CLINICAL CASE - TEST YOURSELF Musculoskeletal Imaging

Sports induced medial ankle pain in an adolescent

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PART A

A previously healthy 11-year-old male adolescent, presented with right ankle pain of the last 2 months. Pain was typically exacerbated after football and volleyball activities. No history of trauma was reported. The patient was not on medication and had an otherwise unremarkable medical history.

Clinical examination revealed an oedematous and painful at palpation medial malleolus at the malleolar insertion of the deltoid ligament. The foot was painful upon pronation and to a lesser degree upon supination. Dorsiflexion and plantar flexion were normal.

An anteroposterior radiograph of both ankle joints **(Fig. 1)** and coronal T1-w (b) and fat suppressed T2-w **(Fig. 3)** MR images, are shown.

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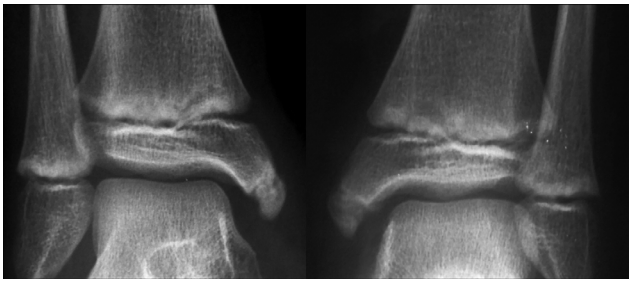

Fig. 1. *AP radiographs of both ankles.*

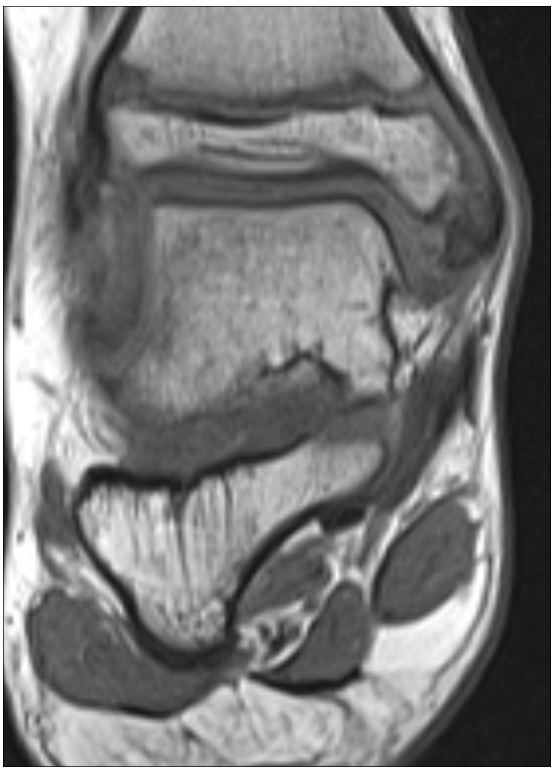

Fig. 2. *Coronal T1W MR image.*

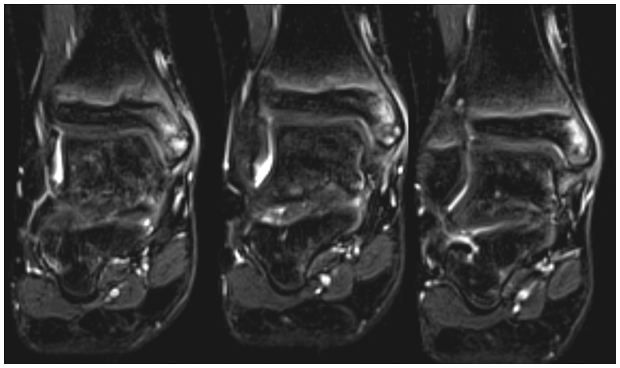

Fig. 3. *Consecutive coronal fat suppressed T2W MR images.*

PART B

Diagnosis: Osteochondrosis and traction apophysitis of the medial malleolus accessory ossification centre

Discussion

Osteochondrosis represents a dysfunction of endochondral ossification and can affect all growth centres including epiphyses and apophyses [1,2]. "Osteochondritis dissecans" has been used as a synonymous term and refers to an idiopathic aseptic necrosis of the subcortical bone with gradual fragmentation of the articular surface and partial or complete osteochondral detachment [3]. However, the latter term is misleading as inflammation is not the primary pathophysiology in this group of disorders. In addition, this term is not applicable on the apophyseal location where there is no articular surface.

The accessory ossification centre of the medial malleolar tip can develop before adolescence, typically between 8 and 11 years of age in males [4]. The incidence of this centre has been shown to be 11% in football players [5]. It has been suggested that sports activities may have contributed to the presence of the accessory ossification centres [3]. Symptomatic fragmentation in the context of osteochondrosis, has been also attributed to a sports activities induced traction apophysitis of the medial malleolus [6,7]. A deltoid ligament induced stress has been considered to be the underlying cause of the osteochondrosis [5,7]. Others have shown that secondary ossification centres are a part of the normal range of medial malleolus development [4].

Osteochondrosis of the ossification centre at the medial malleolus has been reported only in case reports and is extremely rare [1,3,6-9]. The aetiology of osteochondrosis at any location, remains unknown. However, there is a consistent association with sports participation and high levels of activity, indicating that repetitive microtrauma is an important factor in its pathogenesis. Other possible causes include inflammation, genetic predisposition, epiphyseal dysplasia and local ischemia; however, they have not been adequately supported by the literature and the true cause may likely be multifactorial. The clinical presentation varies. Patients may be asymptomatic, present with vague pain or complain of severe pain or pain exacerbated by activity. In some cases, mechanical symptoms are present (e.g. "clicking", "locking"), raising concern for unstable intra-articular lesions. Effusion, swelling and variable degrees of joint stiffness are often present. There are no typical clinical signs, and many patients will be symptomatic for more than one year prior to diagnosis.

Radiographic assessment of the ankle joint in two orthogonal planes is usually the first imaging step followed by MR imaging. In our patient, radiographs typically demonstrated an area of crescentic lucent subchondral bone with fragmentation as shown by the presence of multifocal sclerotic foci (Fig. 1). On MR imaging, osteochondrosis was demonstrated with low signal intensity on T1W images, and high on fluid sensitive sequences. Bone marrow oedema on both sides of the synchondrosis and slight detachment of the secondary ossification centre, suggest traction apophysitis whereas multifocal oedema suggests osteochondrosis (Fig. 2,3).

The differential diagnosis in a painful medial ankle joint with tenderness upon the medial malleolus includes traction apophysitis, osteochondrosis of the medial epiphysis, a combination as in our case, avulsion fracture of an accessory ossification centre, and stress reaction or fracture. Based solely on radiological findings, the differential diagnosis also includes bone bruise secondary to direct impaction and osteoid osteoma which is expected though in older individuals at late adolescence and young adulthood.

Conservative management is reserved for lesions in skeletally immature patients. Due to patient's age and stability of the lesions, conservative treatment was chosen [1,7-10]. Our patient was advised to cease sports activities, apply ice on the swollen medial part of the ankle and return in 3 months for a clinical and radiological follow-up. No casting was applied. During follow-up he reported complete resolution of symptoms and had a normal physical examination. A follow-up MR imaging showed a restored signal intensity of the bone marrow on T1W and reduced size and signal intensity of the bone marrow oedema as well as complete resolution of the overlying soft tissue oedema on the fat suppressed T2W MR images, in keeping with significant improvement (Fig. 4). Similar findings have been reported in the literature [1,3,8].

This clinical case aims to increase the awareness that an adolescent, involved in sports activities, who presents with persistent medial ankle pain without a distinct traumatic event, should be investigated for osteochondrosis. MR imaging is the best way to go for early diagnosis. R

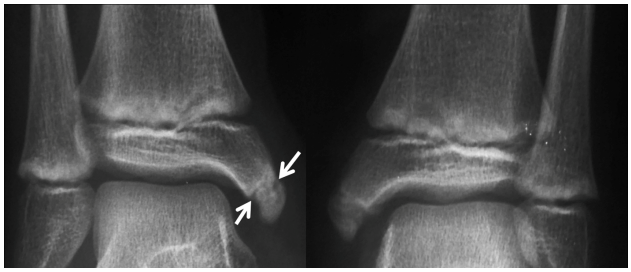

Fig. 1. *AP radiographs of both ankles. An accessory ossification centre of the medial malleolus is present bilaterally. On the right, symptomatic side, there is a fragmented appearance of the tip of the medial malleolus (arrows), and slight detachment as opposed to the contralateral side.*

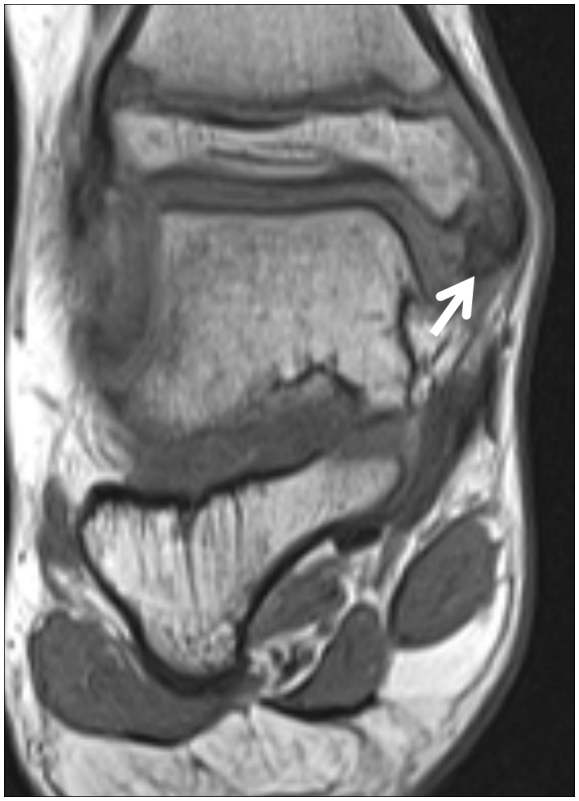

Fig. 2. *Coronal T1W MR image showing low signal intensity within the tip of the medial malleolus, in keeping with bone marrow edema (arrow).*

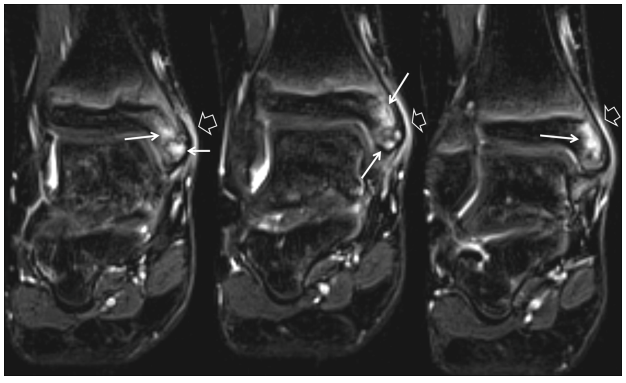

Fig. 3. *Consecutive coronal fat suppressed T2W MR images, showing multifocal bone marrow edema on both sides of the synchondrosis (arrows). Soft tissue oedema over the medial malleolus is also shown (open arrows).*

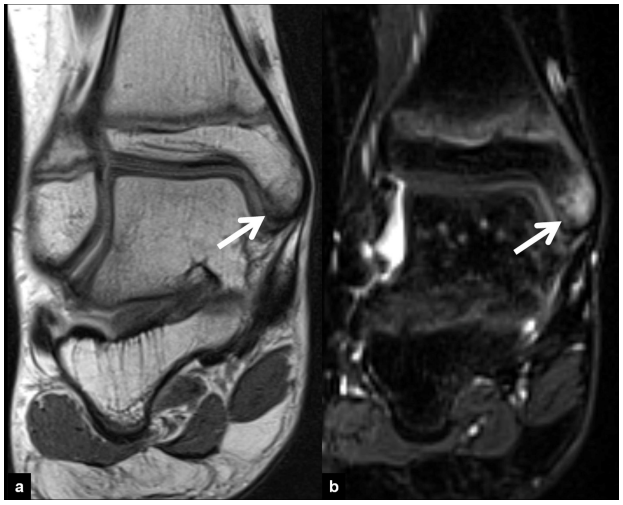

Fig. 4. *Coronal T1W (**a**) and fat suppressed T2W (**b**) MR images. Improvement is suggested by the restored marrow signal intensity along with reconstitution of the epiphysis (arrow on **a**) and uniform and reduced in size and signal intensity bone marrow edema (arrow on **b**) suggesting improvement. There is complete resolution of the soft tissue oedema.*

KEY WORDS

MR imaging/diagnosis; Sports injuries; Medial malleolus/Osteochondrosis; Medial malleolus/Traction apophysitis; ; Adolescents

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