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Topics in Diagnostic Imaging

Diagnostic Ultrasonography of an Ankle Fracture Undetectable by Conventional Radiography: A Case Report

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Abstract

Objective: The purpose of this study is to present diagnostic ultrasonography assessment of an occult fracture in a case of persistent lateral ankle pain.

Clinical Features: A 35-year-old woman presented to a chiropractic clinic with bruising, swelling, and pain along the distal fibula 3 days following an inversion ankle trauma. Prior radiographic examination at an urgent care facility was negative for fracture. Conservative care over the next week noted improvement in objective findings, but the pain persisted.

Intervention and Outcome: Diagnostic ultrasonography was ordered to assess her persistent ankle pain and showed a minimally displaced fracture of the fibula 4 cm proximal to the lateral malleolus. The patient was referred to her primary care physician and successfully managed with conservative care.

Conclusion: In this case, diagnostic ultrasonography was able to identify a Danis-Weber subtype B1 fracture that was missed by plain film radiography.

Introduction

Ankle injuries are responsible for more than 5 million emergency department visits annually.[1,2] Compared with sprains, there is an 8 to 1 ratio of ankle sprain to fracture.[3] Ankle fracture is the most common intraarticular fracture of a weight-bearing joint.[4] Affecting up to 187 per 100,000 individuals yearly, ankle fractures can present with similar symptoms as a sprain and may require imaging studies to rule out the presence of a fracture.[5–8] Whereas ankle sprains are typically managed conservatively, fractures may require surgical stabilization depending on the type of fracture.[6,9] In most cases, ankle fractures are a straightforward diagnosis and uncommonly require advanced workup.

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The acute ankle fracture can present with symptomatology consistent with an ankle sprain.[6] Tissue swelling and ecchymosis, along with pain and ligament laxity and decreased range of motion, can accompany either fractures or sprains. An inability to bear weight with pain at the medial, lateral, or posterior aspect of malleolus or obvious deformity is an indication for further examination by radiography, ultrasonography (US), or magnetic resonance imaging/computed tomography.[6] Tuning fork tests have some value in ruling out fractures but are not sufficiently reliable or accurate for widespread clinical use.[10] The use of the Ottawa Ankle rules as an initial screening tool may aid in diagnostic decision making between fracture and sprain and limit the need for imaging studies.[6,11–13] Patients that fail this screen have a high probability of fracture and will require imaging.[6,14] Sprain injury or tendon injury can also result in failure of the Ottawa Ankle rules. The relatively low specificity (48.4%) is reflective of the other potential injuries seen with ankle inversion.[15] The purpose of this case report was to demonstrate the ability of diagnostic US to image an occult fibula fracture.

Case Presentation

A 35-year-old white woman presented for chiropractic care 3 days following an inversion ankle injury. She reported immediate self-management with rest and ice and woke up the next morning with severe pain in the lateral ankle area. She went to her local urgent care facility where plain film radiographs were performed and interpreted by a radiologist as negative for fracture and gross abnormality (Fig 1A and B). The radiology report indicated incidental bone spurs at the plantar surface of the calcaneus as well as the Achilles tendon insertion. Pain was reported with active dorsiflexion and inversion of the ankle, rated 6 on a scale of 1-10. She described moderate difficulty going up and down stairs, walking on her toes, and initiating walking from rest.

Physical examination observed bruising and edema over the lateral ankle and foot with intact sensory and motor findings. Palpation demonstrated tenderness along the anterior talofibular ligament, Achilles insertion, and diffusely around the lateral malleolus and distal fibula. Pain could not be reproduced with palpation to the medial malleolus, base of the fifth metatarsal, and/or navicular. Pain was reproduced with passive dorsiflexion and inversion. Talar tilt maneuver was negative with eversion. Ankle drawer test was

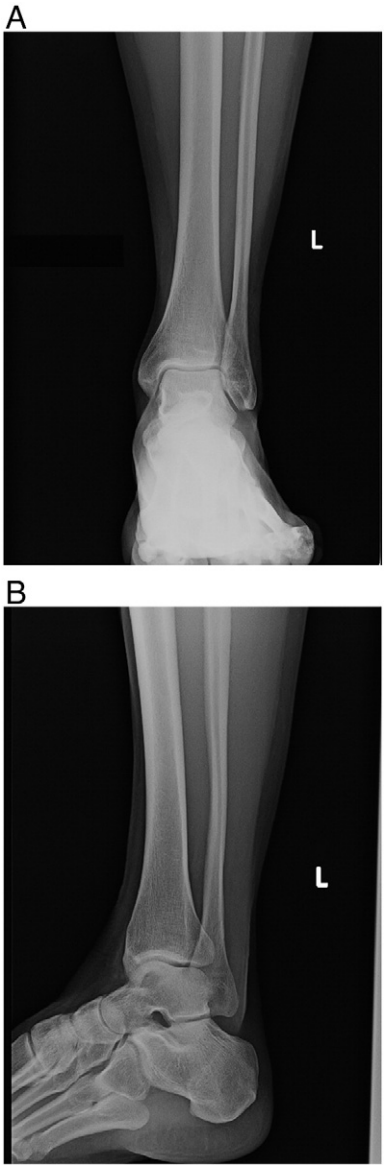

Fig 1. A and B, Anteroposterior and oblique projections of the ankle demonstrate no evidence of corticol disruption to suggest fracture. There is no evidence of dislocation.

painful, but no laxity was noted. Vibration from a tuning fork placed over the lateral malleolus and distal fibula produced pain.

She was diagnosed with a grade II lateral ankle sprain and treated conservatively with ankle mortise dorsiflexion mobilization, lymphedema taping, open chain ankle range of motion exercises, and instruction in ice application. Grade II classification describes incomplete ligament tear with moderate functional impairment and usually present with moderate pain and swelling, mild to moderate ecchymosis, tenderness, and mild/moderate instability on stress examination.[16] She presented 2 more times in the next week for follow-up care. Objective improvement in bruising and edema