



CONSERVATIVE MANAGEMENT OF ACHILLES TENDON RUPTURES. COMMON FEATURES OF VARIOUS PROTOCOLS OF FUNCTIONAL REHABILITATION IN THE UNITED KINGDOM.

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ABSTRACT

Introduction
The conservative management of the acure ruptures of the Achilles tendon remains the mainstay of management of these options. Less frequently, surgical management if offered to patients with complete rupture of the tendon’s body with no opposition of tendon’s ends >1cm (in passive plantarflexion) and to patients with delayed presentation following their injury.

Aim
This study aims to present the common features of the various functional rehabilitation protocols of the conservative management of the acute Achilles tendon ruptures in the United Kingdom.

Material & Methods
Retrospective review of the literature and various functional rehabilitation protocols of different NHS Trust.

Results
Conservative management with functional rehabilitation protocols results in satisfactory outcomes without significant difference in re-rupture rates and plantarflexion strength compared to surgical management.

Conclusions
Latest evidence supports the conservative management of the acute ruptures of the Achilles tendon with functional rehabilitation protocols, given the higher complication rates of surgical management and the equivalent low re-rupture rates and similar plantarflexion strength.

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INTRODUCTION

Historically, when functional rehabilitation was not used for the nonoperative treatment of an acute midsubstance rupture of the Achilles tendon, the benefits of surgical treatment have been cited as increased strength, decreased rerupture, and a faster return to high-level activity. However, two high-quality level 1 studies have demonstrated that nonoperative treatment with functional rehabilitation provides equivalent outcomes to surgical treatment. As a result, there has been an increased incidence of patients avoiding the risks of surgery and choosing nonoperative treatment.

Functional Rehabilitation Protocol

Willits et al were the first to support through their study that accelerated functional rehabilitation and nonoperative treatment for acute Achilles tendon ruptures. All measured outcomes of nonoperative treatment were acceptable and were clinically similar to those for operative treatment. In addition, this study suggested that the application of an accelerated-rehabilitation nonoperative protocol avoids serious complications related to surgical management.

Time Frame	Activity
0-2 weeks	Posterior slab/splint; non-weight-bearing with crutches: immed. postop. in surgical group, after injury in nonop. group
2-4 weeks	Aircast walking boot with 2-cm heel lift*†
	Protected weight-bearing with crutches
	Active plantar flexion and dorsiflexion to neutral, inversion/eversion below neutral
	Modalities to control swelling
	Incision mobilization modalities‡
4-6 weeks	Knee/hip exercises with no ankle involvement; e.g., leg lifts from sitting, prone, or side-lying position
	Non-weight-bearing fitness/cardiovascular exercises; e.g., bicycling with one leg, deep-water running
	Hydrotherapy (within motion and weight-bearing limitations)
	Weight-bearing as tolerated*†
6-8 weeks	Continue 2-4 week protocol
	Remove heel lift
	Weight-bearing as tolerated*†
	Dorsiflexion stretching, slowly
	Graduated resistance exercises (open and closed kinetic chain as well as functional activities)
	Proprioceptive and gait retraining
	Modalities including ice, heat, and ultrasound, as indicated
	Incision mobilization‡
	Fitness/cardiovascular exercises to include weight-bearing as tolerated; e.g., bicycling, elliptical machine, walking and/or running on treadmill, StairMaster
	Hydrotherapy
8-12 weeks	Wean off boot
	Return to crutches and/or cane as necessary and gradually wean off
	Continue to progress range of motion, strength, proprioception
>12 weeks	Continue to progress range of motion, strength, proprioception
	Retrain strength, power, endurance
	Increase dynamic weight-bearing exercise, include plyometric training
	Sport-specific retraining

*Patients were required to wear the boot while sleeping. †Patients could remove the boot for bathing and dressing but were required to adhere to the weight-bearing restrictions according to the rehabilitation protocol. ‡If, in the opinion of the physical therapist, scar mobilization was indicated (i.e., the scar was tight or not moving well), the physical therapist would attempt to mobilize using friction, ultrasound, or stretching (if appropriate). In many cases, heat was applied before beginning mobilization techniques.

Table 1. Achilles Tendon Rupture Rehabilitation Protocol. Willits at al.

It is essential that patients and surgeons alike understand that nonoperative treatment does not mean no treatment. Nonoperative treatment protocols, must be closely supervised by an experienced physiotherapist and physician, with open communication to allow optimal results and avoid complications. If this cannot be done, patients should be educated on the historical benefits of surgery in the absence of functional rehabilitation.

Nonoperative treatment methods include several different techniques. A functional rehabilitation protocol can include early weight bearing, early controlled range of motion (ROM), or both. The degree to which a patient is weight bearing and the amount of time before controlled ROM exercises begin are variable between protocols, but there is evidence in the literature that suggests they are important components in the success of nonoperatively treated Achilles tendon ruptures.

Time Period	Protocol
0–2 wk	<ul style="list-style-type: none">Plaster cast with ankle in maximum passive plantar flexion; non-weight bearing with crutches
2–4 wk	<ul style="list-style-type: none">Achilles-specific (or other) walking boot with maximum passive plantar-flexed heel liftsProtected weight bearing with crutches:<ul style="list-style-type: none">Weeks 2–3—25%Weeks 3–4—50%Weeks 4–5—75%Weeks 5–6—100%Active plantar and dorsiflexion ROM exercises to neutral, inversion/eversion below neutralModalities to control swelling (ultrasound, interferential current with ice, acupuncture, light/laser therapy)Electrical muscle stimulation to calf musculature with seated heel raises when tolerated.Patients being seen 2–3 times/wk depending on availability and degree of pain and swelling in the foot and ankleKnee/hip exercises with no ankle involvement, for example, leg lifts from sitting, prone, or side-lyingNon-weight-bearing fitness/cardio work, for example, biking with 1 leg (with boot walker on), deep water running (usually not started until 3–4 wk point)Hydrotherapy if available (within motion and weight-bearing limitations)Emphasize need of patient to use pain as guideline. If in pain, back off activities and weight bearing.
4–6 wk	<ul style="list-style-type: none">Continue weight bearing as toleratedContinue 2–4 wk protocolProgress electrical muscle stimulation to calf with lying calf raises on shuttle with no resistance as tolerated approximately weeks 5–6. Please ensure that ankle does not go past neutral while doing exercises.Continue with physiotherapy 2–3 times/wk.Emphasize patient doing non-weight-bearing cardio activities as tolerated with boot walker on.
6–8 wk	<ul style="list-style-type: none">Continue physiotherapy 2 times/wkContinue with modalities for swelling as needed.Continue with electrical muscle stimulation on calf with strengthening exercises. Do not go past neutral ankle position.Remove heel lifts in stages dependent on Achilles length. Remove 1 lift daily as tolerated. Always leave 1–2 lifts in to represent regular shoe lift, depending on boot design.Weight bearing as tolerated, usually 100% weight bearing in boot walker now.Graduated resistance exercises (open and closed kinetic chain as well as functional activities)—start with resisted tubing exercisesWith weighted-resisted exercises, do not go past neutral ankle position.Gait retraining now that 100% weight bearingFitness/cardio to include weight bearing as tolerated, for example, bikingHydrotherapy
8–12 wk	Ensure patient understands that tendon is still very vulnerable, and patients need to be diligent with activities of daily living and exercises. Any sudden loading of the Achilles (trip, step up stairs, etc.) may result in a rerupture. <ul style="list-style-type: none">Wean off boot (usually over 2–5 d process—varies per patient), at night as well

UKSTAR which is a multicentre randomised controlled trial and economic evaluation showed no evidence that traditional plaster casting is superior to early weight-bearing in a functional brace. The use of functional bracing is likely to be cost-effective. Nilsson-Helander et al found that using functional braces results in more favorable outcomes than casting, as demonstrated by a lower rerupture rate. Suchak et al investigated early weight bearing and its consequence on health-related quality of life and found it increased the quality of life in the early stages of rehabilitation. Lastly, a study conducted by Olsson et al demonstrated early controlled ROM and early loading of the tendon resulted in favorable clinical outcomes.

Glazebrook and Rubinger suggested an Achilles protocol for nonoperative treatment (GAPNOT), which is standardized accelerated rehabilitation protocol modified from the previous well-studied protocol of Willits et al.

(continued)	
Time Period	Protocol
	<ul style="list-style-type: none">Wear Achilles compression ankle brace to provide extra stability and swelling control once boot walker is removed.Return to crutches/cane as necessary and gradually wean off. Have patient always wear shoes, limiting time in bare/sock feet.Continue to progress to ROM, strength, and proprioception exercises.Add exercises, such as stationary bicycle, elliptical, and walking on treadmill, as patient tolerates.Add balance board activities—standing with block to prevent dorsiflexion past neutral position.Add calf stretches in standing (gently). Do not allow ankle to go past neutral position.Add double-heel raises and progress to single-heel raises when tolerated. Do not allow ankle to go past neutral position.Continue physiotherapy 1–2 times/wk depending on how independent patient is at doing exercises and access to exercise equipment.
12–16 wk	<ul style="list-style-type: none">Continue to progress ROM, strength, and proprioception exercises.Retrain strength, power, endurance. Ensure patient understands that tendon is still very vulnerable and patients need to be diligent with activities of daily living and exercises. Avoid lunges, squats, etc., because these places excessive stretch on tendon.
16+ weeks	<ul style="list-style-type: none">Increase dynamic weight-bearing exercise, including sport-specific retaining (ie, skipping, jogging, and weight training).
6–9 mo	<ul style="list-style-type: none">Return to normal sporting activities that do not involve contact or sprinting, cutting jumping, etc., if patient has regained 80% strength
12 mo	<ul style="list-style-type: none">Return to sports that involve running/jumping as directed by medical team and tolerated if patient has regained 100% strength.

Table 2. Glazebrook/Rubinger Achilles protocol for nonoperative treatment (GAPNOT).

CONCLUSIONS

The use of early functional rehabilitation in the treatment of nonoperative Achilles tendon ruptures has been shown to provide patients with outcomes similar to operative treatments. Rerupture rates are similar to those for surgical treatment while offering the advantage of a decrease in other complications.

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