Postoperative rehabilitation protocols for Achilles tendon ruptures: a meta-analysis
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CRD summary
The authors concluded that early functional rehabilitation protocols improved patient satisfaction in comparison with standard immobilisation regimens, with no difference in re-rupture rates. However, further research is required to confirm these findings. There were limitations to this review but, overall, the authors' cautious conclusions appear appropriate.

Authors' objectives
To compare the effects of early functional rehabilitation protocols with cast immobilisation after surgical repair of an acute rupture of the Achilles tendon.

Searching
MEDLINE (1966 to July 2004), CINAHL (1982 to July 2004), EMBASE (1988 to week 28, 2004), PEDro, the Cochrane Database of Systematic Reviews, the Cochrane CENTRAL Register and DARE were searched using the reported search terms. In addition, a Web of Science cited reference search was conducted using the reference lists of included studies.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) and quasi-randomised controlled trials were eligible for inclusion.

Specific interventions included in the review
Studies that compared an early functional rehabilitation protocol with a standard immobilisation and delayed weight-bearing regimen were eligible for inclusion. In the included studies, patients who were allocated the early functional protocol started weight bearing from day 1 to 6.5 weeks. Partial weight bearing began at day 1 or day 21 in the early function protocol and ranged from day 21 to day 42 in the standard immobilisation group.

Participants included in the review
Studies of adults (aged 18 years or older) who were receiving post-operative management following surgical repair of an acute Achilles tendon rupture were eligible for inclusion. All patients had undergone an open surgical technique. The time to surgery varied from 0 to 112 hours in the immobilisation group and from 0 to 508 hours in the early functional group. The mean age of the participants was 40 years, 84% were male and 90% had ruptured their Achilles tendon during a sporting event.

Outcomes assessed in the review
Studies that assessed subjective patient satisfaction, re-rupture, infections, minor surgical complications and functional measures were eligible for inclusion. The primary review outcomes were patient satisfaction and re-rupture. The included studies used different scales to measure patient satisfaction.

How were decisions on the relevance of primary studies made?
Two reviewers independently selected the studies and resolved any differences by discussion.

Assessment of study quality
The studies were assessed for randomisation, blinding, population, intervention and outcomes. Any differences were resolved by discussion, implying that more than one reviewer assessed validity.
Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. Data on the occurrence of each outcome of interest were extracted from the individual studies. Patient satisfaction data were extracted from the different scales and reclassified into excellent, adequate or poor. Where required, authors were contacted to provide missing data.

Methods of synthesis
How were the studies combined?
The results of patient satisfaction were dichotomised for the analysis. Studies with similar outcomes were combined using random-effects meta-analyses. Pooled odds ratios (ORs) with 95% confidence intervals (CIs) were calculated for dichotomous data, and pooled weighted mean differences with 95% CIs for continuous data. Studies with dissimilar outcomes were combined in a narrative.

How were differences between studies investigated?
Statistical heterogeneity was assessed using the Breslow-Day test and the I-squared statistic. Differences between the studies were also discussed.

Results of the review
Six studies were included in the review (n=315): 4 RCTs (n=248) and 2 quasi-randomised studies (n=106).

Three studies used an adequate randomisation method and 4 studies reported blinded assessment of the outcome. All studies reported patients lost to follow-up.

The proportion of patients rating their satisfaction as 'excellent' was significantly higher when treated using an early functional protocol compared with standard immobilisation (OR 5.14, 95% CI: 2.61, 10.12, p<0.0001; based on 270 patients in 5 studies). No significant difference was shown between early functional protocols and immobilisation for re-rupture rate (OR 0.62, 95% CI: 0.17, 2.28, p=0.47; based on 310 patients in 6 studies). No statistically significant heterogeneity was detected for either of these meta-analyses (I-squared was zero for both).

There was no difference between early functional protocols and immobilisation for superficial and deep infections (2.6% versus 3.9%; OR 0.75, 95% CI: 0.22, 2.49). Other complications were significantly less common in the early functional protocol groups compared with the immobilisation groups (5.8% versus 13.5%, p=0.01; OR 0.30, 95% CI: 0.12, 0.75).

One study showed that early functional protocols were associated with significantly less calf atrophy and improved planter flexion compared with immobilisation regimens. In contrast, 5 studies reported no significant difference between treatments in calf atrophy or planter flexion strength.

Of the 4 studies that reported on range of motion, one reported significantly greater range of motion in the early functional protocol group (p<0.00001).

Authors' conclusions
Early functional rehabilitation protocol for Achilles tendon rupture improved patient satisfaction, compared with standard immobilisation regimens, with reductions in minor complications and no difference in re-rupture rates. Further research is required to confirm these findings.

CRD commentary
The review question was clear in terms of the study design, participants, intervention and outcomes. Several relevant sources were searched and some attempts were made to identify unpublished studies. It was unclear whether any language limitations had been applied, so the potential for language bias could not be assessed. Methods were used to minimise reviewer error and bias in the selection of studies and assessment of validity, but it was unclear whether
similar steps were taken at the data extraction stage. This is of importance in view of the need to reclassify patient satisfaction scores. Validity was assessed using specified criteria, although the criteria used to assess study population, intervention and outcome were not clearly documented.

Details of the individual studies were limited and the authors stated that outcome measures varied across the included studies. These factors made it difficult to determine whether it was appropriate to statistically combine the studies. Statistical heterogeneity was assessed and similar studies were combined using meta-analysis. There were limitations to this review but, overall, the authors' cautious conclusions appear appropriate.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that larger, adequately powered RCTs are required to confirm the review's findings and to evaluate individual elements of early weight-bearing regimens. Time to return to work and sports were important outcomes to assess.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.