

Lateral ligament reconstruction

Anatomy & Pathophysiology

LIGAMENT ANATOMY AND BIOMECHANICS

- The anterior talofibular ligament and calcaneofibular ligament are the primary lateral ankle structures identified radiographically [1].
- Sectioning of the deltoid ligament results in a 43% increase in tibiotalar contact area [7].
- Sectioning of the deltoid ligament results in a 30% increase in peak pressures [7].
- Sectioning of the deltoid ligament alone results in valgus tilt of the talus [7].
- Chronic instability resulting from deltoid ligament sectioning may lead to tibiotalar arthrosis [7].
- The deep deltoid ligament consists of short fibers [7].
- The Chrisman-Snook reconstruction resulted in a significantly more stable ankle joint complex than ankles with cut anterior talofibular ligaments [2].
- The Chrisman-Snook reconstruction resulted in ankles with significantly less motion than intact ankles [2].
- Transection and imbrication of the lateral ligaments results in improved mechanical stability in approximately 80% of patients [2].

PATHOPHYSIOLOGY OF INSTABILITY

- Chronic instability of the ankle from an earlier rupture of a ligament should first be treated conservatively if it is symptomatic [2].
- Mechanical instability is characterized by stress radiographs showing 8 to 10 degrees of increased tilt of the talus in the ankle mortise compared with the normal ankle [2].
- Functional instability is defined as the subjective feeling of ankle instability or recurrent ankle sprain caused by neuromuscular or proprioceptive deficits [2].
- Recurrent sprains are associated with a risk of associated injuries to other structures, such as osteochondral lesions [2].
- An acute lateral ankle sprain significantly decreases physical activity across the lifespan [1].
- Chronic medial instability often does not cause severe disability that cannot be treated conservatively [7].

- Patients with chronic medial ankle instability may give a history of a pronation-type injury but more often report having had multiple ankle sprains without clearly remembering the mechanism [7].
- The combination of posterior tibial insufficiency and deltoid incompetence is categorized by Myerson as a stage IV adult-acquired flatfoot [7].
- This combination of posterior tibial insufficiency and deltoid incompetence is most commonly seen in the older population [7].
- A symptomatic anterolateral exostosis at the insertion of the anterior talofibular ligament, described as an excentric lesion, is found by CT scan in patients with chronic ankle pain after an inversion injury [2].
- Physical examination and oblique radiographs were suggestive of the excentric lesion in most cases [2].
- Unsatisfactory results for lateral ligament shortening procedures may occur in patients with generalized joint hypermobility or long-standing ligamentous laxity [2].
- Unsatisfactory results for lateral ligament shortening procedures are frequent in patients with prior ankle surgery [2].
- Better functional results may be obtained with reconstruction of both lateral ligaments than with reconstruction of the anterior talofibular ligament alone, although the literature is inconclusive [2].
- Karlsson et al. recommended combined reconstruction if there is any doubt regarding the involvement of both ligaments [2].
- Primary repair of a chronic deltoid tear, either end-to-end, “vest-over-pants,” or advancement to bone, does not usually work [7].
- Anatomic primary repair of the chronically deficient deltoid ligament is less satisfactory than repair of the lateral ankle ligament due to the short fibers of the deep deltoid and increased tension placed on the medial aspect of the ankle [7].
- Medial ankle ligament reconstruction is indicated after failed conservative treatment in patients with chronic symptomatic mechanical instability [7].
- It is important to assess for incompetence of the medial tendons of the ankle, especially the posterior tibial tendon, in patients with chronic medial instability [7].

Investigations

- With mechanical instability, stress radiographs show 8 to 10 degrees of increased tilt of the talus in the ankle mortise compared with the normal ankle [2].
- If stress radiographs do not show increased talar tilt, other causes for the disability, such as a stress fracture, should be sought [2].
- A symptomatic anterolateral exostosis at the insertion of the anterior talofibular ligament, described as an excentric lesion, can be found by CT scan in patients with chronic ankle pain after an inversion injury [2].
- Bone scans reveal increased uptake in the middle third of the fibula, indicating a stress fracture in patients with chronic, recurrent pain over the distal third of the leg and ankle [2].
- MRI is used for ankle injuries [3].

- Stress views of the ankle mortise are utilized in evaluation [3].

Treatment

- The arthroscopic Broström technique is a described method for lateral ligament repair [1].
- Anatomic ligament repairs are performed for syndesmotic injuries [1].
- Medial ankle instability involves the deltoid ligament [1].
- An evidence-based approach exists for the treatment of acute traumatic syndesmosis (high ankle) sprains [1].
- Gravity stress radiographs are used to assess deltoid ligament integrity and medial clear space measurements [1].
- Subtalar instability is a condition with specific diagnosis and treatment protocols [1].
- Ankle fracture syndesmosis fixation and management is a current practice among orthopedic surgeons [1].
- The Broström procedure has been evaluated for long-term results in chronic lateral ankle instability [1].
- Combined medial and lateral anatomic ligament reconstruction is used for chronic rotational instability of the ankle [1].
- Outcome scales are used to assess lateral ankle ligament reconstruction [1].
- Predictors of peroneal pathology have been identified in Broström-Gould ankle ligament reconstruction for lateral ankle instability [1].
- Acute and chronic lateral ankle instability are conditions affecting athletes [1].
- Lateral ligament augmentation using suture-tape affects functional instability [1].
- A randomized comparison exists between lateral ligaments augmentation using suture-tape and modified Broström repair in young female patients with chronic ankle instability [1].
- A modified Broström procedure can be combined with arthroscopic debridement of medial gutter osteoarthritis in patients with chronic ankle instability [1].
- Ossicle resection is performed during lateral ligament repair for the treatment of chronic lateral ankle instability [1].
- Qualitative and quantitative anatomic investigations of the lateral ankle ligaments inform surgical reconstruction procedures [1].
- Deltoid ligament abnormalities are present in cases of chronic lateral ankle instability [1].
- Magnetic resonance imaging is compared to physical examination for diagnosing syndesmotic injury after lateral ankle sprain [1].
- Interventions for treating chronic ankle instability have been systematically reviewed [1].
- Open mosaicplasty is used for osteochondral lesions of the talus [1].
- Operative management of ankle instability includes reconstruction with open and percutaneous methods [1].

- Radiographic identification is used to identify primary lateral ankle structures [1].
- Acute superficial deltoid complex avulsion is repaired during ankle fracture fixation in National Football League players [1].
- Calcaneofibular ligament injury plays a role in ankle instability with implications for surgical management [1].
- Deltoid ligament repair is compared to syndesmotic fixation in bimalleolar equivalent ankle fractures [1].
- Anatomic reconstruction of the anterior talofibular and calcaneofibular ligaments can be performed using a semitendinosus tendon allograft and interference screws [1].
- Repair of only the anterior talofibular ligament resulted in similar outcomes to repair of both the anterior talofibular and calcaneofibular ligaments [1].
- Simultaneous ossicle resection and lateral ligament repair provide excellent clinical results with an early return to physical activity in pediatric and adolescent patients with chronic lateral ankle instability and os subfibulare [1].
- Morphological characteristics of os subfibulare are related to the failure of conservative treatment of chronic lateral ankle instability [1].
- The modified Broström procedure in patients with chronic ankle instability is superior to conservative treatment in terms of muscle endurance and postural stability [1].

References

[1] Campbell S Operative Orthopaedics 4 Volume Set. REPAIR OF ACUTE RUPTURE OF LATERAL LIGAMENTS > ACUTE ANKLE LIGAMENT INJURIES, CHRONIC ANKLE INSTABILITY.

[2] Campbell S Operative Orthopaedics 4 Volume Set. REPAIR OF ACUTE RUPTURE OF LATERAL LIGAMENTS > CHRONIC INSTABILITY AFTER INJURY.

[3] Campbell S Operative Orthopaedics 4 Volume Set. REPAIR OF ACUTE RUPTURE OF LATERAL LIGAMENTS > Anesthesia (Continued).

[7] Campbell S Operative Orthopaedics 4 Volume Set. REPAIR OF ACUTE RUPTURE OF LATERAL LIGAMENTS > MEDIAL REPAIR OF CHRONIC INSTABILITY.