

## ANTERIOR TALOFIBULAR LIGAMENT RECONSTRUCTION AND AUGMENTATION WITH INTERNAL BRACING



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### Abstract:

Lateral ankle instability is a common pathological condition in recreational and professional athletes (1). Most foot and ankle surgeons perform an open-modified Brostrom operation for the treatment of lateral ankle instability, and good-to-excellent results have been reported (2, 3). Despite the value of the Brostrom procedure, limitations of this technique exist. Waldrop et al. (4) reported that both direct suture repair of the anterior talofibular ligament (ATFL) and the use of suture anchors in the fibula or talus had significantly inferior strength compared with the intact ATFL

in a cadaveric model. As a result, the need for early protection of all three types of Brostrom procedures and cautious early rehabilitation was emphasized (4). Kirk et al. (5) also recommended protection to prevent ATFL elongation. Furthermore, in patients with long-standing lateral ankle instability with attenuated native tissue and in very large patients or athletes, both of whom are likely to place extra stress on their ankles, the adequacy of these repairs has been questioned (5, 6). To address situations such as these, the concept of using high-strength nonabsorbable suture tape has been proposed, as described in previous literature for rotator cuff repairs (7, 8). An internal brace is a ligament repair bridging concept using braided ultra-high-molecular-weight polyethylene/polyester suture tape and knotless bone anchors to reinforce ligament strength as a secondary stabilizer after a repair which may help resist injury recurrence (9).

### Case:

A 25-year-old male complaining of recurrent ankle instability presented to us after 8 months after an inversion injury to his ankle. Patient complained of recurrent internal rotation of the foot and ankle, pain and an unstable ankle. He had an episode of twisting injury 8 months back which was managed conservatively using a crepe bandage. On examination, ankle and foot range of motion was good. There was a lateral joint line tenderness. On evaluating the stability of the ankle varus stress test and anterior drawer test was positive for the patient. Radiological evaluation in the form of talar tilt angle and anterior talar translation as a part of stress x-rays were taken and were found to be more than the opposite side. After which an



Fig 1: Plain radiographs & MRI imaging. A: Positive talar tilt angle, B: Anterior drawer stress x-rays, C: ATFL tear( red circle)

MRI was done which revealed ATFL ligament tear(Fig 1). We planned an arthroscopic assisted Anterior talofibular ligament reconstruction with internal bracing for the patient.

### Surgical technique:

With patient in supine position, using a standard anteromedial and anterolateral portal a diagnostic arthroscopy was done to look for osteochondral defects which was found normal. A lateral J shaped incision was employed over fibula & upper and lower flaps were raised. Lax ATFL ligament was identified and was split in two halves. Lower end of fibula was made raw and two 1.9 mm suture anchors were inserted over it. Inferior extensor retinaculum was identified and bites were taken through it to perform Gould modification. Brostrom repair was done using Pant over Waist technique.

After the repair two knotless anchor loaded with fibertape (internal brace) were used to augment the repair with one anchor in centre of talus and the other over fibula. Internal brace was tightened with ankle in neutral position and a mosquito forceps was kept below it to prevent overtightening of repair(Fig 2).

Following the procedure, a below knee slab was applied for 2 weeks followed by ankle rom exercises, Full weight bearing allowed after 4 weeks and return to sport allowed after 6 months.

### Discussion:

To date, the open modified Brostrom operation has been the gold standard procedure, with good-to-excellent results (12, 13). Brostrom advocated a method of ankle ligament reconstruction in 1966 (2); however, Gould later modified this technique by reinforcing the ligament with the inferior extensor retinaculum (14). Theoretically, inferior extensor retinaculum reinforcement covers the calcaneofibular ligament vector. Furthermore, substantial initial stability was obtained using an anatomical reconstruction of the anterior talofibular ligament alone with inferior extensor retinaculum reinforcement (15).

Lee et al. [16] performed a review of simultaneous ankle joint pathologic entities for chronic lateral ankle instability. They reviewed 28 ankles that underwent ankle joint arthroscopy with concomitant open Brostrom-Gould stabilization and reported a frequency of 7-100 % for associated intra-articular pathologic features.

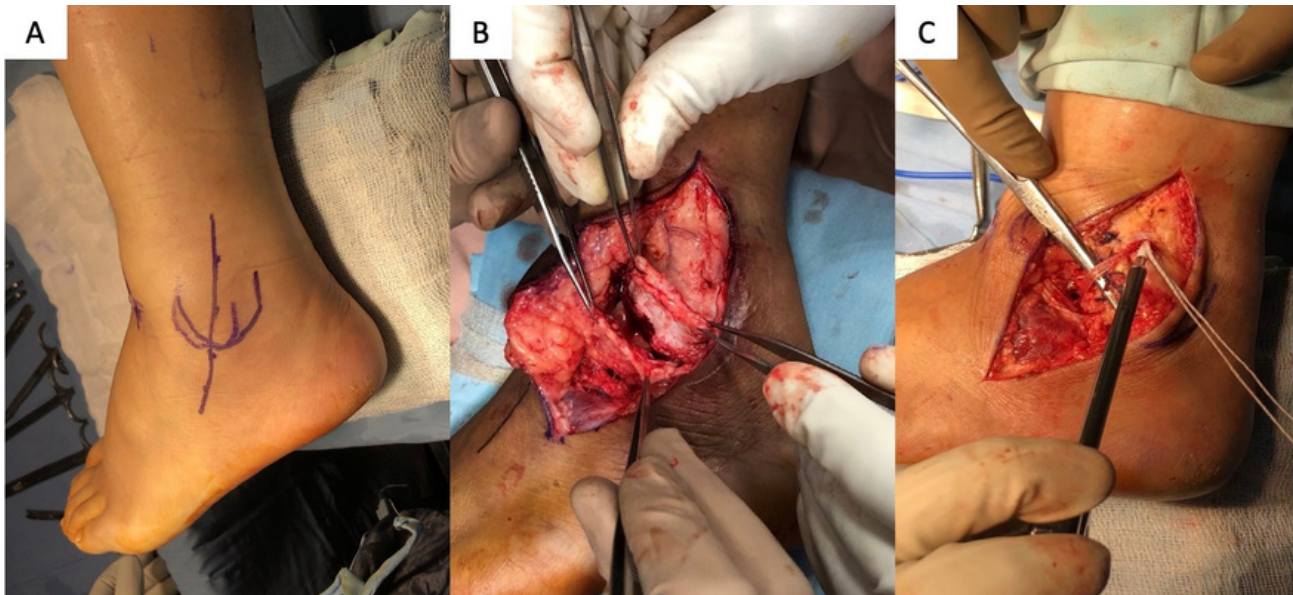


Fig 2: Intraoperative images. A: J shaped approach, B: Upper and lower flaps of ATFL, C: Augmentation with internal brace

Of the 28 ankles reviewed, 100 % were found to have some degree of synovitis, which was frequently identified in the anterolateral aspect of the joint. Other associated pathologic features were talar dome osteochondral defects in two ankles (7 %), talar dome fibrillation in seven (30 %), loose bodies in three (11 %), Bassett's lesion in two (7 %), anterolateral impingement in four (14 %), and distal anterior tibial spurring in four (14 %). Ferkel and Chams (10) reported on 21 ankles that underwent ankle arthroscopic evaluation before a Brostrom-Gould procedure. They identified pathologic intra-articular findings in 95 % of their patients. Therefore, an arthroscopic inspection is almost mandatory because of the high incidence of concomitant intra-articular lesion (17). A reliable arthroscopic method for treating ankle instability without the need for open surgery would be ideal (18).

Many studies have been reported on the strength and the clinical results of the arthroscopic modified Brostrom operation. Lee et al. (19) reported that there was no significant difference in torque to failure between the open and arthroscopic modified Brostrom operation through a biomechanical

study of 11 human cadaveric specimens. In 2011, Nery et al. (17) reported the long-term results of an arthroscopic modified Brostrom operation in 38 patients with a mean follow-up of 9.8 years. The mean AOFAS score was 90 and only one patient required soft-tissue debridement for anterior impingement postoperatively. Corte-Real and Moreira (18) reported a similar technique but differed in that only one anchor was placed into the fibula, and only one distal location was used for the sutures to exit through an accessory portal. They followed up 31 patients for a mean 24.5 months and found an average postoperative AOFAS score of 94.4.

Moreover, Viens et al. (20) reported that the strength and stiffness of the Brostrom repair with suture tape augmentation were not significantly different from those of the intact ATFL in a cadaveric model. Prior research has reported ATFL with the standard Brostrom repair to be at least 50 % weaker than native ATFL at time zero (4); the results of this study also show that suture tape augmentation techniques produce stronger and stiffer results than those of the standard Brostrom repair.



## Conclusion:

- Clinical and radiographic outcomes using a suture tape augmentation for lateral ankle instability are excellent and are equivalent to standard Brostrom repair.
- There is evidence to suggest earlier return to sports and lower recurrence rates with suture tape augmentation

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