Acute and Chronic Injuries to the Syndesmosis

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KEYWORDS

• Syndesmosis • Tibiofibular • Chronic syndesmosis • Syndesmotic • Disruption
• High ankle sprain

KEY POINTS

- Stable syndesmotic injuries do not require surgical stabilization and can be treated with protected weight bearing. Advanced imaging demonstrating an intact deltoid ligament with preservation of the interosseous ligament and posterior inferior tibiofibular ligament is associated with a stable injury.
- Unstable syndesmotic injuries require operative stabilization. The use of a suture button device may be appropriate in the setting of a length-stable fibula.
- Use of a suture button device in the setting of a Maisonneuve injury may not provide sufficient coronal and sagittal stability and should be used with caution in these cases.
- Anatomic reduction of the syndesmosis is critical to providing improved outcomes, and direct visualization should be considered in addition to obtaining a contralateral lateral radiograph to assess the reduction.
- Chronic syndesmotic diastasis requires restoration of the mortise and can be performed with graft reconstruction or arthrodesis. The use a graft has been successful in limited clinical series and may offer stability without limiting the motion of the fibula and theoretically may improve function and decrease the risk of ankle arthritis compared with syndesmotic fusion.

ANATOMY OF THE SYNDESMOSIS

Understanding of the anatomy of the normal syndesmosis is essential in both interpretation of diagnostic imaging and therapeutic management.

Distal Tibiofibular Joint

A syndesmosis is defined as a fibrous joint in which 2 adjacent bones are linked by a strong membrane or ligaments. The distal tibiofibular joint comprises the convex

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medial aspect of the distal fibula and the concave lateral aspect of the distal tibia, known as the incisura fibularis. Direct contact facets, which are very small and covered with articular cartilage, between the distal tibia and the fibula, are present in approximately three-quarters of patients.[1]

The size and shape of the incisura fibularis play an important role in ankle injury, and have been investigated using cadavers and computed tomography (CT). The anterior tibial tubercle is typically larger than the posterior tubercle and prevents forward translation of the distal fibula. In 97% of normal cases, the fibula is situated either anteriorly or centrally in the tibial incisura.[2] This posterior joint space width is significantly wider than the central and anterior joint spaces.[2] The axis of the distal tibiofibular joint was found to be, on average, 32° externally rotated in relation to the transmalleolar axis.[3]

Significant variance in this bony anatomy exists between individuals.[4] However, there is minimal difference between ankles of the same person, with tibiofibular intervals not varying by more than 2.3 mm and the rotation of the fibula not varying by more than 6.5°.[4] Because of significant anatomic variation between individuals, using a patient's contralateral ankle for comparison provides a precise definition of normal tibiofibular relationships.

Ligamentous Structures

The distal tibiofibular syndesmosis consists of 3 distinct ligaments that act to statically stabilize the distal tibiofibular joint.[5–7]

Anterior tibiofibular ligament

This multilayered ligament extends obliquely from the anterolateral tubercle of the distal tibia on average 5 mm above the articular surface to the longitudinal tubercle located on the anterior border of the lateral malleolus. The inferior fibers can be viewed arthroscopically as they cover the anterolateral corner of the ankle and anterolateral dome of the talus.

Posterior tibiofibular ligament

This ligament consists of a deep and superficial component. The superficial portion extends obliquely from the lateral malleolus to a broad attachment on the posterolateral tibia tubercle. The deep component is the transverse ligament, which is sometimes referred to as a separate ligament. This portion is thick and strong and originates from the round posterior fibular tubercle, inserting on the lower part of the posterior border of the tibial articular surface. This deep portion is more transverse and acts as a labrum, deepening the tibial articular surface.

Tibiofibular interosseous membrane and ligament

This membrane spans most of the length of the lower leg between the tibia and fibula. The ligament is a pyramidal thickening of the distal membrane that terminates just superior to the anterior tibiofibular ligament (AITFL) and posterior tibiofibular ligament (PITFL), helping stabilize the talocrural joint during loading.

Blood Supply

The vascular supply to the syndesmosis has been examined in a singular study. The posterior branch of the peroneal artery is the predominant blood supply to the posterior syndesmotic ligaments. The anterior branch of the peroneal artery, which is the predominant blood supply to the anterior ligaments, perforated the interosseous membrane on average 3 cm proximal to the ankle joint. Thus, this vascular supply would be at considerable risk of insult with a syndesmotic injury, which could explain