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Operative Techniques in

Sports Medicine

Lateral Ankle Instability

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Ankle sprains are common injuries that often occur in the athletic population. Lateral ankle instability is a long-term complication from plantar flexion inversion stress and injuries to the ankle. Acute injuries should be graded appropriately based on examination and treated with nonsurgical functional treatment. Acute surgery for a grade 3 injury in the high-level athlete has been described and is an option, albeit without robust literature support currently. Chronic ankle instability without a history of conservative treatment should first undergo an appropriate course of physical therapy and bracing. Surgery is planned after ascertaining any risk factors for recurrent instability, including poor-quality tissue, previous surgery, generalized laxity or hypermobility, and cavovarus deformity. These risk factors should determine if concurrent procedures should be performed or if an anatomical reconstruction is appropriate. One must keep in mind that most patients can and should still be treated by an anatomical repair.
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Introduction

Injury and derangement of the ankle commonly manifest in the form of an ankle sprain. Patients often describe "rolling" the ankle, but many are unable to recall the exact mechanism. This is a ubiquitous injury in the general population, but athletes are even more at risk. Half of all athletic injuries include ankle sprains, and basketball accounts for most of these injuries in some populations.[1] Lateral ankle ligament injuries are a much more likely presentation than medial-sided complaints,[2] often coinciding with plantar flexion and inversion of the foot under the leg.

The frequency of lateral ligament injuries should not lessen the importance of appropriate treatment and investigation. Concurrent pathology may occur along with the diagnosed ankle sprain, such as injury to the peroneal tendons. Subtle alignment abnormalities may predispose a patient to initial ankle sprains and a recurrence in the future. Lateral ligament injuries demand a complete medical history to uncover confounding diagnoses. Furthermore, the treating surgeon inevitably encounters athletes of various competitive levels, and appropriate treatment may be altered to assist a high-level athlete. Although appropriate nonsurgical treatment yields excellent outcomes, as many as 20% of patients treated with conservative measures may go on to develop symptoms of instability and pain.[3] Long-standing lateral ankle ligament instability has also been implicated in clinical and radiographic degenerative arthritis of the ankle.[4] Surgical alternatives are necessary based on each patient individually.

Anatomy

The ankle is intrinsically stabilized by bony congruity between the talus and tibia along with the medial and lateral malleoli. The conical shape of the talus underneath the mortise creates an oblique axis on which the ankle joint articulates. The apex of this cone is medial; therefore, a broad, single, stout ligament complex is sufficient in the form of the deltoid ligament to maintain stability. Laterally, the base of the talar cone creates a broader articulating structure that the fibula buttresses posterolaterally. Therefore, 3 distinct ligaments stabilize the lateral ankle with separate insertions. The anterior talofibular ligament (ATFL) originates 1 cm proximal to the fibular tip along the anterior aspect and attaches on the talar neck anterolaterally just distal to the talar dome's articulation. This is a broad thickening of the ankle joint capsule oriented 25° from the horizontal plane. The calcaneofibular ligament (CFL) originates on the tip of the fibular and inserts just posterior to the peroneal tubercle on the calcaneus creating an angle of 10°-45°

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from the vertical axis of the fibula. This ligament crosses 2 joints (subtalar and tibiotalar) and therefore provides stability to both. The posterior talofibular ligament (PTFL) is a stout ligamentous structure from the posteromedial fibula to the talar body.

Nearly all injuries to the lateral ligament complex include the ATFL, with more severe injuries including the CFL. The PTFL is rarely involved because of its posterior placement and decreased involvement in an inversion injury. Most injuries occur during a plantar flexion inversion position of the foot in relation to the ankle, thereby primarily stressing the ATFL. With relative dorsiflexion, the CFL insertion swings anterior. More severe injuries and injuries with less plantar flexion then have more chance of injuring the CFL concurrently. The CFL is also damaged because of the close approximation of the ATFL origin.

Diagnosis of Lateral Ankle Instability

Diagnosis begins with a complete history and examination. It is crucial to ascertain a history of previous sprains, instability, and pain across the lateral ankle as the treatment for chronic ankle instability can be quite variable. It is important to note how many times the patient has previously sprained their ankles, with what frequency, and whether the frequency of these occurrences is increasing or remaining stable. Additionally, one should note how these episodes occurred—whether during vigorous activity or while simply walking, or whether on uneven terrain or simply stepping on a minor irregularity on the surface. Previous interventions after such an injury should be documented to further understand the chronicity of the injury. Besides the nature of the injury, one must discuss the patient's preinjury activity level and goals after treatment. Is this an athlete who plays at a professional level or someone who does not wish to continue a weekend recreational game? Understanding of the patient's goals will allow one to guide appropriate treatment. A medical history is particularly important to include diagnoses that might limit appropriate healing or predispose the patient to recurrence. This may include but is not limited to benign hypermobility syndrome (as diagnosed by the Brighton Criteria[5]), Ehlers-Danlos syndrome, diabetes, neuropathies, and hereditary motor sensory neuropathy or Charcot-Marie-Tooth disease. Other injuries to the lateral foot and ankle must be investigated.

Physical examination acutely after an ankle sprain may be difficult. The foot and ankle will likely be swollen and ecchymotic, decreasing the specificity of a palpation or instability examination. This is not usually the case in patients presenting with chronic ankle instability in whom the ankle may appear relatively benign. In all cases, the foot and ankle should be assessed with a complete examination, paying particular attention to the alignment and locations of tenderness.[6] The patient should be examined standing from an anterior and posterior view to identify signs of cavovarus foot deformity such as a "peek-a-boo" heel[7,8] or a high arch secondary to a plantar flexed first ray. In most cases, this is subtle, in the form of varus hindfoot alignment (Fig. 1), but anything more than 5° of hindfoot varus can be significant enough to predispose the patient to lateral ankle ligament injury. A Coleman block test[9] can then be helpful to determine if the varus is more forefoot or hindfoot driven.

Figure 1 A varus heel demonstrating a "peek-a-boo" sign.

Careful palpation may help determine involvement of surrounding structures injured during an inversion ankle injury. Peroneal tendon pathology, CFL tears, ATFL tears, Bassett ligament, lateral process of the talus, anterior process of the calcaneus, and talar dome all have specific areas of maximal tenderness, and these should be delineated with a thorough examination. Peroneal tendons should also be tested for dislocation, subluxation, or intrasheath subluxation by palpating the tendons under the superior peroneal retinaculum within the retrofibular groove and asking the patient to circumduct the ankle (particularly during eversion and dorsiflexion). Strength testing helps to detect subtle weakness in the peroneals that can add stress to the ligament complex and has been implicated in decreased proprioception.[10]

In addition to palpation, range of motion and instability should be tested and compared with those of the contralateral leg. Acute injuries have historically been classified by a grading system 1 through 3. When stressing a patient's ankle with talar tilt testing or anterior drawer testing, one must try to determine asymmetry from the contralateral leg as well as a firm end point during stress. The lateral ligament complex also limits the ankle's rotation considerably.[11] During anterior drawer testing, one must allow the ankle to rotate internally, limiting the stress on the deltoid. The amount of rotation may be helpful in comparing both the sides. Attempting to quantify the distance of laxity is clinically unreliable.

Imaging for most ankle sprains and instability can be limited to weight-bearing films of the ankle and foot. If the diagnosis is