

Middle Cuneiform Stress Fracture in a Postal Worker: A Case Report

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Abstract

This report is to supplement the limited nature of isolated cuneiform fractures. Cuneiform fractures are identified as “low risk stress fracture” but with delayed diagnosis may cause prolonged treatment due to continued foot pain. Delayed diagnosis may be due to low sensitivity on radiographic exam and/or low suspicion clinically due to the rare involvement of isolated cuneiform fractures.

Keywords: Cuneiform Stress Fracture; Plantar Fasciitis; Foot Pain; Postal Worker

Introduction

The cuneiforms provide structural support of the medial arch through their wedge-shaped relationship, articulating with the navicular and first through third metatarsals. Each cuneiform provides independent attachments for the larger hindfoot structures. The medial cuneiform serves as an insertion site of the Peroneus Longus tendon plantarly and tibialis anterior tendon dorsally, and as an attachment for the Lisfranc ligament. The intermediate cuneiform provides attachment for the tibialis posterior tendon and multiple dorsal and plantar tarsal ligaments. The lateral cuneiform is also an insertion site for the lateral slip of the tibialis posterior tendon, as well as origin for the adductor hallucis and flexor hallucis brevis muscles [1].

Nonunion of the cuneiforms is rare due to dorsal arterial network. Cadaveric study by Kraus, *et al.* depicts extraosseous blood supply to the middle cuneiform from the middle pedicle branch of the dorsalis pedis artery and the plantar aspect supplied by the medial plantar and superficial medial plantar arteries [1,2].

There is a rarity of isolated cuneiform stress fractures and inherent difficulty in identifying pathology on plain radiographs on initial presentation. An article from Injury 2006 cites cuneiform fractures as 0.1 to 0.5% of all fractures from industrial workers [3] and Rockwood and Green's analysis on adult fractures 2015 suggest that there is insufficient epidemiologic data to define occurrence rate of isolated cuneiform fractures [4]. Cuneiform fractures are far more frequently associated with multiple other midfoot fractures, dislocations, or ligamentous injuries [5,6].

A relatively small pool of data exists and is very well documented in a case study in clinical medicine insights arthritis musculoskeletal disorders by Krebs and Borchers with literature review of 9 other articles and 15 cases [7]. This study dialogued all case studies and series related to cuneiform stress fractures to date. Including our case study of middle cuneiform stress fracture, the incidence of

the medial (first cuneiform), intermediate (second cuneiform) and lateral (third cuneiform) were 6, 7 and 6 respectively. Strictly isolated cuneiform fracture(s) encompass 12/16 total cases. The average age is 38. Interestingly, their study further identified a correlation between plantar fasciitis and cuneiform fractures, potentially due to chronic or continuous stress through the medial foot [7,8]. This was true in our case.

Case Report

This case study looks at a 54-year-old female with chronic foot pain. Her initial symptoms were largely attributed to her foot structure and work type. She works in the postal service with long hours walking and pushing heavy mail carts. She has a flat foot structure, advanced with skew foot deformity (Figure 1). She initially presented with complaints of plantar fasciitis and had been treating herself with a myriad of conservative therapies. She brought with her four pairs of shoes and three sets of inserts. She had tried a home exercise program for her heel pain. She had a heel injection with marcaine, toradol and betamethasone and took time off from work in the matter of weeks demonstrating significant motivation in trying to treat her pain. She was started on weekly vitamin-D supplementation for bone and musculoskeletal health. The heel pain resolved but her complaints remained rather specific to the midfoot as she returned to work and her complaints were very persistent. In planning for flatfoot reconstruction, an MRI was performed for surgical planning, addressing joint viability, and determining areas of bone edema or stresses through the foot. The result of the MRI was an isolated cuneiform fracture of the middle or second cuneiform (Figure 2). She was continued on vitamin D2 and returned to the fracture boot for 6 weeks and self-transitioned back to supportive tennis shoes. Similar to other studies, she was protective weightbearing in the boot. Similar to the other case studies, fracture healing was completed at about 12 weeks starting from initiation of protected weightbearing for 6 weeks and then supportive weightbearing additional 6 weeks [5,8]. She reported significant relief at that time and did not feel like she need further treatment or surgical intervention and foot reconstruction was no longer pursued. She has remained pain free at annual follow up.

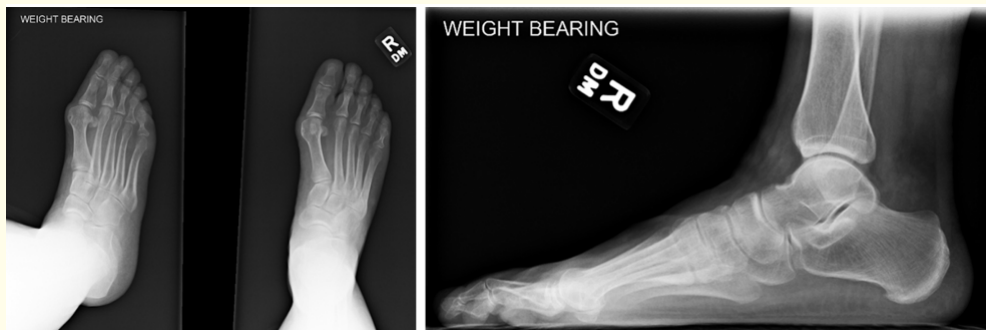
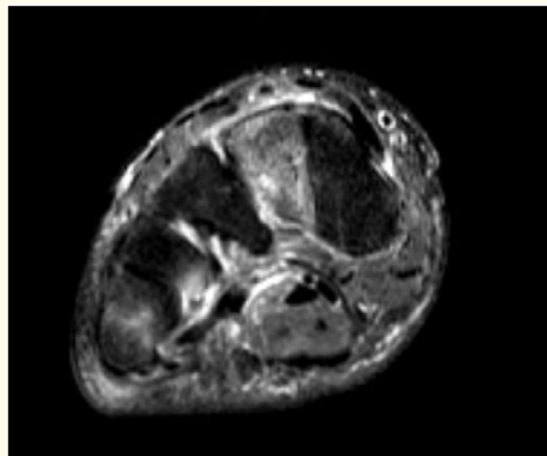


Figure 1: Anteroposterior and lateral radiographs demonstrating acquired pes planovalgus.

Discussion and Conclusion

Cuneiform fractures are identified as “low risk stress fracture” but with delayed diagnosis may cause prolonged treatment due to continued foot pain [7]. As with any other stress fracture, it is important to consider the biomechanical factors that contribute to stress injury, skew foot type, and occupation with repetitive strain through the midfoot.



a



b



c

Figure 2a-2c: MRI with stress fractures and diffuse bone marrow edema of the second cuneiform.

Always remain at a high suspicion for tarsal bone and midfoot fractures prior to steroid injection therapy to avoid delayed healing via steroid. It is important not to overlook tarsal bone fractures or stress fractures with midfoot pain. Contributing clinical findings that correlate with cuneiform stress fractures may include plantar fascial injury, changes in gait, posterior tibial tendinitis, obesity, excess or new exercise regimens.

Conflict of Interest Statement

The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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