

ANKLE SYNDESMOTIC INJURY

Introduction

Ankle Syndesmotic Injury (also referred to as “**high ankle sprain**”) is an injury to **one or more of the ligaments** comprising the **distal tibiofibular syndesmosis**.

Diagnosis is more problematic than for the far more common forms of medial and lateral ankle sprains, in most part because the diagnosis is *not considered*.

The possibility of a syndesmotic injury should especially be considered in athletes with pain following injury around the ankle or lower leg, where signs and symptoms do not appear to clearly relate to a medial or lateral ankle sprain/ strain

A syndesmotic ligament injury can

1. Be isolated
2. Occur in conjunction with injury to other ligament groups.
3. Be associated with fractures around the ankle (primarily Weber B or C ankle fractures)

In general recovery from syndesmotic sprains takes much longer than is seen in typical lateral - medial ankle sprains. ²

Management will depend on:

1. The grade of injury
2. Associated bony injuries
3. Patient factors
 - Whether or not the patient is an elite athlete
 - Patient co-morbidities
 - Patient preferences

In general terms:

Grade I injuries are managed conservatively.

Grade II injuries may be managed conservatively or surgically

Grade III injuries are managed surgically

Anatomy

A **syndesmotic**, or “**high ankle sprain**” is one that involves the **ligaments** binding the **distal tibia** and **fibula** at the **distal tibiofibular syndesmosis**.

A **syndesmosis** is a slightly movable fibrous joint in which bones such as the tibia and fibula are joined together by ligaments. Examples include the distal tibiofibular joint, the radioulnar joint and the coracoacromial joint.

The **distal tibiofibular syndesmosis joint** consists of **4** ligaments:

- Anterior inferior tibiofibular ligament
- Posterior inferior tibiofibular ligament
- Inferior transverse tibiofibular ligament
- Inferior interosseous ligament (or membrane).

See Appendix 1 below

Epidemiology

High ankle sprains are *much less common* than lateral / medial ankle sprains.

They comprise approximately 6 % of acute ankle sprains without fracture.

Mechanism

Injuries can occur with virtually any ankle motion, but the most common motions involve:

- Extreme external rotation
- Dorsiflexion of the Talus.

The dome of the talus is wider in the anterior aspect than in the posterior aspect, and so these particular movements are liable to force apart the tibial and fibular malleoli.

Sufficient distraction of the distal fibula from the tibia can cause strain or rupture of one or more of the ligaments that bond the lower aspect of these bones.

Risk factors:

An external rotation force applied to a dorsiflexed ankle is the most common mechanism.

High impact sports pose a particular risk .

Skiing and skating increase risk, presumably due to the high-energy external rotation forces that may be exerted on the lower leg.

Classification

There is diversity of opinion regarding classification of ankle syndesmotic injuries, with no generally agreed standard.

The following is one suggestion: ¹

Grade 1 injury:

- Partial tearing of the anterior tibiofibular ligament

Without

- Diastasis on plain radiograph, CT or MRI

This is considered a stable injury.

Grade 2 injury:

- Complete tearing of the anterior tibiofibular ligament and partial tearing of the interosseous membrane

Without

- Diastasis seen on plain radiograph, CT, or MRI.

This is considered a **latently unstable** injury.

Ultrasound or **MRI** may be needed in some cases for the diagnosis and distinction from Grade 1 and Grade 3 injuries.

Usually also involves partial medial (i.e deltoid) ankle ligament injury.

Grade 3 injury:

- Complete tear of anterior tibiofibular ligament and interosseous membrane plus partial or complete tear of the posterior tibiofibular ligament

With

- **Diastasis** on radiograph, CT, or MRI.

Therefore if plain radiographs identify diastasis between the distal tibia and fibula but no fracture, a Grade 3 syndesmotic injury is present.

This is considered an **unstable** injury.

It frequently involves concomitant fractures and complete deltoid ligament ruptures.

Distinguishing between Grade II and III injuries:

In patients with a clinically diagnosed syndesmotic injury but negative plain radiographs (i.e. no fracture and no diastasis), distinguishing between Grade 1 and Grade 2 injuries can be difficult (and will usually require an MRI)

The distinction is important, as patients with Grade 2 injuries *may* benefit from surgical repair while those with Grade 1 injuries are managed non-operatively.

Association of Syndesmotic Injury and Fracture:

85 % of syndesmotic injuries without ankle fracture are Grade 1

9 % of syndesmotic injuries without ankle fracture are Grade 2

5 % of syndesmotic injuries without ankle fracture are Grade 3.

Complications

If unrecognized syndesmotic injuries can lead to long term

1. Pain
2. Disability
3. Myositis ossificans
3. Secondary degenerative changes at the ankle

Clinical Features

Non-specific findings include:

1. Compared with the more common lateral and medial ankle sprains, the high ankle sprain causes pain and tenderness **more proximally**, typically **just above the ankle joint**
2. Inability to perform a single-leg hop

3. Localized tenderness over the anterior tibiofibular ligament

There are three somewhat more specific tests for ankle syndesmotic injury:

1. **External rotation stress test**

- The patient's ankle is passively dorsiflexed whilst in maximal external rotation (either seated or lying prone with knee flexed to 90 degrees).

Pain at the syndesmosis is regarded as a positive test

2. **Squeeze test:**

- This test recreates the forces involved in a common mechanism of this injury

The examiner squeezes the upper half of the calf in an anteromedial-to-posterolateral direction.

Biomechanically, this maneuver causes widening of the distal tibiofibular space, which results in pain when ligaments are damaged.

Pain reproduced in the region of the **anterior tibiofibular ligament** location is considered a positive test

3. **Interosseous membrane tenderness length test**

- The patient sits or lies supine with their affected leg extended on examination table.

Palpate between the fibula and tibia from the ankle joint proximally.

Determine the length of tenderness from the distal tip of the fibula and document

Other tests described include fibular translation and talar translation maneuvers. However, these examination tests have not been rigorously tested for sensitivity, specificity, or clinical accuracy and have poor interrater reliability, and therefore are **not** currently recommended. ¹

Investigations

Plain radiography:

Plain radiography will usually be done to exclude bony fracture.

It cannot demonstrate a ligamentous syndesmotic injury directly; however it may provide strong indirect evidence of this injury by showing a displaced ankle mortise without fracture.

For patients with suspected high ankle sprain, plain radiographs views include:

- Anteroposterior (A-P)
- Lateral
- Mortise views

See Appendix 3 below.

Ultrasound:

Given its superficial location, the Anterior inferior tibiofibular ligament is easily visualized with ultrasound.

Ultrasound also has the advantage of allowing a real-time, *dynamic* assessment of diastasis when a dorsiflexion-external rotation (DFER) stress is applied to the ankle.

In unstable syndesmotic injury, the tibiofibular clear space (TFCS) can be seen to widen during DFER stress, compared with its neutral state.

Comparison with the uninjured ankle is also useful.

CT Scan:

CT is *not* the imaging modality of choice when isolated syndesmosis injury is suspected.

It scan may be done to:

- Fully define the nature and extent of associated **bony fractures**
- Detect the presence of an **occult fracture**.

MRI:

MRI is the best imaging modality to visualize ligamentous injury to the syndesmosis.

It is used to determine the exact injury pattern and to grade injury severity

Management

Management will depend on:

1. The grade of injury

2. Associated bony injuries
3. Patient factors
 - Whether or not the patient is an elite athlete
 - Patient co-morbidities
 - Patient preferences

All syndesmotom injuries should be treated initially with splinting and non-weight-bearing.

Initial management in the first 48-72 hours is, as for most soft tissue injuries:

- Analgesia as clinically indicated
- “RICE” and “No-HARM”, (see **Soft Tissue Injury - Sports Injury folder**).

In *general* terms:

Grade I injuries:

- These are managed by Physiotherapists conservatively with immobilization and non-weight bearing for 1-3 weeks followed by a gradual return to activity.

The patient should be immobilized initially with a removable fracture boot that prevents any ankle motion, and using crutches for non-weight-bearing or partial weight-bearing as determined by pain and the clinical scenario, for one to three weeks

Grade II injuries may be managed conservatively or surgically.

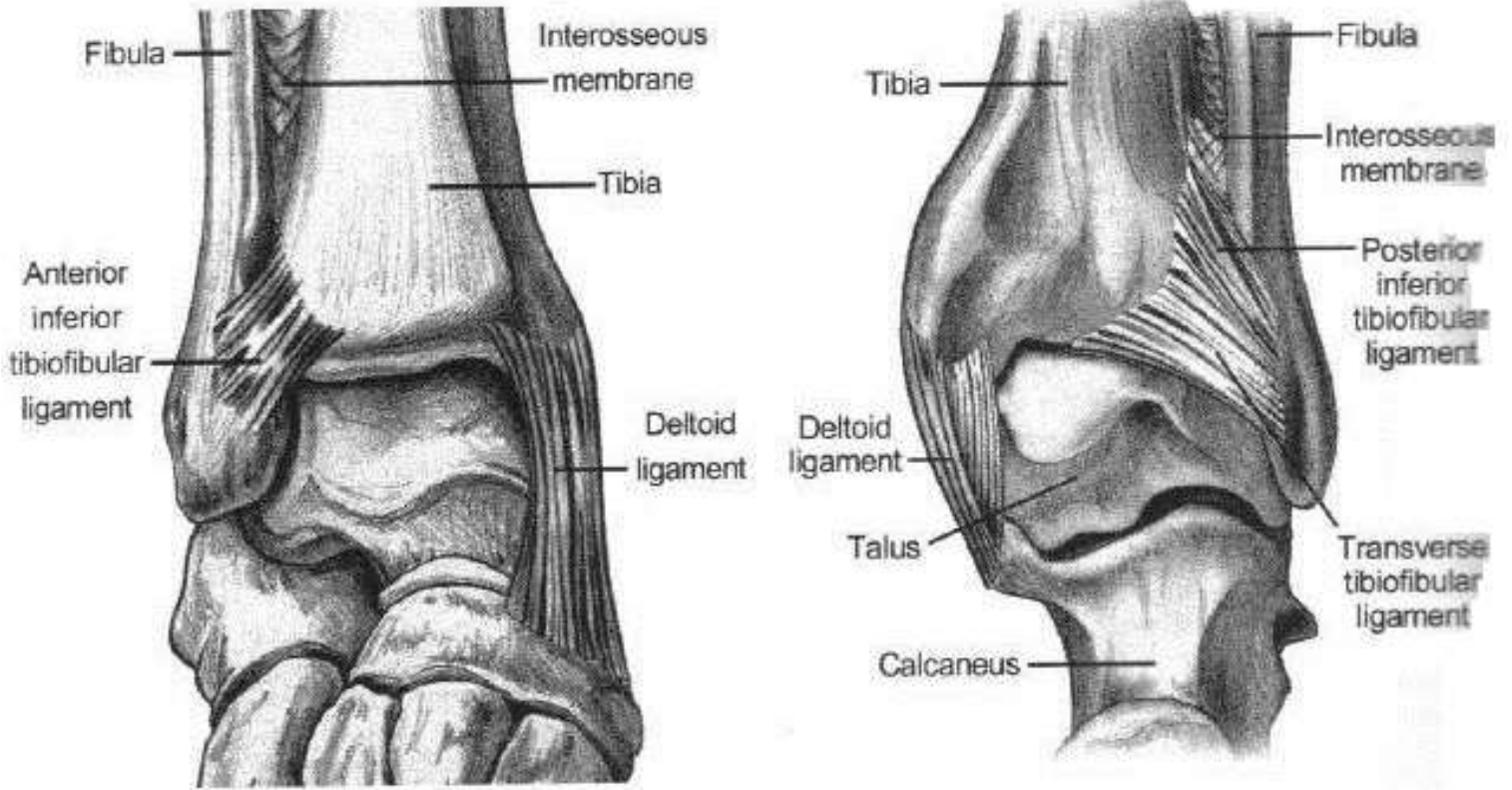
Grade III injuries are managed surgically.

Disposition:

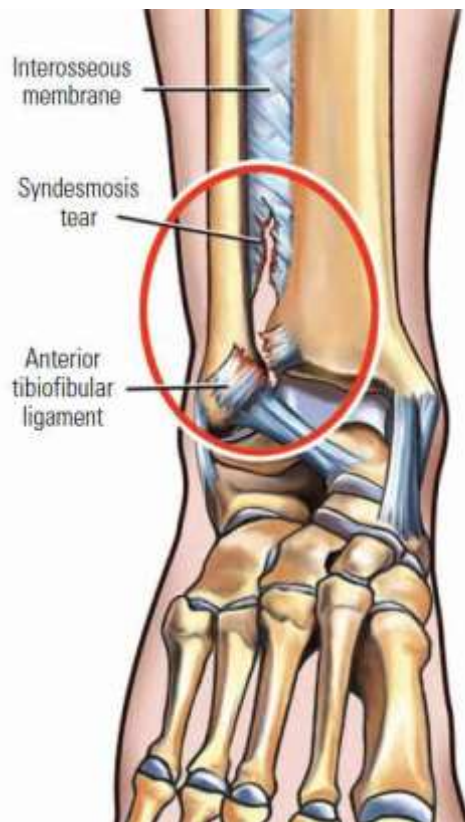
Referral to a (knowledgeable) orthopaedic surgeon is indicated for Grade 2 and Grade 3 syndesmosis injuries and any Grade 1 injury associated with a fracture.

Referral to Physiotherapy for all grades of injury.

Appendix 1: Anatomy of the Lower Tibiofibular syndesmosis:



The Inferior Tibiofibular syndesmosis joint.



Syndesmotic ankle injury, (Grade II).³

Appendix 2

Testing for syndesmotic injury:

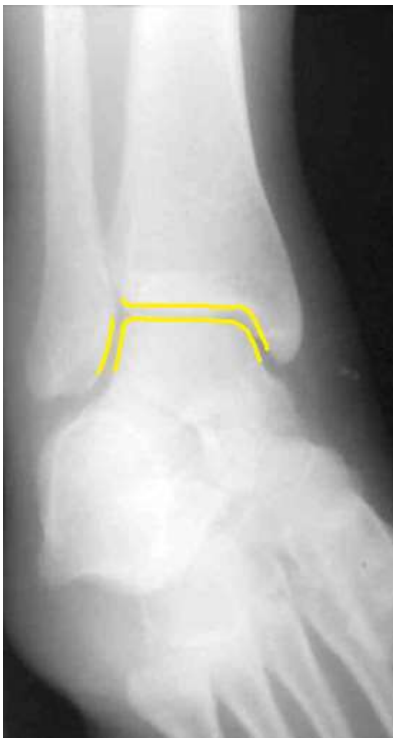


Left: The external rotation stress test a high ankle sprain injury Right: The Squeeze test for a high ankle sprain injury. ¹

Appendix 3: Plain radiography:



Radiographs of the normal right ankle in the anteroposterior (A), oblique (B), and lateral (C) projections. Image B exposes the mortise-like configuration of the joint, and this projection is commonly referred to as a “mortise view”.



The mortise view enables assessment for fractures and spacing of the entire joint surface, including that between the fibula and the talus. The distance between the talus and either the fibula or tibia should be equal throughout the whole of the joint.



A grade III syndesmotomous injury of the left ankle in a 63 year old male. Left image shows an oblique mortise view demonstrating irregularity in the talus - tibia gap. Right image shows the lateral view which reveals an associated non-displaced vertical tibia fracture.

References

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3. Drew Slimmon, Peter Bruckner. Sports ankle injuries. Australian Family Physician vol 39 No. 1/2 January / February 2010

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