

EVIDENCE SUMMARY

Syndesmotic injury

Anatomy & Pathophysiology

LIGAMENTOUS ANATOMY

- The ankle syndesmosis is composed of the anterior-inferior tibiofibular ligament, the posteroinferior tibiofibular ligament, and the interosseous membrane [2].
- A separate anterior-inferior tibiofibular ligament fascicle, known as the Bassett ligament, may be present and contribute to syndesmotic impingement [2].
- Approximately 20% of the syndesmotic ligament is intra-articular [2].
- The interosseous membrane is important in weight transmission through the fibula [3].

PATHOMECHANICS

- Syndesmotic injuries result from a combination of dorsiflexion and external rotation forces [1].
- Syndesmotic rupture can occur as a result of a torsional movement of the talus that forces the tibia and fibula apart [3].
- Syndesmotic rupture can occur as a result of a severe abduction force [3].
- Severe syndesmotic injuries are associated with deltoid ligament disruption and fibula fracture [1].
- Syndesmotic instability results in lateral and rotatory displacement of the talus [1].

RADIOGRAPHIC ANATOMY & MEASUREMENTS

- Normal tibiofibular clear space is less than 6 mm on either the AP or mortise ankle view [1].
- Normal tibiofibular overlap is greater than 6 mm on the AP view and greater than 1 mm on the mortise view [1].
- A tibiofibular clear space of greater than 5 mm on the AP view has been suggested to correlate with syndesmotic rupture [3].
- A tibiofibular overlap of less than 5 mm on the AP view or less than 1 mm on the mortise view has been suggested to correlate with syndesmotic rupture [3].
- The mean tibiofibular clear space in the normal population is 3.8 mm in females and 4.6 mm in males [3].

- Some normal individuals have a shallow incisura resulting in no radiographic tibiofibular overlap [3].
- CT studies show wide variation in the shape of the syndesmosis, including deep concave incisurae and limited curves [3].

PATHOPHYSIOLOGICAL CONSEQUENCES

- Injury to the ankle syndesmosis can result in persistent pain and dysfunction secondary to syndesmotomic impingement [2].
- Syndesmotomic impingement most often involves the anterior tibiofibular ligament, with resulting synovitis and scarring [2].
- Untreated syndesmotomic diastasis may result in persisting instability, pain, and progressive osteoarthritis [3].
- Patients with radiographic evidence of syndesmosis widening demonstrated a poorer overall outcome at 5 years in a study of ankle fracture outcomes [3].

Clinical Presentation

HISTORY AND PHYSICAL EXAMINATION

- Acute syndesmotomic injuries are typically associated with a twisting mechanism [1].
- Patients with syndesmotomic instability usually cannot bear weight [1].
- Physical examination findings include tenderness near the syndesmosis and the deltoid ligament [1].
- Pain is elicited by external rotation of the ankle [1].
- A positive squeeze test is defined as pain at the syndesmosis when compressing the tibia and fibula at midcalf [1].
- Swelling and ecchymosis are present in acute syndesmotomic injuries [1].
- Patients with syndesmotomic impingement exhibit localized tenderness along the anterior syndesmosis [2].
- Dorsiflexion and external rotation of the ankle increase symptoms in patients with syndesmotomic impingement [2].
- Tenderness during the squeeze test may be present in patients with syndesmotomic impingement [2].

IMAGING

- The AP view of plain radiography shows decreased tibiofibular overlap in syndesmotomic injury [1].
- The mortise view of plain radiography shows increased tibiofibular clear space in syndesmotomic injury [1].
- Tibial radiographs should be obtained to rule out a proximal fibula fracture (Maisonneuve fracture) [1].
- In subtle cases, the diagnosis is confirmed by weight-bearing radiographs and stress radiographs in eversion and external rotation, with comparison to the opposite side [1].
- CT may help evaluate the syndesmotomic space, especially in chronic cases [1].
- MRI may show subtle syndesmotomic ligament injury [1].

Investigations

CLINICAL EVALUATION

- Tenderness near the syndesmosis and deltoid ligament is a clinical sign of syndesmotic injury [1].
- Pain with external rotation is a clinical sign of syndesmotic injury [1].

PLAIN RADIOGRAPHY

- A tibiofibular clear space greater than 5 mm on the AP view has been suggested to correlate with syndesmotic rupture [3].
- A tibiofibular overlap less than 5 mm on the AP view has been suggested to correlate with syndesmotic rupture [3].
- A tibiofibular overlap less than 1 mm on the mortise view has been suggested to correlate with syndesmotic rupture [3].
- The tibiofibular clear space is the most reliable parameter among plain radiographic measurements for syndesmotic rupture [3].
- Cadaveric models have shown that no predictable increase in measurements on plain radiography can be found on sectioning of the syndesmotic ligaments [3].
- An increase in the tibiofibular clear space in comparison to the contralateral ankle may be more accurate than absolute values [3].

ADVANCED IMAGING

- Axial imaging has been shown to demonstrate disruptions not evident on plain radiographs [3].
- CT studies have shown wide variation in the shape of the syndesmosis, including a deep concave incisura in some and a limited curve in others [3].
- MRI provides a more accurate assessment of syndesmotic injury than plain radiography [3].
- MRI assessment of syndesmotic injury correlates well with direct arthroscopic assessment [3].
- MR arthrography may add further accuracy to the assessment of syndesmotic injury [3].
- The integrity of syndesmotic ligaments is rarely visualized on MRI and is surmised from radiographic diastasis [3].

Treatment

- Anatomic ligament repairs are a described surgical technique for syndesmotic injuries [4].
- An evidence-based approach to the treatment of acute traumatic syndesmosis (high ankle) sprains has been outlined [4].
- Syndesmotic fixation and management is a current practice among orthopedic surgeons for ankle fractures [4].

- Deltoid ligament repair is an alternative to syndesmotic fixation in bimalleolar equivalent ankle fractures [4].
- Repair of acute superficial deltoid complex avulsion is performed during ankle fracture fixation in National Football League players [4].
- Magnetic resonance imaging has been compared to physical examination for the diagnosis of syndesmotic injury after lateral ankle sprain [4].

References

[1] Aaos Comprehensive Orthopaedic Review 3. Acute and Chronic Injuries of the Ankle > IV. Syndesmotic Instability.

[2] Aaos Comprehensive Orthopaedic Review 3. Arthroscopy of the Ankle > IV. Syndesmotic Impingement.

[3] Rockwood And Green S Fractures In Adults. 59: Patellar Fractures and Dislocations and Extensor Mechanism Injuries > *Syndesmotic Injuries*.

[4] Campbell S Operative Orthopaedics 4 Volume Set. REPAIR OF ACUTE RUPTURE OF LATERAL LIGAMENTS > ACUTE ANKLE LIGAMENT INJURIES, CHRONIC ANKLE INSTABILITY.