Syndesmotic disruption of the ankle

Essay
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ABSTRACTS

Syndesmosed injuries are rare, but very debilitating and ferquently misdiagnosed . the purpose of this essay is to review the anatomy, biomechanics, mechanisms of syndesmotic injuries, clinical examination methods, diagnosis, management of the injuries, and complication of management and missed diagnosis .

External rotation and excessive dorsiflexion of the foot on the leg have been reported as the most common mechanisms of injury . the injury is most often incurred by individuals who participate in skiing, football, soccer, and other sport activities played on turf . the external rotation and squeeze tests are reliable tests to detect this injury. The ability of imaging studies to assist in an accurate diagnosis may depend on the severity of the injury .

In pure syndesmotic injury the intervention programs with early rigid immobilization and pain relief strategies, followed by strengthening and balance training are recommended. Heel lift and posterior splint intervention can be used to avoid separation of the distal syndesmosis induced by excessive dorsiflexion of the ankle joint. Surgical intervention is an option when a complete tear of the syndesmotic ligaments is present or when fractures are observed.

The management of injury to the distal tibiofibular syndesmosis remains controversial in the treatment of ankle fractures. Operative fixtion usually involves the insertion of a metallic diastasis screw. There are a variety of options for the position and characterization of the screw, the type of cortical fixation, and whether the screw should be removed prior to weight-bearing.

Key words;

Syndesmosis, external rotation and excessiv dorsiflexion.

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List of Abbreviations

AITFL	***Anterior inferior tibiofibular ligament***
PITFL	***Posterior inferior tibiofibular ligament***
LCL	***Lateral Collateral Ligament***
AP	***Anteroposterior***
RSA	***Radiostereometric analysis***
CT	***Computerized tomography***
MRI	***Magnetic radioassay***
ORIF	***Open reduction and internal fixation***
mm	***Millimeter***

Introduction

Ankle injuries are the most common injuries incurred during sports and recreational activities. They are particularly common in sports such as basketball, soccer, volleyball, or other activities performed on uneven surfaces ,Stability of the distal tibiofibular syndesmosis is necessary for proper functioning of the ankle and lower extremity(Fernandez,2007).

Syndesmosis is made up of anterior-inferior tibiofibular ligament, interosseous ligament, and posterior- inferior tibiofibular ligaments, inferior transverse tibiofibular ligament, and; these stabilize the mortise by opposing the fibula in the fibular notch (Ivins, 2006).

Ankle syndesmotic injury does not necessarily lead to ankle instability, however, the coexistence of deltoid ligament injury critically destabilize the ankle joint, the syndesmotic injuries may involve the distal tibiofibular syndesmosis and can be associated with a variable degree of trauma to the soft tissue and/or osseous structures that play an important role in ankle joint Stability(*Zalavras,2007)*.

The diagnosis of syndesmotic injury may not be a straightforward, in the absence of fracture; physical examination findings suggestive of injury include ankle tenderness over the anterior aspect of the syndesmosis and a positive squeeze or external rotation test, radiographic findings usually include increased tibiofibular clear space, decreased tibiofibular overlap, increased medial clear space, and other advanced diagnostic modalities include CT and MRI. However, syndesmotic injury may not be apparent radiographically; thus, routine stress testing is necessary for detecting syndesmotic instability (Beumer et al, 2006).

Although the pathomechanics and extent of syndesmotic injuries have been systematically described by Lauge-Hansen and Weber, These injuries are frequently overseen or misdiagnosed as

anterolateral rotational instability of the ankle and often become apparent through protracted courses (*Michelson, 1996)*.

The goal of management is to restore and maintain the normal tibiofibular relationship to allow for healing of the ligamentous structures of the syndesmosis. Non-surgical management is indicated when the syndesmotic sprain is not associated with diastasis or instability, or when restoration of the proper tibio-fibular relationship and accurate restoration of the fibular length is achieved with open reduction and stable fixation of the fibular fracture. Non-surgical treatment begins with rest, ice, compression and elevation. Subsequently, a non weight bearing cast is used for 2 to 3 weeks followed by progressive weight bearing as tolerated (Clanton and Paul, 2002).

Fixation of the syndesmosis is indicated when evidence of a diastasis is present. This may be detected preoperatively, in the absence of fracture, or intraoperatively after fixation of medial malleolus and fibular fractures. Syndesmotic injury can be controlled by screw fixation. However, the choice between metal and bioabsorbable screws, screw size, number of cortices fixed, and indications for screw removal remain controversial. Conditions such as uncomplicated diabetes or advanced age are no longer absolute contraindications to usual management recommendations (Clanton and Paul, 2002).

Failure to diagnose and stabilize syndesmotic disruption adversely affect outcome. Functional, mechanical instability, or chronic pain, stiffness, and/or edema is the main complication of missed diagnosis and management of this type of injury (Weening and Bhandari, 2005).

Aim of the work

The aim of this essay is to discuss the importance of the injury, the proper diagnosis and management of syndesmotic disruption of the ankle with or without associated bony or other ligament injuries, and the complication associated with missed diagnosis and management.

Chapter1

Anatomy & biomechanics

To understand the tibiofibular syndesmosis, a thorough knowledge of the surrounding anatomic structures is needed. A detailed and comprehensive understanding of the superficial and deep structures of the talocrural and subtalar joints, in addition to the tibiofibular articulations, is needed to fully comprehend the joint mechanics and injury mechanisms involved(susan,2001).

Talocrural and Subtalar Joints

The talocrural, or ankle joint, is a uniaxial, modified-hinge joint formed by the talus, the medial malleolus of the tibia, and the lateral malleolus of the fibula. Specifically, the concave distal articular facet of the tibia articulates with the convex superior articular surface of the talus (trochlea). The medial malleolus articulates with the medial aspect of the trochlea, whereas the lateral malleolus articulates with the lateral aspect of the trochlea. The stability of the ankle mortise is enhanced because the dome-shaped body of the talus fits snugly into the slightly concave tibial undersurface *(Magee, 1997).*

The relation of the tibia, fibula, and talus is maintained by an articular capsule and 3 groups of ligaments (medial, lateral, and syndesmosis). The articular capsule surrounds the joint and is attached to the borders of the articular surfaces of the malleoli proximally and to the distal articular surface of the talus distally. The anterior aspect of the capsule is broad, thin, and membranous, whereas the posterior component of the capsule is very thin and consists mostly of transverse fibers. The lateral aspect of the capsule is slightly thickened *(Magee, 1997).*

The deltoid (medial) ligament is a strong, flat, and triangularly shaped ligament on the medial aspect of the ankle. This ligament consists of 4 bands: the anterior tibiotalar, the posterior tibiotalar, the tibio calcaneal, and the tibio navicular *(Figure 1)*. The deltoid ligament is considered the strongest of the ankle ligaments and, especially during plantar flexion, functions to prevent excessive eversion at the subtalar joint. The deltoid, particularly its anterior portions, also resists talar external rotation. *(Michelson&Waldman, 1996).*

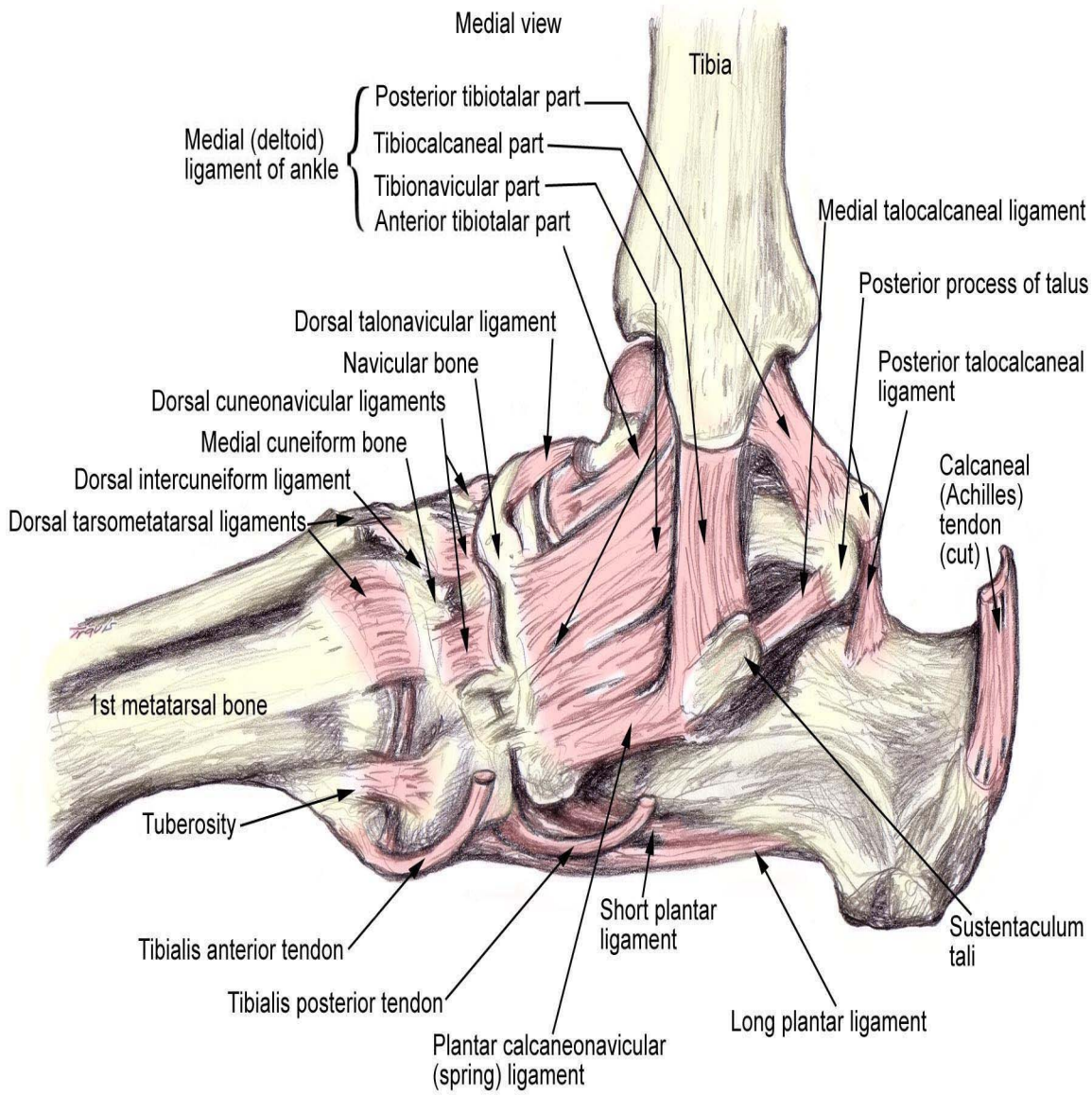

Figure 1

Deltoid ligaments of the ankle.

{ after (Michelson,1996)}

Lateral collateral ligaments of the ankle formed of the anterior talofibular ligament, the posterior talofibular ligament, and the calcaneofibular ligament ***(Figure 2).*** The anterior talofibular ligament limits anterior displacement and medial shifting of the talus (or posterior displacement and lateral rotation of the tibia and fibula), respectively, primarily in plantar flexion. This ligament also helps to prevent lateral talar tilt. The posterior talofibular ligament braces the talus posteriorly and helps to limit talar external rotation (or internal rotation of the tibia and fibula). The calcaneofibular ligament functions to prevent lateral talar tilt, principally when the ankle is in a neutral amount of plantar flexion and dorsiflexion ***(Sarrafian, 1993).***

The bony and ligamentous arrangement of the talocrural joint provides it with considerably more stability than other diarthrodial joints, such as the knee or shoulder. Depending on the position and the loads placed on the joint, the bones and ligaments alternate as primary and secondary stabilizers. Weight bearing and axial loading have been reported to increase talocrural bony stability. When dorsiflexed, the ankle is thought to be in the most stable position, sometimes termed *close packed,* since this is the position of the most bony contact. In this position, most of the mortise is occupied by the talus, and contact is maximal between the involved articulating surfaces ***(Turco, 1995) (Brosky &Nyland, 1995).***

Tibiofibular Syndesmosis

A third articulation in the region of the ankle and lower leg is between the tibia and fibula. This articulation of the fibula with the tibia can be subdivided further into 3 regions: the superior or proximal tibiofibular joint, the interosseous membrane, and the inferior or distal tibiofibular joint. The superior tibiofibular joint is a syndesmotic joint that is held in place by the anterior superior tibiofibular and posterior superior tibio-fibular ligaments. This articulation helps to maintain proximal integrity between the tibia and fibula ***(Magee, 1997).***

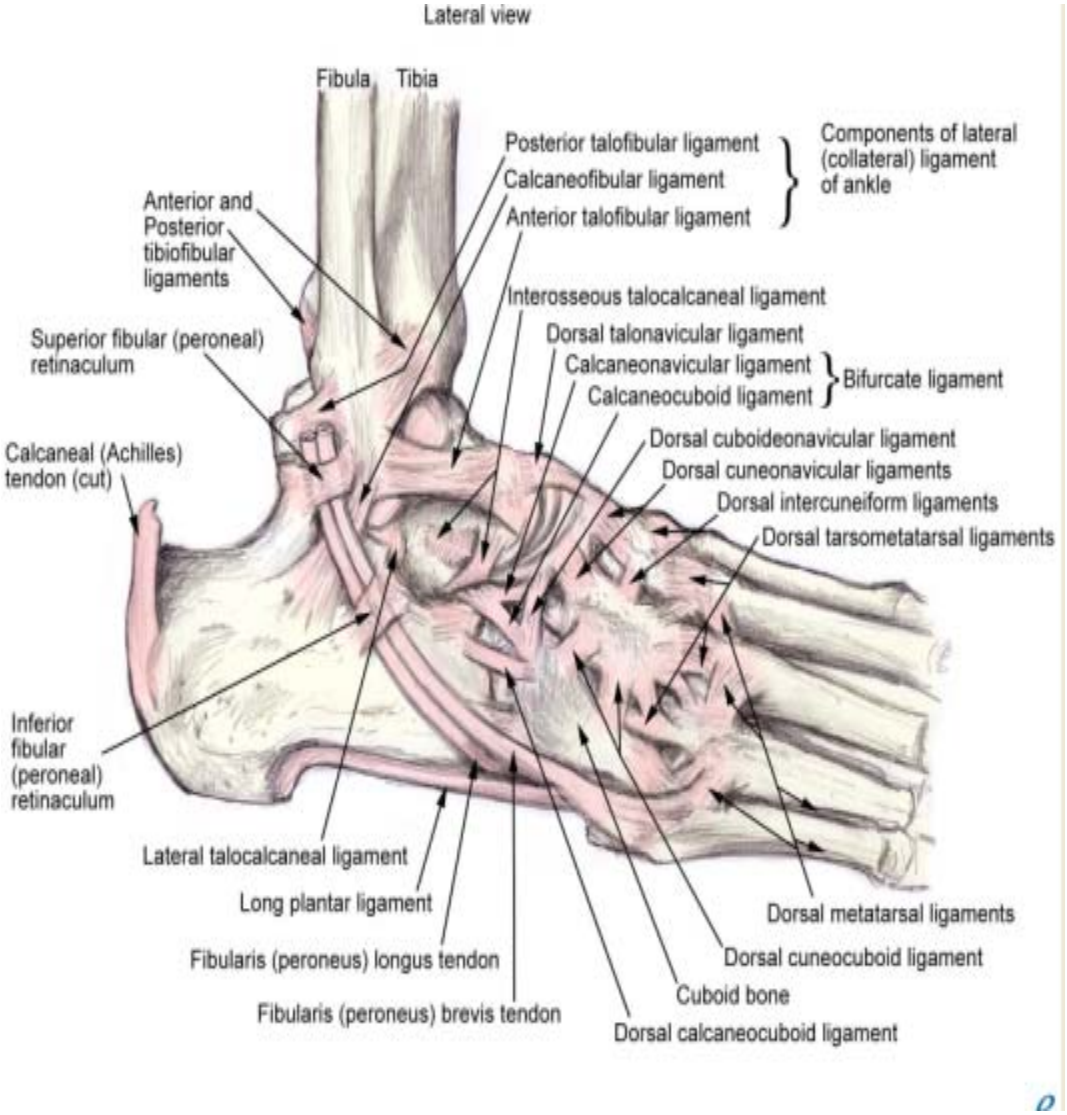

Figure 2
Lateral view of the ankle.
{after (Michelson,1996)}