

All-Inside Endoscopic Broström-Gould Procedure for Chronic Ankle Instability

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3.1 Introduction

Ankle sprains are the most common sports-related injury. The main complication is the development of chronic ankle instability (CAI), which occurs in about 20% of patients [1, 2]. Surgery to stabilize the ankle is indicated when nonoperative treatment fails. The goal of surgery is not only to restore stability but also to prevent the development of lesions due to chronic instability such as osteo-chondral lesions at the talar dome and, most importantly, tibio-talar osteoarthritis [3–6].

There are basically two main groups of surgical procedures for CAI, with many variants and modifications: repair techniques (retensioning and direct suturing of the anterior talo-fibular ligament [ATFL] and calcaneo-fibular ligament [CFL]) and reconstruction techniques (in which a tendon graft is used to rebuild the ATFL and CFL). The most popular repair technique was described by Broström in 1966 [7]

with retensioning and direct suturing of the ATFL. Augmentation by advancing the extensor retinaculum as described by Gould et al. [8] can be added. A Broström-Gould procedure seems to remain the gold standard for CAI [9].

In recent years, several studies reported good short-term outcomes of arthroscopic repair techniques [10–18]. The arthroscopic technique of the Broström-Gould repair technique for CAI is described. Although the role for arthroscopy in the management of CAI remains controversial, these arthroscopic procedures may improve the detection of ligament lesions, as well as of concomitant lesions amenable to same-stage treatment [19–21]. Theoretical advantages of arthroscopic surgery for CAI include lower rates of cutaneous and infectious complications and a shorter time to recovery. However, these techniques were introduced only recently, and further studies are needed to assess their reliability, reproducibility, and potential for iatrogenic injury [22–24].

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3.2 Tools (Fig. 3.1)

The technique is performed with the 4 mm 30° angle arthroscope because of a better view, and the laxity usually allows a complete exploration of the joint. Arthroscopic dissection is performed using a 4.5 mm bone/soft tissue shaver blade. Suture passers and push knot are helpful. This



Fig. 3.1 Standard tools

technique can be performed with different types of anchors: with knot and knotless [10–17] (Fig. 3.1).

3.2.1 Patient Positioning

Two installations are possible: in a prone position or in lateral decubitus. If the patient is placed in a prone position, a bag must be positioned under the buttock to have the foot in a vertical position and avoid automatic external rotation and having access to the lateral aspect of the ankle. In case of lateral decubitus position the patient is placed with the pelvis slightly rotated 30° posterior. Position 1 is used for anterior arthroscopy. The hip is externally rotated. Position 2 is used for the lateral hindfoot endoscopy. The hip is internally rotated (Fig. 3.2).

3.2.2 Landmarks: Identification and Marking of Portals

Three portals are usually created to perform the procedure. The anteromedial portal is the first portal (portal 1). It has to be made medial to the tibialis anterior tendon, in hyperdorsal flexion of the ankle in order to have the portal as much lateral as possible. In this way, the anterior working area is bigger, the cartilage is protected because of the dorsiflexion, and the tibialis anterior tendon is at the most lateral position.

After ankle joint exploration, the second portal is the accessory anterolateral portal (portal 2) which is not marked on the skin as it is made under transillumination guidance when the



Fig. 3.2 Patient setting in lateral position

arthroscope is positioned in portal 1 and viewing the lateral gutter. The placement of this portal is between the spotlight and malleolus (Fig. 3.3). The third portal is the sinus tarsi portal (portal 3). Through the sinus tarsi portal, it is possible to have a full access to the lateral aspect of the ankle and to have a complete vision of the inferior extensor retinaculum (IER). Portal 3 is made 1 cm anteriorly to the mid-distance point between the tip of the fibula and the proximal tip of the fifth metatarsal (Fig. 3.4).

3.2.3 Step 1: Anterior Arthroscopy, Making the Broström Repair

The arthroscope is introduced in portal 1. Once the arthroscope is perfectly well centered on the external gutter, portal 2 is positioned between the spotlight and the lateral malleolus. For the realization of this portal, we can use a needle. The position should be anteriorly to the malleolus in the external gutter above the ATFL (Fig. 3.5). A mosquito clamp is introduced using the nick and spread technique. A debridement is then begun with the shaver. The resection starts with the scar



Fig. 3.3 Portal 2 by transillumination

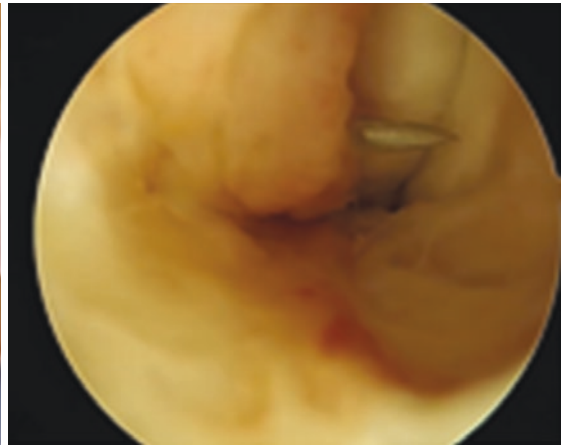


Fig. 3.4 Portal 3

tissue in the lateral gutter. The first anatomical landmark is the distal fascicle of the anterior tibiofibular ligament (Basset ligament) that always appears as an oblique structure between the anterolateral edge of the distal tibia and the lateral malleolus (Fig. 3.5a). Following this ligament from medial to lateral and from proximal to distal, it is easy to reach the malleolar insertion of the anterior talo-fibular ligament (ATFL) [25]. It is important then to move backward the scope in order to visualize the talar neck and have a general vision. The other important landmark is the anterolateral corner of the talar dome without cartilage. This landmark is constant and is just above the talar insertion of the ATFL. Then a capsulotomy is performed with a beaver blade between the ATFL and the capsule, at the lateral aspect of the ATFL, from proximal to distal, to get a complete vision of the ATFL from its malleolar insertion to its talar insertion (Fig. 3.5b, c). The ATFL

is then peeled off from its malleolar origin (as usually the avulsion is from the malleolar side with scar tissue at this location). The anterior facet of the distal malleolus, at the ATFL footprint, is then prepared with a burr, to enable a good healing of the ATFL reinsertion on the distal malleolus. This preparation of the malleolus is extended from the most distal to the distal insertion of the anterior tibiofibular ligament. The inferior part of the final malleolar preparation is going to receive the ATFL reinsertion and the superior part will receive the retinaculum augmentation (Fig. 3.6). The first anchor is positioned in the footprint of the ATFL, always with the arthroscope in portal 1, instruments and the anchor by portal 2. The second and/or third anchor will be placed for the Gould augmentation with IER.

The first suture is passed through the ATFL. The stand from the ligament is passed into the loop to obtain a lasso around the portion of ligament (Fig. 3.7) [11–17]. This technical pearl is made to reinforce the suture. The ATFL is then reinserted on the malleolus, with the anchor, with the ankle in a neutral position.

3.2.4 Step 2: Lateral Hindfoot Endoscopy, Making the Gould Augmentation

From the sinus tarsi portal (portal 3) the smooth trocar of the arthroscope is introduced and passed between the IER and the skin to create a working

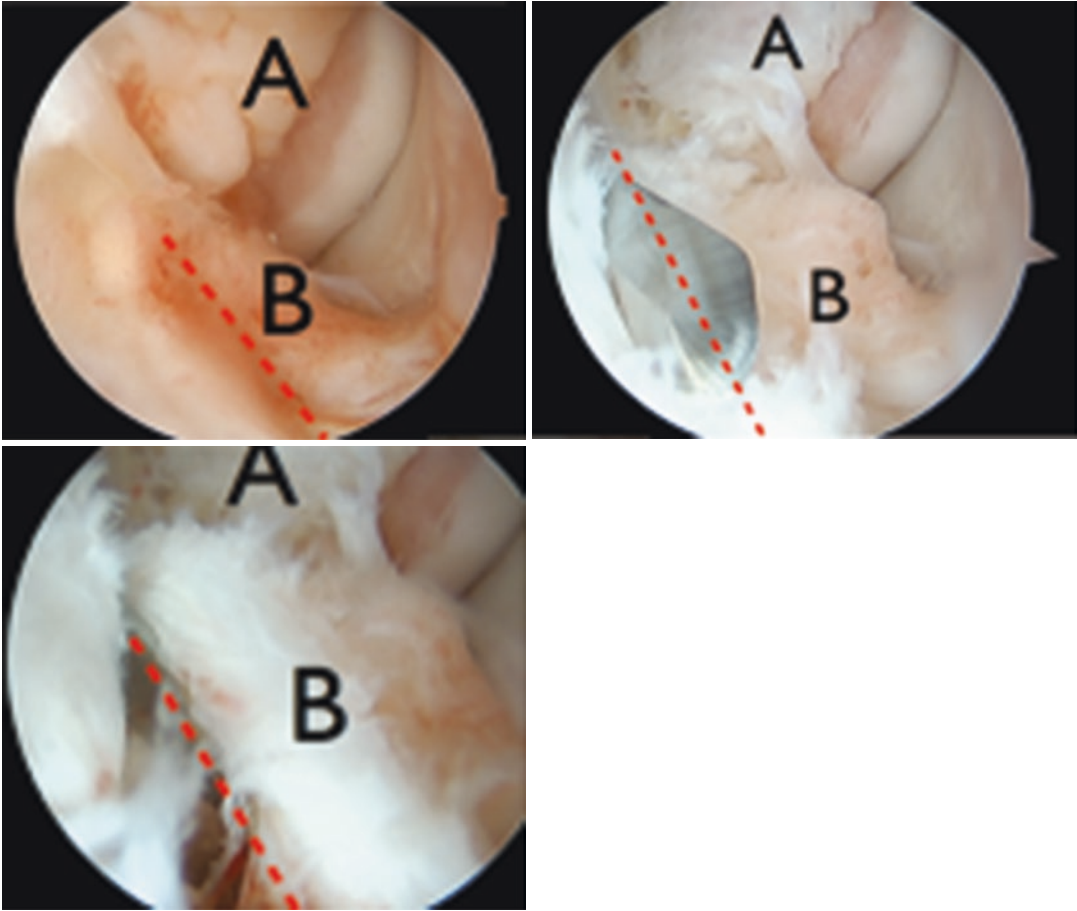


Fig. 3.5 Lateral gutter dissection: visualization of the distal part of the Basset ligament (a) and superior bundle of the ATFL (b)

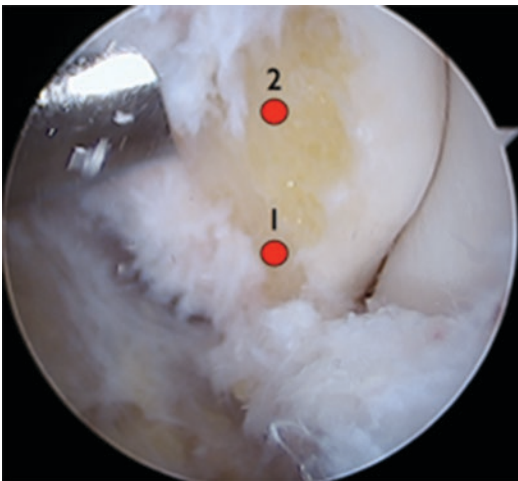


Fig. 3.6 ATFL footprint preparation: positioning for the anchor for ATFL repair (1) and for IER augmentation (2)



Fig. 3.7 Lasso loop on the ATFL

area around the IER. In this way, the cutaneous nerve stays with the fatty subcutaneous tissue and as it is avascular, there is no vascular or neurological danger (Fig. 3.8).

The arthroscope is then positioned in portal 3, looking at portal 2 from inferior to superior. A

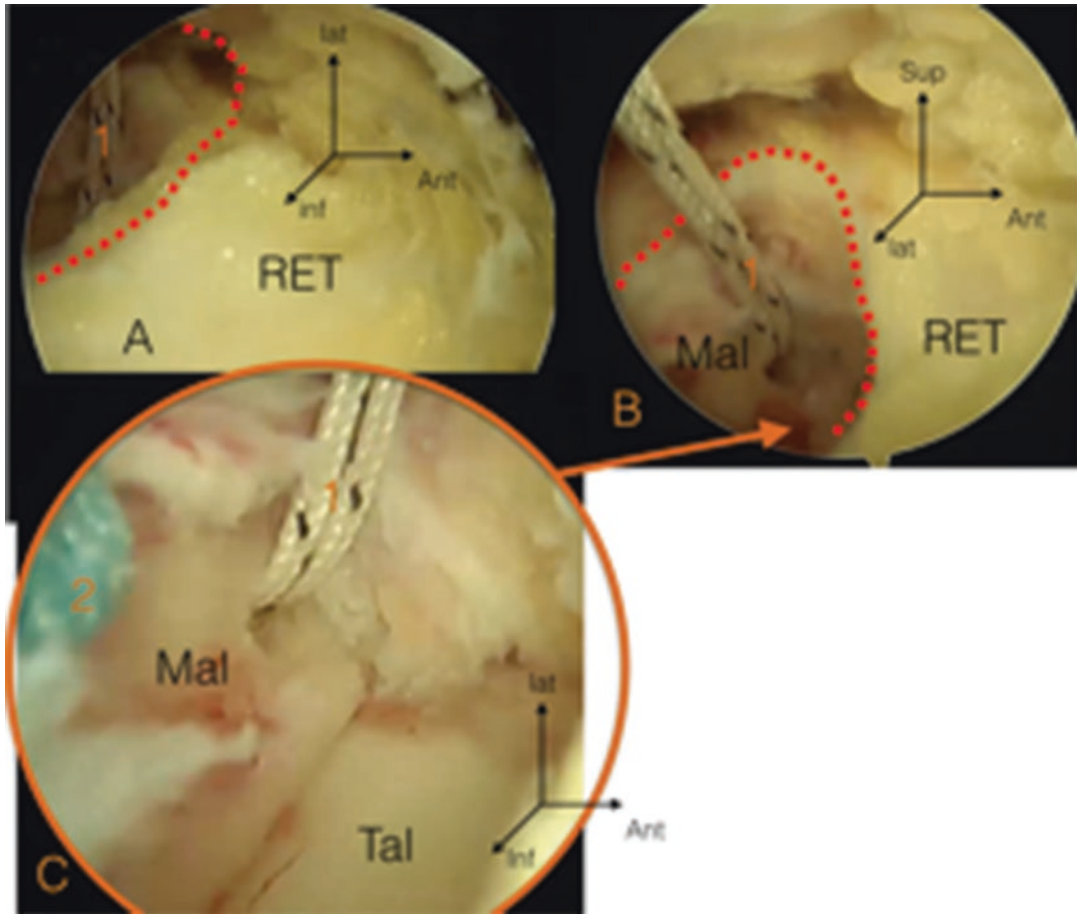


Fig. 3.8 Preparation of the working area for IER dissection

shaver introduced by portal 2 is finishing the preparation and dissection of the IER. The window of the shaver must always be under arthroscopic vision. It is important to obtain a perfect visualization of the IER as well as the hole created in step 1 via the portal 2 to know where the augmentation has to be placed with accuracy and safety. It is important to see on one side the prepared malleolus and on the other side the IER, ready to be sutured on the malleolus above the ATFL repair. More deeply, it is possible to have a vision of the Broström repair and more superiorly the lateral side of the talus (Fig. 3.9).

The second anchor is then introduced by portal 2 and placed on the anterior part of the malleolus at 1 cm superior to the previous anchor in the

prepared zone. Once the anchor is inserted, the suture is passed into the IER. By passing the 2 strands, it is possible to realize a mattress suture. It is possible to add a second anchor more inferiorly to have two fixations in the IER. In this case, it is important to put the anchor before doing the knot of the first one. The suture is tight on the malleolus to create the augmentation on the ATFL repair (Fig. 3.10).

3.2.5 Postoperative Care

ATFL repair is performed in outpatients. The patient is immobilized in a normal brace with immediate full weight bearing as tolerated. Foot elevation and ice are required for the first 2 weeks

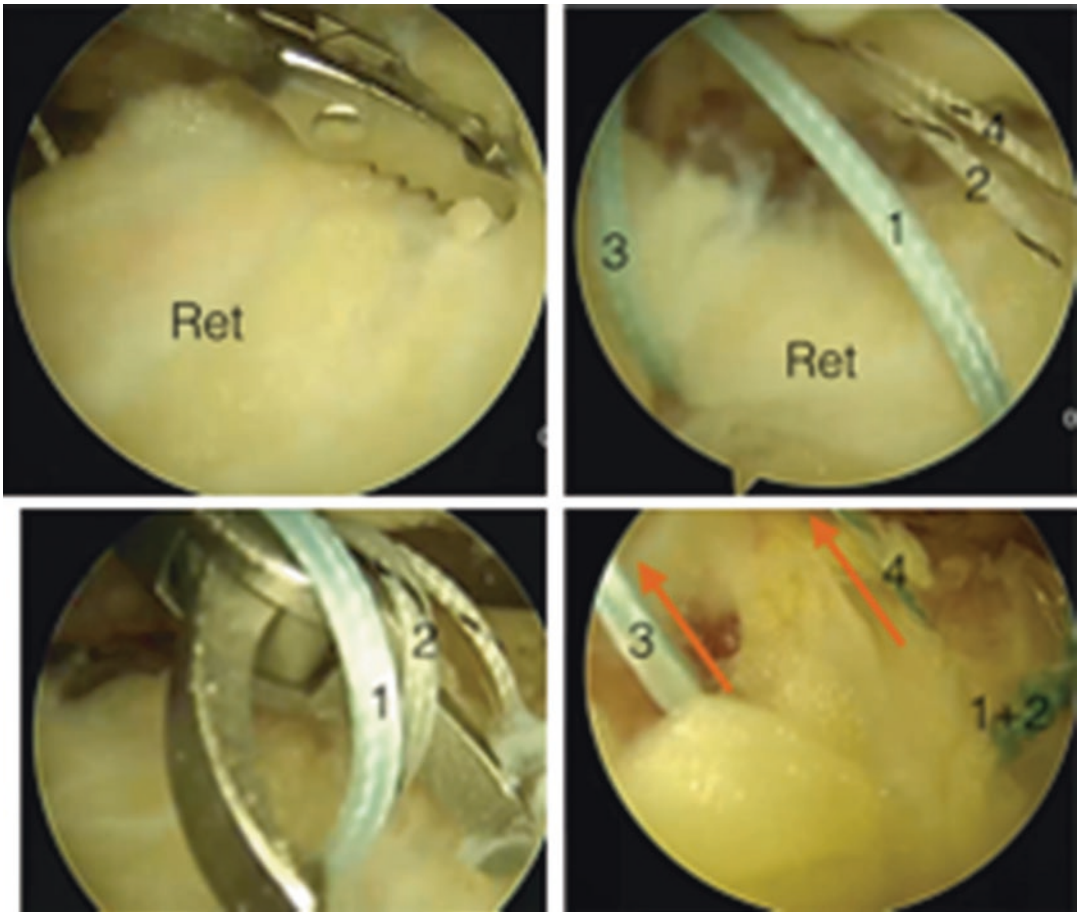


Fig. 3.9 Suture in the IER

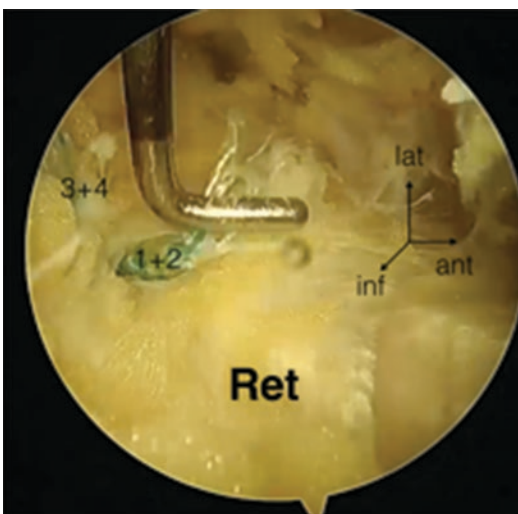


Fig. 3.10 Gould augmentation: Anchor in the malleolus (mal). Suture in the IER (ret)

to avoid swelling and pain. Rehabilitation is begun after 3–4 weeks for mobilization and proprioception. Return to sports activities is allowed after 6 weeks depending on the pain.

3.3 Discussion

Arthroscopy is gradually moving to a central position in the management of CAI, as it allows the diagnosis and treatment of concomitant lesions and, most importantly, provides a more accurate assessment of ATFL lesions, thereby guiding the treatment decision. Although arthroscopic techniques have not been proven superior over conventional open ligament repair and reconstruction, arthroscopy deserves to be viewed as a technique of choice for the treatment

of CAI, as it provides a comprehensive assessment of the ligament lesions and helps to choose the optimal surgical technique [19].

Arthroscopy improves the evaluation of lesions to the lateral ligament complex. Arthroscopic findings have modified the concept of anterolateral impingement by showing that the cause is micro-instability or rotational instability, which cannot be detected on imaging studies [26–28]. Arthroscopic exploration of the talo-fibular gutter is simple to perform and is conducted as the first step of the procedure to allow an evaluation of the ligament lesions [25]. When the ATFL is present and of good quality, or is distended or avulsed but exhibits good mechanical resistance, ATFL repair with or without advancement of the extensor retinaculum can be performed. In contrast, if the ATFL is thin, fragile, or absent, with a bald malleolar tip and abnormally good visibility of the talo-fibular gutter and fibular tendons, anatomic reconstruction with tendon grafting is in order. Thus, simple arthroscopic exploration provides definitive objective criteria for choosing the surgical technique best suited to the ligament lesions.

These arthroscopic techniques are simple and reproducible, as they are performed by anterior arthroscopy without distraction [9]. The learning curve of arthroscopic ATFL repair is quite short and the different steps must be carefully respected.

Arthroscopic ATFL repair, with or without extensor retinaculum advancement, is indicated if the ATFL is present and of good quality [10–17, 24]. These arthroscopic ATFL repair techniques carry a lower risk of cutaneous and infectious complications compared to open surgery [22–24]. The main complication of arthroscopic ATFL repair is injury to the superficial fibular nerve, which occurred in 4.3% of a recent prospective study of 286 cases, about half the rate reported with open surgery [24, 29–31]. Superficial fibular nerve injury usually manifests chiefly as transient dysesthesia, whose frequency is similar to that seen after any anterior ankle arthroscopy procedure [32]. No increase in the risk of nerve injury was seen in patients managed with versus without extensor retinaculum

advancement or with versus without knots [24, 33–36].

The main difficulty is the patients selection in order to know if ATFL repair remains the best option for each case. Further assessment with longer follow-up is in progress to have better indications and results of this arthroscopic technique.

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