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Predictors of functional outcome in non-operatively managed Achilles tendon ruptures

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ABSTRACT

Background: Acute Achilles tendon (AT) rupture management remains debatable but non-operative functional regimes are beginning to gain popularity. The aim of this study was to identify predictors of functional outcome in patients with AT ruptures treated non-operatively with an immediate weight bearing functional regime in an orthosis.

Methods: Analysis of prospectively gathered data from a local database of all patients treated non-operatively at our institution with an AT rupture was performed. For inclusion in the study patients required a completed Achilles Tendon Rupture Score (ATRS) at a minimum of 6 months post injury. The ATRS score was correlated against age, gender, time following rupture, duration (8 or 11 weeks) of treatment in a functional orthoses and complications were recorded.

Results: 236 patients of average age 49.5 years were included. The mean ATRS on completion of rehabilitation was 74 points. The mean ATRS was significantly lower in the 37 females (65.8) as compared to the 199 males (75.6) ($p = 0.013$). Age inversely affected ATRS with a Pearsons correlation of −0.2. There was no significant difference in the ATRS score when comparing the two different treatment regime durations. There were 12 episodes of VTE and 4 episodes of re-rupture. The ATRS does not change significantly after 6 months following rupture treatment completion.

Conclusion: Patients with AT ruptures treated non-operatively with a functional rehabilitation regime demonstrate comparable function to other non-surgical regimes with low re-rupture rates. Increasing age and female gender demonstrate inferior functional outcomes.

Clinical relevance: Females and increasing age predict poorer functional outcome in acute Achilles tendon ruptures managed in a dynamic full-weight bearing treatment regime.

1. Introduction

The Achilles tendon (AT) remains the most common tendon ruptured and the incidence of acute ruptures is increasing [1–3]. The management of these injuries continues to create debate with the treatment algorithm beginning with deciding between operative or non-operative treatment methods, albeit with recent trends going away from operative repair for acute primary ruptures [4–6].

There are numerous treatment protocols for the non-operatively managed AT ruptures, each being individualised to surgeon, department or hospital. Studies have previously looked at operative versus non-operative regimes, use of cast immobilisation versus functional orthosis and whether to allow early weight bearing or not [7–11]. Overall no consensus has been reached upon an ideal treatment protocol but recent studies have shown promising results from non-operatively treated AT ruptures with immediate weight bearing with functional rehabilitation regimes [12,13]. Despite this, operative repair still seems to be the treatment of choice in the United States of America and Scandinavia [14].

Multiple studies have shown that non-operative treatment has the benefit of a reduced complication rate due to avoiding operative risks such as skin breakdown, infection and nerve damage [9]. This benefit was offset by earlier documented higher re-rupture rates [9]. However, a recent meta-analysis showed no difference in re-rupture rate between surgery with postoperative functional bracing (5%) and the sub-group of patients treated in non-operative accelerated rehabilitation regimes (8%) [15]. A Cochrane review demonstrated that patients treated with functional bracing fared better with regards to less time off work and quicker return to sporting activities when compared with plaster cast treatment [16]. In addition to this, functional

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treatment with an orthosis is more work and lifestyle compatible [17,18]. Despite the attention upon functional outcomes following most orthopaedic injuries, recent meta-analyses have focused on re-rupture rates and overall complications as primary outcomes rather than the functional results following AT rupture.

The purpose of this study was to identify predictors of functional outcome in AT rupture patients treated non-operatively with an immediate weight bearing functional regime.

2. Methods

A departmental policy was implemented in January 2010 to standardise the treatment of acute AT ruptures at the University Hospitals of Leicester. The VACOped® walking boot orthosis with immediate full weight bearing mobilisation was used. Initially there was caution about immediate weight bearing in an orthosis so a period of 11-weeks of functional mobilisation was used. A prospective database was created and complications were recorded as an audit tool by clinic staff. In February 2011 the departmental policy changed and the period of functional mobilisation was reduced to 8-weeks in line with literature at that time [11,19]. The treatment protocol has remained the same since. Both regimes are described in detail in Table 1. Since January 2010, more than 90% of acute AT ruptures have been treated this way. The remaining 10% of patients were treated operatively as a result of delayed presentation, open injury, patient choice or high performing athletes. An Achilles Tendon Rupture clinic, led by a clinical specialist physiotherapist, has been established in our department since January 2014. This clinic has aimed to collect functional data prospectively to closely monitor progress since January 2014–January 2015.

All patients with a suspected AT rupture were assessed clinically by the Emergency Department or primary care, placed into a dorsal plaster slab with the ankle in equinus and referred to the trauma & orthopaedic fracture clinic. The majority of patients attended for assessment in the fracture clinic within 3 days, with all attending within one week. Clinical assessment was performed in all patients. This included the calf squeeze test, palpation for rupture gap and ability to single leg heel raise. If on clinical assessment, the diagnosis was in doubt, then imaging studies consisting of either a MRI or ultrasound were conducted. Once the diagnosis was confirmed by a member of the orthopaedic team, patients were placed in the functional VACOped® orthosis (Fig. 1) and the treatment regime initiated (Table 1).

Inclusion criteria for the study were primary acute AT ruptures (as defined by the clinical features above), age >18, presentation within 2 weeks of injury, a minimum follow-up of six months, non-operative treatment, completed functional mobilisation in either VACOped® regime and completed ATRS questionnaire. Patients were excluded if they were less than 18 years of age, had a delayed presentation (>2 weeks) prior to initiation of treatment, other injuries in the same limb, poly-trauma, open injury or if they underwent operative repair. The incidence of re-rupture is presented. However, this group of patients was excluded from the functional analysis of the results. Operative repair was performed in patients with a delayed presentation (>2 weeks), open injury, patient choice or a high performing athlete these were also excluded from functional analysis.

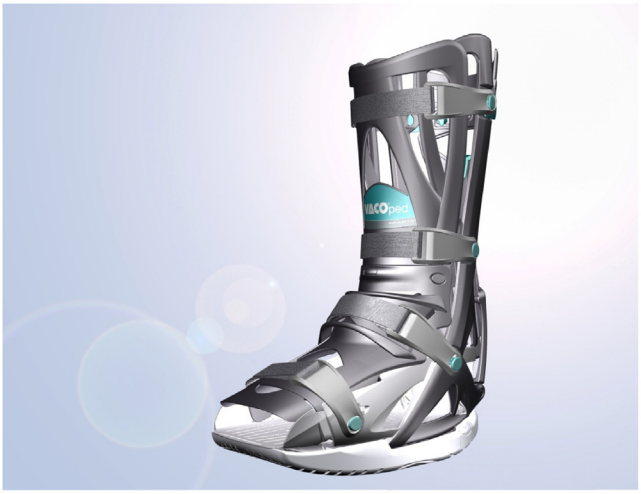

Fig. 1. Picture of the VACOped® boot (Oped Ag Ltd, Germany).

The VACOped® boot (Oped Ag Ltd, Germany) was used as the functional orthosis in all cases (Fig. 1). At each time point on return to the clinic, the boot was removed, skin checks were performed and the liner changed. Boot adjustments were made according to the protocol in place by trained staff. All patients were allowed to fully weight-bear immediately once their orthosis was applied. The VACOped® achieves stability via an inner vacuum cushion that conforms to the shape of the leg by evacuating air, while the external shell provides rigidity. The boot can be locked at a fixed angle (ranging from 0 to 30°) or movements can be permitted within this range.

Following completion of the regime, patients returned for a clinical review and their boot was removed. Clinical assessment of the AT was performed, and if felt clinically intact, the VACOped® was discontinued and patients referred to physiotherapy for strengthening exercises. This was the case for all patients involved.

2.1. Outcome measures

The primary outcome measure was the Achilles Tendon Rupture Score (ATRS). The ATRS is a patient-reported outcome measure developed by Nilsson-Helander et al. in 2007 [20]. It consists of 10 questions based on an 11 point Likert scale, where a total score of 0 is worst, and 100 is best. This questionnaire is perceived to be the only relevant, validated patient reported outcome score for AT ruptures [21]. The ATRS questionnaire was administered by post a minimum of 6 months after injury. ATRS questionnaire was sent via post for patients treated between January 2010 and January 2014. Following this the outcomes were assessed in the dedicated ATR clinic by a research physiotherapist. Secondary outcomes including re-ruptures, venous-thromboembolic (VTE) events and any other complications were collected

Table 1
A table to show the duration in weeks spent in each position in the VACOPed® boot for both 11-week and 8-week regimes.

Regime	30° Plantarflexion (static)	15° Plantarflexion (static)	15–30 (dynamic)	0–30° (dynamic)
11 weeks (January 2010–January 2011)	5	3	2	1
8 weeks (February 2011–January 2015)	4	0	2	2

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