



Surgical repair of acute Achilles tendon rupture with an end-to-end tendon suture and tendon flap



B. Corradino*, S. Di Lorenzo, C. Calamia, F. Moschella

Dipartimento di Discipline Chirurgiche, Oncologiche e Stomatologiche, Sez. Chirurgia Plastica, Università di Palermo, Italy

ARTICLE INFO

Article history:
Accepted 2 May 2015

Keywords:
Achilles tendon rupture
Surgical treatment of tendon rupture,
Achilles tendon injury

ABSTRACT

Background: Achilles tendon ruptures are becoming more common. Complications after open or minimally invasive surgery are: recurrent rupture (2–8%), wound breakdown, deep infections, granuloma, and fistulas. The authors expose their experience with a personal technique.

Materials: In 8 patients with acute rupture of Achilles tendon the surgery was performed at least 25 days after trauma. Clinical exam and MR demonstrated in all case a total lesion of tendon. After a posterolateral skin incision the tendon stumps were debrided and suture in end-to-end fashion. A tendon flap was harvested from the proximal part of the tendon, in order to protect and reinforce the suture itself. A plaster cast was applied for 3 weeks and the patients started the rehabilitation protocol.

Results: After 4 months all patients returned to pre-injury daily activities. The mean follow up was 13 months (ranged between 6 and 24 months). No major complications occurred.

Conclusion: The posterolateral skin incision, not above the tendon, preserves the vascularity of the soft tissues, allows identifying and not accidentally injuring the sural nerve, and prevents the cutaneous scar is overlapped the tendon. In this way is favoured physiological tendon sliding.

The preparation of the flap tendon does not weaken the overall strength of the tendon and protects the tendon suture. The tension on sutured stumps is less than being spread over a larger area.

In our sample of 8 patients the absence of short-and long-term complications and the rapid functional recovery after surgery suggest that the technique used is safe and effective.

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Introduction

The Achilles tendon is the strongest tendon in the body. Defects or rupture of the Achilles tendon are most commonly due to trauma and is a common injury in middle-aged athletes [1].

The incidence of acute ruptured Achilles tendon has increased during the past decade reflecting the greater prevalence of people who are involved in sports. Although some authors still prefer the conservative method of treatment, open surgical repair is very common. Controversy still exists as to whether this injury should be treated operatively or non-operatively. Non-operative treatment is associated with an increased rate of tendon re-rupture (rates between 8 and 35%).

Surgical repairs of Achilles tendons have shown a lower rate of re-rupture (1–5%) and superior functional results compared with that after conservative treatment by cast [1–4].

* Corresponding author at: Dipartimento di Discipline Chirurgiche, Oncologiche e Stomatologiche, Sez. Chirurgia Plastica, Università di Palermo, Via del Vespro 127, 90129 Palermo, Italy. Tel.: +39 091 655 4034; fax: +39 091 6553776.

E-mail addresses: bartolo.corradino@unipa.it (B. Corradino), dilsister@libero.it (S. Di Lorenzo).

At present, surgical treatments for the repair of acute Achilles tendon ruptures are: open surgery and minimally invasive technique as percutaneous and endoscopic techniques.

Percutaneous techniques to repair acute traumatic Achilles tendon ruptures are gaining more popularity amongst foot and ankle surgeons. There have however been concerns that this technique carries a risk to sural nerve injury. However the risk of nerve injury persists even with the use of specific devices (as Achillon) [5].

Operative repair of Achilles tendon rupture is often recommended for younger active patients and for athletes. Reported complications of operative repair are superficial or deep wound infections, granuloma, fistula, skin or tendon necrosis, scar adhesions to the underlying tendon, and sural nerve damage [1–7].

The authors report their experience in the surgical treatment of 8 acute Achilles tendon ruptures with excellent functional long-term results. The described technique allowed the repair of Achilles tendon defects up to 5 cm using the proximal part of the tendon (as turn down flap) to reinforce the end-to-end suture of the tendon stumps.



Fig. 1. MR after the trauma showed the Achilles tendon rupture.

Materials and methods

From 2009 to 2013 we treated eight patients with a complete rupture of the Achilles tendon sustained few days previously the surgery during sport activities (almost all). In 3 patients the right Achilles tendon was interested, in 5 the left.

The most common symptom is stabbing pain in the lower calf at the time of injury. Some also report an audible snap. Walking without pain is impossible especially when trying to push off the toe. Swelling occurs. Standing on tiptoe of the injured foot may also be impossible.

In all patients, mean age 36.7 years-old (range 28–54 years), moderate oedema in the posterior ankle and a palpable defect in the Achilles tendon were evident. A Thompson test confirmed a rupture of the Achilles tendon. Confirmation of a rupture of the tendon was performed by a clinical examination and then confirmed by magnetic resonance image (MRI) scans (Fig. 1). The MRI was performed on all patients. MRI evaluation was particularly useful to determine the length of the rupture to be repaired in addition to the severity and exact location of the rupture along the course of the tendon and the location of the tendon stumps.

The tendon gap ranged between 1.8 cm and 3 cm in length (Table 1).

All patients were taken into the operating room for surgical treatment within 25 days after injury (average 19.3 days; range 14–25 days).

A block of sciatic and femoral nerves was delivered using naropine 7% injection (40 ml). The patients were placed into a prone position. A posterolateral approach was used to expose the tendon rupture and to avoid further vascular damage of the skin over the defect. On the skin, the extremities of the tendon were marked. In the majority of cases the site of rupture was 3–3.5 cm above the insertion of the os calcis. The main gap was 2.47 cm.

Surgical technique

A tourniquet was used. A straight skin incision was made, starting from the posterior aspect of the heel up to the middle of the calf, slightly more laterally, in order to preserve the lesser saphenous vein, the sural nerve and the skin blood supply, avoiding scarring over the tendon. In Fig. 2 the steps of the surgery are clearly outlined.

In 6 cases there was a haematoma at the rupture site near the tendon gap.

The surgical approach (Fig. 2) to the ruptured tendon was extended slightly proximally and distally to the margins of the rupture. The Achilles tendon and the lower part of the gastrocnemius were exposed by a curved skin incision. The tendon ends were debrided (Fig. 3a). A tendon strip, as a tendon flap, was harvested from the proximal part of the tendon, according to the method described in literature [4] for the treatment of neglected Achilles tendon rupture (Fig. 3b). A tendon flap approximately 2.0 cm wide and 7–8 cm long was cut from the lateral side of the proximal part of the Achilles tendon, when the tendon-flap was freed, it was turned over to cover the tendon defect (overturned). The base of the flap is placed 3–4 cm above the line of the tendon rupture (Fig. 2).

The tendon stumps were sutured with 2–0 nylon, thread which provides suitable tension with the ankle at the maximum plantar flexed position. Kessler suture was used.

When the tendon had been sutured, the strip of tendon was overturned to cover the suture line in the tendon and was fixed to the proximal and distal stumps with a few interrupted sutures of nylon (Fig. 3c and d).

Finally, the subcutaneous tissue, and the skin were sutured.

Care was taken during the procedure to avoid damage to adjacent neurovascular structures, in particular, the sural nerve. For the first 15 days after surgery, the ankle was immobilized by a plaster cast with the ankle in a 30° plantar flexed position (equines position).

Results

The postoperative management was important. Movement of the knee was encouraged as soon as possible. Two weeks after the

Table 1

Patient age, cause of injury, time between trauma and surgery, the size of the tendon gap identified during the surgical exploration and follow-up.

Age of patient	Side	Cause of injury	Time between injury and surgery (days)	Gap (cm)	Follow-up (months)
36	Right	Fitness	22	2.5	24
32	Left	Misstep	16	1.8	12
48	Left	Climbing stairs	24	2.5	6
54	Left	Workroom	18	2	6
28	Right	Football	14	2	18
29	Right	Volleyball	16	3	16
30	Left	Falling from the top	25	3	12
37	Left	Football	20	3	12
Mean age 36.75			Average time between injury and surgical repair 19.3 days	Mean gap 2.47 cm	Mean follow up 13 months

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