Dynamically Unstable Syndesmosis Injuries

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Isolated syndesmosis ankle injuries account for 1% to 74% of all ankle injuries.1-5 The mechanism of injury is often an external rotational force of the foot relative to the tibia. The distal tibiofibular joint consists of the anterior inferior tibiofibular ligament, posterior inferior tibiofibular ligament, interosseous membrane, interosseous ligament, and inferior transverse ligament.6-9 Diagnosis of syndesmosis injuries by physical examination is often straightforward. Physical examination findings that are often positive include the squeeze test and the external rotation test. Patients with high-grade syndesmosis injuries often cannot perform a single-leg heel raise. Patients report pain over the anterior and often posterior distal tibiofibular joint and a lack of pain over the calcaneo-fibular and anterior talofibular ligaments.4,8 Radiographs and magnetic resonance imaging are often used in the diagnosis and management of these injuries. The most reliable radiograph indicator of a syndesmosis injury is a tibiofibular clear space larger than 6 mm. Widening of the medial clear space greater than 5 mm and a decreased tibiofibular overlap (less than 6 mm on anteroposterior view and less than 1 mm on mortise view) also suggest a syndesmosis injury.9,10 Edwards and DeLee11 classified syndesmosis injury based on radiographs as frank (evident on initial radiographs) or latent (diagnosed on stress radiographs). Magnetic resonance imaging is sensitive in detecting rupture of the anterior inferior tibiofibular ligament/syndesmosis, but its role in decision making for this injury is still undetermined.12 The West Point Ankle Grading system is more pertinent to athletes and is based on the amount of edema and tenderness, the ability to bear weight, stress testing, and abnormal radiographic parameters as follows: grade I, no evidence of gross instability (partial tear of the anterior inferior tibiofibular ligament); grade II, no or slight evidence of gross instability (complete tear of the anterior inferior tibiofibular ligament, partial tear of the interosseous ligament); and grade III, definite gross instability (complete tear of the distal tibiofibular ligaments). A grade II injury poses a particular diagnostic challenge because the extent of injury and its dynamic instability often require provocative measures to recognize.13
Management of unstable syndesmosis injuries (abnormal initial or stress radiographs) uniformly requires surgical stabilization. Controversy exists regarding the type of fixation that should be used for unstable syndesmosis injuries.\(^7\)

**DISCUSSION**

Controversy surrounds the treatment of syndesmosis injuries in high-level athletes who have a stable syndesmosis on stress views and grade 2 tears. Some authors believe that in-office stress radiographs do not reflect the stress actually seen at the tibiofibular joint during high-level sports activities.\(^13\) In these patients, return to play is highly variable after syndesmosis injuries, so it may be beneficial to stabilize the syndesmosis to allow for earlier weight bearing. Some authors believe the inability to do a single-leg heel raise 48 hours after injury is indicative of a high-grade syndesmosis sprain and results in a minimum of 3 to 4 weeks before return to play is allowed, with negative stress radiographs required before return to play.\(^1,14\)

To test for dynamic instability, the current authors used a syndesmosis taping method first described by Wolf and Amendola.\(^15\) Athletic tape is placed tightly around the distal tibiofibular joint, and the patient is asked to perform a single-leg heel raise. If the patient is able to do so while taped but not without the tape, then the syndesmosis joint is believed to be dynamically unstable (ie, the tape temporarily stabilized the distal tibiofibular joint). The use of a positive tape test is controversial but can help determine which athletes would benefit from syndesmosis fixation.

**CASE REPORT**

An 18-year-old, Division I football player sustained an external rotation ankle injury during a scrimmage when another player landed on his lateral ankle. He was unable to continue play and was evaluated in the training room. He had positive squeeze and external rotation tests and reported pain over the anteroposterior distal tibiofibular joint. He noted no pain over the anterior talofibular or the calcaneofibular ligaments. He was unable to do a single-leg heel raise on the affected foot.

The authors obtained stress radiographs of the ankle (Figure 1), and no gross instability was noted. Magnetic resonance imaging (Figure 2) confirmed a syndesmosis injury with a complete tear to the anterior inferior tibiofibular ligament, consistent with a grade 2 syndesmosis injury. The patient was reevaluated 48 hours after the initial injury and was still unable to perform a single-leg heel raise. His distal tibiofibular joint was tightly taped for a limited time to try to recreate the syndesmosis ligaments, and he was subsequently able to perform a single-leg heel raise (Figure 3). The authors felt this represented a dynamically unstable syndesmosis, and the patient underwent percutaneous syndesmosis fixation with a single 4.5-mm screw 3 days after injury (Figure 4). Ankle arthroscopy performed in conjunction with the syndesmosis fixation showed the disrupted anterior inferior tibiofibular ligament avulsed off of the fibula (Figure 5).

Postoperatively, the ankle was in a walking boot, and the patient was allowed to ambulate with crutches. He started full range of motion exercises and theraband activities on postoperative day 3, in addition to standard ankle proprioceptive training activities. He was weaned off the crutches once he was able to walk without a limp in the walking boot (postoperative day 5). The ankle was removed from the walking boot on postoperative day 10 and placed in an aircast, and the patient started walking in the swim-ex (SwimEx, Inc, Fall River, Massachusetts). On postoperative day 21, he started jogging in the swim ex. He was able to return to sport 7 to 8 weeks after the injury.

**CONCLUSION**

In general, the diagnosis of a syndesmosis injury is fairly straightforward; however, no specific test or imaging study clearly defines the injury severity. Consequently, it is difficult to prescribe highly specific treatment strategies for the spectrum of syndesmosis injuries seen in athletes. Overall, syndesmosis injuries are more common in high-level contact athletes.\(^5\) The treatment for grossly unstable
syndesmosis injuries uniformly requires anatomic reduction and fixation. Grade 1 syndesmosis injuries are generally treated conservatively, as are most grade 2 injuries. If the patient has a grade 2 syndesmosis injury and is able to perform a single-leg heel raise more than 48 hours after injury, the patient should be treated conservatively. However, if the patient cannot perform a single-leg heel raise unless the distal tibiofibular joint is taped (representing dynamic instability), the patient may benefit from syndesmosis fixation.

The authors have adopted this ankle taping method to help diagnose and strategize treatment options for patients with grade 2 high-ankle sprains. The treatment of grade 2 syndesmosis injuries in high-level athletes is controversial. Stabilization of grade 2 syndesmosis injuries with internal fixation helps prevent instability. Theoretically, stabilization of the syndesmosis allows for earlier weight bearing and rehabilitation secondary to decreased pain, often resulting in quicker return to play in high-level athletes. Further clinical studies are necessary to evaluate this treatment pathway.

REFERENCES