Sideline Management of Syndesmotic Injuries in the Athlete: Evaluation, Management, and Return to Play

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Objective: This review aims to provide a comprehensive examination of syndesmotic ankle injuries in athletes, covering pertinent aspects from anatomy to treatment options.

Methods: A thorough literature search was conducted to gather relevant information on syndesmotic injuries in athletes. Data regarding anatomy, epidemiology, injury mechanisms, clinical assessment, imaging modalities, conservative management, and surgical interventions were analyzed and synthesized.

Results: Syndesmotic injuries, colloquially termed *high ankle sprains*, pose significant challenges for medical professionals, especially in high-impact sports such as American football. Clinical evaluation, including specific tests and imaging techniques, is crucial for accurate diagnosis. Conservative management strategies involve immobilization and rehabilitation for stable injuries, while surgical intervention may be necessary for severe cases to maintain anatomic alignment. Various surgical techniques, including screw and suture button fixation, have been utilized with favorable outcomes.

Discussion/Conclusion: A comprehensive understanding of syndesmotic injuries is essential for health care providers involved in the care of athletes. Accurate diagnosis, tailored treatment plans, and appropriate rehabilitation protocols are vital for optimizing outcomes and facilitating safe return to sport. This review serves as a valuable resource for clinicians managing syndesmotic injuries in athletes, highlighting the importance of evidence-based approaches in guiding clinical decision-making.

Patient Consent Disclosure Statement: The author(s) attests that consent has been obtained from any patient(s) appearing in this publication. If the individual may be identifiable, the author(s) has included a statement of release or other written form of approval from the patient(s) with this submission for publication.

Keywords: syndesmosis; high ankle injury; athletic injury; sports; foot and ankle

VIDEO TRANSCRIPT

On behalf of Baptist Health South Florida, thank you for watching our video entitled "Sideline Management of Syndesmotic Injuries in the Athlete: Evaluation, Management, and Return to Play."

We have nothing relevant to disclose.

Here is an overview of what we will be covering in this video.

BACKGROUND AND INDICATIONS

Syndesmotic ankle injuries are commonly referred to as "high ankle sprains" and are notoriously difficult to treat with prolonged recovery and return-to-play times. In fact, surveys of physicians and athletic trainers caring for professional athletes have ranked syndesmotic injuries as the most difficult injuries to treat.[3,9] This is because they can be isolated or can occur in combination with other lower extremity sprains or fractures. Subtle physical examination and imaging findings frequently result in delayed or missed diagnoses. Even with a timely diagnosis, optimal management of these injuries remains controversial due to the wide variation in the severity of these injuries and poorly defined treatment algorithms, with limited data to suggest superior management.

About 1% to 18% of all ankle injuries consist of syndesmosis injuries. American football players are at highest

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risk due to the intensity of play, twisting and cutting, and frequent high-speed contact.[2,3] Time lost from sport varies widely, with averages ranging from 10 to 54 days.[6] Overall, these injuries cause more time lost from sport compared to lateral ankle injuries.[2] Heterotopic ossification is common, and almost half of these patients will have some degree of lingering injury 6 months later.[4]

For the bony anatomy, the syndesmosis stabilizes the bony articulation between the distal fibula and distal tibia just proximal to the actual ankle mortise. The relevant bony anatomy comprises the tibial incisura, a concave triangular-shaped cavity in the lateral distal tibia. The anterior tubercle of the tibia is also known as the Chaput tubercle and serves as the tibial insertion site of the anterior inferior tibiofibular ligament (AITFL), while the posterior tubercle is known as the posterior malleolus or Volkmann tubercle and serves as the tibial insertion of the posterior inferior tibiofibular ligament (PITFL). The crista interossea fibularis is the corresponding convex triangular shape of the medial aspect of the distal fibula that fits within the tibial incisura. The anterior tubercle is known as the Wagstaffe–Le Fort tubercle, and it serves as the corresponding fibular insertion site of the AITFL.

The syndesmosis ensures the talus is positioned underneath the tibial plafond between the medial and lateral malleoli and consists of 4 ligaments. The AITFL, which runs from Chaput's tubercle to Wagstaffe's tubercle, is the weakest and most commonly injured ligament of the syndesmosis.[11] The PITFL runs from Volkmann's tubercle and inserts posteriorly on the lateral malleolus.[11] Just inferior to the PITFL and coursing in a similar orientation is the inferior transverse tibiofibular ligament.[11] The posterior ligaments are significantly stronger than the AITFL and are typically the last structures to fail.[11] Finally, the interosseous membrane between the tibia and fibula thickens distally to form the interosseous ligament.[11]

The most common presenting injury mechanism is a combination of ankle dorsiflexion, external rotation, and pronation of the foot. The foot is typically planted on the ground in dorsiflexion, and the athlete's upper torso and tibia internally rotate relative to the locked foot. This position isolates the AITFL, which leads to failure. Athletes typically complain of generalized pain made worse with weightbearing or in the push-off phase of gait. Some athletes will localize their pain to the anterolateral distal tibia and fibula above the level of the ankle joint.

METHODS

For the physical examination of a suspected syndesmotic injury, first remove the athlete's shoes and socks, and inspect for any visible areas of swelling. Palpate the AITFL to assess for tenderness, as well as the interosseous membrane and the entire fibular shaft well proximal to the ankle joint. Tearing of the interosseous membrane and high fibula fractures may occur along the entire length of the leg and might be missed with routine ankle radiographs.

Specific tests for syndesmosis injuries include the squeeze test, which occurs when the examiner compresses the proximal tibia and fibula together, eliciting pain at the level of the ankle joint. A positive external rotation stress test occurs when the athlete has their knee flexed to 90°. The examiner places the ankle in dorsiflexion, and pain is felt when external rotation is applied through the foot and ankle. A positive fibula translation test is when there is increased translation of the fibula in an anteroposterior (AP) direction while the tibia is kept stationary. The syndesmotic stabilization test is when the examiner asks the patient to perform a single-limb heel rise or hop test. If the patient is symptomatic during this, the examiner then uses a tight supramalleolar wrap with tape or elastic wrap and then has the patient repeat the maneuver. Resolution or improvement of their symptoms with the wrap is a positive sign for a syndesmosis injury and may be more helpful in the case of chronic injuries.

If radiographs are available to the clinician, standard AP, lateral, and mortise ankle radiographs, as well as AP and lateral full-length tibia and fibula films, should be obtained to rule out a Maisonneuve fracture. These should be weightbearing if the athlete can tolerate it to assess for more subtle syndesmotic or medial clear space widening. If the initial radiographic workup is inconclusive with a suspicious examination, consider contralateral films for comparison. External rotation stress films can also be considered, but these are typically difficult for the athlete to tolerate in an acute injury. Initial review of the films should look for any obvious fractures. There can be ligamentous avulsion fractures at any of the previously mentioned insertion sites of the syndesmosis.

Other indicators of syndesmotic injury can be abnormal spatial relationships between the talus, tibia, and fibula. The first is the tibiofibular clear space, which is measured 1 cm proximal to the talus. Diastasis of 6 or more millimeters on the AP or mortise view is considered positive. Other findings include an increased medial clear space of greater than 4 mm or greater than 2 mm of the contralateral side on a mortise view, measured from the medial malleolus to the medial aspect of the talus. You can also assess for the tibiofibular overlap, measured 1 cm proximal to the plafond, and should be greater than 6 mm on the AP view and greater than 1 mm on the mortise view. In addition, bony avulsions can be seen from the anterior or posterior aspects of the tibia, and in chronic cases, calcifications can be identified within the syndesmosis or interosseous membrane. Computed tomography scans can be useful to identify subtle fractures and axial plane fibular displacement in acute cases and chronic cases to assess for fibular malreduction within the incisura. In the acute setting, magnetic resonance images that provide detailed soft tissue anatomy have a reported 100% sensitivity and 93% specificity for diagnosing acute syndesmotic injuries.[8]

Syndesmotic injuries are typically graded from 1 to 3, similar to other ligamentous injuries. Grade 1 injuries are more stable, grade 2 injuries exhibit mild laxity, and grade 3 injuries show frank instability.

Stable grade 1 injuries are typically treated conservatively. The first step on the sideline is to remove the shoe and apply ice and a gentle compressive wrap to the affected area to control swelling, with appropriate rest and

elevation. A CAM boot is preferred to allow for periodic nonweightbearing with controlled ankle range of motion while protecting against abduction and external rotation during ambulation. The athlete is transitioned to a functional brace that restricts external rotation, such as a Malleoloc brace. Bracing may be de-escalated as the athlete's symptoms improve, with supramalleolar ankle taping employed later for symptom reduction during training or returning to play.

Grade 2 and 3 injuries are controversial, but if nonoperative management is selected, then the goal of treatment is to first maintain the anatomic reduction of the mortise. After initial nonweightbearing in a splint, a brief period of casting has been beneficial in our practice, followed by transitioning into a CAM boot and then functional bracing and a tailored return-to-play protocol. Serial radiographs should be obtained approximately every 2 weeks to ensure maintenance of the reduction. The rehabilitation protocol should focus on regaining range of motion, strength, proprioception, and a functional return to play. Injectable agents such as platelet-rich plasma can also be considered, but more studies are needed to elucidate its effects.

DISCUSSION

In general, high ankle sprains take twice as long to return to play compared to lateral-sided ankle sprains and are much more likely to cause long-term dysfunction.[1] The clinician should counsel the athlete to not attempt to play through pain due to the possibility of worsening the injury, leading to displacement, persistent instability, and risk of reinjury. In the acute phase, the goals of rehab are protection, decreasing swelling, and pain control. In the subacute phase, the goals progress to restore mobility, strength, and function in normal gait. Beyond this, the rehab should focus on sport-specific functional tasks facilitating a return-to-play protocol, with an average return to play at 13.4 weeks.[10]

For unstable grade 2 and 3 injuries, recent trends favor more aggressive treatment, opting for surgery to avoid any subtle misdiagnoses or a delayed loss of reduction while attempting cast immobilization. For unstable grade 3 injuries, a previous study in collegiate athletes treated with early surgery showed no difference in long-term outcomes and performance, with an early return to play at an average of less than 6 weeks.[5,13] In general, syndesmotic injuries with an associated fracture of the fibula or posterior malleolus typically require surgery to restore stability. Recent studies have shown improved outcomes with suspensory fixation over transsyndesmotic screws, with higher patient-reported outcome measures, fewer complications, and better cost-effectiveness.[7,12,14] In our practice, we typically treat all grade 3 injuries with suspensory fixation, and we reserve suspensory fixation for grade 2 injuries for the in-season athlete who requires a quicker recovery timeline to get them back to play. If an athlete has a grade 2 injury and has more time to recover, we typically start with a physical therapy trial, and if they are not progressing to their satisfaction, we then offer surgery in the form of suspensory fixation.

Thank you for your attention. Here are our references.

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