

Calcaneus and Traumatic Stress Fracture

Elizabeth Jelpke¹, Saphalya Pattnaik¹, Gur Aziz Sidhu¹

Learning Point of the Article:

Calcaneal stress fractures, typically due to overuse, can also result from acute trauma and may require an MRI for diagnosis when plain radiographs are inconclusive.

Abstract

Introduction: Although uncommon, the calcaneus stress fracture is an important differential diagnosis of both traumatic and non-traumatic foot pain. The calcaneus is one of the tarsal bones that are prone to stress fractures, which usually occur as a result of overuse. The diagnosis of stress fractures is aided by plain radiographs, with the mainstay of management usually conservative.

Case Report: This case report is of a 57-year-old female who presented with instant left-sided heel pain after stepping off a step at home. Investigations included plain radiographs of the left foot and ankle, with no obvious fractures visible. As a result, a magnetic resonance imaging was obtained, which confirmed a stress fracture of the left os calcis. Management remained conservative, with the patient placed in an ankle boot for 4–6 weeks with non-weight bearing instructions provided. Heel pain can be caused by a stress fracture of the calcaneus, and although these injuries are usually caused by repetitive forces, this case study provides a reminder that they can also be caused by acute trauma.

Conclusion: Calcaneal stress fractures, typically due to overuse, can also result from acute trauma and may require MRI for diagnosis when plain radiographs are inconclusive. The mainstay of treatment is conservative management.

Keywords: Calcaneus, stress fracture, magnetic resonance imaging, conservative.

Introduction

Although uncommon, the calcaneus stress fracture is an important differential diagnosis of both traumatic and non-traumatic foot pain. The calcaneus is one of the tarsal bones that are prone to stress fractures, which usually occur as a result of overuse. The diagnosis of stress fractures is aided by plain radiographs, with the mainstay of management usually conservative. This case report is of a patient who sustained a stress fracture as a result of direct trauma – an uncommon cause of this pathology.

Case Report

A 57-year-old female presented with instant left-sided heel pain after stepping off a step at home. Clinical examination revealed mild swelling over the medial side of the left heel upon inspection, with tenderness over the swelling on palpation, with no distal neurovascular deficit elicited. The patient's past medical history included hypothyroidism, asthma, and chronic smoking. Investigations included plain radiographs of the left foot and ankle, with no obvious fractures visible. As a result, a magnetic resonance imaging (MRI) was obtained, which confirmed a stress fracture of the left os calcis (Fig. 1).

Author's Photo Gallery



Dr. Elizabeth Jelpke



Dr. Saphalya Pattnaik



Dr. Gur Aziz Sidhu

Access this article online

Website:
www.jocr.co.in

DOI:
<https://doi.org/10.13107/jocr.2025.v15.i09.6062>

¹Department of Trauma and Orthopaedic, University Hospital Lewisham, London, England.

Address of Correspondence:

Dr. Elizabeth Jelpke,
Department of Trauma and Orthopaedic, University Hospital Lewisham, Lewisham High Street, London, SE13 6LH, England.
E-mail: ejelpke@nhs.net

Submitted: 20/06/2025; Review: 06/07/2025; Accepted: August 2025; Published: September 2025

DOI: <https://doi.org/10.13107/jocr.2025.v15.i09.6062>

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Figure 1: T1-weighted magnetic resonance imaging left ankle showing incomplete banding of low signal in the plantar cortex of the posterior calcaneus, consistent with bone stress injury.

Management remained conservative, with the patient placed in an ankle boot for 4–6 weeks with non-weight-bearing instructions provided. Further management to investigate the cause of the low-impact fracture included referral for a DEXA scan, and the patient was advised to take calcium and vitamin D supplements.

Discussion

The calcaneus is one of seven tarsal bones and is part of the hindfoot, which includes the calcaneus and the talus [1]. Stress fractures are relatively uncommon injuries, accounting for approximately 1–7% of all athletic injuries, occurring as a result



Figure 2: A young male recreational athlete who recently joined a running group with a quick increase in his running mileage presented with right heel pain that began abruptly on a 5-mile run 2 months before presentation, with imaging demonstrating a posterior calcaneal stress fracture that was treated with activity modification and eventual gradual resumption of impact and running activities.

of overuse [2,3]. They occur over time as a result of repetitive forces causing microscopic damage to the bone, as well as in cases where physical activity is increased in the setting of relative energy deficiency [4].

The signs and symptoms of stress fractures may include: Slowly developing generalized pain in the heel area, swelling in the heel area, as well as a positive calcaneal compression test [4].

The diagnostic capability of X-rays is limited, as stress fractures may only appear on X-ray once the fracture has started to heal (after 2–3 weeks of symptoms), at which point a sclerotic or radiolucent line may be visible. With more advanced imaging, a stress fracture will appear darker on the bone scan than an uninjured area. With this type of injury, this would be visualized

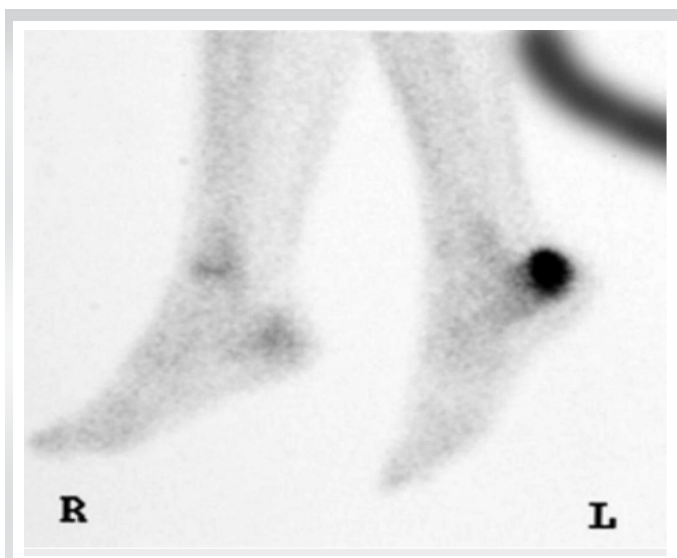


Figure 3: Bone scan showing intense increased uptake in the left calcaneus, highly suspicious of a fracture.



Figure 4: Magnetic resonance imaging of the left ankle showing Linear T1 intramedullary signal in the calcaneus with surrounding edema.

on MRI as a line in the trabecular calcaneus, hypo-intense in all sequences, surrounded by an area of abnormal bone marrow signal due to local edema (hypo-intense on T1-weighted and hyper-intense on fluid-sensitive images) [5-7] (Fig. 2-4).

Calcaneal stress fractures can be adequately treated with activity modification – without casting or surgical intervention – or with cast immobilization and non-weight bearing for 6 weeks [5,6]. Treatment for the prevention of stress fractures includes bone stimulators, bisphosphonates, hormone replacement, and dietary supplementation of calcium and Vitamin D [5,6,8-10].

In most cases, it takes from 6 to 8 weeks for a stress fracture to heal. More serious stress fractures can take longer.

Conclusion

Heel pain can be caused by a stress fracture of the calcaneus. Although these injuries are usually caused by repetitive forces,

this case study provides a reminder that they can also be caused by acute trauma. Similar to most stress fractures, the fracture was not visible in plain radiographs but instead confirmed with MRI. The primary treatment is conservative, with unloading of the affected foot. Further treatment consists of identifying risk factors leading to fatigue fractures, such as a tarsal coalition, infection, neoplasm, bone mineral osteopenia syndrome, osteopenia, and overuse of the foot.

Clinical Message

Calcaneal stress fractures should be considered in patients with heel pain following minor trauma, especially when plain radiographs are inconclusive, as early MRI can confirm the diagnosis and guide conservative management.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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Conflict of Interest: Nil
Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

How to Cite this Article

Jelpke E, Pattnaik S, Sidhu GA. Calcaneus and Traumatic Stress Fracture. Journal of Orthopaedic Case Reports 2025 September;15(9): 185-187.

