Orthopaedics & Traumatology: Surgery & Research xxx (2017) xxx–xxx

Available online at
ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com/en

Original article

Functional outcomes and return to sports after surgical treatment of insertional Achilles tendinopathy: Surgical approach tailored to the degree of tendon involvement

Alexandre Hardy[a,*], Romain Rousseau[a], Samir Issa[a], Antoine Gerometta[a], Hugues Pascal-Moussellard[a], Benjamin Granger[b], Frédéric Khiami[a]

[a] *Service de chirurgie orthopédique et traumatologie du sport, CHU de La Pitié-Salpêtrière, 47–83, boulevard de l'Hôpital, 75013 Paris, France*
[b] *Département de biostatistique et de santé publique, CHU de La Pitié-Salpêtrière, 47–83, boulevard de l'Hôpital, 75013 Paris, France*

ARTICLE INFO

Article history:
Received 22 March 2017
Accepted 22 May 2018

Keywords:
Achilles
Insertional tendinopathy
Haglund disease
Ankle
Calcaneal tendon

ABSTRACT

Introduction: Insertional Achilles tendinopathy is a generic term that encompasses several types of ailments. While conservative treatment is less effective than for conditions isolated to the tendon body, there is no consensus as to the best type of surgical care.
Hypothesis: Surgical treatment for insertional Achilles tendinopathy that is tailored to the severity of the tendon involvement will lead to satisfactory functional outcomes.
Material and methods: Forty-six patients were included with an average age of 44.1 ± 11.4 years and a mean preoperative AOFAS score of 62.2 ± 11.7. The mean duration of symptoms before the surgery was 33.1 ± 24 months. The inclusion criteria were pain at the tendon insertion and failure of at least 6 months of conservative treatment. Tendon involvement was evaluated preoperatively using MRI and confirmed intraoperatively after debridement. The primary treatment in all patients was resection of the calcaneal abnormality. Depending on the degree of tendon involvement, debridement or detachment/reattachment were also performed. The minimum follow-up was 12 months.
Results: The mean follow-up was 33 ± 13.5 months. None of the patients were lost to follow-up. The mean AOFAS score was 93.7 ± 7.3 at the last follow-up. The ATRS and VISA-A scores were 89.2 ± 4.1 and 89 ± 3.2, respectively. The sports participation level was the same or higher in 71.7% of cases. Increased preoperative passive dorsiflexion was statistically correlated with the degree of tendon involvement.
Conclusion: Surgery for insertional Achilles tendinopathy led to good functional outcomes and satisfactory return to sports when the surgical care was tailored to the sdegree of tendon involvement.
Level of evidence: IV.

1. Introduction

Achilles tendinopathy can be divided into two groups: tendon body lesions and insertional lesions. While insertional tendinopathy seems less common (20 to 25%) [1], it is more likely to require surgical treatment in 53 [2] to 89% of cases [3]. Several surgical techniques have been described and appear to lead to satisfactory outcomes. While there is consensus on the need to resect the posterosuperior tuberosity of the calcaneus (except for Zadek osteotomy), the role of associated treatments is less clear. These may consist of debridement, calcaneal osteotomy, local reinforcement with an autograft or tendon detachment/reattachment [4,5].

Many studies have looked into the correlation between clinical findings and the presence of a posterosuperior calcaneal bone abnormality. Various radiological analyses have described the calcaneal height, Chaveau and Liet angle [6], Fowler-Phillip angle [7], parallel pitch lines [8], Heneghan and Pavlov lines [9] and size of the calcaneal abnormality [10]. But none have found any obvious correlation between the size of this bone abnormality and functional disability. Hence, we decided to focus on analyzing the degree of tendon involvement to tailor our surgical treatment.

We hypothesized that when insertional Achilles tendinopathy surgery is tailored to the severity of the tendon damage, this will lead to good functional outcomes. The primary goal of this study

* Corresponding author.
E-mail address: alexandre.hardy@me.com (A. Hardy).

https://doi.org/10.1016/j.otsr.2018.05.003
1877-0568/

Blazina scale

Stage 0	No Pain
Stage 1	Pain after training, vanishing with rest
Stage 2	Pain during training, vanishing then coming back with rest
Stage 3A	Permanent pain, limiting training
Stage 3B	Daily living pain
Stage 4	Tendon rupture secondary to chronic tendinopathy

Fig. 1. Blazina score description.

was to evaluate the functional outcomes when the surgical technique is tailored specifically to the degree of tendon damage.

2. Patients and methods

2.1. Type of study

This was a single-center, single-surgeon, retrospective study. Patients operated between November 2007 and May 2014 were included and a clinical review performed after a minimum of 12 months postoperative.

2.2. Inclusion criteria

The inclusion criteria were pain at the Achilles tendon insertion, MRI confirming insertional tendinopathy, and failure of at least 6 months [11] of non-surgical treatment consisting of at least 6 weeks rest, non-steroidal anti-inflammatory drugs, shockwave therapy, bracing, deep transverse friction massage, stretching and eccentric strengthening prescribed by a physical therapist. Among the included patients were those who had suffered an acute insertional Achilles tendon rupture complicating a documented case of chronic tendinopathy.

The exclusion criteria were a prior history of surgery on the Achilles tendon and greater than 30° calcaneal slope (best suited to Zadek osteotomy).

2.3. Patients

The 46 included patients had a mean age of 44.1 ± 11.4 years at the time of surgery. The right side was affected in 27 cases (59%) and 40 patients were men (87%). Sports participation was described as intense (> 2x/week) in 26 patients (47.8%), regular (< 2x/week) in 12 patients (26.1%) and occasional (< 1x/month) in 8 patients (17.4%) while 4 patients (8.7%) were sedentary. Among the patients, 26 (56.5%) had a normal BMI, 2 (4.4%) were underweight, 14 (30.4%) were overweight and 4 (8.7%) were obese. All patients had a preoperative MRI, which was evaluated by an independent radiologist to determine the degree of tendon involvement. The mean time between the start of symptoms and the surgical treatment was 33.1 ± 24 months. Pain when standing on the tiptoes of the involved leg was present in 28 patients (62.2%), while 25 patients (54.4%) had pain while running. Six patients (13%) had increased dorsiflexion in the involved leg. The preoperative Blazina score (Fig. 1) was 3A in 11 patients (23.9%) while 35 patients (76.1%) had a score of 3B. The AOFAS score (out of 100) [12] before surgery was 62.2 ± 11.7 [32; 84].

2.4. Surgical technique

The procedure was performed with the patients prone. The surgical approach was planned preoperatively based on the degree of tendon damage. If the condition was isolated or less than 50% of the tendon was involved on MRI, a posteromedial incision was made. If the tendon damage was more extensive, a midline approach was used. Bursectomy then resection of the posterosuperior tuberosity of the calcaneus was performed in every patient. Then, debridement of necrotic tissue, nodules and calcifications in the tendon and any posterior osteophytes was carried out. After the debridement, the patients were separated into three groups based on the appearance of the tendon: no tendon damage, less than 50% of tendon volume damaged, more than 50% of tendon volume damaged.

If the tendon appeared healthy, no additional procedures were performed. If less than 50% of the tendon was damaged, debridement only was performed. If more than 50% of the tendon was damaged, the tendon was detached and reattached in a calcaneal trench. Reattachment was done with transosseous sutures with non-absorbable suture using double loop mattress stitch. If only debridement was done, immediate partial weight bearing was allowed in a walking boot for 6 weeks. When the tendon was detached and reattached, no weight bearing was allowed, and the lower leg was immobilized in 10° plantar flexion. After 6 weeks, this was switched to a walking boot with adjustable plantar flexion to allow the patient to gradually regain their ankle range of motion.

2.5. Analysis methods

After a minimum follow-up of 12 months, the patients were reviewed clinically by a surgeon not involved in the surgical procedure. The functional outcomes consisted of the AOFAS, ATRS (out of 100) [13], VISA-A (out of 100) [14] and Blazina scores (5 stages) [15]. Physical examination was done to determine whether the patient had pain when standing on the toes of the operated leg. The return to sports and presence of pain during sports were determined. The patients were asked to rate the outcome subjectively. The MRI grade of tendon involvement was compared to the intraoperative findings.

Quantitative variables were described by the mean, minimum, maximum and standard deviation. Qualitative variables were described based on the frequency and percentage. The Wilcoxon test was used with quantitative variables and Fisher's exact test with qualitative variables. Significance threshold was set at 0.05. Informed consent was obtained from all patients. This research study complied with the principles of the Helsinki declaration. The Paris VI research ethics board approved the study protocol.

3. Results

The patients were reviewed with a mean follow-up of 33 ± 13.5 months. None of the patients were lost to follow-up. The following surgical treatments were performed: 17 patients (37%) had removal of the posterior impingement with bursectomy, 17 patients (37%) had tendon debridement also, and 12 patients (26%) had their tendon detached and reattached. The AOFAS score did not differ preoperatively based on the degree of tendon involvement. The age, BMI and sports level did not differ preoperatively between these groups. The increase in preoperative dorsiflexion did not differ between groups. The MRI and intraoperative findings are shown in Table 1; the overall agreement was 71.7%.

There were two complications (4.3%): one case of superficial phlebitis and one cyst in the middle of the tendon. These resolved spontaneously or with appropriate treatment.

Table 1
MRI results versus interoperative findings of tendon involvement.

	Intraoperative findings		
MRI results	No detachment	Detachment < 50%	Detachment > 50%
No detachment	13	2	0
Detachment < 50%	4	14	6
Detachment > 50%	0	1	6

Please cite this article in press as: Hardy A, et al. Functional outcomes and return to sports after surgical treatment of insertional Achilles tendinopathy: Surgical approach tailored to the degree of tendon involvement. Orthop Traumatol Surg Res (2017), https://doi.org/10.1016/j.otsr.2018.05.003