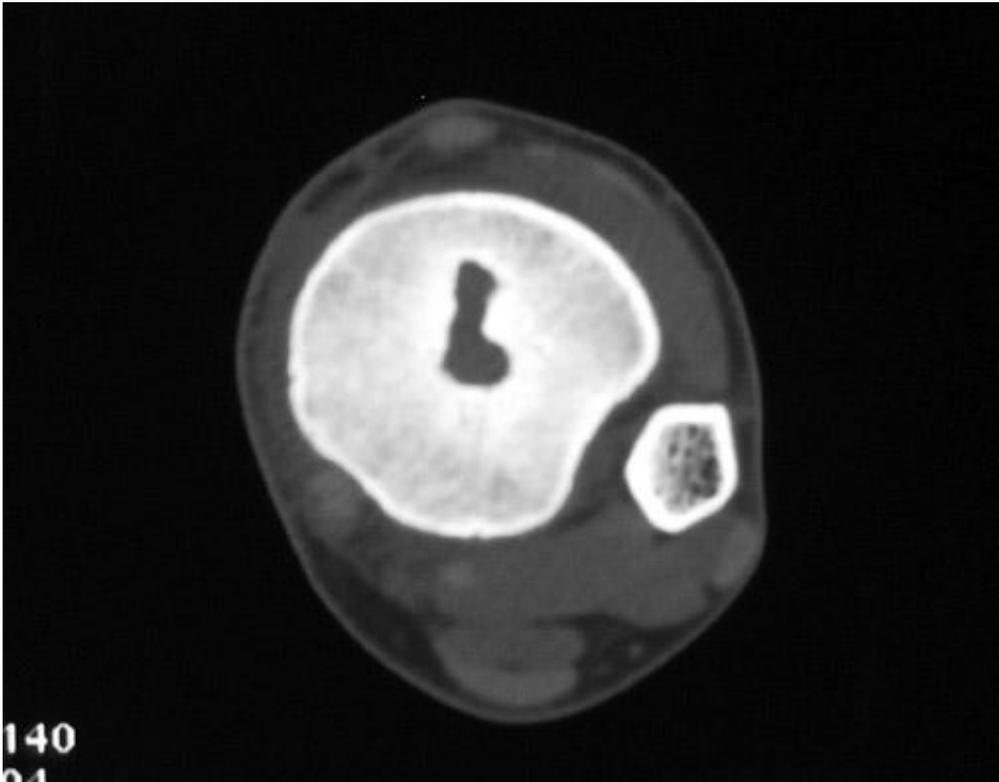
a



Description: Flow (a) , diffusion (b) and static (c) images of techcetium99 MDP bone scan showing intense uptake in the distal tibia. **Origin:**

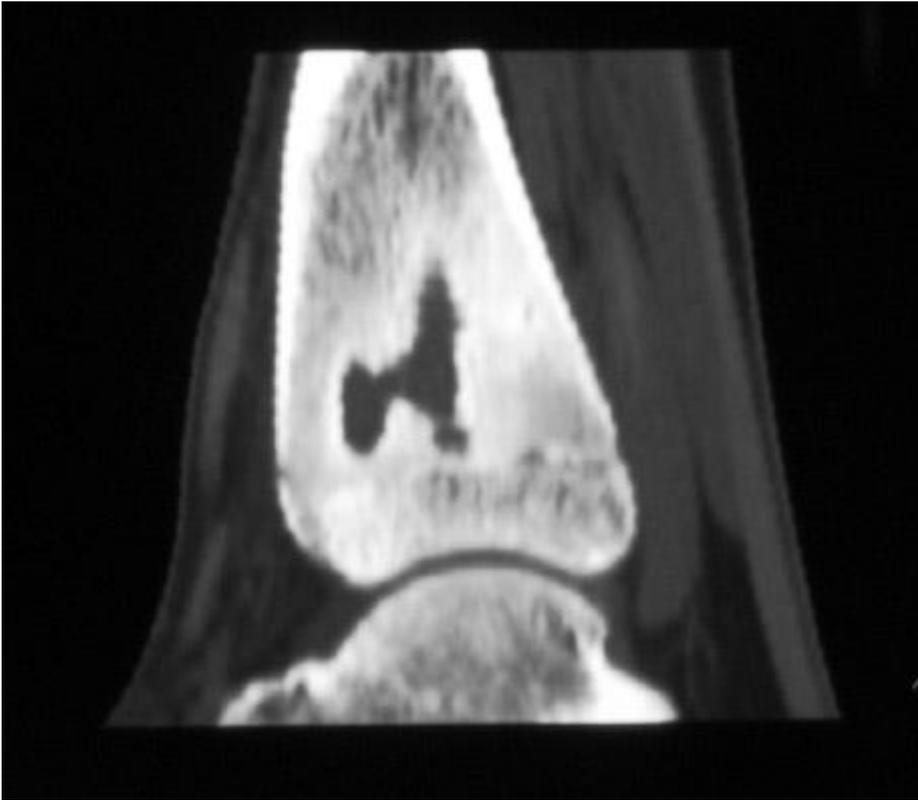
Figure 3

a



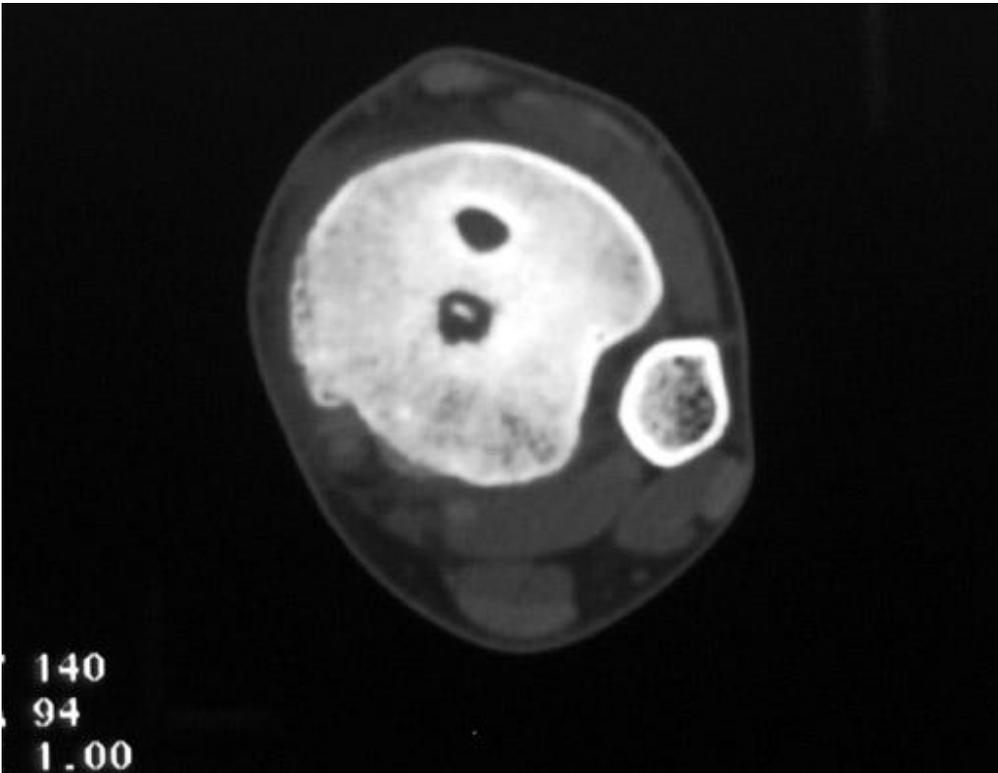
Description: Axial image (bone windows) showing a well-defined lucency and surrounding sclerosis.
Origin:

b



Description: Sagittal reformatted image showing the extent of the lucency. Note the characteristic channel leading towards the physis. **Origin:**

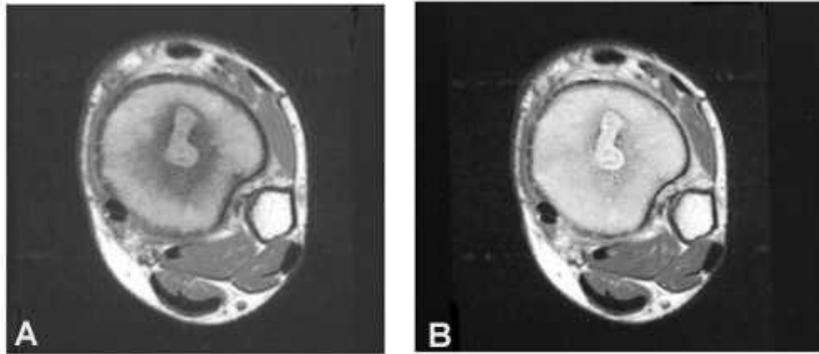
c



Description: Axial image showing a small sequestrum. **Origin:**

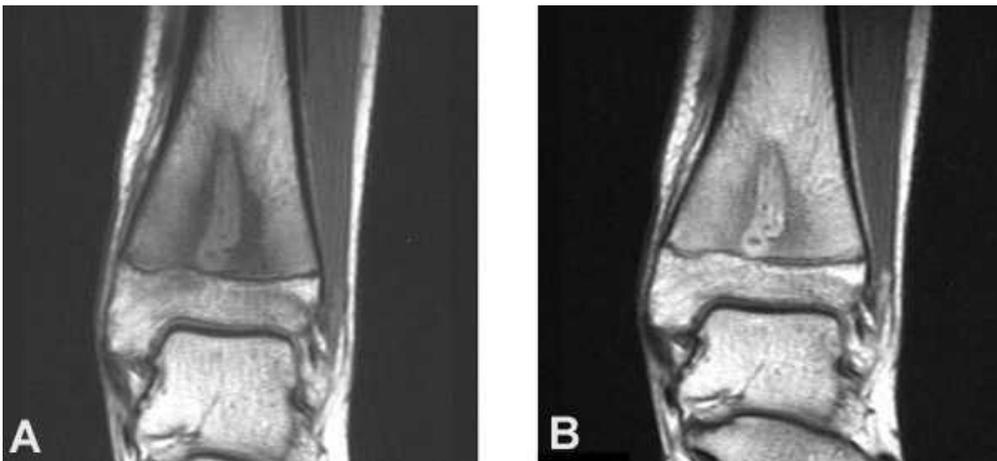
Figure 4

a



Description: Axial T1W images pre- (a) and post- (b) gadolinium showing enhancement of the margins of the cavity and of the surrounding bone marrow. **Origin:**

b



Description: Coronal T1W images pre- (a) and post- (b) gadolinium showing enhancement of the central cavity and surrounding bone marrow. **Origin:**



Description: Sagittal T1W pre-(a) and post- (b) gadolinium and STIR (c) images showing the full extent of the cavity and surrounding marrow changes which extend into the epiphysis. **Origin:**