



A Study on Current Status of Syndesmotric Injuries

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Abstract

Syndesmotric injuries are common after ankle fractures. This review aims to present current concepts about the diagnosis and treatment of these injuries.

Keywords: Ankle fractures, Ankle joint, Malleolar fracture, Syndesmosis, Syndesmotric injury.

Introduction

Our understanding of the ankle complex, syndesmosis injuries, and significance of syndesmotric instability has evolved in the last 50 years shifting from no treatment at all to fixing all the fractures. In recent years, it has been recognized that not all syndesmotric injuries require stabilization. Recently, a survey of the Orthopaedic Trauma Association (OTA) members showed a high grade of variability and controversy in the treatment of ankle fractures.

Review

Syndesmotric injuries usually occur after ankle pronation external rotation injuries and can be associated with malleolar fractures. A better understanding of the ankle and syndesmotric anatomy has allowed the orthopaedic surgeon to treat syndesmotric injuries. The medial, lateral, and posterior malleoli are important for ankle stability.

Diagnosis

Physical exam and clinical signs have not shown to be reliable in diagnosing syndesmotric injuries.

Well-known X-ray parameters that suggest a syndesmotric injury are tibiofibular (TF) overlap (>6 mm in the AP view and >1 mm from the tibial plafond in the mortise view), TF clear space (<6 mm, 1cm above the tibial plafond in the AP and mortise views), and medialclear space. It is also suggested using the anterior tibiofibular ratio (ATFR) measured on the lateral view as an additional measure that can aid in the diagnosis of a syndesmotric lesion. Dynamic stability of the ankle should be assessed using either external rotation stress, gravity stress, or weight-bearing (WB) radiographs. It is important to bear in mind that each of these methods has pros and cons, for example, manual stress and WB radiographs are dependent on patient's pain tolerance, which can affect its technique. Obtaining ankle stress radiographs in dorsiflexion and external rotation has shown to predict deltoid ligament disruption. It has been reported to have nearly perfect sensitivity and specificity for deltoid ligament disruption. Weight-bearing radiographs allow evaluation of stability and congruence of the ankle joint while reducing the need for surgery. Weber

et al. evaluated the use of WB radiographs taken 3–10 days post-injury founding that this approach allows for a pain-free evaluation while being reliable in distinguishing those injuries that require surgery without affecting functional results. In cases in which a syndesmotic lesion is suspected but no definitive diagnosis can be made based on X-rays and clinical history alone, a magnetic resonance imaging (MRI) can be warranted. Evaluate the incisura fibularis, and when fractures are present, the articular extension, impaction, and presence of a posterior fragment. In the setting of an ankle fracture, diagnosis of syndesmotic instability can be made intraoperatively under fluoroscopic guidance using either the hook test or external rotation stress test.

Treatment

We selected 10 cases of ankle fracture or syndesmotic injury is deemed to require surgical fixation, we must consider the different options to obtain and maintain reduction.

Obtaining of Adequate Reduction

It is critical to obtain an adequate reduction of the syndesmosis, this can either be performed via indirect or direct methods. It is important to consider the anatomic variabilities of the incisura fibularis. A reduction clamp is the simplest method that can be used to reduce the syndesmosis, but adequate positioning is crucial, as a too anteriorly positioned tine can malreduce the syndesmosis translating the fibula and narrowing the incisura anteriorly and vice versa which results in malreduction. Efforts have been made to identify the most accurate clamp position. Clamp placement along the axis of the ankle joint (i.e., tines should be positioned lateral to the malleolar ridge at the fibula and in the central part of the medial cortex in the tibia) has historically been used. Cosgrove et al. described medial tine placement in the anterior third of the tibial line. The use of the TSA has proven to help guide adequate clamp positioning. Therefore, Sagi et al.

recommended a “direct, open visualization of the syndesmosis during reduction maneuver”. Recently, Tornetta et al. proposed using the articular surface as a visual landmark during open reduction aligning it with the anteromedial fibular articular surface, by doing so, alignment is further improved when compared to relying on the incisura alone. Bringing back the “ring concept”, it is important to evaluate if a posterior malleolus fracture is present. The posterior malleolus is the attachment site for the posterior inferior tibiofibular ligament (PITFL). Thus, disruption of the posterior complex can lead to syndesmotic instability. Even after fixation of this fragment has been achieved, it is important to rule out persistent syndesmotic instability.

Method of Fixation

Once reduction has been obtained, we faces the question of whether to use a static (screw) or dynamic fixation. Several biomechanical and clinical studies have addressed many of the questions and there seems to be no difference in screw size (i.e., 3.5 - 4.5-mm screws), although resistance to shear stress is better tolerated with 4.5 mm screws, material (stainless steel or titanium), the use of one or two screws, three or four for cortical, and location (trans- or supra-syndesmotic). Advocates of suture-button devices argue that, since the syndesmosis is a mobile joint, a dynamic stabilization should be biomechanically more favourable as it allows movement while preserving reduction. In their study, there were no statistically significant differences in functional outcomes, malreduction (although higher rates were found with screw fixation), and postoperative complications.

Assessment of Reduction

Irrespective of the method used, it is important to achieve an adequate reduction of the syndesmosis as it affects fixation stability, ankle biomechanics, functional outcomes, and increases the risk of posttraumatic arthritis secondary to an increase in joint reactive forces. Malreduction has been

identified in upto 50% of the cases and “small” differences (2-mm) in the anterior TR distance when compared to the uninjured side showed to correlate with poorer outcomes. Persistent diastasis is often overlooked in plain radiographs; therefore, we must be aware of the methods to evaluate diastasis intraoperatively and postoperatively. To evaluate instability intraoperatively, a hook test can be performed and can be complemented with an external rotation stress examination with fluoroscopic imaging. Stress test can be complemented with a mortise and talar dome. Three-dimensional (3D) imaging has shown promising results and its use has been proposed as an alternative to identify subtle malreductions that are not identified in conventional fluoroscopy and/or postoperative radiographs.

Time of Implant Removal

There seems to be an agreement regarding implant removal. Literature has shown that there is no additional benefit to screw removal as there is no difference in functional, clinical, or radiographic outcomes. It is important to have an early conversation with patients and explain that screw breakage is a possibility, more importantly, it is crucial to emphasize that this does not affect recovery nor outcomes, and hardware removal is not advisable. There are circumstances in which implant removal should be considered (e.g., persistent pain or syndesmosis malreduction). Early removal (i.e., 8-10 weeks) has been associated with syndesmotic diastasis. It is advisable to wait at least 12 weeks for adequate healing.

Summary

Despite controversy and lack of consensus in some aspects of the diagnosis and treatment of syndesmotic lesions, irrespective of the reduction and fixation method used, to obtain good results it is essential to achieve an adequate reduction.

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