

Aneurysmal bone cyst of the second metatarsal: three-phase bone scan findings and radiological assessment

To the Editor: Aneurysmal bone cysts (ABC), are usually located in the long bones and the spine and have a benign pathology [1, 2]. ABC are mainly diagnosed in infants, children and young adults. Pain and/or pathological fractures are the most common findings [1-3]. A rare location for ABC is metatarsal bone and few such cases occurring in children have been reported in the literature [4-6]. We have studied an ABC of the second metatarsal bone in a 15 years old boy who was admitted to the hospital with a persistent, progressive pain and gradually increasing swelling in the left foot, during the last year. There was no history of trauma. Clinical examination revealed diffuse swelling and tenderness of the left foot. Routine laboratory analyses were all normal. Plain radiograph of the left foot revealed an osteolytic and markedly expansive

lesion in the second metatarsal bone (Fig. 1A). Computed tomography (CT) (Fig. 1B) and magnetic resonance (MR) (Fig. 1C) images showed a large well-defined cystic lesion with thin cortex and internal septa, in the second metatarsal bone. A three-phase bone scan was performed after the intravenous injection of 740 MBq technetium-99m methylene diphosphonate (^{99m}Tc -MDP). The blood-flow (Fig. 2A), blood-pool (Fig. 2B) and delayed images (Fig. 2C, D) showed increased vascularity and increased radiotracer accumulation in the left second metatarsal bone. The delayed lateral image demonstrated the characteristic doughnut sign [3] with moderately increased radiotracer accumulation at the periphery of the lesion, that may be due to hyperemia and little activity in its center (Fig. 2D). The patient underwent surgery. The lesion

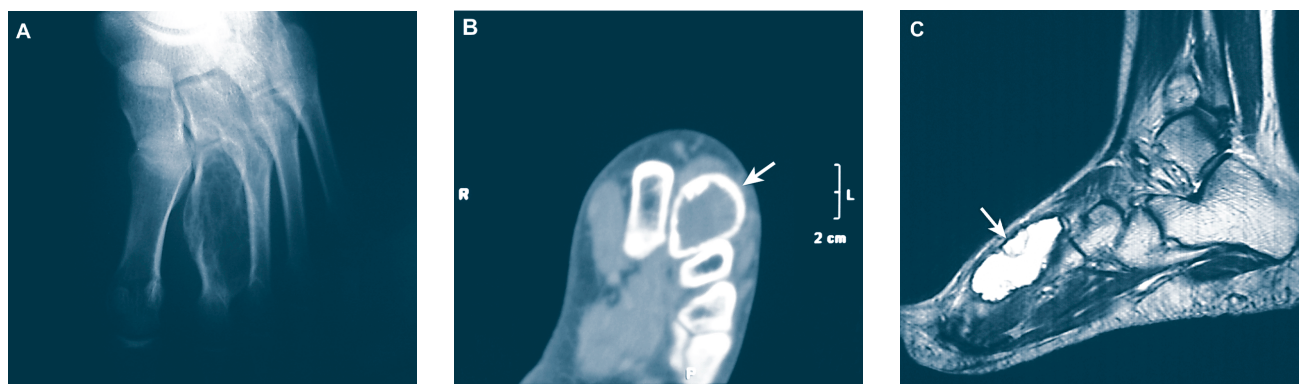


Figure 1. Plain radiograph of the left foot (A) revealed an osteolytic and markedly expansive lesion (arrow) in the second metatarsal bone. Axial multi-detector computed tomography (B) and sagittal T2-weighted magnetic resonance (C) images showed a well-defined expansive cystic lesion with thinned cortex (arrows) and internal septa (arrowheads) in the second metatarsal bone.

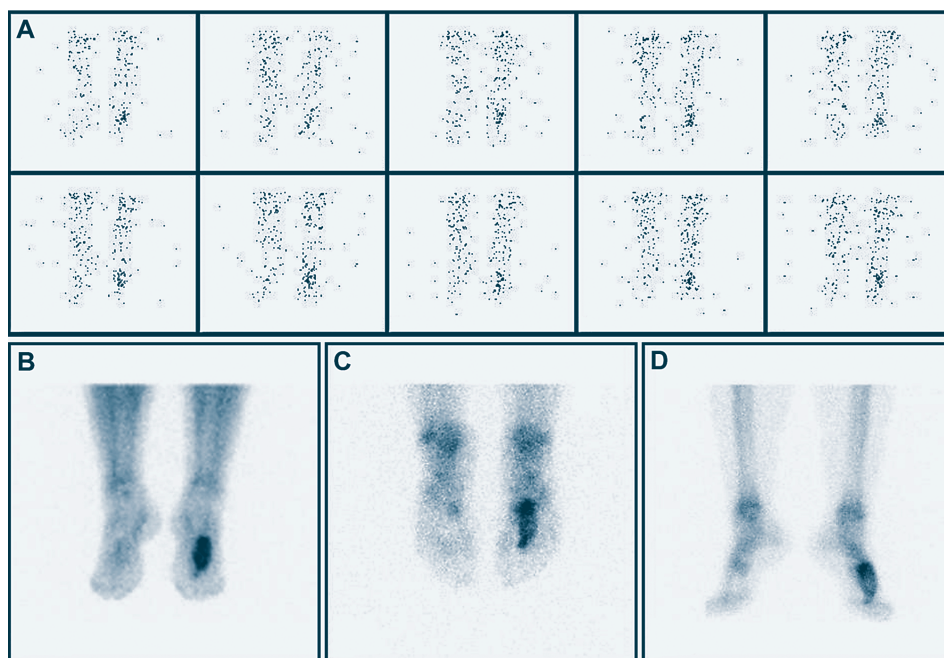


Figure 2. The blood-flow phase (A) comprises a localized acquisition of one frame every 1 second for 1 min after ^{99m}Tc -MDP injection. The blood-pool phase (B) comprises a localized anterior planar acquisition for 5 min, respectively. The delayed (C, D) phase images were acquired 3 hrs after the intravenous injection ^{99m}Tc -MDP. All phase images showed increased vascularity and increased radiotracer uptake in the second metatarsal bone.

was curetted and cancellous auto-grafting was performed. Histopathological examination findings of the curetted material were consistent with ABC. The postoperative course was uneventful.

ABC was first described by Jaffe and Liechtenstein in 1940 [7]. It is a rare, benign, and expansile bone lesion and accounts for only 1.3 % of all bone tumors [2]. The metaphysis of the long bones and spine are the most affected sites [1, 2]. Among the flat bones the majority of ABC cases are seen in the pelvis [2]. Only 7 % of the ABC are located in the metatarsal bones [6, 8]. Only a few cases of ABC in the metatarsal bone have been reported previously [4-6]. We believe that this is the first case of ABC documented by a three-phase bone scan.

Static bone images in 64 % of the cases demonstrate peripherally intense and centrally low accumulation (doughnut sign) [9]. However, this scintigraphic pattern is not specific for ABC. It is also found in giant cell tumors and chondrosarcomas [3]. Radiographic features can usually exclude giant cell tumors-typically occurring only in adult patients-and also chondrosarcomas usually found in the meta-diaphyseal or diaphyseal region and in patients over 40 years of age [3]. The differential diagnosis for the scintigraphic pattern seen in this case also includes osteosarcomas. On the bone scan osteosarcomas typically show the pattern of intense homogenous uptake. Thus, the bone scan pattern can support the differentiation between osteosarcoma and ABC [3, 10]. Plain radiograph, CT and MR images showed typical features of ABC such as focal cystic distension, thin cortical layer and internal septa.

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