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Original Article

Insertional Achilles tendinopathy: evaluation of postoperative outcomes

Lucas Cândido Honório[1], Mariana Alcantara Roldi de Azeredo[1], Joaquim Maluf Neto[1]

1. Conjunto Hospitalar do Mandaqui, São Paulo, SP, Brazil.

Abstract

Objective: Retrospectively analyze surgical procedures performed on patients with insertional Achilles (calcaneal tendon) tendinopathy, focusing on outcomes and the impact on the patients' functional quality.

Methods: A descriptive, retrospective, case series study drawn up by collecting data directly from the patients' medical records. For the functional analysis of patients, we used the questionnaire of the adapted American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Scale (AOFAS). An assessment was carried out on each of the patients who underwent surgery at our hospital from 2010 to 2019, using the surgical technique described in this article, i.e., resection of the affected portion of the tendon with its subsequent reinsertion.

Results: All surgical patients achieved an improvement in their AOFAS score and in pain levels, with good functional performance only three months into the postoperative period, from 50.1 to 83.75 ($p<0.001$).

Conclusion: The use of the technique proved very effective, particularly in terms of the maintenance of foot function and important improvement in pain levels, thus producing a relevant increase in function among patients.

Level of Evidence IV; Therapeutic Study; Case Series.

Keywords: Calcaneal tendon/pathology; Tendinopathy/surgery; Calcaneus.

Introduction

The calcaneal tendon is the strongest and most resistant tendon in humans[1]. It is formed by the junction of the soleus and gastrocnemius muscles, and measures approximately 15 to 17cm in length, with its insertion in the posterior calcaneal tuberosity[1]. The exact cause of tendon degeneration with or without the presence of posterior calcaneal exostosis is unknown, but is associated with repetitive use of the tendon and metabolic disorders (gout, diabetes, obesity)[2].

The complaint reported is pain in the distal insertion of the calcaneal tendon, usually with edema, local swelling, pain on palpation, and especially pain when walking or playing sports. The presence of a posterior bone exostosis (Haglund's deformity) is a common occurrence. The diagnosis is eminently clinical, and imaging tests, X-rays and MRI scans, are routinely requested only in cases refractory to clinical treatment and with indication for surgical treatment[2].

Several surgical techniques can be found in the literature. In our department, we prefer the technique consisting of distal resection of the calcaneal tendon, posterior exostectomy (when Haglund's deformity is present), lengthening of the myotendinous junction, using a modified Vulpius procedure[3], and reinsertion of the distal stump in the posterior calcaneal tuberosity after debridement of all soft tissue around the posterolateral and medial aspect of the calcaneus, using two 5mm anchors for reinsertion of the healthy stump of the calcaneal tendon[4].

Study performed at the Conjunto Hospitalar do Mandaqui, São Paulo, SP, Brazil.

Correspondence: Lucas Cândido Honório. 453 Almirante Protógenes St., Jardim Santo André, Santo André, SP, Brazil, Zip Code: 09090-760. **E-mail:** lucaschonorio@gmail.com. **Conflicts of interest:** none. **Source of funding:** none. **Date received:** November 15, 2019. **Date accepted:** April 01, 2020. **Online:** April 30, 2020.

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This study was conducted with the aim of evaluating the effectiveness of the technique employed in the department.

Methods

This study was approved by the Institutional Review Board and registered on the Plataforma Brazil database under CAAE (Ethics Evaluation Submission Certificate) number: 29089020.6.0000.5551.

The patients in this study routinely underwent at least three months and at most six months of conservative treatment before surgical treatment was indicated. The conservative treatment protocol in our department consists of the use of non-hormonal anti-inflammatory drugs (where not contraindicated), use of shoes with a 2.5cm-3cm heel, with a soft heel pad, cessation of intense physical activity, avoidance of pressure or direct trauma to the calcaneus, and physical therapy (US, TENS, stretching exercises) (Figure 1).

The patients were all asked questions before and after the physical therapy treatment. Those who maintained complaints of pain and inability to engage in everyday and sports activities were referred for surgical treatment.

Twenty feet were assessed in 19 patients with a clinical diagnosis of insertional Achilles tendinopathy, confirmed by nuclear magnetic resonance. They had previously received at least three months and at most six months of clinical treatment, and had been operated on between 2010 and 2019, by the same surgeon. We assessed patients both preoperatively using the adapted AOFAS scale (Table 1), and 90 days postoperatively, in addition to mean age, laterality, prevalence of sex, comorbidities, average time of symptoms before surgery, and complications. All patients who had undergone prior surgery or had previously ruptured their calcaneal tendon were excluded.

The surgical technique started with the patient in prone position, applying a tourniquet at the top of the thigh, making a medial incision to the calcaneal tendon with inverted "L" extension (Figure 2) and a 4-cm accessory longitudinal incision at the myotendinous transition. In the proximal route, the small saphenous vein and the sural nerve are moved aside to perform a Vulpius-type inverted "V" cut to increase the length of the calcaneal tendon.

A distal portion of 3 or 4cm of the calcaneal tendon is surgically removed (observing the injured length, assessed

Figure 1. Stretching of the calcaneal tendon affected (right).

Table 1. Score according to AOFAS criteria

PAIN: 40 points	
None	40 points
Mild, occasional	30 points
Moderate, daily	20 points
Severe, always present	0 points
FUNCTION: 45 points	
A. Activity	
No limitations, no support	15 points
Limited recreational activities, does not use cane	7 points
Limited recreational activities, uses cane	4 points
Severe limitation, uses walker, crutches	0 points
B. Shoe	
Conventional, without insole	5 points
Comfortable, with insole	3 points
Modified or orthesis	0 points
C. Metatarsophalangeal joint mobility	
Normal or mild restriction (≥75º)	10 points
Moderate restriction (30-74º)	5 points
Severe restriction (<30º)	0 points
D. Interphalangeal joint mobility (plantar flexion)	
No restriction	5 points
Severe restriction	0 points
E. Metatarsophalangeal joint stability	
Stable	5 points
Unstable	0 points
F. Metatarsophalangeal Callosity	
Absent or present and asymptomatic	5 points
Present and symptomatic	0 points
ALIGNMENT: 15 points	
Good, Hallux well aligned	15 points
Fair, some degree of malalignment, asymptomatic	8 points
Poor, severe malalignment, symptomatic	0 points
Overall TOTAL	**100 points**

through MRI observation), including its insertion in the distal calcaneus. All the soft tissue in the posterolateral and medial region of the calcaneus must be thoroughly cleaned, and the site cauterized (Figure 3).

An important step is the cleaning of the posterior calcaneal tuberosity, removing bony excrescences (Figure 4), (only as necessary), leaving the proximal stump reinsertion site open. This step is followed by the insertion of two parallel 5.0 millimeter anchors with a 45 degree inclination (south Texan fence line type). Sutures are inserted in the medial and lateral region of the distal stump of the tendon, using the Krackow technique, with the foot at 15 degrees of plantar flexion (Figures 5 and 6). We finished by cleaning the wound with saline solution, closing it with separate stitches and placing a plaster cast on the equinus described.

The average length of stay for all patients was 24 hours. The stitches were removed after an average of 21 days. During this phase we remove the plaster cast and fitted the patient with an AFO boot. The patient was not allowed to bear weight on the foot until the 30th postoperative day, when we started weight-bearing with crutches until the 45th - 50th postoperative day. During this phase, we removed the orthosis and started physiotherapy (mobility exercises, gait training without crutches, proprioception exercises and gentle stretching). After 15 sessions on average (around the 60th postoperative day), patients were already walking relatively normally without the use of an orthesis.

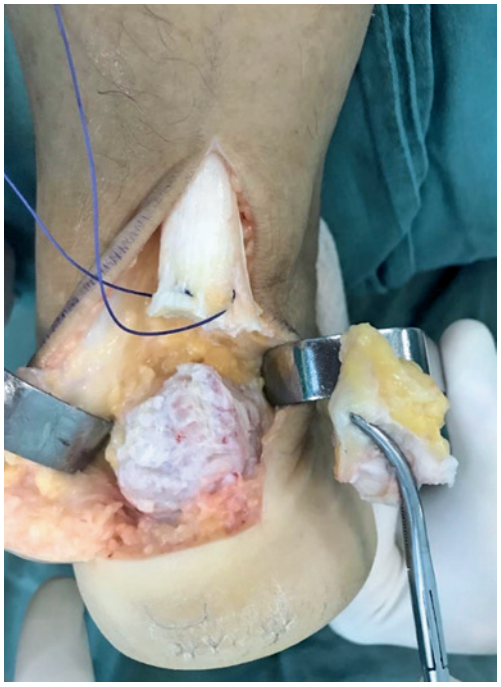

Figure 3. Exeresis of 3 or 4cm distal portion of the calcaneal tendon, including its insertion into the distal calcaneus, and cleaning of all surrounding tendon tissue.

Figure 2. Medial incision in the calcaneal tendon with inverted "j" extension, 4cm accessory longitudinal incision.

Figure 4. Cleaning the posterior calcaneal tuberosity, removing bone excrescences (only as necessary).

Figure 5. Reinsertion of the Calcaneal Tendon after medial and lateral "Krackow" suturing, done firmly and with the foot at maximum plantar flexion of 15 degrees.

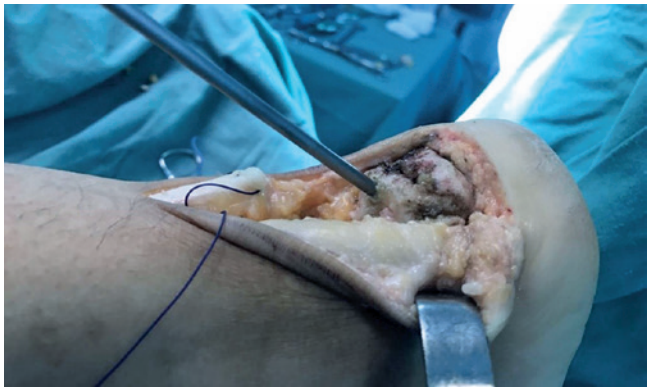

Figure 6. Insertion of two parallel 5.0 millimeter anchors with 45 degree inclination (south Texan fence line).

Normal distribution of the data collected was obtained by descriptive statistics for the pre and postoperative period, and the Student's t test was applied, yielding a p-value of <0.001 (Table 2).

Table 2. Descriptive statistics of the AOFAS results in the pre and postoperative periods

Mean	50.15	83.75
Median	53	80
SD	14.47421	10.24374

Results

We assessed 20 feet of patients who had undergone surgery (Table 3), 35% of whom were male and 65% female. The mean age was 56 years (ranging from 38 to 73 years). The average time of pain and disability before the indication for surgical treatment was 24 months; the right side was affected in 60% and the left side in 40% of the patients. Of the 20 feet, only one did not have shortening of the calcaneal tendon (5%) measured by the Silfverskiöld test preoperatively. The mean AOFAS score adapted in the preoperative period was 50.15, ranging from 14 to 70, and the postoperative score was 83.75, ranging from 68 to 100 (P<0.001). Of the 20 feet, 8 (40%) had Haglund's deformity. As regards comorbidities, the most common were diabetes (20%), rheumatoid arthritis (5%), and SAH (5%). Of the 19 patients, seven were smokers (35%). The minimum follow-up was eight months and the maximum follow-up nine years, averaging 5.6 years. All of the patients who engaged in some form of sport resumed their normal activities seven months after surgery.

Regarding complications, there were five cases of superficial suture dehiscence (25%), three of which were in the distal incision and two in the proximal incision. All were resolved with outpatient debridement and dressing changes. We did not observe any deep infections or tendon re-ruptures.

Discussion

Insertional Achilles tendinopathy is quite common and difficult to resolve with conservative treatment. It causes significant disability across a very wide range of age groups[3]. Frequently seen in foot and ankle outpatient clinics, it behaves like a severe disability, and is common in female patients, who can no longer wear ordinary women's shoes[4].

Comparing our work with the literature, we noticed that few studies took into account the very common comorbidities in this type of problem, and did not apply the Silfverskiöld test, which assesses the shortening of the gastrocnemius/soleus complex, a frequent finding in patients with insertional tendinopathy (95% of our cases). Our preoperative assessment had a much lower AOFAS score than the mean score found in the literature studied (50.1 versus 56.4), which partly explains why our final score was below the mean recorded in the literature (83.75 versus 90.0), as our patients were potentially more severe cases who had been disabled for longer[5-11].

Another factor that contributed to our lower improvement score is that we assessed our patients at 3 months postoperatively, while all the others[5-11] were assessed at 24.4 months on average. Nonetheless, the improvement achieved with surgical treatment was significant from 50.1 to 83.75 (p<0.001). In the study by Ahn et al. (2015)[10], the mean age of the patients undergoing surgery was 33.1 years, which influences the final result obtained. Our mean age was 56 years, consistent with other studies.

Our postoperative recovery time was compatible with the literature (around 60 days)[7,9-11], with the exception of the article by Rigby et al.[9], 2013, who achieved partial weight-bearing just 10 days postoperatively.

Table 3. Results of the study

Name	Sex	Number	Age	Side	Stage	Duration of preoperative pain	Surgery	Complication + Risk Factor	Date of surgery	Pre AOFAS	Post AOFAS
CRPAS	M	909060	58	R	III	14 months	Resection + Vulpius	Shortening	07/07/2010	70	96
VLPO	F	99353	54	L	III	24 months	Resection + Vulpius	Shortening	24/05/2010	58	81
AIRDSDR	F	11548	45	L	III	12 months	Resection + Vulpius	Shortening	08/11/2011	51	79
SC	M	104421	49	R	III	19 months	Resection + Vulpius	Shortening	02/08/2011	46	77
SCR	F	60786	53	R	III	14 months	Resection + Vulpius	Shortening + HAGLUND	12/04/2011	46	77
PAC	F	38529	38	R	III	09 months	Resection + Vulpius	NO	18/05/2011	67	100
AAD	M	64866	44	L	III	08 months	Resection + Vulpius	Shortening + HAGLUND	21/03/2011	70	100
ALF	M	103349	61	R	III	36 months	Resection + Vulpius	Shortening	11/03/2011	33	75
MDLGR	F	18171	65	R + L	III	48 months	Resection + Vulpius	Shortening	02/03/2010 (L) 04/05/2012 (R)	46(L) 46(R)	77(L) 77(R)
YPC	F	113201	74	L	III	32 months	Resection + Vulpius	Shortening + HAGLUND	07/10/2013	30	75
CCC	F	91949	62	L	III	18 months	Resection + Vulpius	Shortening + HAGLUND	27/05/2014	58	85
MRG	F	119449	73	R	III	48 months	Resection + Vulpius	Shortening + DIABETES	24/02/2015	58	97
ITL	F	122900	65	L	III	36 months	Resection + Vulpius	Shortening + DIABETES	01/02/2016	30	75
CRSDR	F	102114	68	L	III	36 months	Resection + Vulpius	Shortening + HAGLUND + DIABETES + RA	12/04/2016	14	68
RRL	F	125193	47	R	III	12 months	Resection + Vulpius	Shortening	19/12/2016	55	86
SZ	F	127141	67	R	III	18 months	Resection + Vulpius	Shortening	31/01/2017	50	72
RBB	M	68959	61	R	III	18 months	Resection + Vulpius	Shortening + HAGLUND + DIABETES	03/04/2017	55	86
GBDS	M	136423	43	R	III	24 months	Resection + Vulpius	Shortening + HAGLUND	08/04/2019	60	96
EBM	M	122965	43	R	III	10 months	Resection + Vulpius	Shortening + HAGLUND	08/05/2019	60	96

Our surgical approach enables us to correct the shortening of the gastrocnemius/soleus complex, which is not mentioned in other works. Another noteworthy difference is seen in the technique used, in which the diseased segment of the Achilles tendon is removed. This is evident when we analyze the magnetic resonance images and is confirmed by anatomic pathology in all patients who underwent surgery in our series.

Complications were superficial suture dehiscence in five cases, treated on an outpatient basis, a fact similar to the literature studied. There were no tendon reinsertion ruptures in our cases.

Conclusion

The surgical technique requires little material and had excellent results based on the AOFAS score, when compared to the literature. Although there was superficial dehiscence of the wounds in five of 20 patients who underwent surgery, all were successfully treated on an outpatient basis without sequelae. The technique proved to be a good treatment option for insertional Achilles tendinopathy.

Authors' contributions: Each author contributed individually and significantly to the development of this article: LCH *(https://orcid.org/0000-0002-3912-2385) performed the surgeries, wrote the article, conceived and planned the activities that led to the study, participated in the review process, approved the final version; MARA *(https://orcid.org/0000-0002-2826-170X) performed the surgeries, participated in the review process, approved the final version; JMN *(https://orcid.org/0000-0003-2007-2557) performed the surgeries, interpreted the results of the study, conceived and planned the activities that led to the study, participated in the review process, approved the final version. *ORCID (Open Researcher and Contributor ID).

References

1. Paavola M, Kannus P, Järvinen TAH, Khan K, Józsa L, Järvinen M. Achilles tendinopathy. J Bone Joint Surg Am. 2002;84(11):2062-76.
2. Kvist MH, Lehto MU, Jozsa L, Järvinen M, Kvist HT. Chronic achilles paratenonitis. An immunohistologic study of fibronectin and fibrinogen. Am J Sports Med. 1988;16(6):616–23.
3. Javors JR, Klaaren HE. The Vulpius procedure for correction of equinus deformity in cerebral palsy. J Pediatr Orthop. 1987; 7(2):191–3.
4. Barbosa RC, Borba VC, Gondim BF, Martins JS, Costa EN. Peroneus brevis tendon transfer with the use of an interference screw in Achilles tendon injuries: a functional evaluation. Sci J Foot Ankle. 2018;12(2):79-83.
5. Xia Z, Yew AKS, Zhang TK, Su HCD, Ng YCS, Rikhraj IS. Surgical correction of Haglund's triad using a central tendon-splitting approach: a retrospective outcomes study. J Foot Ankle Surg. 2017;56(6):1132–8.
6. Boffeli TJ, Peterson MC. The Keck and Kelly wedge calcaneal osteotomy for Haglund's deformity: a technique for reproducible results. J Foot Ankle Surg. 2012;51(3):398–401.
7. Pansin JV, Guizzo J. Surgical treatment of tendinopathy achilles tendon. Rev ABTPé. 2011; 5(2):53-62.
8. Witt BL1, Hyer CF. Achilles tendon reattachment after surgical treatment of insertional tendinosis using the suture bridge technique: a case series. J Foot Ankle Surg. 2012;51(4):487-93.
9. Rigby RB, Cottom JM, Vora A. Early weightbearing using Achilles suture bridge technique for insertional Achilles tendinosis: a review of 43 patients. J Foot Ankle Surg. 2013;52(5):575-9.
10. Ahn JH, Ahn CY, Byun CH, Kim YC. Operative treatment of Haglund syndrome with central Achilles tendon-splitting approach. J Foot Ankle Surg. 2015;54(6):1053-6.
11. Boffeli TJ, Peterson MC. The Keck and Kelly Wedge Calcaneal Osteotomy for Haglund's Deformity: A Technique for Reproducible Results. J Foot Ankle Surg. 2012;51(3):398-401.