

Case report

Beyond the Brand: A Case Report on Footwear-Related Injury in a National-Level Sprinter

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Abstract

Ankle injuries are a common concern among track and field athletes, particularly sprinters, due to the high mechanical demands placed on the ankle during rapid acceleration, deceleration, and repeated forceful foot strikes. These injuries, if not addressed promptly and appropriately, may significantly affect athletic performance and career longevity. This case report presents a national-level female 100m sprinter who developed progressive left anterior ankle joint line pain extending to both medial and lateral joint lines extending over one month, affecting her ability to train and compete. Despite symptomatic treatment and continuation of intense training, her symptoms persisted, prompting her to seek specialized care. This case highlights the clinical approach to diagnosing and managing ankle pain in a high-performance athlete, with particular focus on footwear assessment, imaging correlation, and a comprehensive rehabilitation plan that ultimately enabled the athlete to return to peak performance and surpass her personal best.

Key words: Ankle Sprain, Ligament Injury, Biomechanical Analysis, Footwear-related Injury

Introduction

One of the most frequent musculoskeletal injuries is an acute ankle sprain, which is especially common among physically active people. Furthermore, the development of chronic ankle instability (CAI) is linked to the high recurrence rate of acute ankle sprains. Anterior talofibular ligament injuries account for roughly 73% of lateral ankle sprains, which account for more than three-quarters of all acute ankle sprains. About 25% of all acute ankle sprains are either high ankle/syndesmosis or medial (deltoid ligament)¹

Case report

A 22 years old female athlete presented to sports, exercise and musculoskeletal medicine unit, Colombo North teaching Hospital (SEMMU - CNTH) Ragama in January 2025, complaining of left anterior ankle joint line pain extending to both medial and lateral joint lines

with a duration of one month. She is a national level 100m runner with a personal best time of 12.01 seconds. She had recently changed her spikes and started using a new branded expensive pair.

The pain was dull and aching in nature, with an insidious onset and localized to the joint line. There was no preceding trauma or ankle twisting episode. She experienced difficulty performing running and jumping activities. The pain was aggravated mostly during the final phase of the sprint and sometimes halfway through the event. There was no pain at rest. She had tried massage therapy, cryotherapy and analgesics but her symptoms did not subside. Despite the pain she continued her usual training schedule of 6 days per week, which included strength training, plyometric and sports specific training. The terrain she trained was also an even one. Over time, she found it increasingly difficult to perform due to the pain. She had no

prior ankle injuries, except for a previously sustained left quadriceps strain, which had fully resolved. She initially sought medical care from the private sector, where corticosteroid injection to the affected area was planned. She then visited SEMMU–CNTH for further evaluation and management.

On examination, there was tenderness at the anterior joint line, extending to both sides, with mild anterior swelling. Biomechanical analysis showed normal foot arches, and no anatomical or biomechanical abnormalities were identified in the lower limbs. She was able to perform a single-leg squat with pain but had difficulty with single-leg hopping. The range of motion was normal. Special tests revealed positive anterior drawer and talar tilt tests, indicating ligamentous pathology. The syndesmotic squeeze test and external rotation test were negative. Neurovascular examination was unremarkable.

Based on clinical suspicion, differential diagnoses included anterior or anterolateral impingement, tibialis anterior tendinopathy, talar stress fracture, and talar dome chondral injury. Although it appeared to be an overuse-type injury, ligamentous involvement was also suspected. Plain radiographs were normal. A phased ankle rehabilitation program was initiated, focusing on improving range of motion, strengthening the ankle musculature, and gradually enhancing balance, proprioception, and coordination. However, initial symptom improvement was not satisfactory. Therefore, an MRI was planned, and her footwear was assessed thoroughly.

Interestingly, a strong association was noted between the onset of symptoms and the period when she began using her new spikes, which featured air bubbles. On examination, the left shoe had a reduced height between the insole and spike plate compared to the right. The lateral air bubble in the left shoe had completely collapsed (Figure 1). She also owned a pair of spikes without air bubbles and was advised to use those instead to avoid further risk.

An ultrasound scan of the ankle showed periarticular swelling at the anterolateral joint line but was otherwise inconclusive. MRI revealed a grade I sprain of the anterior tibiofibular ligament, a complete grade III tear of the anterior talofibular ligament (ATFL), a

grade II partial tear of the calcaneofibular ligament (CFL), and a grade I sprain of the posterior talofibular ligament (PTFL). A mild joint effusion was seen, along with bone contusions in the medial malleolus and the neck of the talus. Following the diagnosis, she underwent three ultrasound-guided platelet-rich plasma (PRP) injections to the injured ligaments and joint capsule. In the private sector, she also received ultrasound therapy, shockwave therapy, and dry needling.

She underwent motion capture biomechanical analysis, which showed compensatory patterns and motor control alterations consistent with a complete ATFL tear. Notably, increased coronal joint angles in the left foot suggested lateral dominance. Sagittal plane motion demonstrated a 9.37% reduction in peak range, suggesting a subconscious limitation in dorsiflexion and plantar flexion to avoid instability and pain. Without adequate rehabilitation focusing on neuromuscular control, balance, and strength, there is a risk of developing chronic ankle instability, which may affect other joints as well. As she had already started the rehabilitation program and changed her footwear, she experienced dramatic improvement within six weeks. She went on to break her personal best time of 12.01 seconds, recording 11.95 seconds at the Western Province Athletic Championship in July 2025 becoming the first place in her category.

Discussion

Ankle pain in elite athletes poses a diagnostic and therapeutic challenge due to the overlapping presentation of various musculoskeletal pathologies and the high demands placed on the ankle joint during sport. In this case, a national-level 100m sprinter presented with insidious anteromedial ankle pain, which progressively worsened with training and competition. Although initial clinical suspicion pointed toward anterior ankle impingement, tibialis posterior tendinopathy or talar dome chondral injury, magnetic resonance imaging (MRI) ultimately revealed a more complex injury pattern involving both ligamentous injuries and bony contusions. Anterior talofibular ligament (ATFL) injuries are the most common component of lateral ankle sprains, accounting for nearly 70% of all

ligamentous ankle injuries in athletes ². The presence of a complete ATFL tear, along with partial tear of the calcaneofibular ligament (CFL) and sprains of both the anterior and posterior tibiofibular ligaments (AITFL and PTFL), indicates a high-grade lateral ligament complex injury. The associated bone contusions and mild joint effusion seen on MRI suggest repetitive microtrauma and axial loading, which are common in sprinters due to the forceful push-off and braking mechanics ³. From a clinical point of view, MRI underlines the presence of bone marrow edema in both symptomatic and asymptomatic subjects, particularly in high-level athletes and military recruits ¹⁰

Interestingly, the athlete reported a recent change in footwear, and further assessment revealed an asymmetrical spike structure with a collapsed air bubble in the left shoe, likely contributing to abnormal load distribution and altered foot mechanics. Improper or worn-out footwear has been recognized as a significant extrinsic risk factor for lower limb injuries in runners and sprinters ^{5, 6}. Even subtle biomechanical alterations can lead to increased stress across the ankle joint, particularly during explosive activities such as sprinting and plyometrics.

Despite the presence of pain, the athlete continued intense training (six days per week), delaying recovery and potentially exacerbating the underlying pathology. This highlights a common dilemma in sports medicine: the reluctance of high-performance athletes to reduce training load, often resulting in progression from minor to more significant injury ⁷. This emphasizes the need for athlete education regarding early symptom reporting and the potential consequences of training through pain. The management strategy in this case focused on non-operative rehabilitation, in line with current best practices for lateral ankle ligament injuries, which prioritize restoring range of motion, strength, proprioception, and neuromuscular control. Non-steroidal anti-inflammatory medications and early mobilisation were strongly supported for the composite outcomes of pain, swelling, and

function following an acute sprain, while exercise and manual therapy approaches were somewhat supported. The effectiveness of acupuncture and surgery in treating acute ankle sprains was the subject of conflicting research. The use of ultrasonography to treat acute ankle sprains was not well-supported by the available data, even though she was treated with ⁸. In addition, adjunctive therapies such as platelet-rich plasma (PRP) injections, shockwave therapy, ultrasound, and dry needling were employed. While some studies suggest PRP may aid in ligament healing and reduce recovery time ⁹, evidence remains inconclusive, and further high-quality trials are needed to establish their routine use ¹⁰

The athlete's outcome was favorable, with full recovery achieved within six weeks and subsequent improvement in her 100m sprint time. This supports the efficacy of a comprehensive, individualized rehabilitation approach, combined with correction of modifiable risk factors such as improper footwear. Importantly, it also illustrates that even high-grade ligamentous injuries may be managed successfully with conservative measures if functional stability is preserved and a structured program is followed.

In conclusion, this case reinforces the importance of early diagnostic imaging, comprehensive biomechanical assessment, and multimodal rehabilitation strategies in managing ankle pain in athletes. A multidisciplinary, athlete-centered approach that includes training modification, footwear analysis, and evidence-based rehabilitation modalities is critical to successful outcomes.

Conclusion

In the development of ankle pain in elite athletes, this instance illustrates the intricate interaction between extrinsic and intrinsic causes. Significant bone contusions and ligamentous injuries were sustained by a high-performance sprinter, most likely as a result of improper footwear and excessive training. Complete functional recovery and enhanced athletic performance were the results of prompt imaging, in-depth biomechanical assessment,

and customized rehabilitation, encompassing both conventional and adjunctive therapies. In order to get the best results for ankle, injuries related to sports, the case emphasises the importance of early clinical suspicion, adequate imaging, footwear assessment, and an organised, athlete-specific rehabilitation plan.

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Figure 01: Pair of spike with left spike bubbles collapsed