

Medial Malleolar Stress Fracture caused by Chronic Lateral Ankle Instability - Case Report



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Abstract

Background: Stress fractures are most sustained in the lower extremities owing to the repetitive weight-bearing forces. They are overuse injuries that are seen often in athletes, but rare in the general population. This is a rare example of successful treatment of a medial malleolar stress fracture with lateral ankle instability.

Patient concerns: A 30-year-old male patient presented with acute-onset right ankle pain. Four years previously, he had sprained his ankle several times during practice soccer. The symptoms were mild at rest but increased upon walking and training soccer. Plain radiographs of the right ankle showed a vertical fracture line in the medial malleolus and tilting of the talus, demonstrating the lateral instability of the ankle.

Interventions: Surgery was performed under spinal anesthesia using a C-arm image intensifier. The medial malleolar fracture was fixed using two screws and the hemi-Castaing technique was done to repair the complex lateral ligament of the ankle.

Conclusion: According to the bibliographic review, only one previous article published case report (5) describes the relationship between medial malleolar stress fracture and lateral instability of the ankle, supporting the hypothesis that lateral instability of the ankle accelerated the medial malleolar stress fracture. Fatigue fracture of the tibial malleolus associated with lateral ankle instability due to ligament injury should be treated surgically, paying special attention to correcting lateral instability.

Keywords: Ankle fracture; Sprain; Stress fracture; Instability

Introduction

Stress fractures are overuse injuries that are often seen in athletes and are very rare in the general population [1-5]. They most often involve the lower extremities owing to the repetitive weightbearing forces imparted on the bony anatomy, and specific anatomic sites are related to individual sports [4]. The most common site for stress fractures in the lower extremity is the distal third of the tibia; stress fractures of the medial malleolus are rare. Although they are uncommon, it is important that medial malleolar stress fractures be diagnosed and treated early because failure to assess and manage the fracture properly can result in complications such as fracture progression, delayed healing, nonunion, chronic pain, and delayed return to their athletic lives [2,3]. We present the case of a patient with a history of chronic lateral ankle instability who suffered a medial malleolar stress fracture. We proceeded to perform open reduction and osteosynthesis of the tibial malleolus and plasty of the lateral ankle ligament using the hemi Castaing technique.

Case Presentation

A 30-year-old male patient presented with acute-onset right ankle pain. Four years previously, he had sprained his ankle several times during practice soccer. Subsequently, the ankle pain worsened, and he had tenderness on the medial aspect of his right ankle. The symptoms were mild at rest but increased upon walking and training soccer. Plain radiographs of the right ankle showed a vertical fracture line in the medial malleolus and tilting of the talus, demonstrating the lateral instability of the ankle (Figure 1).

Treatment

Surgery was performed under spinal anesthesia using a C-arm image intensifier. The medial malleolar fracture was fixed using two screws and the hemi-Castaing technique was done to repair the complex lateral ligament of the ankle [6] (Figure 2). Only the technique of lateral ankle ligament plasty is described below.



Figure 1: Preoperative plain anteroposterior, and lateral radiographs of the right ankle showing a vertical fracture line in the medial malleolus and varus talar tilt.



Figure 2: Postoperative plain anteroposterior radiograph of the right ankle.

Surgical Technique.

Description of the hemi-Castaing technique.

The principle of most non-anatomical ligamentoplasties is to use the tendon of the peroneus brevis muscle. Due to its position and inherent strength of its distal anchor point, this complete tendon is used to strengthen the lateral ankle joint in the ligamentoplasty initially described by Castaing et al. [6]. The hemi-Castaing procedure is a form of split peroneus tendon tenodesis,

which has been infrequently reported in the literature [7,8]. The benefit of a hemi-Castaing is the preservation of the natural ankle stabilizing properties of the peroneus brevis muscle.

The modification used in this study of this tenodesis, named the hemi-Castaing or Castaing II, makes use of half the peroneus brevis tendon [9]. Hemi-Castaing ligamentoplasty begins with an incision over the lateral ankle, exposing the lateral malleolus and tendon of the peroneus brevis muscle (Figure 3a), approximately 15 cm from its point of insertion.



Figure 3: (a, b, c, d) - Hemi-Castaing surgical procedure. Details on the operation are given in the “Surgical technique” section.

The tendon is hemi-sected proximally for half of its diameter and then split over the length of the tendon to the level of the most distal point of the fibula, releasing an 8-cm cord of tendon, free proximally, but remaining firmly anchored at its point of insertion at the base of the fifth metatarsal, the so-called hemi-tendon (Figure 3b). A hole is then drilled through the distal part of the lateral malleolus, forming a tunnel running between the directions of the ATFL and CFL (Figure 3c). The hemi tendon is passed through the tunnel from back to front and sutured to itself distally. The foot is maintained in a neutral anatomical position while the sutures are progressively tightened until optimal tensioning is reached (Figures 2 & 3d) [9]. Postoperatively patients are kept in non-weightbearing plaster for two weeks and weight-bearing plaster for six weeks.

Discussion

Rettig et al. [10] reported the first case series of stress fractures of the medial malleolus. They established 3 basic criteria for identifying medial malleolar stress fractures: tenderness over the medial malleolus and joint effusion; pain during activities before an acute episode; and a vertical line from the tibial plafond. Plain radiographs are frequently normal in the early phase because the medial malleolus consists mainly of cancellous bone. Additional imaging using CT, MRI, or nuclear bone scans is recommended [11-13]. In this case, plain radiographs of the right ankle showed a vertical fracture line in the medial malleolus and tilting of the talus, demonstrating the lateral instability of the ankle. Ankle sprain is reported to be among the most common recurrent injuries. About 20% of acute ankle sprain patients develop chronic ankle instability. The failure of functional rehabilitation after acute ankle sprain leads to the development of chronic ankle instability.

Unlike acute ankle sprain, chronic ankle instability might require surgical intervention [14].

Lateral ankle sprains are a common consequence of physical activity. If not managed appropriately, a cascade of negative alterations to both the joint structure and a person’s movement patterns continue to stress the injured ligaments. These alterations result in an individual entering a continuum of disability as evidenced by the 30 % of ankle sprains that develop into chronic ankle instability (CAI) and up to 78 % of CAI cases that develop into post-traumatic ankle osteoarthritis (OA) [15]. In this case, the history of repeated ankle sprains and the 3 diagnostic criteria listed above led us to us focus on lateral instability and medial malleolar fracture. Plain radiograph showed a vertical fracture line in the medial malleolus and varus talar tilt [16].

According to the bibliographic review carried out by the author, only one previous article published case report [5] describes the relationship between medial malleolar stress fracture and lateral instability of the ankle, supporting the hypothesis that lateral instability of the ankle accelerated the medial malleolar stress fracture. Therefore, the treatment of fatigue fracture of the medial malleolus associated with lateral ankle instability should be surgical combining the lateral ligament plasty with osteosynthesis of the medial malleolus.

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