



# Ultrasonography in the Assessment of Lateral Ankle Ligament Injury, Instability, and Anterior Ankle Impingement: A Diagnostic Case Report



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## Abstract

**Objective:** The purpose of this case report is to describe the diagnostic value of ultrasonography (US) in a patient with injury to the lateral ligaments of the ankle with concomitant ankle joint osteoarthritis and anterior impingement.

**Clinical Features:** A 28-year-old male had a history of an inversion injury of the left ankle. Diagnostic US of the left ankle using an 8- to 15-MHz linear array transducer demonstrated a full thickness tear of the anterior talofibular ligament, partial thickness tearing of the calcaneofibular ligament, and laxity of the ankle with varus stress testing. In addition, US was able to demonstrate degeneration of the ankle and talonavicular joints and anterior impingement with dorsiflexion. Osteoarthritic changes were confirmed with radiography. Other US findings included remote deltoid ligamentous complex injury, multiple sites of tenosynovitis, and a large ankle joint effusion with synovial hypertrophy and synovitis.

**Intervention and Outcome:** Using US, an accurate diagnosis was established with respect to the pathology and functional impairments of the patient's ankle.

**Conclusion:** This case report exemplifies the value and utility of US in diagnosing derangement in ligamentous, tendinous, articular, and osseous injuries of the ankle.

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## Introduction

Ankle joint injuries are common especially in sports and may result in ligamentous trauma, functional instability, and early degenerative changes.<sup>1,2</sup> Acute ankle injuries typically compromise the anterior

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talofibular ligament (ATFL) and calcaneofibular ligament (CFL).<sup>3</sup> Recurrent inversion injuries may result in ankle instability subsequent to failure of the lateral stabilizing ligamentous structures. This in turn results in a range of functional deficits and internal derangement. This may include increased likelihood of synovial inflammation, synovitis, cartilage degradation, hyperalgesia and post-traumatic osteoarthritis, varus malalignment and persistent instability.<sup>2,4</sup> In fact, lateral ankle sprains in sporting injuries are the main cause of post-traumatic ankle osteoarthritis.<sup>4</sup> Furthermore, a combination of tibiotalar osteophytes and surrounding synovitis may produce anterior ankle impingement, a condition characterized by limitations with dorsiflexion and concurrent pain.<sup>5</sup> Inversion ankle injuries should be thoroughly examined so that appropriate diagnosis and treatment can be provided to avoid recurrent injury and obviate ankle joint osteoarthritis. Ultrasonography (US) is useful in evaluating the lateral ankle ligaments as it provides high resolution of ligament anatomy and pathology.<sup>6</sup> In addition, as US imaging can be performed dynamically, the integrity of the lateral ankle ligaments can be assessed in real-time under joint stress maneuvers. In cases where joint degeneration has occurred or impingement is suspected clinically, the dynamic nature of US again allows real-time visualization of bony impingement while also permitting correlation to the patient's symptomatology. Recently, bedside US in an emergency department performed by the emergency physician was demonstrated to have comparable sensitivity (93.8%) and specificity (100%) in detection of ATFL injuries when compared to a magnetic resonance image (MRI) interpreted by a radiologist.<sup>7</sup> In patients with suspected chronic lateral ligamentous injury, US again demonstrated high sensitivity, specificity, and accuracy when compared to arthroscopy for detection of ATFL and CFL injury.<sup>8</sup> The purpose of this case report is to describe a patient with a chronic injury to the lateral ligaments of the ankle with presumed secondary osteoarthritis and subsequent anterior ankle impingement and the use of US in diagnosing derangement in ligamentous, tendinous, articular, and osseous injuries of the ankle.

## Case Report

A 28-year-old man presented to a chiropractic teaching clinic with a chief complaint of left ankle pain 5 days after an inversion injury while playing

basketball. Clinical findings included inability to fully bear weight on the left, pain provoked while walking, moderate localized swelling over the left lateral ankle joint and point tenderness over the left lateral malleolus. No ecchymosis was noted. Positive orthopedic tests included anterior drawer and varus stress testing. He was diagnosed clinically with a grade II ATFL sprain and underwent conservative treatment directed at ankle stabilization and proprioceptive rehabilitation. Twelve weeks after initiating treatment he sustained an insidious exacerbation of left ankle pain. Ultrasonography of the left ankle was performed using a GE LOGIQ E9 US system (GE Healthcare, Milwaukee, WI) operating with an 8- to 15-MHz linear array transducer to evaluate for internal derangement and to assess the dynamic stability of the lateral ankle ligaments. During the US examination, a full thickness ATFL tear was visualized without power Doppler activity indicating the likelihood of chronic ligament injury (Fig 1). Laxity and partial thickness tear of the CFL was visualized during varus stress testing. Ankle joint and talonavicular osseous hypertrophic changes consistent with osteoarthritis were noted. Additionally, forceful dorsiflexion provoked anterior ankle pain due to bony impingement subsequent to these osteoarthritic changes (Fig 2). Other US findings also included remote deltoid ligamentous complex injury, fibularis (peroneus) and posterior tibialis tenosynovitis, and a large ankle joint effusion with synovial hypertrophy and synovitis. In order to further evaluate the osteoarthritic changes, radiography of the ankle was performed. Radiographic examination demonstrated joint space narrowing within the ankle joint, talar ridging, juxta-articular osteophytes at the talonavicular joint, and multiple corticated ossicles within the ankle joint supporting a diagnosis of osteoarthritis complicated by secondary synovial chondrometaplasia (Fig 3). The patient provided consent for publication of their de-identified healthcare information.

## Discussion

Ultrasonography and radiography were utilized to diagnose the multiple ankle ligamentous injuries sustained by this patient and the presumed osteoarticular sequelae. Importantly, US provided a real-time dynamic examination of the impaired ligamentous structures likely contributing to chronic joint instability and recurrent exacerbation of symptoms. In addition, US enabled visualization of ankle joint and talonavicular

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