

## Case Report

# Calcaneus stress fracture: a case report

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### ABSTRACT

Calcaneal stress fracture is a rare clinical entity associated with diverse etiological factors such as high intensity training, female sex, smoking and poor nutrition. The authors present a case of a calcaneal stress fracture treated conservatively with immobilization, limited weight bearing and vitamin D supplementation.

**Keywords:** Stress fracture, Vitamin D deficiency, Calcaneal fracture, Foot and ankle

### INTRODUCTION

Stress fractures are microfractures caused by repeated submaximal straining to the bone.<sup>1,2</sup>

The second most common stress fracture location of the foot and ankle is the calcaneus, after the distal tibia. It is most common in athletes and military personnel.<sup>3</sup>

Several risk factors have been identified as high intensity training, female sex, smoking, poor nutrition and biomechanical predisposition such as cavus alignment, calcaneonavicular coalition or total knee arthroplasty.<sup>4,5</sup>

### CASE REPORT

A 61-year-old woman presents to our outpatient clinic with ankle and heel pain with 6 months' duration, coupled with an antalgic gait with limited weight bearing capacity. There was no history of trauma. The patient is a teacher, smoker, physically active – does weekly trekking activities with a lower calorie intake diet.

On the physical exam the patient presented with pain on the hind foot exacerbated with dorsiflexion of the foot and with palpation of the peroneal muscles and Achilles tendon

insertion. There was mild edema but no other inflammatory signs.

Plain film radiography showed no significant alterations (Figure 1).

Magnetic resonance imaging (MRI) images showed an incomplete fracture between the calcaneal tuberosity and the posterior articular surface, 2 cm anterior to the Achilles tendon insertion, with extensive intraosseous edema, with no extension to the plantar cortex (Figure 2). The lesion had high intensity signal in T2 and hypointense in T2.

The diagnosis of calcaneal stress fracture was made and due to the risk factors associated with stress fractures, blood analysis was ordered.

The hemogram, liver and kidney tests were normal. There was a low vitamin D-25(OH)D level of 2 ng/ml. Folic acid, calcium and vitamin B12 levels were within normal range.

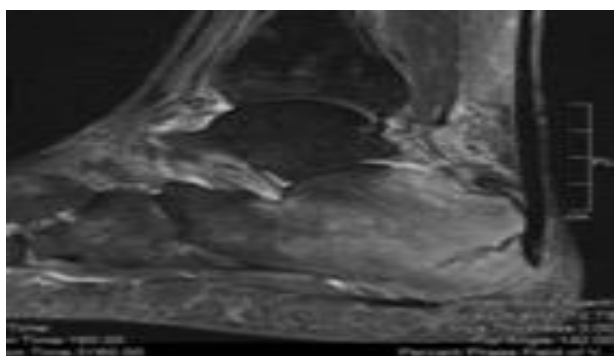
The patient underwent conservative treatment. She was immobilized with a posterior leg cast splint for 2 weeks with no weight bearing. At 2 weeks, the splint was exchanged for a rocker bottom padded walker boot and worn with gradual weight bearing for an additional 6 weeks.

A daily supplement of 800 IU 25(OH)D vitamin was administered for 2 months.

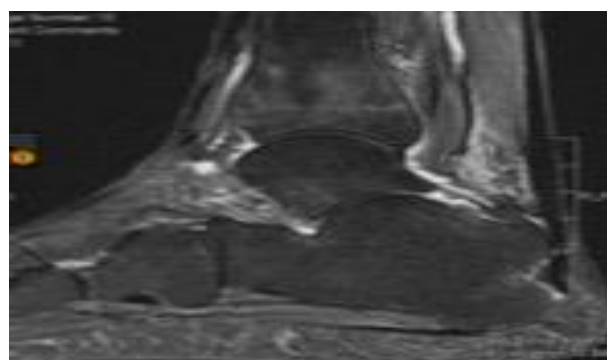
At 2 months' follow up, a control MRI was ordered, which revealed complete healing (Figure 3).



**Figure 1: Initial radiographic exam.**



**Figure 2: MRI scan that reveals posterior calcaneus fracture.**



**Figure 3: MRI scan with fracture healing.**

The foot and ankle outcome score (FAOS) was applied before the start of the treatment and 2 months after. She had an initial score of symptoms 36, pain 34, function 28, sports 15, and QoL 25.

At three months' follow up, the patient had returned fully to daily activities. At four months' follow up, she had returned to sporting activities, with a FAOS of symptoms 86, pain 87, function 89, sports 40, and QoL 63. Blood

25(OH)D levels were evaluated and had increased to 31 ng/ml.

## DISCUSSION

Stress fractures can be divided in two categories: fatigue fractures, when normal bone is subjected to an abnormal load, as occurs in athletes and military personal, and insufficiency fractures, when abnormal bone is subjected to a normal load, such as in patients with osteopenia.<sup>1,3</sup>

Calcaneus stress fractures present predominantly with heel pain and diagnosis can go unnoticed due clinical similarity with common pathologies such as plantar fasciitis and Achilles tendon tendinitis.<sup>3,5</sup>

Initial diagnosis study can be made by simple radiographic study – although it is only positive in about 10% of cases. Overtime it can become positive in 30-70% after 3 weeks, due to local reabsorption. The fracture is usually best observed on the lateral view, being most common on the posterior section of the calcaneus, with no displacement to the Bohler angle.<sup>6,7</sup>

Bone scintigraphy was the usual confirmatory test, with 74 to 100 percent sensibility, but with a low specificity of 40%.<sup>8-10</sup>

MRI can confirm the diagnosis with comparative sensibility to the scintigraphy, with a higher sensitivity of close to 100%, with a specificity of 85%.<sup>7,12</sup>

The fracture presents as hypointense in T1-weighted an hyperintense in T2- weighted images, and can show evidence of intraosseous edema. A follow-up MRI can prove important to the ascertaining of fracture consolidation.<sup>10,11</sup>

Computer tomography has a limited value due to lower sensitivity and superior radiation exposure.

Several risk factors have been identified, including female sex, older age, prior physical inactivity with a peak of activity (weekend athletes), smokers, vitamin D deficiency, total knee arthroplasty, calcaneonavicular coalition and menstrual disturbances.<sup>4</sup>

Treatment of risk factors should be associated, such as smoking cessation and gradual return to physical activity with a delay of impact loading activities. Lappe et al presented a decrease of 20% of stress fractures in female navy recruits being administrated preventative calcium and vitamin D.<sup>13</sup>

In patients with hypovitaminosis-D that have already sustained a stress fracture, such as our patient, prescribing 25(OH)D supplementation can help with fracture consolidation, and if left untreated can lead to delayed fracture consolidation, Inklebarger et al.<sup>14,15</sup>

Conservative treatment with limited weight bearing until pain subsidence is the first line of treatment. Rome et al proposed that the use of pneumatic compression walking boots can reduce pain.<sup>7,16</sup>

## CONCLUSION

Calcaneal stress fracture is an underdiagnosed clinical entity. Risk factors must be evaluated and corrected, when possible, to ensure adequate fracture consolidation and early return to daily and sport activities.

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