Operative versus nonoperative management of acute Achilles tendon ruptures: a quantitative systematic review of randomized controlled trials

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CRD summary
The authors concluded that open surgical repair of acute Achilles tendon ruptures resulted in significantly lower re-rupture rates than non-operative management but had higher rates of deep infections, non-cosmetic scar complaints and sural nerve dysfunctions. Uncertainty over review methods and synthesis, between-study differences and unclear re-rupture results suggest that the conclusions may not be reliable.

Authors' objectives
To compare re-rupture rates between open surgery repair and non-operative management of acute Achilles tendon ruptures.

Searching
Five databases including PubMed and DARE were searched (search dates not reported) for articles in English. Search terms were reported. Reference lists of included articles were handsearched for additional studies.

Study selection
Randomised controlled trials (RCTs) that compared open surgical repair versus non-operative management of acute Achilles tendon ruptures were eligible for inclusion. The primary outcome of interest was re-rupture rate; secondary outcomes included time to return to work, deep infections, sural nerve sensory disturbances, non-cosmetic scar complaints and deep vein thrombosis. Studies that were retrospective, not adequately randomised or did not report re-rupture rates were excluded.

Mean patient ages ranged from 37.2 to 41.8 years. From 64% to 91% of participants were men. Time from injury to surgery and immobilisation ranged from less than 72 hours to less than weeks. Period of cast immobilisation ranged from one to eight weeks; time that dorsiflex was permitted above neutral ranged from six to 12 weeks. Surgery techniques of most studies were end-to-end Krakow or end-to-end Bunnell; one study reported Bunnell stitch in the proximal tendon through the distal calcaneal bone tunnel. Just over half of the studies reported return of strength, as assessed by isokinetic testing.

The authors did not report how many reviewers selected studies for inclusion.

Assessment of study quality
Coleman methodology score was used to assess study quality according to 10 criteria such as follow-up, outcome assessment and patient selection (all criteria stated in paper). Total scores ranged from zero to 100 (scores of 100 indicated highest quality).

The authors did not state how many reviewers performed the quality assessment.

Data extraction
Data were extracted to calculate mean differences for return to work data, log odds ratios for re-rupture rates and percentages for incidence of all other outcomes; effect estimates were estimated using 95% confidence intervals. Where only ranges were reported in the studies the Matsuyama method was used to estimate variances. Authors were contacted for additional information where necessary.

The authors did not state how many reviewers extracted data.

Methods of synthesis
Effect estimates and 95% confidence intervals were pooled using the inverse variance method. The log odds ratio was used when pooling odds ratios. The exact Cochran-Mantel-Haenszel test was applied to assess observed differences.
relating to complications using a 0.05 significance level.

**Results of the review**

Seven RCTs were included in the review and meta-analysis. The exact total of patients was unclear (reported as 677 and 694); number of patients per trial ranged from 42 to 144. Coleman scores of study quality were all high (78 to 97); the lowest domain-specific scores were reported for adequacy of follow-up and patient selection. Mean duration of follow-up ranged from 10 to 36 months.

Incidence of re-rupture was significantly lower by 57% with open surgical repair compared with non-operative management (OR 0.43, 95% CI 0.22 to 0.82; seven trials). Statistically significant higher incidences of deep infections (2.36% versus 0%; five RCTs; p=.011), non-cosmetic scar complaints (13.1% versus 0.62%; six RCTs; p<.001) and sural nerve sensory disturbances (8.76% versus 0.78%; five RCTs; p<.001) were found with open surgical repair compared with non-operative management.

No statistically significant differences were found between open surgical repair and non-operative management for time taken to return to work and deep vein thrombosis rates. Results for return of strength were not reported due to variations in assessment times and testing across the studies.

**Authors’ conclusions**

Open surgical repair of acute Achilles tendon ruptures resulted in significantly lower rates of re-rupture compared with non-operative management but significantly higher rates of deep infections, non-cosmetic scar complaints and sural nerve dysfunctions.

**CRD commentary**

The review question was clear and inclusion criteria were clearly defined. Several relevant databases were searched the restriction to studies in English increased the risk of language bias. Little information on the review methods was reported so risks of reviewer error and bias were unclear. Although the studies appeared to be of fairly high quality, the quality assessment tool used did not assess some major areas of quality that are particularly relevant to the RCT design (such as blinding, allocation concealment, and comparability of groups at baseline).

Study details were presented and revealed some clinical and methodological differences across the studies. In particular, the authors acknowledged the variability of study protocols for mobilisation. The forest plots presented showed some heterogeneity among the small selection of included studies, especially for the return to work outcome. No statistical estimate of this heterogeneity was reported and this made it difficult to assess the extent to which the studies differed. Different numbers of patients were reported in the text and characteristics table. Results for re-rupture rates were difficult to interpret on the scale shown on the forest plot. Confidence intervals for some studies were wide and suggested that the results were not very precise.

Uncertainty about the review methods and the synthesis, between-study differences and unclear results for the re-rupture rate outcome suggest that the authors’ conclusion may not be reliable.

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

**Practice:** The authors stated that surgeons wishing to minimise the risk of re-ruptures should proceed with primary surgical care of acute achilles tendon ruptures.

**Research:** The authors stated that collection of strength data should be standardised in future studies.

**Funding**

Not stated.

**Bibliographic details**


**PubMedID**

Database of Abstracts of Reviews of Effects (DARE)
22802271

**DOI**
10.1177/0363546512453293

**Original Paper URL**
http://ajs.sagepub.com/content/40/9/2154.abstract

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Achilles Tendon /injuries /surgery; Acute Disease; Adult; Female; Humans; Male; Randomized Controlled Trials as Topic; Recurrence; Rupture; Tendon Injuries /therapy

**AccessionNumber**
12012047724

**Date bibliographic record published**
21/11/2012

**Date abstract record published**
19/02/2013

**Record Status**
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.