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Original Article

Hindfoot arthroscopy management of flexor hallucis longus tenosynovitis: 24-month outcomes

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Abstract

Objective: We present a series of patients with flexor hallucis longus tenosynovitis submitted to hindfoot endoscopy, describing clinical outcomes and reporting surgical findings and complications seen throughout the treatment.

Methods: Thirty-one patients diagnosed with flexor hallucis longus tenosynovitis submitted to posterior ankle endoscopy were followed. The mean follow-up was 24 months. Patients were classified according to American Orthopaedic Foot and Ankle Society (AOFAS) and Visual Analogue Scale (VAS) scores. Patient satisfaction was measured.

Results: The mean age of patients was 35.13 (± 10.68) years. The VAS score improved from 7.16 preoperatively to 2.16 in postoperative follow-up. The AOFAS score improved from 76.39 (± 5.06) preoperatively to 97.10 (± 3.78) in postoperative follow-up. Patients were able to return to sports activities at the same level as before surgery by a mean of 4.6 (± 1.27) months. One of our patients developed a complication of wound erythema in a portal, which resolved without additional treatment.

Conclusion: The diagnosis of flexor hallucis longus tenosynovitis is commonly associated with a large Stieda process or os trigonum impingement, limiting participation in sports activities. In our series, the endoscopic procedure showed good results in treating this condition, promoting a swift return to sports activities. Patients further presented a good postoperative recovery with few complications.

Level of Evidence IV; Therapeutics Studies; Cases Series.

Keywords: Arthroscopy/methods; Tenosynovitis; Treatment outcome.

Introduction

Conflict between bony and capsular ligament structures in the posterior aspect of the ankle can often lead to chronic pain, worsened by overuse in repetitive plantar flexion movements[1,2]. A Stieda process or an os trigonum may cause this impingement, which can also be due to edema of the flexor hallucis longus (FHL). In most cases, posterior impingement affects patients who perform repetitive and forceful plantar flexion, such as dancers, football players, gymnasts, and runners[3,4].

Os trigonum is present in 3% to 15% of patients with posterior ankle pain. Though plain radiographs are useful in the diagnosis of posterior ankle impingement, plain magnetic resonance imaging (MRI) is the most useful non-invasive diagnostic tool[5], as it detects fluid in the FHL tendon sheath, partial ruptures or adjacent inflammatory processes[6].

Conservative treatment is the first line of attack, with a success rate between 13% and 64%[7,8]. Open surgical techniques can be beneficial for treating the impingement in cases where conservative treatment is unsuccessful, or there is a pathology recurrence[9,10]. Endoscopic treatment is sought by athletes seeking shorter recovery times and maximal improvement as an alternative to open surgery procedures. It has also shown a lower incidence of complications making it appealing to surgeons[11-14].

The purpose of this study is to report the outcomes of posterior endoscopy of the ankle in a series of 31 patients with FHL tenosynovitis. We report functional results similar to those previously reported in the literature with open techniques[1] offering a quick return to sports activities and a low complication rate.

Study performed at the Hospital Medica Sur, Ciudad de Mexico, Mexico.

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Methods

This is a retrospective, observational, case-series study. Medical records of 31 patients submitted to posterior endoscopy of the ankle between 2014 and 2017 due to a diagnosis of FHL tenosynovitis were reviewed.

All patients had a preoperative evaluation. During this evaluation, pain in the medial retromalleolar region was reported by 96.8% of our patients. Pain increased when ankle plantar flexion was sustained and flexion of the hallux was performed. The following auxiliary tools corroborated the pathology: a plain radiograph with or without a Stieda process or an os trigonum, an MRI showing signs of FHL tenosynovitis, presence of Stieda process or os trigonum, or synovial hypertrophy. All patients received medical treatment for at least three months before surgery, which consisted of physical therapy, reduction of sports activities, and a course of non-steroidal anti-inflammatories. All medical records in our series had at least a preoperative and a postoperative evaluation at 24 months from surgery. We did not include medical records of patients who did not complete the follow-up period or had a history of previous ankle surgery. The evaluation was based on functional scales and patient satisfaction. All medical records included an American Orthopaedic Foot and Ankle Society (AOFAS)[15] score, a satisfaction score using the Likert scale[16], and a pain score using the Visual Analogue Scale (VAS) for each patient. The AOFAS score consisted of excellent result (100-91 points), good result (90-81 points), regular result (80-61 points), and bad result (<60 points).

Surgical Technique

The procedure was performed with antibiotic prophylaxis under regional anesthesia and ischemia. Patients were placed in ventral decubitus position, assuring ankle mobility (Figure 1A).

Endoscopy portals and procedures popularized by van Dijk[17] were followed (Figure 1B). All surgeries were performed using a 4.0 mm arthroscope and conventional arthroscopic instruments. The scope was introduced through the lateral portal and the shaver, through the medial portal.

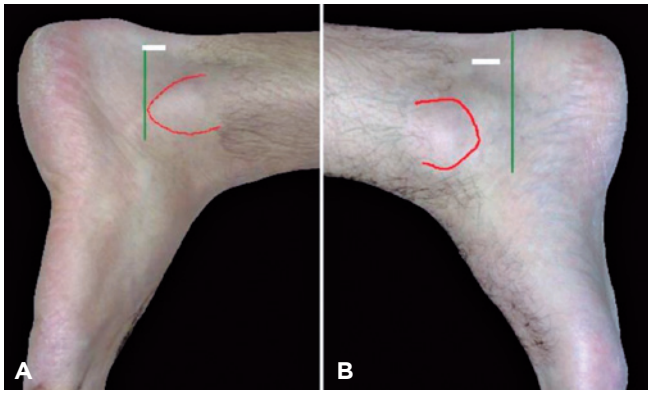

Figure 1. Portals. A) Lateral view. B) Medial view.

The first step of the surgery was to identify the FHL and ensure that it moved freely by flexing and extending the hallux. If a posterior process or an os trigonum was thought to cause the impingement, it was removed. Where the impingement was caused by an inferior muscular insertion of the FHL, the exceeding muscle was removed with radiofrequency (Figure 2A-C). Once these procedures were completed, it was checked again for any conflict by moving the ankle and the hallux.

Postoperative Care

Immobilization was ensured during the early postoperative phase with controlled ankle movement (CAM) walker boots, with immediate weight bearing for ten days. After immobilization, a rehabilitation program was assigned to patients for six weeks to restore mobility, reinforce muscle strength, and improve the ankle range of motion. Patients were advised to return to sports training around the seventh week after surgery.

Statistical Analysis

Statistical analysis was performed using the SPSS software version 19 (IBM corp released 2010 IBM SPSS Statistics for windows version 19.0 Armonk, NY : IBM Corp.). Descriptive analysis was performed using measures of dispersion and central tendency for continuous variables and frequencies for categorical variables. Difference between means of continuous variables was measured with paired student t-test. The statistical significance level was set at <0.05.

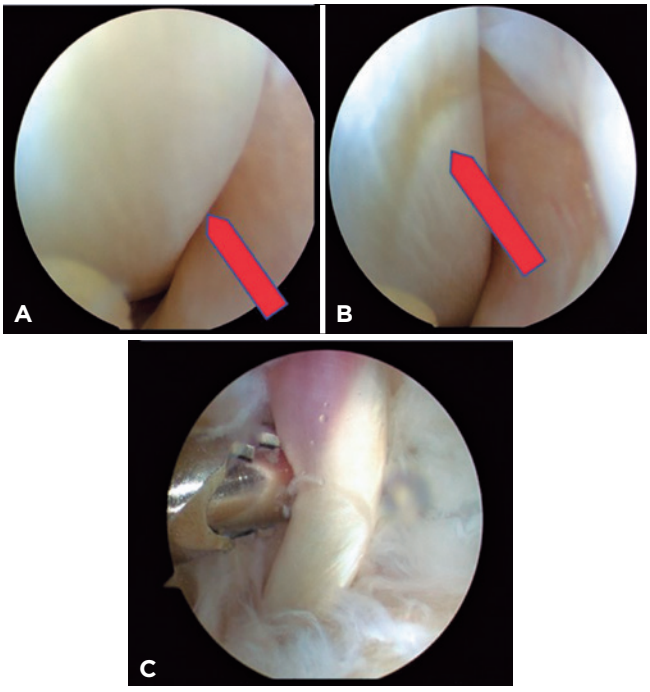

Figure 2. Surgical findings. A) Bony conflict. B) Stenosing FHL. C) Low muscle insertion.

Results

The study included 31 patients with a mean age of 35.13 years. The mean follow-up was 24 months after surgery.

The competitive, leisure, active, and sedentary (CLAS) level was used to determine the sports activity level of our patients (Table 1). Out of 23 patients who practiced sports, 19 returned to some level of sports activities by the seventh week after surgery. After surgery, all patients returned to regular sports activities with a mean of 4.5 months (± 1.27).

Preoperatively, 96.8% of the patients presented pain posterior to the medial malleolus, and 24 (77.4%) presented a positive FHL sign. The AOFAS and VAS pain scales were used to evaluate function and pain preoperatively and postoperatively; preoperative and final follow-up results are shown in Table 2. The Mann-Whitney test was performed on these values and a statistical difference (p<0.001) was found between the preoperative evaluation and the final evaluation in the VAS pain score and the AOFAS scores.

Surgical findings were reported as follows: 20 cases with FHL tenosynovitis, 20 cases with an os trigonum, six cases with fibrotic bands in the posterior medial region mainly five cases with low insertion of the muscle, and three cases with a hypertrophic talar process (Stieda process).

Osteochondral lesions were found in all patients. Lesions were classified according to the Outerbridge classification (Table 3): Grade I in 24 cases (77.4%), Grade II in six cases (19.4%), and Grade III in one case (3.2%).

Table 1. Baseline characteristics of patients undergoing posterior ankle endoscopy

	n	%
Age		
<35.1	15	48.39
>35.1	16	51.61
Sex		
Male	21	67.74
Female	10	32.26
CLAS		
C: Competition	10	32.26
L: Leisure	11	35.49
A: Active	2	6.45
S: Sedentary	8	25.8
Comorbidities		
No	22	70.97
Systemic	2	6.45
Musculoskeletal	7	22.58

Table 2. Difference in the AOFAS and VAS pain score pre-and post-posterior ankle endoscopy

	Preoperative	Final follow-up	t-value	p-value
AOFAS	76.38 ± 5.29	97.09 ± 3.96	5.65	<0.00001
VAS	7.16 ± 3.53	2.16 ± 2.46	4.97	<0.00001

By the final follow-up, 81.9% of the patients ranked their satisfaction with the procedure as very good or excellent.

No complications were observed in 30 patients (96.8%); one case (3.2%) presented erythema surrounding the wounds, which healed before the second week without further medical intervention.

Discussion

The presence of an os trigonum is a potential factor for developing pain in the posterior and posterior-lateral ankle region. This is more relevant in patients who practice sports where a repetitive plantar flexion is performed.

Good results have been reported in open surgical techniques to treat posterior ankle pain, like in Abramowitz et al.[18], who report an improvement from 51.7 to 87.6 points in the AOFAS scale, but report a complication rate of 24%.

This series shows an improvement in the AOFAS functional scale from 76.38 points preoperatively to 97.09 points at the last follow-up. The results are consistent with other reports of endoscopic techniques in the literature. In addition, a good improvement in the AOFAS scale, a high personal satisfaction rate after surgery, and a low percentage of reported complications[5,11,15,19].

Lopez Valerio[20] analyzed VAS pain scores in 20 professional football players and reported an improvement from 7.5 points preoperatively to 0.8 points postoperatively. In his report, the mean time to return to sports activity was 46.7 days. The VAS pain scale improved in our series from 7.16 points preoperatively to 2.16 points in the last follow-up. In this study, the mean time to return to sports activity was seven weeks, which is compatible with that reported by Ahn et al.[10] and López Valerio[20].

In a series of 189 cases with posterior endoscopic treatment, Nickisch et al.[12] reported a complication rate of 8.5%, mainly due to sural nerve dysesthesia, complex regional pain syndrome, Achilles tendon tightness, and infection of a cyst in the portal.

Table 3. Surgical findings in patients submitted to posterior ankle endoscopy

	n	%
Soft tissue		
Tenosynovitis	20	64.51
Fibrosis	6	19.35
Low muscular insertion	5	16.13
Bone		
Os trigonum	20	64.51
Free body	2	6.45
Chondral lesion		
Grade I	24	77.4
Grade II	6	19.4
Grade II	1	3.2
Grade IV	0	0

In other series of endoscopic procedures, a complication rate of 5% to 8.6% has been reported[11,13,14,19,21], while a 10% to 24% complication rate has been reported in open surgery series. In these series, the most commonly reported complications are: retractile scare, sural nerve dysesthesia, infection, complex regional pain syndrome, fibrosis, and Achilles tendon tightness[6,9,22]. In this series, only one patient had a complication (erythema at the site of a portal) that did not require additional treatment. No sural nerve lesions or other wound complications were found.

The limitations of this case series are the small sample and the lack of control cases. The strength of this case series is the 24-month follow-up. The retrospective, observational methodology allowed us to evaluate the extent of recovery over time and assess its continuity.

Conclusion

Posterior endoscopy of the ankle through the posterior classical portals is a safe and reproducible procedure. It provides adequate visualization of structures to enable the surgeon to treat lesions completely. This endoscopic procedure offers reduced complications compared to open surgery.

In this case series, the time to return to previous sports activity was 4.5 months after surgery. We believe that endoscopic treatment of posterior ankle impingement offers adequate solutions to patients, especially the active ones seeking reduced recovery times.

Authors' contributions: Each author contributed individually and significantly to the development of this article: ACA *(https://orcid.org/0000-0002-6129-954X) Conceived and planned the activities that led to the study, participated in the review process, bibliographic review, formatting of the article; ACKM *(https://orcid.org/0000-0003-2457-9654) Participated in the review process, data collection, statistical analysis, bibliographic review, formatting of the article. All authors read and approved the final manuscript. *ORCID (Open Researcher and Contributor ID).

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