Ankle Instability and Arthroscopic Lateral Ligament Repair

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KEYWORDS

• Ankle instability • Arthroscopy • Arthroscopic lateral ankle ligament reconstruction • Brostrom • Ankle sprain • All inside arthroscopic repair

KEY POINTS

- There is increasing interest in arthroscopic techniques to surgically correct chronic lateral ankle ligament instability.
- The anatomic "safe zone" in the lateral ankle allows surgeons to perform arthroscopic techniques safely.
- Recent published clinical and biomechanical studies show arthroscopic lateral ankle ligament reconstruction to have results similar to open modified Brostrom techniques.

INTRODUCTION

Ankle sprains are one of the most common lower extremity injuries.[1,2] Although most people recover without significant long-term consequences, chronic ankle instability does develop in about 20% of patients. Affected individuals usually complain of recurrent ankle sprains, difficulty with ambulation on uneven ground, and, in some cases, pain with activity.[1,3,4] Patients with cavovarus foot deformity, tibia vara, peroneal tendon injuries, and hyperligamentous laxity syndrome are at increased risk of chronic ankle instability.[1,5,6]

The normal treatment of a patient with chronic ankle instability focuses on a combination of peroneal muscle strengthening, balance reflex training, and external bracing as needed to prevent recurrent injury. Oftentimes, patients who follow these nonoperative regimens can successfully manage their instability without surgery.[1,7,8] Patients who fail these measures are candidates for lateral ankle ligament reconstruction.

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Traditionally, the primary surgical treatment performed is the Brostrom or augmented Brostrom technique using either drill holes or the more contemporary suture anchor techniques.[1,7,9,10] More complex tendon reconstructive techniques are normally reserved for either failed primary reconstructions or patients at high risk for failure with a primary Brostrom-Gould technique.[1,6,11,12]

Over the last 40 years, there has been an evolution in the surgical treatment of instability in the knee and shoulder. Initially procedures were performed in an open manner with nonanatomic methods externally to restrain abnormal motion. This method was then followed by arthroscopic examination followed by open procedures. Subsequently, surgeons moved toward arthroscopic examination with mini-open procedures. Finally, fully arthroscopic stabilization procedures have become the current standard of care in the knee and the shoulder.[13–15]

The concept of minimally invasive lateral ankle ligament reconstruction was first introduced in the use of a mini-open technique and stapling to the fibula.[16] Although fully arthroscopic procedures for knee and shoulder instability have advanced significantly since then, the concept of arthroscopic lateral ankle ligament reconstruction has been slow to move forward until recently. In the last 5 years, there has been significantly increased interest in arthroscopic techniques to address chronic lateral ankle instability.

In this review, the authors begin with a discussion of the anatomy and biomechanics of the lateral ankle ligament complex. The pertinent anatomy and biomechanics related to arthroscopic lateral ankle ligament reconstruction is then explored. Publications of recent clinical studies using arthroscopic techniques are reviewed. Finally, the intraoperative technique proven to be biomechanically equivalent to the current open Brostrom technique and most familiar to the authors is described.

ANATOMY AND BIOMECHANICS

Understanding the anatomy of the lateral ligamentous complex is essential to the diagnosis and treatment of ankle instability. When considering arthroscopic lateral ligament repair it is equally important to have proper anatomic knowledge of the structures surrounding this complex. To simplify this section, the authors first discuss the basic ligament anatomy and its relation to lateral ankle instability, and then describe the anatomy as it relates to the arthroscopic ligament repair.

Lateral Ligamentous Complex and Biomechanics of the Normal Lateral Ankle

The lateral ligamentous support of the ankle comprises 3 main structures: the anterior talofibular ligament (ATFL), the calcaneofibular ligament (CFL), and the posterior talofibular ligament (PTFL). The ATFL is the most frequently injured ligament with inversion sprains.[17,18] Most commonly, it consists of 2 bands originating at the anterior margin of the distal fibula with the center averaging 10 mm from the tip of the lateral malleolus.[19–21] From the origin, it runs anteromedially to a bifid insertion on the body of the talus anterior to the articular margin.[20,22] The ATFL is the weakest of the lateral ankle ligaments (ultimate failure, load 138–160 N) and thus most prone to injury with inversion sprains.[23]

The CFL originates as a confluent footprint with the ATFL on the anterior border of the distal fibula. It then courses deep to the peroneal tendons to insert on a tubercle on the lateral wall of the calcaneus. This footprint lays approximately 3 cm posterior and superior to the peroneal tubercle.[20] Although combined rupture may occur in up to 20% of cases, clinical and biomechanical studies have not demonstrated direct repair of this ligament to be essential to good outcomes.[9,24–26]