

Ankle instability: presentation and management

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Abstract

The ankle joint is akin to a mortise. Damage to this mortise joint with injury to either the medial, lateral or syndesmotic complex can result in chronic ankle instability. In this article we discuss the management of ankle instability, most commonly arising from injuries to the lateral ligament complex. Chronic ankle instability may develop from an inversion-type ankle sprain, usually affecting the anterior talo-fibular ligament (ATFL). Most affected patients improve with conservative management following this injury, but up to 30% of patients can develop debilitating chronic ankle symptoms. In assessing ankle instability it is important to differentiate between patients with functional instability and those with mechanical instability. Clinical assessment is the cornerstone of diagnosis, although stress views performed under anaesthesia (including the contralateral ankle for comparison) are useful. MRI is helpful in the assessment of soft tissue and cartilage injury. Short periods of immobilisation and physiotherapy are the mainstay of acute treatment. Patients with functional instability may benefit from peroneal strengthening and proprioceptive rehabilitation. Surgery is recommended for patients with mechanical instability who fail conservative treatment. Anatomical ligament repair has the best results. Non-anatomic ligament reconstruction is reserved for revision cases although primary ligament reconstruction may have a role in selected cases.

Keywords ankle instability; anterior talo-fibular ligament; Brostrom repair; functional instability; mechanical instability

Introduction

Ankle sprains are among the most common sporting injuries. It is estimated that around 5000 ankle sprains occur every day in the UK.¹ Although most of these patients get better with conservative treatment, a significant number continue to have long term problems with pain, swelling and chronic ankle instability.²

It is important to appreciate, when a patient presents with complaints of the ankle giving way, that he or she may have anatomical abnormalities that predispose to chronic ankle instability (CAI). It is also useful to emphasise that not all patients who complain of ankle instability have objective signs of an unstable

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ankle. Freeman introduced the term “functional instability” for a group of patients who complain of giving way but do not have abnormal mobility of the ankle. It is thought that functional instability occurs due to proprioceptive or neuromuscular deficits, or because of poor postural control. Proprioceptive deficits can arise as a consequence of damage to proprioceptive fibres in the joint capsule and ankle ligaments. Neuromuscular deficits can arise due to damage to the peroneal muscles. These types of functional deficits result in impaired neuromuscular recruitment, and affected patients are likely to benefit from an appropriate physiotherapy regimen. Patients who demonstrate abnormal ankle joint mobility on clinical examination or under stress radiography are said to have “mechanical instability”. Although conceptually it is nice to be able to classify patients with CAI into two different classes the reality is that the complete spectrum of CAI often includes an overlap in presentation³ (Figure 1).

Relevant anatomy (Figure 2)

Lateral collateral ligament complex

This ligament complex comprises the Anterior talo-fibular ligament (ATFL), posterior talo-fibular ligament (PTFL) and the calcaneofibular ligament (CFL).

ATFL: the ATFL is essentially a discrete thickening of the ankle joint capsule. It is a flat quadrilateral structure that originates from the antero-inferior margin of lateral malleolus and runs antero-medially to be inserted on to the talar body just anterior to the lateral malleolar articular surface and is about 0.5–1 cm wide. Although the ligament is depicted as a single band in most illustrations, Sarrafian described the ATFL as having two distinct bands, later corroborated by Golano P et al.⁴ It is the weakest of the three ligaments but can undergo great deformation before failure.

PTFL: the PTFL originates from the malleolar fossa on the medial surface of the lateral malleolus and travels horizontally to be inserted on to the postero-lateral talus, coming under tension in dorsiflexion. It is very strong and is rarely injured.

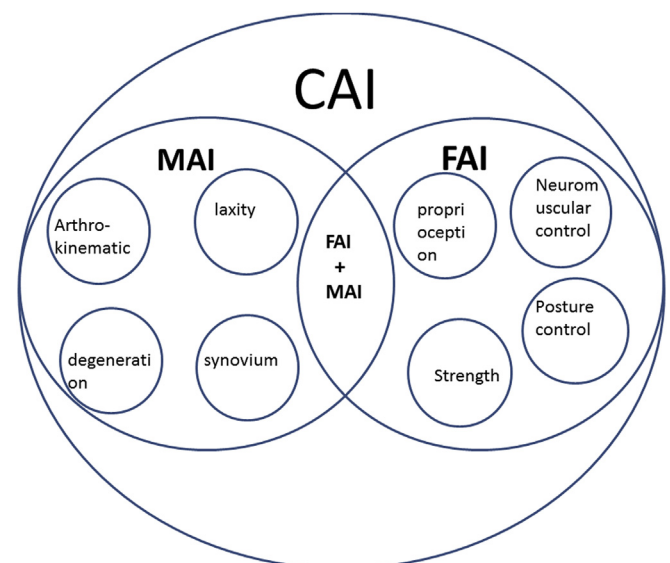


Figure 1 Interplay of factors in chronic ankle instability.

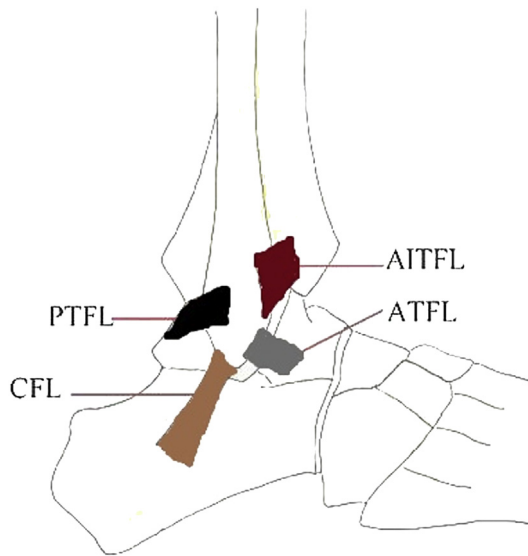


Figure 2 Anatomy of the ankle: lateral ligaments and the anterior inferior tibio-fibular ligament.

CFL: the CFL is a distinct structure. It is not a capsular thickening but is extra-capsular. It is in close proximity to the peroneal tendons. During surgical exploration these tendons act as a landmark for the CFL. It is found immediately deep to, and runs at right angles to, the peroneal tendons. The CFL originates from the tip of the fibula and runs downwards and backwards to attach to a tubercle situated on the postero-lateral surface of calcaneus. Its footprint on the calcaneus is around 3 cm posterior and superior to the peroneal tubercle. There is some variation in its proximal attachment. Instead of attaching proximally to the tip of the fibula, the CFL can be attached to the ATFL or have attachments to both fibula and ATFL.

Syndesmosis complex

The ankle syndesmosis is formed between the distal tibia and fibula. The stability of this complex is maintained by the anterior tibio-fibular ligament, posterior tibio-fibular ligament and interosseous tibio-fibular ligament. Stability of the syndesmosis is also provided by the inferior margin of the interosseous membrane. The anterior tibio-fibular ligament is directed inferior and laterally from the anterior tubercle of the distal tibia to the anterior margin of the lateral malleolus. The lower fascicle of the anterior tibio-fibular ligament (AITFL) is frequently damaged in ankle sprains and can consequently produce anterolateral ankle impingement. The pathologic lesion can be seen at ankle arthroscopy as a thick hyalinised “meniscoid” lesion.

Biomechanics

ATFL

The ATFL is horizontal in the neutral position of the ankle. Therefore, as a restraint, it is ineffective in a neutral or dorsiflexed position. The ATFL becomes more vertical in ankle plantar flexion in line with the fibula and becomes a true collateral ligament in this position. The ligament is therefore stressed in the plantar flexed ankle and is most prone to injury in this position. Indeed, it is the main stabiliser of the ankle in plantar flexion

against anterior translation, varus tilt and internal rotation of the talus.

CFL

The CFL is angulated posteriorly in the neutral position of the ankle but becomes more vertical in ankle dorsiflexion and in this position acts as a true collateral ligament. It spans both the ankle and the subtalar joints. The CFL resists ankle inversion with the ankle in neutral to dorsiflexion and is an important stabiliser of the subtalar joint. It is relaxed in a valgus ankle and stressed in a varus position.

It is therefore apparent that throughout the arc of ankle motion either the ATFL or the CFL acts as a true collateral ligament of the ankle (ATFL in plantarflexion and CFL in dorsiflexion). There is a window in this range of movement where neither of the two ligaments is able to support the ankle. The mean normal angle between the two ligaments is 105° (range 70° – 140°). If the angle between the two ligaments is increased then the window of instability also enlarges. Individuals with such an anatomical variation may be more prone to develop ankle instability.

Practice point 1

- ATFL stabilises the ankle in PF
- CFL stabilises the ankle in DF
- ATFL is the weakest of the lateral ligaments and is the most frequently injured
- Individuals who have widely spaced ATFL and CFL may be more prone to chronic ankle instability
- Varus hindfoot and tight tendo Achilles both predispose to ankle instability

Anatomic factors predisposing to ankle instability

Varus hindfoot

A varus hindfoot predisposes to ankle instability. Inversion of the subtalar joint locks the transverse tarsal joint and reduces the ability of the ankle to dissipate stress. In a normal ankle, on heel strike, the centre of pressure of the foot lies lateral to the subtalar joint axis. This results in the Ground Reaction Force (GRF) producing pronation torque in a normal ankle. However, if the hindfoot is in varus this produces a supinating torque because of the medially placed centre of pressure. This torque stresses the ATFL.

Tight tendo Achilles

Tightness of the Achilles tendon limits ankle dorsiflexion and also results in the ATFL being stressed for a longer period of the gait cycle.

Pathomechanics of ankle sprain

It has been proposed that on landing from a height the ankle assumes the natural loose-packed position of inversion and plantar flexion.² Therefore, synchronous firing of the evertors and dorsiflexors are necessary to stabilise the ankle. Ankle sprains occur when this mechanism is disrupted. It has also been

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