



Medial Malleolar Stress Fracture in an Adolescent Athlete



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ABSTRACT

A stress fracture of the medial malleolus in adolescent athletes is a rare condition with poorly defined outcomes. Proper management requires early recognition, with treatment directed toward the athlete's safe return to their sport. Failure to assess and manage the fracture properly can result in significant complications, including fracture progression, delayed healing, nonunion, and chronic pain. We present the case of a medial malleolar stress fracture in a 14-year-old football player, who was successfully able to return to competition 4 weeks after surgical treatment. We have also provided a review of the published data regarding the management of these injuries and recommendations for returning athletes to competition.

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Stress fractures are common overuse injuries seen in athletes at all competitive levels. They are most often sustained in the lower extremities owing to the repetitive weightbearing forces imparted on the bony anatomy, and specific anatomic sites have been associated with individual sports (1–3). Although medial malleolar stress fractures are relatively uncommon, they can result in significant debilitation and prolonged recovery. They are considered high-risk stress fractures owing to their predilection for progressing to a complete fracture, delayed union, nonunion, or chronic pain (4). Because of clinicians' possible low index of suspicion and the injury's indolent nature, athletes often attempt to continue to compete, further delaying an accurate diagnosis. However, early identification of these injuries is critical to proper treatment and optimal outcomes.

A limited number of case reports have been published, dating back to the original description of medial malleolar stress fractures by Shelbourne et al (5), but these have included patients of all ages and activity levels (6–9). Returning injured athletes to play has remained a controversial topic, especially in the adolescent age group. Previous reports have shown a trend toward quicker recovery with operative fixation than with conservative management, although large variability also exists in published reports (5–7).

Adolescent athletes, ranging in age from 10 to 19 years, account for a significant portion of individuals involved in competitive and recreational sporting activities (10). Medial malleolar stress fractures in this population should be considered in the differential

diagnosis of ankle pain or swelling. Missed injuries can have significant negative consequences on future participation in sports and other activities. We present the case of a medial malleolar stress fracture in a skilled adolescent athlete. After an initial unsuccessful course of nonoperative management, the injury required operative fixation to allow his timely return to football. Additionally, we have provided a comprehensive review of the current published data on this topic and recommendations for returning athletes to competition.

Case Report

An otherwise healthy, 14-year-old male athlete (6'1", 198 lb) presented to our clinic with a 3-month history of insidious left medial ankle pain after a basketball game. He had no history of an injury or preceding symptoms. He had initially been diagnosed with an ankle sprain by a physician outside our institution. Treatment had included a brace and physical therapy. However, he had continued to experience significant pain with activity. The physical examination findings were notable for discrete tenderness to palpation over the medial malleolus but were otherwise negative for ligamentous laxity, weakness, limited range of motion, or other abnormalities. The radiographic findings of the ankle were negative (Fig. 1).

Advanced imaging studies of the ankle were ordered to assess for additional underlying pathologic features because of the patient's ongoing medial ankle pain and activity limitations. Magnetic resonance imaging (MRI) demonstrated a nondisplaced vertically oriented stress fracture of the medial malleolus with surrounding edema extending into the medial aspect of the physis and distal metaphysis (Fig. 2). Conservative treatment was initiated with immobilization in a short-leg cast and strict non-weightbearing precautions.

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Fig. 1. (A and B) Left ankle radiographs taken at the patient's initial presentation, demonstrating no evidence of fracture or other abnormality.

After 6 weeks of immobilization, the patient's discomfort had resolved, and he demonstrated no tenderness to palpation or other abnormalities about his ankle on examination. Plain films were again noted to have a normal radiographic appearance. The patient was slowly transitioned off crutches with a walking boot during the next 2 weeks. At the 8-week mark, he was allowed to begin upper body exercises and nonimpact cardiovascular training on an exercise bicycle. He had progressed to light agility training at 12 weeks but had noted a recurrent episode of mild medial ankle pain while running. A subtle radiolucent line at the site of the fracture could be seen on the new radiographs (Fig. 3). A repeat MRI scan was obtained, which revealed a persistent nondisplaced fracture (Fig. 4). Given the patient's recurrent symptoms and desire to play in the upcoming football season, we decided to proceed with operative fixation of his medial malleolar stress fracture. He underwent percutaneous fixation with placement of two 4.0-mm cancellous screws across the fracture (Fig. 5). The procedure was uneventful, with no associated complications.

Postoperatively, the patient was instructed to use "touchdown" weightbearing in a walking boot for 1 week. He was then transitioned to weightbearing as tolerated. At 3 weeks postoperatively, he began light running and agility training drills with no significant pain, swelling, or other symptoms. By 4 weeks postoperatively, the patient had resumed full activity as the starting linebacker on his high school football team. The final radiographs at 3 months postoperatively demonstrated no visible fracture (Fig. 6), and the patient denied any ankle pain, swelling, or other symptoms. He continued to play without limitations and had no additional complaints.

Discussion

Shelbourne et al (5) first described medial malleolar stress fractures in 6 athletes aged 17 to 24 years, 4 of whom were adolescents. Treatment was determined by the presence or absence of a fracture demonstrated on plain radiographs. Those with positive radiographic findings underwent open reduction and internal fixation with two



Fig. 2. (A–D) Coronal, sagittal, and axial magnetic resonance imaging views of the left ankle at the initial presentation. A hyperintense T₂-weighted signal involving the medial half of the distal tibial metaphysis and epiphysis, representing edema. On the coronal and axial images, a vertically oriented hypointense linear defect extending from the anterior cortex of the medial malleolus, representing a stress fracture, is present.

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