

SURGICAL VERSUS CONSERVATIVE TREATMENT OF ACUTE LATERAL ANKLE SPRAINS IN ATHLETES

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INTRODUCTION

Inversion ankle sprains are the most common injuries in sports. Although these injuries are often considered minor, they can lead to persistent disability in athletes. Inadequate treatment can lead to chronic problems such as decreased range of motion, pain, and joint instability. The following paper will discuss the injury, evaluation, diagnosis, and treatment of these injuries, focusing on evaluation and comparison of different treatment modalities.

RISK FACTORS

There is limited evidence concerning risk factors for ankle injuries. A history of previous ankle sprain has been cited as a common risk factor. A prospective study of recreational basketball players demonstrated that a history of ankle sprain was a moderate risk factor for ankle injury sustained during play. Wearing shoes with air cells and inadequate stretching also could play a role (1). The reported prevalence of ankle injury varies among sports and is highest in basketball, ice skating, and soccer (2). There appears to be no relationship between the type of sport and risk of ankle injury in collegiate male athletes (1). However, an athlete's sex, foot type, and generalized joint laxity may affect his or her risk of ankle injury (1).

Limited ankle dorsiflexion in children may increase the risk of ankle injury (1). However, the role of other physical

parameters such as height, weight, limb dominance, ankle joint laxity, and postural sway is unclear (1). Finally, the playing surface, especially when comparing artificial turf to grass, has no effect on risk potential (3).

DIAGNOSIS

The typical ankle sprain is an inversion injury that occurs in the plantar-flexed position. Ankle sprains can be classified as grade I to III, depending on the severity of the injury (Table 1). The most common injured ligaments are the lateral stabilizing ligaments; anterior talofibular, calcaneofibular, and posterior talofibular (Figure 1). The anterior talofibular ligament is the most affected. High ankle (syndesmotic) sprains are caused by dorsiflexion and eversion of the ankle with internal rotation of the tibia. This can injure the posterior and anterior tibiofibular ligaments.

HISTORY AND PHYSICAL EXAMINATION

Physicians should ask patients with ankle injuries about the mechanism and timing of the injury and if the patient has a history of recurrent sprains. Urgent evaluation is recommended for patients with a high level of pain, rapid onset of swelling, coldness or numbness in the injured foot, inability to bear weight, or a complicating condition. Re-examining the patient three to five days after injury is

Table 1

GRADES OF ANKLE SPRAINS

Sign/ Symptom	Grade I	Grade II	Grade III
Ligament Tear	None	Partial	Complete
Loss of Function	Minimal	Some	Great
Pain	Minimal	Moderate	Severe
Swelling	Minimal	Moderate	Severe

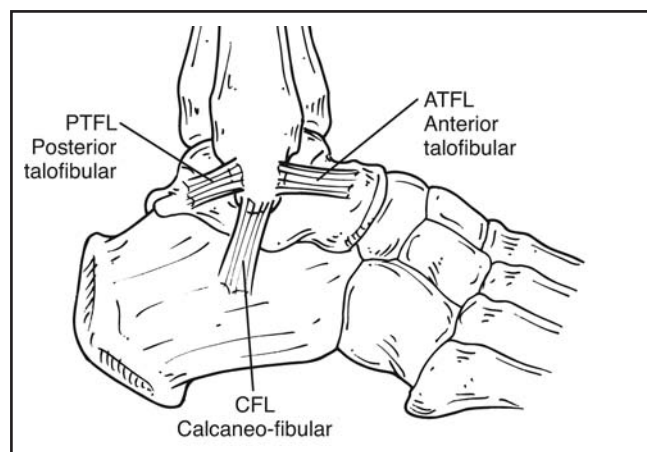


Figure 1. Lateral ankle ligaments.

important in distinguishing partial tears from frank ligament ruptures. Excessive swelling and pain can limit an examination up to 48 hours after injury.

Key physical examination findings associated with more severe grade III sprains include swelling, hematoma, pain on palpation, and a positive anterior drawer test. A systematic review showed that 96 percent of patients with all four of these findings had a lateral ligament rupture compared with only 14 percent of patients without all of these findings (4).

The anterior drawer test can detect excessive anterior displacement of the talus from the tibia. If the anterior talofibular ligament is torn, the talus will distract anteriorly compared with the unaffected ankle. The inversion stress test or talar tilt can detect calcaneofibular ligament instability. No definite end point or unilateral joint laxity suggests a grade III ankle sprain. A crossed-leg test can detect a high ankle sprain. This injury is indicated if pressure applied to the medial side of the knee produces pain in the syndesmotic area.

The use of radiographs in the evaluation of ankle sprains is controversial. The Ottawa Ankle and Foot Rules can reduce unnecessary radiography in children and adults. A systematic review validated the usefulness of the rules in predicting the need for radiography (5). The review included 12 studies assessing the ankle, 8 assessing the foot, 10 assessing both, and 6 assessing the use of the rules in children (5). The rules missed fracture in only 47 out of 15,581 patients (0.3%). Therefore, the rules correctly ruled out fracture, without using radiography, in 299 out of 300 patients. Although the rules are designed for high sensitivity, their specificity is highly variable, ranging from 10-79%. Variability in clinical skill, setting, and patient recall may influence the number of unnecessary radiographs that are avoided. In some cases a magnetic resonance image (MRI) may be useful in evaluating the extent of ligamentous damage.

TREATMENT

The immediate goals of treating acute ankle sprain are to decrease pain and swelling and protect ankle ligaments from further injury. The PRICE (Protection, Rest, Ice, Compression, and Elevation) treatment protocol for acute ankle injury is commonly used. The protocol includes elevating the ankle and protecting it with a compressive boot or cam walker. Ice is applied to the injured ankle, and the patient is advised to rest for up to 72 hours to allow the inflammation to subside.

Cryotherapy

The use of cryotherapy in the treatment of acute ankle sprains has been advocated by many (2, 6, 7). Direct

application of cryotherapy helps reduce edema and probably helps decrease pain and recovery time. A systematic review of small, limited-quality studies evaluated cryotherapy for acute soft-tissue injuries and showed wide variations in the use and timing of the therapy. One study of compression with cryotherapy for inversion ankle sprains suggests that patients with focal compression recover function earlier, but the study was too small to draw definitive conclusions (7). Heat is not recommended for the treatment of acute ankle injury.

Nonsteroidal Anti-Inflammatory Drugs

Controlled trials of nonsteroidal anti-inflammatory drugs (NSAIDs) in patients with ankle sprain showed that, compared with placebo, NSAIDs were associated with improved pain, control, and function, decreased swelling, and more rapid return to activity (8). A randomized controlled trial compared piroxicam with placebo in 364 Australian army recruits with ankle sprains (8). Participants who took piroxicam experienced less pain, had increased exercise endurance, and were able to return to duty more quickly (8). A placebo-controlled trial comparing celecoxib and naproxen revealed similar improvements in level of pain and ankle function in patients with ankle sprains (9).

Immobilization

The use of immobilization with either casting or splinting, followed by rehabilitation, has been the mainstay of treatment of the acute ankle sprain. The exact method and time remains unclear. Immobilization that allows movement until healing has taken place (3-6 weeks) is the criterion standard for ankle sprain treatment because the collagen fibers heal the fastest and orient along the lines of force where protected movement occurs. Early movement also helps in decreasing swelling and the danger of fibrosis that normally develops in chronic swelling (2).

The Collaborative Ankle Support Trial (CAST) in the UK was a randomized, controlled trial that compared the clinical effectiveness and cost-effectiveness of 3 methods of ankle support (below-knee cast, Aircast brace, and Bledsoe boot) with that of the double-layer tubular compression bandage (Tubigrip). At 3 months, the below-knee cast was shown to provide an advantage in terms of overall recovery (pain, activities of daily living, and sports participation); whereas, the Aircast provided minimal advantage, and the Bledsoe boot provided no significant advantage (10).

By 9 months, there were no significant differences in the 4 therapies in the CAST trial. Cooke et al concluded that the below-knee cast and the Aircast brace provided cost-effective alternatives to the tubular bandage in the treatment of acute severe ankle sprain. However, since no differences

in long-term outcome were noted, practitioners should consider likely patient compliance and acceptability when choosing a brace (10).

Recently, the very use of immobilization has become controversial. The current literature recommends avoiding extended immobilization totally and to utilize “functional treatment” or supervised exercises.

Functional Treatment

Functional treatment usually consists of three phases: the PRICE protocol is initiated within 24 hours of injury to minimize pain and swelling and limit the spread of injury; exercises to restore motion and strength usually begin within 48 to 72 hours of injury (i.e., early range of motion, weight bearing, and neuromuscular training exercises) and endurance training, sport-specific drills, and training to improve balance begin when the second phase is well underway. Proprioceptive training on a tilt board after 3 to 4 weeks helps improve balance and neuromuscular control of the ankle. Plyometric training appears to be more effective than resistant exercises in improving functional performance of athletes after lateral ankle sprains (11).

Although the overall quality of studies on functional treatment is somewhat limited, a systematic review of 21 trials (2,184 total participants) showed that functional treatment is superior to immobilization for treatment of ankle sprains (12). Five of the trials showed that, compared with immobilization, more patients undergoing functional treatment returned to sports during the study period, and two trials showed that these patients returned to sports 4.6 days sooner (95% confidence interval [95% CI] 1.5-7.6). Seven of the trials showed that patients undergoing functional treatment returned to work 7.1 days sooner than those treated with immobilization (95% CI 5.6-8.7). Although the extent and type of benefit associated with functional treatment varied among individual studies, no benefits were seen with immobilization.

Ankle Support

A Cochrane review showed that lace-up or semi rigid supports are more effective for ankle injury than tape or elastic bandages (13). The review included 9 trials (892 total participants) that evaluated different methods of ankle support. The findings showed the semi rigid ankle support resulted in a shorter time to return to sports and to work and less ankle instability when compared with the elastic bandage. The lace-up ankle support significantly decreased persistent swelling at short-term follow-up compared with the semi rigid ankle support, taping, or bandaging. More skin irritation was reported with taping than with the other methods.

Surgical Therapy

The 2 indications for surgical treatment of acute ankle sprains that are generally agreed upon are a grade three lateral ligament rupture with significant hematoma and laxity, especially if the deltoid ligament is caught intra-articularly with widening of the medial ankle mortise, and an inferior tibiofibular syndesmotic sprain causing real or potential widening of the ankle mortise. Acute grade 3 tears of the inferior tibiofibular ligament can have a normal radiographic appearance if taken when patients are not weight bearing. Thus, keep in mind that normal radiographic findings do not rule out the need for surgery (14).

Pain and swelling localized over the inferior tibiofibular syndesmosis should alert the clinician to tears in the syndesmotic complex that may best be treated with surgical fixation. There is still controversy concerning the surgical treatment of complete anterior talofibular and calcaneofibular tears (double ligament tears) and for the rare cases in which all 3 lateral ankle ligaments are torn. In a young patient with athletic requirements, surgical repair of a severe lateral ankle sprain is sometimes indicated.

Treatment of distal tibiofibular syndesmotic sprains consists of placement of a screw across the syndesmosis (2). The screw remains in place for 6 weeks. To avoid screw breakage, the screw is removed before weight bearing is allowed.

Surgical repair of the lateral ligaments is still debated. Exposure must be made carefully so as to avoid the sural nerve posterior and the lateral branch of the superficial peroneal nerve anteriorly. Exposure of the ligament is obtained through a curvo-linear incision beginning at the posterior inferior to the tip of the fibula and carried anterior to the neck of the talus. The peroneal tendon sheaths are opened and the tendons retracted to access and repair the calcaneus fibular ligament. The peroneal tendon sheaths should be repaired along with the joint capsule. Nonabsorbable, flexible suture is preferred for suturing the ligaments and the capsule. Careful skin handling and meticulous repair are indicated, as the skin is thin and fragile over the lateral ankle, even in young athletes.

Surgical Repair Versus Conservative Treatment

There are very few reports in the literature that compare surgical versus conservative treatment of acute injuries of the lateral ligament complex. The paper by Kerkhoffs et al in 2002, and later updated in 2007, is the most comprehensive (15,16). Twenty trials were included and 2,562 patients. The patients were mainly young adult males. The 4 primary outcomes were nonreturn to pre-injury level of sports, ankle sprain recurrence, long-term pain and subjective or functional instability. The findings of statistically significant

differences in favor of the surgical treatment group for the 4 primary outcomes when using the fixed-effect model were not robust when using the random-effects model, nor on the removal of one low quality (quasi-randomized) trial that had more extreme results. A corresponding drop in the I (2) statistics showed the remaining trials to be more homogeneous. The functional implications of the statistically significantly higher incidence of objective instability in conservatively treated trial participants are uncertain. There was some limited evidence for longer recovery times, and higher incidences of ankle stiffness, impaired ankle mobility, and complications in the surgical treatment group.

In an earlier paper, Lynch and Renstrom found Grade I and II injuries recover quickly with nonoperative management (17). Treatment for grade III injuries is more controversial. They found after a comprehensive literature evaluation and meta-analysis that early functional treatment provided the fastest recovery of ankle mobility and earliest return to work and physical activity without affecting late mechanical stability. Functional treatment was complication-free, whereas surgery had serious, though infrequent, complications. Functional treatment produced no more sequelae than casting with or without surgical repair. In addition, secondary surgical repair, even years after an injury, has results comparable to those of primary repair. Therefore, even the competitive athletes can receive initial conservative treatment and have secondary surgical repair if necessary. Sequelae of lateral ligament injuries are common. After conservative or surgical treatment, 10 to 30% of patients have chronic symptoms, including persistent synovitis or tendinitis, ankle stiffness, swelling, pain, muscle weakness and “giving-way.” A well-designed physical therapy program usually reduces instability. For individuals with chronic instability refractory to conservative measures, surgery may be needed. Subtalar instability should be carefully evaluated when considering surgery.

SUMMARY

Acute lateral ligament sprains are commonly seen in the athlete. A detailed examination should be performed to determine the extent of the injury. All grades of injury should be treated with PRICE for the first 48-72 hours. Grade I and II can be treated with functional therapy. Severe Grade III injuries can be considered for surgical repair of the ligaments. In cases, where the deltoid ligament is involved or there is a severe syndesmotric injury, surgery is the primary course of treatment in athletes.

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