Arthroscopic anterior talofibular ligament repair for lateral instability of the ankle

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Received: 29 June 2023; Accepted: 21 November 2023; Published online: 28 December 2023.

doi: 10.21037/aos-23-3

View this article at: https://dx.doi.org/10.21037/aos-23-3

Introduction

Lateral ankle sprains (LAS) are the most common injuries among athletes. Despite the high incidence of ankle sprains, only 50% of patients seek treatment (1). In undertreated injury, LAS is associated with residual symptoms, including muscle weakness, chronic pain, and instability, impacting greatly on professional athletes (2). Over time, it would lead to joint degeneration and osteochondral lesions (3). The anterior talofibular ligament (ATFL) is most likely involved in ankle sprains with an 80% prevalence, whereas the calcaneofibular ligament (CFL) is involved in 50% to 75% cases (2,4). Conservative management such as RICE (rest, compression, ice, and elevation) protocol, early controlled movement, and rehabilitation are recommended in the first instance (5). If the non-surgical treatment fails and the lateral instability of the ankle remains persistent, then surgical treatment should be performed to maintain the lateral stability of the ankle.

This case presents a modified lass-loop stitch technique to repair the ATFL. We present this article in accordance with the SUPER reporting checklist (available at https://aos.amegroups.com/article/view/10.21037/aos-23-3/rc).

Case presentation

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for the publication of this study and accompanying images and the video. A copy of the written consent is available for review by the editorial office of this journal.

A 32-year-old male with no history of other underlying diseases underwent this procedure. A magnetic resonance imaging (MRI) examination was performed because of a habitual sprain of the left ankle. The results of the examination showed that the ATFL was ruptured, and there was no damage to the CFL, cartilage, or other ligaments. Physical examination revealed a positive anterior drawer test. Ultrasonography could clearly show ATFL and CFL, and the accuracy of ATFL and CFL injuries would be improved with the help of ultrasound. MRI showed a sensitivity of 88.5% and a specificity of 81.3%, whereas ultrasound testing had a sensitivity of 96.8% and a specificity of 88.3% of the ATFL injuries (6). Applying the anterior drawer test during ultrasonography was useful for assessing the laxity and quality of the ligaments. Although the specificity of the anterior drawer test could be 100%, its sensitivity was only 39.5% to 50% (4).

Surgical techniques

Placement of portals

The patient was supine, and a leg holder was elevated on the leg. *Figure 1* shows the outline of the fibula, and the marked fibular obscure tubercule, where is the attachment of ATFL.

The arthroscope was introduced through the medial midline (MML) portal, just lateral to the tibialis anterior tendon. The alternative watching portal was an anterior medial portal, which was just medial to the tibialis anterior

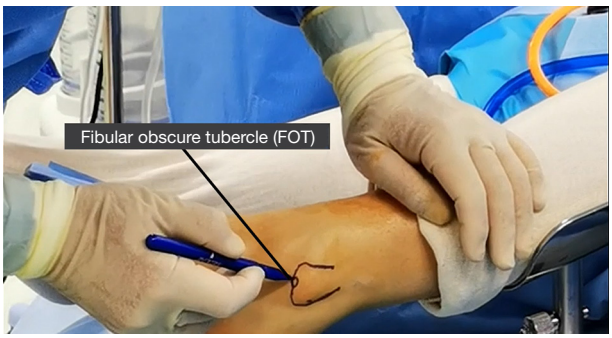


Figure 1 The outline of the fibula and the fibular obscure tubercule.

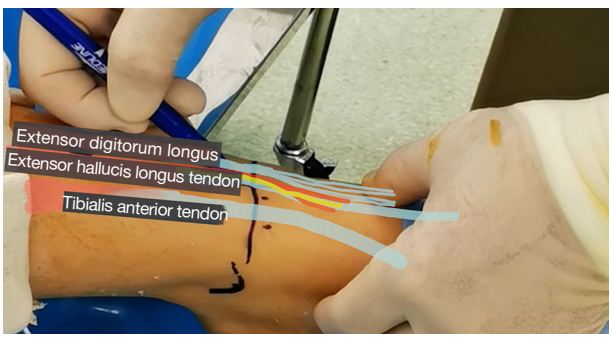


Figure 2 Important structures in front of the ankle joint.

tendon. To make the MML portal at the level of the joint line, with the ankle in the plantar flexion position, which was a safe portal and is suitable for a 2.7-mm arthroscope. As shown in *Figure 2*, we should notice that the tibia anterior artery and a deep peroneal nerve run near this portal.

Firstly, 10 mL saline was injected through the MML portal to inflate the joint cavity with the ankle joint in the plantar flex position. And then the No. 11 blade was used to make a 3 mm skin incision, and blunt dissection with a straight mosquito clamp. Be careful not to damage the cartilage while inserting the trocar.

Secondly, we used a 2.7-mm 30-degree arthroscope to perform an arthroscope examination. The cartilage lesions and osteophytes that cause impingement were observed. Then the accessory anterior lateral working portal was established by the transillumination technique. A needle was used to ensure the correct position of the portal, which was close to the fibular ATFL attachment prior to the skin incision and the blunt dissection using a straight mosquito clamp.

Suture anchor insertion

A suture anchor was placed in the fibular ATFL footprint via the working portal. The correct anchor position was ensured by identifying the fibular attachment of the ATFL, and the drill hole, made at the lower edge of the ATFL. A drill guide was used in a direction at 45 degrees concerning the longitudinal axis of the fibula.

Modified lass-loop stitch technique

For the modified lasso loop stitch, an 18-G needle and 2-0 nylon suture were used to penetrate the ATFL remnant from the front to back as deeply as possible through the working portal.

Firstly, confirmed that the needle tip touched the front of the ATFL. Then adjusted the direction of the needle using the needle tip to probe the inferior bundle of the ATFL and then penetrated the deep layer. The needle was rotated several times in one direction and then in the opposite direction to enlarge the nylon loop.

Secondly, after hooking, the 18-G needle was removed, and then the nylon loop was pulled outside the working portal while the suture of the shooter anchor was then passed through the nylon loop, and the nylon loop was used to pull just the middle portion of the suture through the ATFL, such that a loop of the suture was created.

Thirdly, this loop was then twisted half a turn to make a first loop, and the other suture of the anchor was passed through it. A second loop was made by turning the first loop half-turn again. And then the same suture was passed through this second loop and pulled to tighten the loop very loosely.

Finally, the ankle maintained at 0 degrees neutral position, pulled the opposite suture firmly and let it slip to tighten, a self-cinching knot was created.

The repair was completed by placing two additional square knots over it with a knot pusher and the suture was subsequently cut by a suture cutter. The step-by-step procedure is shown in detail in *Figure 3*.

Discussion

LAS is a very common injury, especially in athletes. If left untreated, it may affect the athlete's motor function (2). The techniques for treating LAS can be divided into anatomic procedures and tenodesis stabilization (7). Anatomical procedures include anatomical repair and

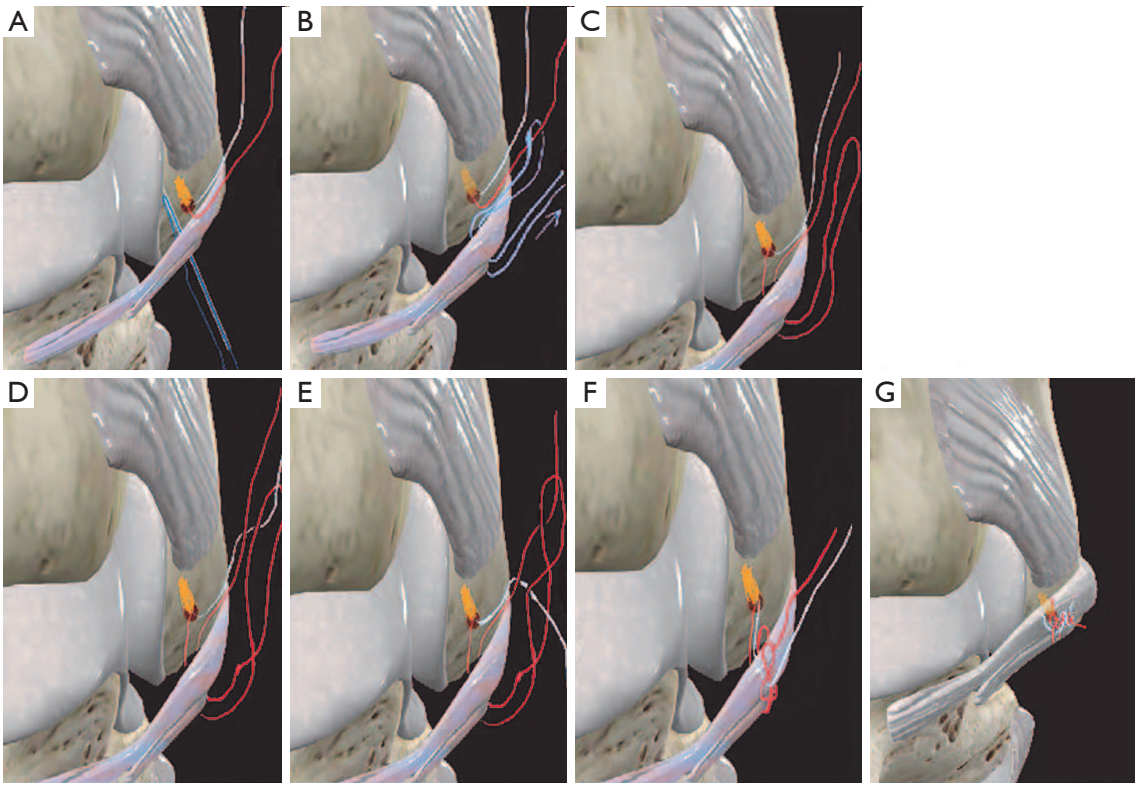
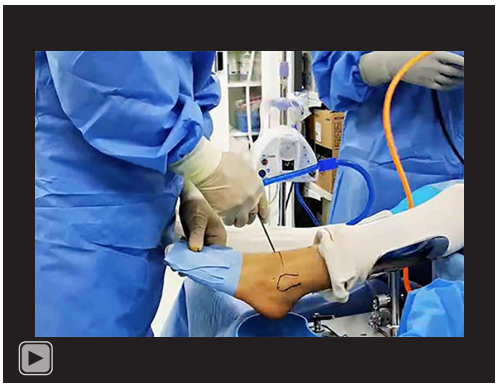


Figure 3 Modified lass-loop stitch technique. (A) An 18-G needle and 2-0 nylon suture are used to penetrate the ATFL. (B) The nylon loop is used to pull just the middle portion of the suture through the ATFL. (C) A loop of the suture is created. (D) The loop is then twisted half a turn and the other suture of the anchor is passed through it. (E) A second loop is made by turning the first loop half-turn again and the same suture is passed through it. (F) Pull the opposite suture firmly and let it slip to tighten. (G) The repair is completed by placing two additional square knots over it with a knot pusher and the suture is subsequently cut by a suture cutter. ATFL, anterior talofibular ligament.

anatomical reconstruction to restore the normal anatomy and biomechanics of the ankle joint. The lateral ankle ligamentous complex consists of three structures: CFL, ATFL, and posterior talofibular ligament (PTFL). ATFL is the most anterior and the weakest and most easily injured structure of the lateral ankle ligamentous complex (8).

This article introduces a new surgical method for ATFL repair. In this surgical technique, only two initial anterior arthroscopy portals were used. A MML portal is just lateral to the tibialis anterior tendon and an accessory anterolateral (AAL) working portal. The traditional open technique requires at least a 4-cm-long incision with significant dissection and soft tissue debridement, and it sometimes causes surrounding blood vessels and nerve injuries (9). Compared with other arthroscopic ATFL repair methods, this surgical method uses a modified lass-loop stitch technique. The lasso-loop stitch is one of the self-cinching stitches (10). Previous studies have shown that they have superior tissue-holding strength when compared to equivalent non-self-cinching stitches (11). For postoperative rehabilitation, instruct the patient to perform isometric contractions of the muscles around the ankle joint on the first postoperative day. An ankle brace is n not required. Patients were instructed to start partial weight-bearing training the day after surgery, avoiding active ankle plantarflexion on the operated side, and after four weeks were encouraged to plantarflex their ankles actively and to start resuming normal gait and low-intensity exercise. This surgical technique provides doctors with a new surgical option when performing LAS surgery. For the patient in the presented case, the patient was allowed to perform weight bearing the day after surgery. After 4 weeks of surgery, the patient had basically regained normal gait, and the anterior drawer test of the ankle was negative. Eight weeks after



Video 1 The step-by-step procedure for arthroscopic anterior talofibular ligament repair using the modified lass-loop stitch technique.

surgery, the patient had fully recovered the range of motion of the ankle joint and began to return to sports gradually. *Video 1* illustrated the detailed surgical techniques in a stepwise fashion.

Acknowledgments

Funding: None.

Footnote

Reporting Checklist: The authors have completed the SUPER reporting checklist. Available at https://aos.amegroups.com/article/view/10.21037/aos-23-3/rc

Peer Review File: Available at https://aos.amegroups.com/article/view/10.21037/aos-23-3/prf

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://aos.amegroups.com/article/view/10.21037/aos-23-3/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patients for publication of this manuscript and any accompanying images and the video. A copy of the written consent is available for review by the editorial office of this journal.

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doi: 10.21037/aos-23-3
Cite this article as: Wu P, Xing Y, Iwashita K, Takao M. Arthroscopic anterior talofibular ligament repair for lateral instability of the ankle. Art Surg 2023;7:3.