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## A rare case of anterior talofibular ligament reconstruction using partial split autologous peroneus brevis tendon graft for chronic lateral ankle instability in a PPRP limb: A case report

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### Abstract

Chronic ankle instability often develops when acute lateral ankle ligament injuries, like ankle sprains, are left untreated or are poorly managed. Typically, conservative treatment is preferred for these injuries, reserving surgical intervention for specific cases. Surgery may become necessary if rigorous rehabilitation does not yield satisfactory results. Several surgical options exist, including anatomic repair, anatomic reconstruction, and tenodesis procedures. Anatomic repair is feasible when the ligaments are in good condition. However, if the ligaments are severely damaged, anatomic reconstruction using either autografts or allografts is recommended. Additionally, ankle arthroscopy can be performed alongside ligament repair to address any intra-articular issues contributing to chronic instability. While tenodesis techniques have been used, they are generally discouraged due to their less favourable long-term outcomes, particularly because they can alter the biomechanics of the ankle and hind foot. Ultimately, surgical treatment for chronic lateral ankle ligament instability is beneficial for patients who have not responded to non-operative approaches, with open anatomic reconstruction being a reliable method for stabilizing the ankle. This article presents a unique case where the anterior talofibular ligament reconstruction was done in a polio foot along with which additional procedures were carried out to correct the deformities of the foot and to make the ankle stable.

**Keywords:** Anterior talofibular ligament, lateral ankle instability, ankle sprain, PPRP

### Introduction

Ankle ligament sprains are among the most common injuries in sports medicine, accounting for 20% to 40% of all athletic injuries, and they are also frequently encountered in general medical practice. The anterior talofibular ligament (ATFL) is particularly vulnerable and is often the most commonly injured or even ruptured ligament in ankle sprains <sup>[1]</sup>. When patients do not receive adequate conservative treatment, they may experience chronic lateral ankle instability, characterized by ongoing ankle swelling, pain, and functional decline.

Key symptoms of this condition include a persistent fear of walking, especially at night, ongoing ankle swelling and pain, and a sense of either looseness or stiffness in the ankle. This instability often results from diminished function and can lead to articular cartilage damage due to changes in joint mechanics when conservative treatments are unsuccessful <sup>[2]</sup>.

The stability of the ankle is primarily supported by the lateral ligament complex, which consists of three capsular ligaments: the anterior talofibular ligament, the calcaneofibular ligament (CFL), and the posterior talofibular ligament. Among these, the anterior talofibular and calcaneofibular ligament serve as the main stabilizers on the lateral side of the ankle, playing a crucial role in maintaining its integrity <sup>[3]</sup>. The posterior, while part of this complex, contributes less significantly to overall ankle stability.

For patients with a short duration of symptoms and mild injury, where ligament continuity is still present, anatomical suture repair of the ligaments is recommended. In cases of severe injury, open lateral ligament reconstruction using autologous or allogeneic tendons is advised to anatomically reconstruct the ATFL and calcaneofibular ligament. This approach aims to restore ankle stability and function, reducing the long-term risk of osteoarthritis. While conservative management remains the first-line treatment for acute lateral ankle ligament injuries, surgery may be necessary when strict rehabilitation does not achieve the desired outcomes.

Multiple successful surgical procedures have been described for individuals with failed non operative management of lateral ankle ligament instability, an ideal single procedure remains elusive [4]. Brostrom described a technique for repair of the ligament. Winfield in 1953 and later Christman-Snook in 1969 modified the technique using a split peroneus brevis tendon graft [5]. Several authors later modified this technique with better anatomic orientation of the bone tunnels and more tendon reinforcement of the graft [6].

This article presents a unique case where the anterior talofibular ligament reconstruction was done in a polio foot along with which additional procedures were carried out to correct the deformities of the foot and to make the ankle stable.

Arthroscopic reconstruction is an excellent technique used for the treatment of lateral ankle instability but given the complexity of the foot and the need of multiple procedures in the current case, open ligament reconstruction was preferred.

### Case report

We report the case of a 40-year-old male came to outpatient department with the chief complaints of pain and instability of right ankle associated with difficulty in walking. The patient had history of twisting injury to the ankle while working in a field 5 months before. A plain radiograph of the ankle AP along with lateral view and weight bearing xrays were taken of both the ankles. Clinically it was suspected to be a chronic lateral ankle instability due to anterior talofibular ligament injury. Meary's angle was calculated which was increased with convexity upwards suggestive of cavus deformity. Coby's x-ray view was taken to check for the hind foot alignment angle and it was suggestive of hind foot varus deformity. Further Coleman block test was performed and it was found out that hindfoot varus was rigid. MRI foot and ankle was done to confirm the diagnosis which showed complete tear of anterior talofibular ligament.



**Fig 1:** Position of ankle on standing



**Fig 2:** Position of ankle on walking

Based on the examination findings above the following surgical preoperative planning was devised in order - Anterior talofibular ligament reconstruction, Lateralizing calcaneal valgus producing osteotomy, 1st metatarsal dorsiflexion osteotomy, Medial plantar fascia release, Percutaneous tendoachilles lengthening.

A curved incision parallel to the peroneus brevis was taken starting from 5cm above the tip of lateral malleoli to the base of 5th metatarsal. Soft tissue dissection done carefully to avoid injury to sural nerve and peroneus tendons. Peroneus tendons identified, brevis isolated and split partially for about 15cm from its distal attachment and cut proximally. The free end of the graft was secured with no 2 ethibond using whip stitch. Two tunnels were created in the lateral malleoli using 4mm drillbit, horizontal above and one oblique facing down below. The graft was passed through the 1st and 2nd tunnel. The first graft anchor was done over the body of the talus using suture anchor to reconstruct anterior talofibular ligament. Next the graft passed from the 2nd tunnel is anchored over the body of the calcaneum using an interference screw.



**Fig 3:** Harvesting the peroneus brevis graft



**Fig 4:** Making tunnels in the lateral malleoli



**Fig 5:** Reconstruction of anterior talofibular Ligament using suture anchor



**Fig 6:** Anchoring the graft over calcaneum using interference screw

Using bone saw osteotomy of calcaneum behind the anchor attachment of CFL, lateralized and fixed with 4mm CC screw and K wire. With a stab incision taken over the medial part of the heel, plantar fascia was released. Similarly about 10 cm above tendoachilles insertion partial tendoachilles was cut and released. A 2 cm incision taken over the head of 1<sup>st</sup> metatarsal, osteotomy was done and fixed with K wires. Thorough wound wash was given. Wounds were closed in layers.



**Fig 7:** Ankle lateral x-ray at 6 months follow up

Patient was put on below knee slab until the suture removal and then was put on below knee cast for total of 3 months. After 6 months of follow-up the patient exhibited a painless foot with relatively satisfactory aesthetic outcomes, indicative of successful intervention and rehabilitation.

**Discussion**

Ankle joint is a hinged synovial joint with a complex ligamentous anatomy. Anterior talofibular ligament is the weakest of all and more prone to injury and restoring the integrity of the ligament is ideal to maintain the stability of the ankle. Many modifications have been made of the surgical procedures for its reconstruction.

Reconstructing the anterior talofibular ligament (ATFL) in patients with polio-affected foot poses unique challenges, primarily due to the altered biomechanics and muscle imbalances that are common in those with post-polio syndrome. In these patients, the weakened or absent muscles around the ankle joint often make the ankle more unstable, making ligament reconstruction a complex yet crucial procedure to restore stability and improve their quality of life. In our study, we found that ATFL reconstruction along with deformity corrections significantly enhanced ankle stability, reduced pain, and improved mobility in polio-affected foot. The choice of graft material, whether taken from the patient’s own body or donated, was essential to the success of the surgery. Given that the local muscles and tendons in polio patients are often weakened or damaged, careful selection of grafts and precise surgical technique were key to achieving good results.

Our observations suggest that anatomical reconstruction of the ATFL, when paired with a tailored post-operative rehabilitation plan, can lead to substantial improvements in ankle function for polio patients. However, it's important to recognize that the extent of pre-existing deformity and muscle weakness plays a significant role in the long-term success of the reconstruction. Patients with severe muscle atrophy or significant structural deformities may need additional surgeries or orthotic support to maintain the benefits of the ATFL reconstruction.

In summary, while reconstructing the ATFL in a polio-affected foot is technically demanding, it can offer significant functional benefits for those dealing with chronic ankle instability. Future research should focus on long-term outcomes and the development of surgical techniques that address the specific challenges of the polio-affected lower limb. Additionally, advancing rehabilitation protocols specifically for post-polio patients could further improve the success of these reconstructive surgeries.

### Results

Injury to the anterior talofibular ligament is not that uncommon. Repair or reconstruction is based on the assessment of the ligament integrity and the duration of the injury. Reconstruction of anterior talofibular ligament demands good surgical skills that too in a PPRP limb is a challenge in itself. Understanding the thorough anatomy of the polio limb, its deformities along with a proper history and good clinical examination is essential to correct the instability of ankle. Reconstruction of anterior talofibular ligament followed by correction of deformities in this case yielded excellent result with patient resuming his day to day activities and agriculture work without difficulty.

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