



Early rehabilitation after open repair for patients with a rupture of the Achilles tendon



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ABSTRACT

Purpose: As outdoor activities participation increase, Achilles tendon rupture incidence also tends to increase. There are a number of treatment and rehabilitation options for a ruptured Achilles tendon. However, the optimal rehabilitation protocols are still under debate. The purpose of this study is to determine whether early rehabilitation is more effective than conventional rehabilitation.

Methods: Medical records of 56 patients who had been treated with open repair after a ruptured Achilles tendon were retrospectively reviewed. 24 patients were treated postoperatively with below knee cast immobilization for four weeks, and they started tolerable weight-bearing rehabilitation at four weeks' follow-up. The remaining 32 patients were managed postoperatively with short leg splint immobilization for two weeks and started the tolerable weight-bearing at two weeks' follow-up. We evaluated the patients several times to identify when the single heel raise was possible and measured the American Orthopedic Foot and Ankle Society (AOFAS) scores and Achilles tendon total rupture scores (ATRS) as a functional outcome.

Results: The single heel raise test was positive in all patients at the last assessment. But there were no statistically significant differences between the groups ($p=0.137$). The patients in the Cast group took significantly more time to return to work than did the patients in the Splint group ($p=0.032$). And AOFAS scores and ATRS were slightly higher in the Splint group than in the Cast group. There were statistically significant differences ($p=0.042$, $p=0.028$) between the two groups.

Conclusion: The early rehabilitation did not lead to greater endurance, but it showed better results in the return to work and the Achilles functional score. Early rehabilitation after open repair for patients with a ruptured Achilles tendon is helpful for functional recovery.

Type of study / Level of evidence: Therapeutic, Level III.

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Introduction

The Achilles tendon is one of the strongest tendons in the human body. It experiences the highest loads of any tendon in the body, with tensile loads reaching up to 10 times body weight during sports activities [1]. Ruptured Achilles tendons occur in 6–18 per 100,000 people each year; it is a relatively common injury [2,3] that typically affects 30- to 50-year-old men who play enjoying active sports [2]. As leisure and sports participation increase, Achilles tendon rupture incidence also tends to increase.

The most common mechanism of the Achilles tendon injury is a rapid eccentric contraction of the gastrocnemius and soleus muscles during sports activities. This injury can be but is not necessarily associated with a pre-existing tendinopathy [4,5];

accordingly, the injury can be divided into acute or chronic. Some patients may experience this injury by traumatic lacerations. There are a number of treatment options for a ruptured Achilles tendon depending on whether the injury is acute or chronic and on the injury site. However, the optimal treatments and rehabilitation protocols for Achilles tendon rupture are still under debate [6].

We analyzed the outcomes of early rehabilitation by measuring the first time that single heel raise was possible and the functional scores for patients who underwent same surgery but had different rehabilitation protocols. The purpose of this study is to determine whether early rehabilitation is more effective than conventional rehabilitation with these results.

Material and methods

From March 2011 to March 2015, we retrospectively analyzed 78 patients who had been treated with open repair after a ruptured Achilles tendon; the inclusion criterion was an isolated, primary,

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and acute total rupture of the Achilles tendon; we defined an acute rupture as less than two weeks [7] from injury to operation. We excluded nine patients because of delayed presentation (over two weeks), re-rupture, or previous Achilles tendon surgery, and we also excluded six patients who had partial rupture by traumatic lacerations. Another seven patients had the injury combined with a fractured tibia or a large defect of the Achilles tendon that required tendon lengthening or transfer.

Finally, 22 patients were excluded and 56 patients were included in this study after Institutional Review Board approval (Fig. 1). There were 46 males and 10 females, with a mean age of 39 years (Range; 13–69) and a mean time between injury and surgery of 3.5 days (Range; 0–9).

48 of the 56 patients had injured themselves during activities; such as football, badminton, tennis, gymnastics, and kendo. 7 patients had been injured by falling and one was injured by a piece of broken glass.

Surgical procedure

In all cases, the corresponding author and colleagues performed the surgeries. We approached the ruptured tendon by a posterior longitudinal incision along the medial border of the Achilles tendon in all patients. We continued the dissection into the paratenon, and full-thickness flaps were reflected to expose the ruptured tendon. We used two double-stranded Krackow sutures (Outside by Ethibond and Inside by PDS) to appose the tendon ends and then supplemented these with interrupted Vicryl circumferential sutures. We sutured over the paratenon repair with Vicryl and closed the skin with interrupted fine nylon mattress sutures.

Postoperative management

We divided all patients into two groups according to the postoperative rehabilitation protocols. Of these 56 patients, 24 were treated postoperatively with below knee cast immobilization for four weeks after the surgery, and they started tolerable weight-bearing rehabilitation in a functional brace at four weeks' follow-up. The remaining 32 patients were managed postoperatively with short leg splint immobilization for two weeks and started the tolerable weight-bearing in a functional brace (Fig. 2) at two weeks' follow-up.

Except for the initial immobilization method and period, the residual rehabilitation protocols were the same in the two groups. During the period of maintenance with a cast or splint, the ankle was immobilized in a non-weight-bearing position of natural plantar flexion. After the patients had switched to the functional



Fig. 2. Functional brace after the removal of the cast or splint. Common in both groups.

brace, tolerable weight-bearing and ankle joint motion from full plantar flexion to -20° dorsiflexion were permitted. The dorsiflexion angle of the ankle joint increased 10° per a week, and then the patients started the single leg stance and both the single and double heel raise when it was possible (Table 1).

At postoperative six weeks in the cast group and four weeks in the splint group, the patients were allowed to perform full weight-bearing as tolerated, using crutches and a functional brace. Additionally, the ankle joint was permitted to the full range of motion in addition to the plantar strengthening exercises and distraction exercise of the muscles around the Achilles tendon using a rubber band. As muscle strength was recovered progressively, all patients necessarily started the single leg stance and both the single and double heel raise.

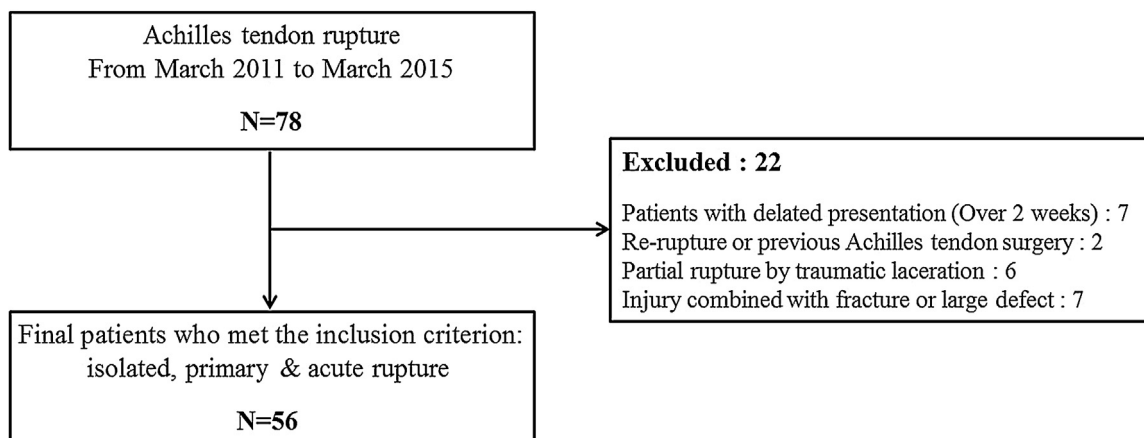


Fig. 1. Flow chart. The progress of patient selection according to our inclusion and exclusion criteria.

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