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Combined Posterior and Anterior Ankle Arthroscopy for Posterior and Anterior Ankle Impingement Syndrome in a Switching Position

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Level of Evidence: Level V, expert opinion.

Keywords: ankle arthroscopy, ankle impingement syndrome, rapid switching position

Introduction

Since the ankle has an articular surface that fits tightly, for a long time it was felt the ankle was not suitable for arthroscopy.[10] However, during recent years, with the development of techniques and improved instruments, more ankle diseases can be managed by arthroscopy. Traditionally, invasive or non-invasive traction was applied on the ankle joint to improve the operative space;[3,4] in addition, a small diameter (2.7 mm) scope has also been used.[4] However, intraoperative traction increased complications.[5] Also, when the scope diameter was too small, the volume of saline influx into the joint might be reduced, resulting in blurred visualization.[10] Therefore, non-traction arthroscopy combined with ankle dorsiflexion or plantar flexion has been used in the treatment of anterior ankle lesions.[9] Van Dijk et al[16] showed that for the anterior ankle lesions, patients could be operated on in the supine position with 2 standard anterior portals and a larger diameter scope (4 mm). In that study, operating space was enhanced through ankle dorsiflexion without traction. In addition, use of a thicker scope could increase infusion of saline and therefore improve visualization.[16] Furthermore, prone position can be used in non-traction arthroscopic surgery when treating posterior ankle lesions, such as posterior ankle impingement syndrome or an os trigonum by using 2 standard posterior portals.[17] However, during surgery for posterior and anterior impingement syndrome, switching between the supine and prone position was needed, which required another round of limb disinfection.

In this study, a new non-traction surgery was introduced using a rapid switching position, which was specified for the combined posterior and anterior ankle arthroscopy in treating posterior and anterior ankle impingement syndrome. The clinical outcomes were also evaluated and discussed. From 2006 to 2010, there were 13 patients (Table 1) treated for posterior and anterior ankle impingement syndrome. All patients presented with tenderness in both the anterior and the posterior ankle joint, which was intensified by extreme passive ankle dorsiflexion and plantarflexion. In all patients, radiographs showed osteophytes on the anterior ankle and an os trigonum or Stieda's process. None of the patients had a history of previous ankle surgeries or severe ankle osteoarthritis. Patients with ankle instability or injury of the cartilage of the talus or tibia were excluded.

Description of Technique

Under epidural or spinal anesthesia, the patient was placed in a lateral position. The affected limb was on the top and a plate with pad was placed to support the hip with a thigh tourniquet (Figure 1A). The standard posterolateral and posteromedial portals were made for the posterior ankle arthroscopy. Both portals were located at the intersection between the joint level and the medial edge or the lateral edge of the Achilles tendon, respectively (Figure 1B). The leg was elevated to provide operating space for the arthroscopy (Figure 1C). The posterolateral portal was established and a 30 degrees scope was inserted into the joint. Under direct visualization, a spinal needle was pierced into the

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Table 1. Patient Demographic Data and Clinical Outcomes.

No.	Gender	Age	Duration From Injury to Surgery (months)	Side	Preoperative AOFAS Score	Postoperative AOFAS Score
1	M	29	3	L	67	84
2	M	29	6	L	74	100
3	M	40	12	L	74	90
4	M	25	10	R	71	94
5	M	26	12	R	74	94
6	M	30	5	R	71	93
7	F	31	1	L	74	98
8	F	15	3	R	67	89
9	M	18	6	R	74	98
10	M	19	14	R	74	89
11	M	47	3	L	64	90
12	F	47	4	R	64	90
13	M	38	6	R	71	98

Abbreviations: M, male; F, female; L, left; R, right; AOFAS, American Orthopaedic Foot and Ankle Society.

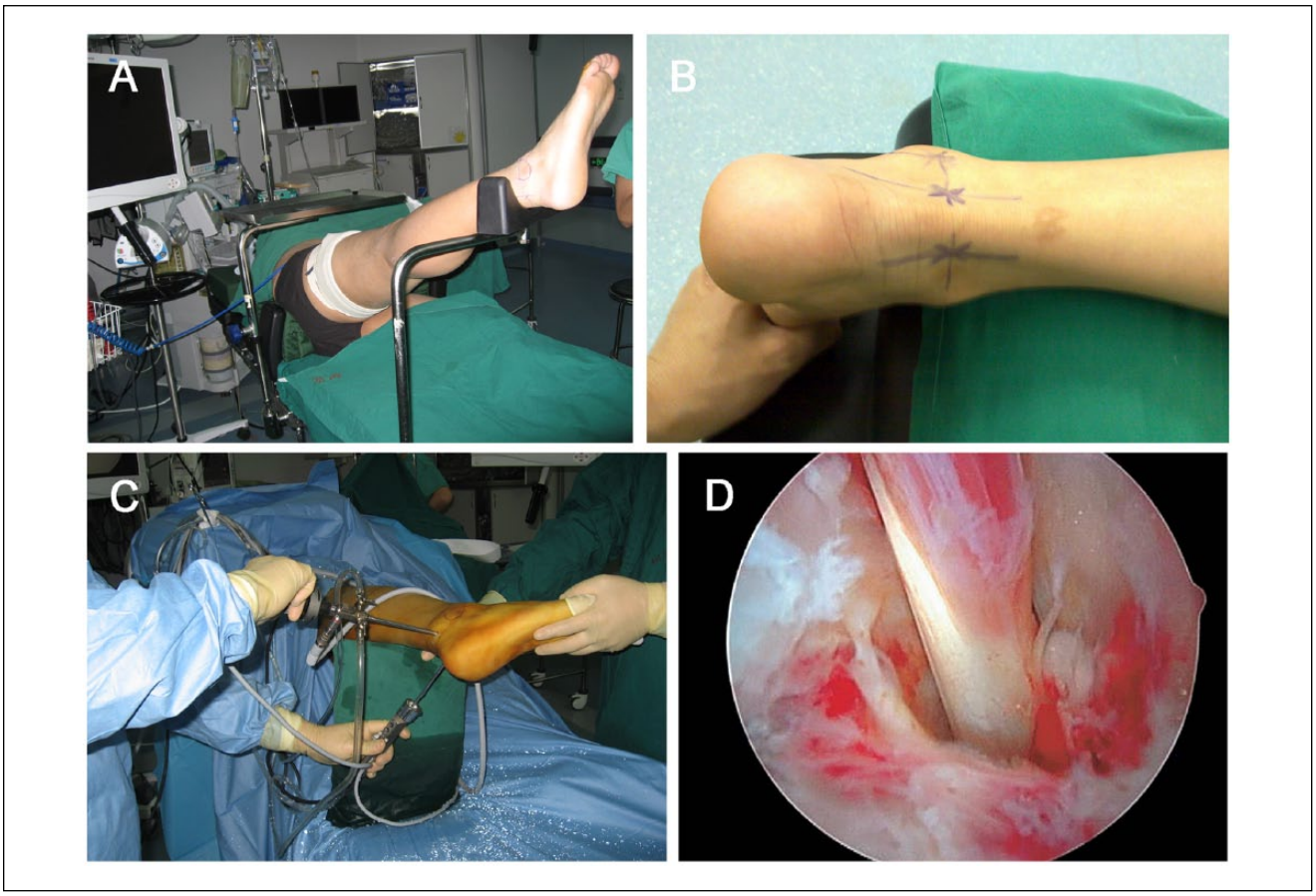

Figure 1. Posterior ankle arthroscopy. (A) Patient in the lateral position with the hip supported with the plate and pad. (B) Standard posterior arthroscopic portals: posteromedial (thick arrow) and posterolateral portal (thin arrow). (C) A disinfected wood brick was placed to elevate the limb. The standard posterolateral and posteromedial portals were made for the posterior ankle arthroscopy. (D) The important anatomical landmark in posterior ankle arthroscopy—flexor hallucis longus tendon.

Figure 2. Anterior ankle arthroscopy. (A) A simulation photo showed the position switch from posterior to anterior ankle arthroscopy. Patient was first tilted posteriorly to change into the semi-supine position. With the hip externally rotated, the ankle joint finally switched to the usual orientation of the supine position. (B) Anterior ankle arthroscopy using standard the anterolateral portal and the anteromedial portal (inserted photo).

posteromedial portal to confirm the location. After removing synovial tissue, the flexor hallucis longus tendon was visualized, which was the crucial anatomical landmark in the posterior ankle arthroscopy (Figure 1D). Debridement should be done lateral to this tendon to prevent damaging the nerves and blood vessels. After adequate synovectomy, the os trigonum was located. After releasing the soft tissue around the os trigonum, the os trigonum or other bony prominences were resected. At the end of the posterior ankle arthroscopy, we could assess for posterior impingement by passive ankle plantarflexion.

When the posterior arthroscopic surgery was finished, the patient was inclined backward, with the hip externally rotated to change the patient into the semi-recumbent position. The ankle could be placed in the usual position for anterior arthroscopy through external rotation (Figure 2A). The anterior ankle arthroscopy was performed using the standard anterolateral and anteromedial portals (Figure 2B), and the anterior impinging osteophytes could then be resected. Anterior impingement could be reassessed with passive ankle dorsiflexion after the resection.

Postoperative Management

Within 24 hours, functional exercise was commenced with passive range of motion. Ice was intermittently applied until 2 weeks after the removal of sutures. Partial weightbearing was allowed as soon as possible after the wounds were in stable condition (about 2-3 days after surgery). Full weightbearing was allowed at 2 weeks postoperatively. Ankle strength training was started at 1 month after surgery, and the rehabilitation sports activities were not allowed until 3 months postoperatively.

Results

The average surgical time was 50.7 minutes, ranging from 45 minutes to 1 hour. The average follow-up time was 15.5 months (range, 12-22 months). The mean preoperative American Association of Foot and Ankle Society (AOFAS) score was 70.7 ± 3.9 points, and the postoperative AOFAS score was 92.8 ± 4.7 points ($P < .01$) (Table 1).

All the patients gained full range of motion within 13 weeks after surgery. There were no significant postoperative complications. All the patients returned to the preinjury activity level by 3 months after surgery. Postoperative x-ray showed the successful removal of both the anterior osteophytes and the os trigonum (Figure 3). No recurrence was found.

Discussion

Traction techniques in ankle arthroscopy have been applied to increase the joint space and to improve the operating visual fields.[2,3,6-8,11,18] However, studies have shown that traction technology, especially invasive traction, accounted for 8% to 17% of the postoperative complications with an average of 10.7%.[10] The non-traction method, which improved the operating space by ankle dorsiflexion, reduced the complication rate to only 3.4%.[15] In the current study, the entire surgical procedure was done without traction. The ankle could be passively moved, and thus impingement could be observed dynamically.

In the treatment of anterior ankle lesions, anterior ankle arthroscopy was preferentially performed in the supine position and through the standard anterolateral and the anteromedial portals without traction. Compared to the traction technique, dorsiflexion helped improve the view by increasing the operative space and also effectively reduced the risk of damage to the neurovascular bundles.[16]

Figure 3. Preoperative and postoperative radiographs. (Left) Preoperative radiograph showed osteophytes on both the anterior edge of the distal tibia and os trigonum located posteriorly. (Right) Postoperative radiograph showed the anterior osteophytes and os trigonum were successfully removed.

For the posterior ankle lesions, Guhl et al[6] used external fixation with an articular retractor, inserting the small diameter (2.7 mm) scope from front to back into the posterior joint cavity. By establishing the posterior portal, they could inspect of the posterior ankle. However, the disadvantage of this technique was that since the external retractor fixed the joint in position, it was hard to evaluate the posterior ankle joint dynamically during surgery. In addition, only a small amount of joint inflow was possible, which often caused poor visualization. For better visualization during posterior ankle arthroscopy, the well accepted technique is in the prone position with 2 standard posterior portals.[13,14,17]

Moreover, for the lesions on both the anterior and posterior ankle joint, even greater trouble can be encountered. In the study of Van Dijk et al,[12] they used the supine position to perform the anterior arthroscopy and then converted to a prone position for the posterior ankle arthroscopy. However, with this technique, patients must be prepped twice, with greater risks of intraoperative contamination. In the present study, a second prep was not required during surgery and the patients were quickly switched to the supine position for the anterior ankle arthroscopy. This rapid switching position saved operative time and reduced the risk of wound infections. Only 1 disinfected wood brick was required to elevate the ankle to increase operating space. It was also necessary to remove a portion of the operating table while switching the patient from the lateral position into the supine position in order to facilitate the change in position. Patients were in a semi-recumbent position and then changed into the traditional supine position with external rotation of the hip.

A previous study reported on posterior ankle arthroscopy through 2 portals conducted in the supine position.[1] Although this technique did not require switching the position intraoperatively, the unconventional posterior portals required the surgeons to be trained to become accustomed to the direction of the posterior structures of the ankle. By using our technique, the standard portals were all established during both posterior and anterior ankle arthroscopy, in which the traditional method of arthroscopic examination could be used to assess the situation of different intra-articular structures. Moreover, only little adaptive practice was required for the surgeon. However, this rapid switching position technique was first performed in the lateral position for the posterior arthroscopy, which does present a different perspective from the conventional technique in the prone position.

Conclusion

A new non-traction technique in the rapid switching position was described in this study for combined posterior and anterior ankle arthroscopy for treating combined posterior and anterior ankle impingement syndrome, which was found to be an effective method with high reproducibility. Clinical outcomes showed a significant improvement of AOFAS scores without postoperative complications.

Declaration of Conflicting Interests

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