

Arthro-Broström with Endoscopic Retinaculum Augmentation using All-inside Lasso-loop Stitch Techniques

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Research Article

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Abstract

Background: There is still controversy about the augmentation of the inferior extensor retinaculum (IER) after arthroscopic anterior talofibular ligament (ATFL) repair. The aim of this study was to evaluate the arthro-Broström procedure with endoscopic retinaculum augmentation using all-inside lasso-loop stitch techniques for chronic lateral ankle instability. **Methods:** Thirty-four cases with type-2 or type-3 chronic ATFL lesions who underwent the arthro-Broström procedure with endoscopic retinaculum augmentation using all-inside lasso-loop stitch techniques were assessed retrospectively. A total of 30 cases (30 ankles) were followed up for a mean of 26.67 ± 4.19 months (range, 24 - 36 months). Five cases were excluded due to insufficient medical records or loss of follow-up reports. The Cumberland Ankle Instability Tool (CAIT) scores, The Karlsson-Peterson scores and Visual Analogue Scale (VAS) scores were evaluated before surgery and at the final follow-up time. Also, the results of stress fluoroscopic tests and complications were recorded. **Results:** At the final follow-up, the average of the Cumberland Ankle Instability Tool (CAIT) scores, The Karlsson-Peterson scores and VAS scores were 86.63 ± 6.69 (range, 77 - 100), 90.17 ± 4.64 (range, 85 - 100) and 0.53 ± 0.63 (range, 0 - 2), respectively. Moreover, the results of stress fluoroscopic tests were improved significantly after surgery. Mild keloid formation and/or knot irritation were observed in four cases. No wound infections, nerve injuries and recurrent instability were recorded. Also, no stiffness or arthritis of the subtalar joint was encountered. **Conclusions:** The arthro-Broström procedure combined with endoscopic retinaculum augmentation using all-inside lasso-loop techniques is reliable and safe due to satisfactory clinical results and avoiding nerve injuries.

Background

Lateral ankle ligament injuries are by far the most common injuries due to people's active lifestyles, however, around 20% of cases should be treated with operative procedures after conservative methods have not been successful [1-3]. The goal of surgical treatment is restoration of the ankle stability and function while minimizing complications. The modified Broström-Gould procedure has been considered the gold standard for chronic lateral ankle instability (CLAI) over the last five decades [1,2]. These procedures were gradually developed from formal open techniques to minimally invasive ones over the years. However, there are still debates related to the reliability and necessity of the augmentation of the inferior extensor retinaculum (IER) after arthroscopic anterior talofibular ligament (ATFL) repair [4-6]. For those cases with an insufficient ATFL remnant, however, the augmentation of the IER is a good choice, except for ligament reconstruction [7-9]. Guillo et al. first reported the technique note of all-inside endoscopic Broström-Gould procedure without clinical results [10]. Then, Cordier et al. described that the all-arthroscopic Broström-Gould technique using an automatic suture passer had shown excellent clinical results with short-term follow-ups [11]. Actually, in most percutaneous or arthroscopic assisted Broström-Gould procedures, these sutures were passed through the IER and then tied in a horizontal mattress configuration, the reliability of the reinforcement is most vulnerable, due to the location and quality of the IER in each individual case [1,12-15].

The aim of this study is to evaluate the arthro-Broström procedure combined with endoscopic retinaculum augmentation using all-inside lasso-loop stitch techniques for chronic lateral ankle instability. We have hypothesized that restoration of the ankle stability and function can be achieved by this all-inside repair technique while avoiding the risk of nerve injuries.

Methods

Patients

The present study is a retrospective investigation of 30 consecutive active patients with chronic lateral ankle instability, who underwent the arthro-Broström procedure with endoscopic retinaculum augmentation. Inclusion criteria [16]: (1) recurrent ankle sprain and signs of ankle instability; a positive or questionable result is associated with anterior drawer and talar tilt stress fluoroscopy (Ligs device, innomotion inc. Shanghai, China); (2) no response to conservative treatments for over three months; (3) the lesion of the anterior talofibular ligament (ATFL) was indicated by magnetic resonance imaging (MRI) and ultrasonography (US). Exclusion criteria: (1) a combined ligament injury with an acute fibular fracture, previous ankle surgery, any foot and ankle malalignment; (2) Patients with systemic diseases, neuromuscular disorders and infectious diseases. The study was approved by the institutional ethical committee of our hospital. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Thirty-four cases were treated with this technique in our institution from August 2018 to October 2019. Four cases were excluded due to insufficient medical records or loss of follow-up data. A total of 30 cases (30 ankles) were followed up for a mean of 26.67 ± 4.19 months (range, 24-36 months). Of these cases, 5 were female (16.67%), 25 were male (83.33%), 14 right ankles (46.67%) and 16 left ankles (53.33%). The average age was 31.83 ± 6.90 years (range, 21-46 years), with 8 being smokers. Concomitant intra-articular pathologic findings including: bone impingement (n=9, 30%), osteochondral lesion (OCL) (n=8, 26.67%), osseous avulsion of the fibular (n=4, 13.33%), os subfibulare (n=1, 3.33%), and loose body (n=2, 6.67%). According to the classification of the ATFL lesion by Thès [9], there were 11 type-2 cases (36.67%) and 19 type-3 cases (66.33%). The average distance between the proximal margin of the IER and anterior margin of the lateral malleolus is 8.8 ± 2.58 mm (range, 5-15 mm). According to the medical records, the average operative time was 59.07 ± 9.81 minutes (range, 43-74 minutes). Those cases with concomitant pathology such as bone impingement, OCL and osseous avulsion of the fibular needed more time. An informed consent was taken from all patients before their participation in this study. All procedures were approved by the institutional ethical committee of our institution. Demographic data is shown in Table 1.

Patients' characteristics

	Total, n=30
	31.83 ± 6.90
	25 (83.33)
	5(16.67)
	16(53.33)
	4(13.33)
	10(33.33)
	16(53.33)
	14(46.67)
at intra-articular pathology	
ngement	9(30)
ndral lesion	8(26.67)
ivulsion of the fibula	4(13.33)
lflare	1(3.33)
ly	2(6.67)
etween IER and LM (mm)	8.8 ± 2.58
ive time(min)	59.07 ± 9.81
ime (mth)	26.67 ± 4.19

l variables were reported as number (n) and percentage (%).

variables are reported as mean ± SD.

malleolus; IER, inferior extensor retinaculum

Surgical procedures

Set up the patient in the supine position, the ipsilateral back and hip were elevated with a big soft pad to place the ankle in a slight medial rotation (Figure 1A). A tourniquet was placed at the proximal thigh, and a traction device and irrigation system were unnecessary. The anatomic landmarks were outlined along the medial and lateral malleoli, the tibialis anterior tendon, peroneus tertius tendon and peroneal tendon. Also, the orientation line of the inferior extensor retinaculum (IER) was palpated and drawn which is located at approximately 1-1.5 cm anterior to the tip of the lateral malleolus (Figure 1B). The lower extremity was prepped in the usual sterile fashion with a complex iodine solution.

Step-one: Arthroscopic Broström Procedures

Firstly, the ankle was placed in neutral position by the assistant, then the modified anteromedial (AM) portal was established (Figure 1C). The 4.0mm arthroscopic cannula and trocar was inserted while the tibialis anterior tendon was pushed laterally, so, visualization of the lateral gutter could be enhanced. Next, the anterolateral (AL) portal was typically created using an outside-in technique. The associated intra-articular lesions were debrided at this stage. The lateral gutter was then debrided gently using a small size end-cutting shaver, afterward, the ATFL remnant was evaluated for quality with a probe. Under

arthroscopic visualization, an accessory anterolateral (acAL) portal which is 1.0cm anterior to the tip of the lateral malleolus was then created. The fibular insertion site of the ATFL was gently prepared with a small burr. A 3.0mm absorbable suture anchor (GRYPHON™ BR Anchor, Johnson & Johnson, USA), which was preloaded with two different color strands of #2 sutures, was implanted into the fibular footprint of the ATFL using a drill guide via the acAL portal. The striped, colored strands were retrieved from the AL portal, these will be used to reinforce the IER later. Under arthroscopic visualization, the maximum possible amount of the ATFL remnant was penetrated by the Arthro-Pierce instrument (Curved, Smith & Nephew, USA) via the acAL portal. Advance the tip of this instrument until it is in the center of the triangle space bordered by the lateral malleolus, the lateral talar articular surface and the ATFL (Figure 2A). When a limb of the violet strands has been grasped, the Arthro-Pierce instrument was slowly retrieved. This limb was pulled through the ATFL remnant while a loop of this limb was created in the lateral gutter (Figure 2B, F). The Arthro-Pierce instrument was then rotated in the opposite direction to release the created loop. The tip of this instrument was passed through this loop, the free end of this limb was then grasped and passed through it (Figure 2C, G). A self-cinching stitch of the ATFL was created when this limb was pulled tight. Finally, the stitched ATFL remnant was then pulled toward the bone surface when the other free end of the violet strands was retrieved. The surgical knot was created and tightened 2-3 times using a knot pusher while holding the ankle in a neutral position (Figure 2D, H).

Step-two: Endoscopic Retinaculum Augmentation Procedure

The ankle was then placed back to a slight medial rotation position (Figure 1D). The viewing portal for the inferior extensor retinaculum (IER) was created at the mid-point between the tip of the lateral malleolus and the fifth metatarsal base[13]. A working space was created between the superficial fascia and the retinaculum using a small mosquito. Another accessory portal for working instruments was created 1.5cm superior to the viewing portal using an outside-in technique (Figure 1B). The margins of the lateral malleolus and the IER were exposed gently using the 2.9mm end-cutting shaver. The striped, colored strands and the ATFL repaired site were cleared carefully. The IER was released along the distal edge of the stem using a small-size radiofrequency device (Figure 3A, E). So, it can be brought to the anterior margin of the lateral malleolus with the desired tension. The Arthro-Pierce instrument was then passed through the deep layer of the retinaculum under endoscopic visualization. The tip of this instrument was advanced until one limb of striped, colored strands was grasped (Figure 3B, F). The Arthro-Pierce instrument was then slowly retrieved. This limb was pulled through the deep layer of the retinaculum. When a loop of this limb was created, this instrument was then released and passed through this loop to grasp the free end of this limb (Figure 3C, G). A self-cinching stitch of the retinaculum was created when the free end of this limb was pulled tight. Also, the other free end of the striped, colored strands (the axial strands) was grasped and pulled to the accessory working portal. The stitched retinaculum was then drawn toward the lateral malleolus when this axial strand was pulled back (Figure 3D, H). Under endoscopic visualization, this suture was tied using a surgical knot with the ankle in a neutral position. The IER was then attached to the lateral malleolus with appropriate tension (Figure 4A, B). These strands were cut and the skin incisions were closed.

Postoperative management

Postoperative management consists of protecting the repair site with a semi-rigid ankle brace. Full weight bearing and active range of motion exercises are allowed with this brace at one week postoperatively. Inversion of the ankle should be prohibited before four weeks postoperatively. At three months, most casual sport activities are allowed with elastic tape support. Competitive sport activities could be performed after six months depending on patients' evaluations

Clinical outcome evaluation

Patients were scheduled for evaluation at postoperative 3, 6, 12, 18, 24 months and beyond. Anterior drawer tests and talar tilt tests were examined by stress fluoroscopy before surgery and at the final follow-up. The clinical outcomes were assessed using the Cumberland Ankle Instability Tool (CAIT), Karlsson-Peterson score and Visual Analogue Scale (VAS) score at the preoperative evaluation and the final follow-up [17-19]. The clinical outcomes and complications were recorded by an independent surgeon with a physical therapist.

Statistical analysis

Statistical analysis was performed using SPSS 16.0 (SPSS Inc, Chicago, IL). Wilcoxon signed-rank test was conducted for evaluation of changes in the Cumberland Ankle Instability Tool (CAIT) scores, Karlsson-Peterson scores and VAS scores before surgery and at the final follow-up. P values less than 0.05 were considered to be statistically significant.

Results

Functional outcomes

The Cumberland Ankle Instability Tool (CAIT) scores improved significantly from an average preoperative score of 35.77 ± 10.32 points (range, 13-47) to 86.63 ± 6.69 points (range, 77 - 100) ($P < 0.001$). Also, the Karlsson-Peterson scores increased significantly from an average preoperative score of 47.1 ± 11.99 points (range, 27 - 65) to 90.17 ± 4.64 points (range, 85 - 100) at the final follow-up ($P < 0.001$). The average VAS score decreased from 3.73 ± 1.55 points (range, 0 - 7) preoperatively to 0.53 ± 0.63 points (range, 0 - 2) postoperatively at the final follow-up ($P = 0.05$). Stress fluoroscopy performed at the final follow-up showed anterior talar translation decreased from 10.77 ± 4.07 mm (range, 4 - 19) preoperatively to 2.7 ± 1.34 mm (range, 0 - 5) postoperatively and a talar tilt angle of $2.17^\circ \pm 1.62^\circ$ (range, $0^\circ - 4^\circ$) against a $9.37^\circ \pm 5.98^\circ$ (range, $3^\circ - 30^\circ$) angle preoperatively ($P < 0.001$). According to the patients' survey, all patients returned to their previous level of sport activities at six months postoperatively. The

appropriate regeneration of the ATFL and CFL was observed on the MRI images at the final follow-up. No recurrent ankle instability was encountered. (Table 2 & Figure-5)

Complications

One female case with poor bone quality was changed to a mini-open repair with a 4.5mm PEEK suture anchor, due to the previous anchor being pulled out when the IER was tied during surgery. No nerve injuries or wound infections were encountered. Three cases complained about discomfort around the released site of the IER with mild limitation of inversion of the ankle within three months postoperatively; the mild keloid formation was palpated around this area. Knot irritation was encountered in a female patient with a low body mass index (BMI). Those local symptoms were significantly relieved after six months without a second intervention. At the final follow-up, no stiffness or arthritis of the subtalar joint was observed. (Table 2) See Fig.6 for typical case.

Arthroscopy scores, Cumberland Ankle Instability Tool scores, VAS scores, Stress fluoroscopy, Complications in 100 cases

	Pre-op	Post-op	95% CI	p
Arthroscopy score	47.10 ± 11.99	90.17 ± 4.64	-46.3 to -39.8	<0.001
Cumberland Ankle Instability Tool	35.77 ± 10.32	86.63 ± 6.69	-54.1 to -47.6	<0.001
VAS score	3.73 ± 1.55	0.53 ± 0.63	0.04 to 6.56	0.05
Stress fluoroscopy(mm)	10.77 ± 4.07	2.70 ± 1.34	4.81 to 11.3	<0.001
Stress fluoroscopy (°)	9.37 ± 5.98	2.17 ± 1.62	3.94 to 10.5	<0.001
Complications (n)				
Wound healing	0 (0.0)			
Ankle instability	0 (0.0)			
Arthritis or degeneration of the ankle	0 (0.0)			
Not issue	2 (0.07)			
Other	3 (0.10)			

Continuous variables are reported as number (n) and (%)

Categorical variables are reported as mean ± SD.

95% confidence intervals

Visual Analogue Scale

Discussion

The important finding of this study is that the arthro-Broström procedure combined with endoscopic retinaculum augmentation using all-inside lasso-loop techniques is reliable and safe. The goal of the ligament reattachment should be focused on the durable biomechanical stability and improving ligament-bone interfaced healing. Even though the modified Broström-Gould repair technique was considered the gold standard, there is still controversy on the augmentation of the inferior extensor

retinaculum (IER) [5,6,20,21]. Behrens reported that there is no significant biomechanical difference between traditional Broström repair and the modified Broström-Gould repair; reinforcement of the IER may be a marginal procedure at the time of surgery [22]. However, according to another classic biomechanics research, the augmentation of the IER provided protection to the primary ATFL repair within ankle inversion conditions [23]. Moreover, elongation of the repaired ATFL was significantly higher with unprotected motion of the ankle [24]. In a long-term clinical study of arthroscopic-assisted Broström-Gould repair, arthroscopic ATFL repair with IER augmentation can provide similar results as the gold standard ATFL and CFL repair. At the last appointments, 86.7% of active patients practiced normal sports activities at the same preoperative level without major complications [14]. Cordier et al. described the all-arthroscopic Broström-Gould technique using an automatic suture passer, excellent clinical results were observed with a median follow-up time of 28 months while only one case required a revision surgery [11]. According to previous studies, type-1 and most type-2 ATFL lesions only reattachment surgery was required without IER augmentation [9,25,26]. Actually, for type-3 ATFL lesions and some high-level athletes with type-2 ATFL lesions could be reinforced with IER. For those type-4 ATFL lesions, the ligament reconstruction, in my opinion, is the good choice.

In most series with percutaneous or arthroscopic Broström-Gould techniques, once passed through the IER, the sutures are then tied in a horizontal mattress configuration [1,13-15]. These procedures are most vulnerable, depending on the location and quality of the IER [12]. Actually, the stitch method may have influenced the durability of the repaired ligament. According to Takao et al's recent study, weight bearing was safe, after day one, using the modified lasso-loop technique for arthroscopic ATFL repair [25]. In our series, all-inside lasso-loop stitch techniques were used to improve tissue reattachment of the ATFL remnant and the IER. At the final follow-up, the mean Cumberland Ankle Instability Tool (CAIT) scores, The Karlsson-Peterson scores were 86.63 ± 6.69 and 90.17 ± 4.64 , respectively. Moreover, the results of stress fluoroscopic tests were improved significantly after surgery. According to the patients' survey, all patients returned to their previous level of sport activities. Fortunately, no recurrent ankle instability was encountered at the final follow-up.

Furthermore, the stem of the IER could be accurately identified and separated under endoscopic visualization in the present study. According to Jeong's previous report, the IER reinforcement wasn't feasible in some cases ($n=10$, 24.4%) due to the distance being too far between the tip of the fibular and the IER, moreover, the IER wasn't found in 6 cases. In his study, the average distance between the IER and the tip of the fibular was 9.8 mm (range, 5-22 mm); when this distance was longer than 18 mm, reinforcement of the IER was not possible [20]. Actually, the structure used to reinforce the ATFL repair in most cases is the sural fascia, not the stem of the IER. The sural fascia is probably easy to tear during early rehabilitation. Dalmau-Pastor et al. reported that the stem of the IER, the only part that could be used in the augmentation of an ATFL repair, is often difficult to identify and reattach through a limited small incision or percutaneous procedure [27]. In our cases, the average distance between the proximal margin of the IER and anterior margin of the lateral malleolus is 8.8 ± 2.58 mm (range, 5-15 mm). This distance was longer than 10 mm only in 6 cases. Performing the sufficient augmentation of the IER was

obtained due to accurate separation of the IER under endoscopic visualization, even though two cases with a thin stem of the IER were observed during surgery. In addition, the released IER was attached to the anterior margin of the lateral malleolus (the footprint of the ATFL) not the tip of the fibular. Appropriate tension of the augmentation, not only protects the repaired ATFL remnant, but also avoids the avulsion of the reinforced IER during postoperative rehabilitation (Figure 6C).

When arthroscopic assisted repaired techniques were applied, the entrapment of the superficial peroneal nerve or sural nerve is another important issue. The concept of a “safe zone” includes the distal fibula, the superior margin of the peroneal tendons and the intermediate branch of the superficial peroneal nerve was recommended to prevent this problem [1]. In a recent study, however, some small collateral branches of the cutaneous nerves were found crossing into the “safe” zone [28]. The close relationship of the IER with surrounding nerves is still a critical point to consider when performing a modified Broström-Gould procedure [29]. According to Guelfi et al’s study, compared with arthroscopic all-inside repair techniques, a higher rate of neuritis was encountered in the arthroscopic-assisted technique [30]. So, the key point for avoiding nerve injuries is performing all procedures under direct visualization. In the present study, the absence of nerve injuries could also be explained by the all-inside procedures.

Finally, tightness of the subtalar joint after reinforcement of the IER to the lateral malleolus is still a concerning issue [21]. Recent anatomical and biomechanical researches have noted that the augmentation of the IER can provide a similar outcome to that of the calcaneofibular ligament (CFL) in stabilizing the subtalar joint [4,31]. According to long-term research of arthroscopic-assisted Broström-Gould repair, no obvious limitation of eversion, inversion and degeneration of the subtalar joint was encountered [14]. In the present study, only 3 female cases complained about irritation around the released site of the IER at the early stage due to the keloid formation. Fortunately, after six months postoperative without a second intervention, this problem was noticeably relieved. Also, no recorded stiffness and degeneration of the subtalar joint was encountered in our cases at the final follow-up (Figure 6D). As mentioned previously, the appropriate tension of the attached IER could avoid tightness of the subtalar joint.

There are several limitations in this study. First, the sample size is relatively small. Second, it remains to be expounded due to the lack of a control group. Third, this is a preliminary report because of a relatively short follow-up time. Clinical trials are needed to further confirm the results in a long-term postoperative period. Additionally, it is difficult to ask every patient to have the stress radiograph in the department of radiology at each follow-up. So, the stress test was performed and evaluated in the department of orthopedics using fluoroscopy. Finally, those special cases with an absent ATFL remnant (Type-4) were not included in this present study. This study still provides useful insight into the clinical efficacy of the all-inside arthroscopic Broström-Gould procedure.

Conclusion

The arthro-Broström procedure combined with endoscopic retinaculum augmentation using all-inside lasso-loop techniques is reliable and safe due to satisfactory clinical results and avoiding nerve injuries. Accurate separation and attachment of the IER under endoscopic visualization could lastingly protect the repaired ATFL remnant without disturbing the subtalar joint.

Abbreviations

ATFL: anterior talofibular ligament; CFL; Calcaneofibular ligament; IER: Inferior extensor retinaculum; CAIT: Cumberland Ankle Instability Tool; VAS: Visual Analogue Scale; MRI: Magnetic resonance imaging; US: Ultrasonography; OCL: Osteochondral lesion; LM: Lateral malleolus; AM: Anteromedial; AL: Anterolateral; acAL: Accessory anterolateral; PEEK: Poly-ether-ether-ketone; BMI: Body mass index; CI: confidence intervals

Declarations

Conflict of interest

All authors read and approved the final manuscript.

All authors confirmed that there are no conflicts of interest.

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Informed consent:

Written consent was obtained from all participants.

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Figures



Figure 1

A: The patient was placed in the supine position, the ipsilateral back and hip was elevated with a soft pad. **B:** The viewing portal for the IER was located at the mid-distance point between the tip of the lateral malleolus and the fifth metatarsal base. An accessory working portal was created 1.5cm superior to this portal. **C:** The ankle was positioned in a neutral position for the ATFL repair. **D:** The ankle was then placed in a slight medial rotation position for augmentation of the IER.



Figure 2

A,E,F: The Arthro-Pierce instrument was introduced into the center of the triangle space bordered by the lateral malleolus, the lateral talar articular surface and the ATFL via the acAL portal. One limb of the violet strands (*shown in green in Fig-2A,B,C,D*) has been grasped. The Arthro-Pierce instrument was slowly retrieved. This limb followed through the ATFL, then a loop was created. **B,C,G:** The Arthro-Pierce instrument was passed through the created loop. The free end of this limb was then grasped. **D, H:** A self-cinching stitch of the ATFL was created. The ligament remnant was then draw toward the bone surface when the axial thread (*shown in dark green in Fig-2A,B,C,D*) was pulled back.

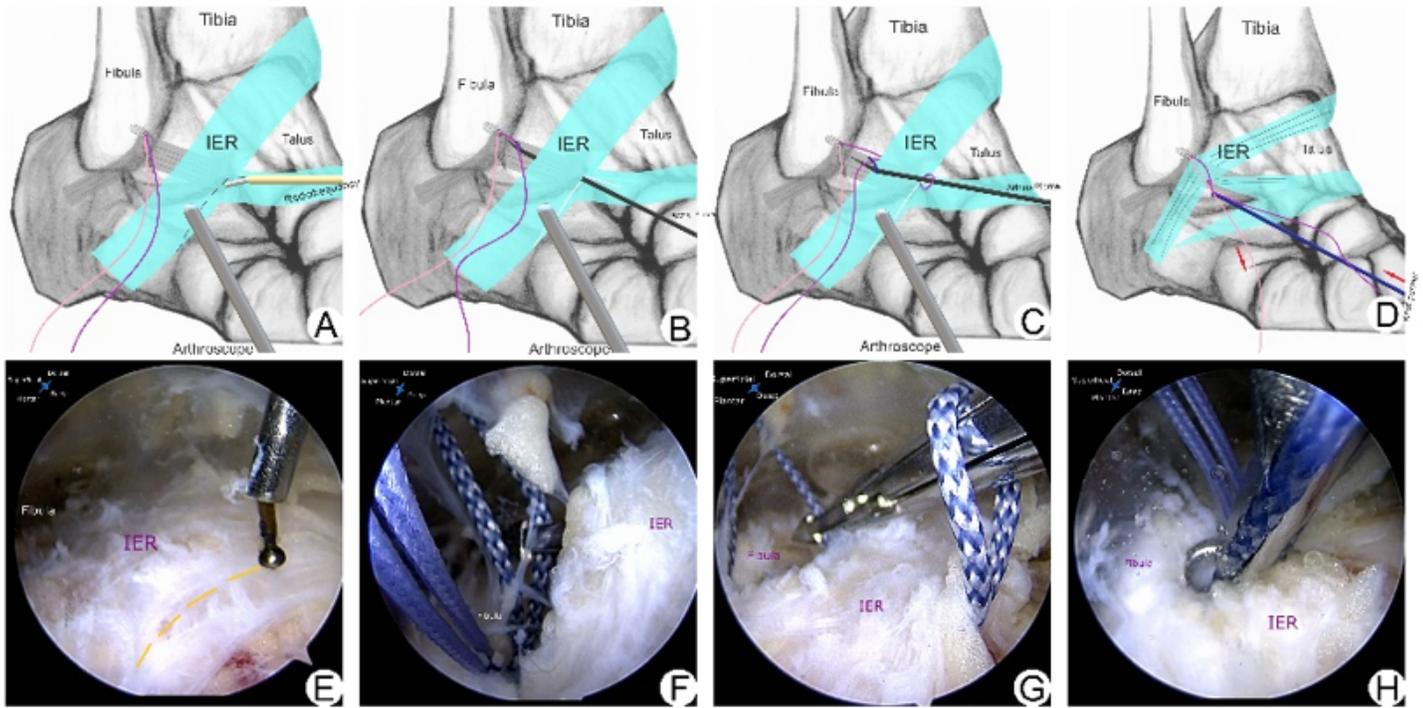


Figure 3

A,E: The IER was released along the distal edge of the stem using a small-size radiofrequency device. **B,F:** The Arthro-Pierce instrument was passed through the deep layer of the IER. The tip of this instrument was advanced until one limb of the striped, colored strands (*shown in violet in Fig-3A,B,C,D*) was grasped. The Arthro-Pierce instrument was then slowly retrieved. **C,G:** When a loop of this limb was created, this instrument was then released and passed through this loop to grasp the free end. A self-cinching stitch of the retinaculum was created. **D,H:** The stitched retinaculum was then drawn toward the lateral malleolus when this axial strand(*shown in pink in Fig-3A,B,C,D*) was pulled back.



Figure 4

Under arthroscopic visualization, the appropriate tension of the augmented IER was confirmed.

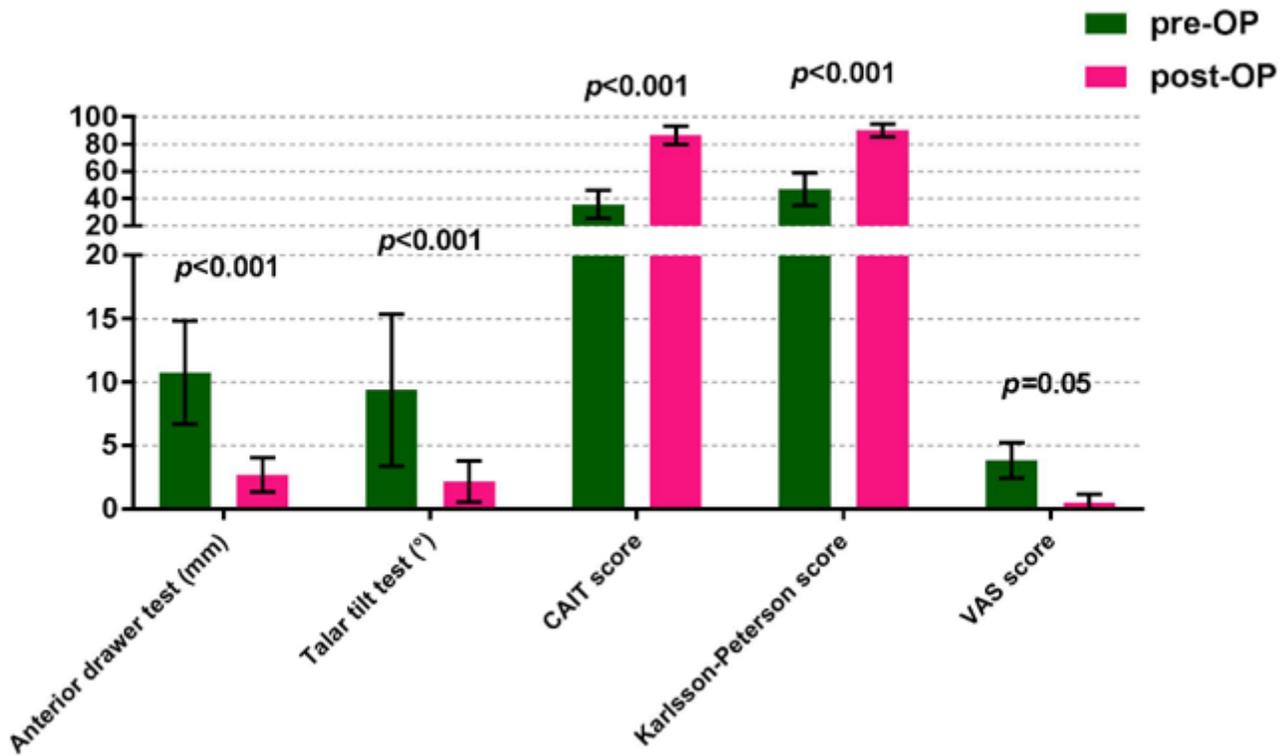


Figure 5

The Cumberland Ankle Instability Tool (CAIT) scores and the Karlsson-Peterson scores were improved significantly at the final follow-up ($P < 0.001$). The average VAS score was decreased at the final follow-up ($P = 0.05$). Moreover, the results of stress fluoroscopic tests were improved significantly after surgery ($P < 0.001$).



Figure 6

Female, 33 years old, had a sprained left ankle one year ago.

A, B The axial and coronal T2-weighted images show the chronic lesion of the ATFL and CFL (*yellow arrows*). **C, D** The axial and coronal T2-weighted images show the appropriate regeneration of the ATFL and CFL (*blue arrows*) at 32 months postoperative. The reinforced IER was still attached at the lateral malleolus (*light blue arrows*). No degeneration of the subtalar joint was encountered