Non-operative treatment of Tendo-Achilles rupture: is “gap size” important in determining suitability for functional rehabilitation?

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Our disclosure is in the Final AOFAS Mobile App. We have no potential conflicts with this presentation.
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Dr Mark A Glazebrook

My disclosure is in the Final AOFAS Mobile App. I have a potential conflict with this presentation due to:

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<thead>
<tr>
<th>Company/Source</th>
<th>Disclosure</th>
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<td>1. Arthrex</td>
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<td>2. Linvatec</td>
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<td>3. Smith &amp; Nephew</td>
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<td>8. Foot &amp; Ankle International</td>
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a = research/institutional support, b = misc. non-income support, c = royalties, d = stock/options, e = consultant/employee, f = Journal reviewer
Introduction

• Treatment of acute rupture of the tendo-achilles (TA) remains controversial.
• Traditional teaching would suggest that the re-rupture rate and function is better with operative treatment.
• Traditional teaching ignores functional rehabilitation as a non-operative treatment option.
• Meta-analysis by Soroceanu et al. compared non-operative with operative treatment of ruptured tendo-achilles. A stratified analysis was performed which showed no statistical difference in re-rupture rates between operative and functional rehabilitation.

<table>
<thead>
<tr>
<th>Non-operative group stratification</th>
<th>Functional rehabilitation</th>
<th>Immobilisation</th>
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</thead>
<tbody>
<tr>
<td>Reduction of re-rupture risk</td>
<td>1.7% (p=0.45)</td>
<td>8.0% (p=0.001)</td>
</tr>
<tr>
<td>i.e. no difference between surgery and non-operative</td>
<td>i.e. favours surgery</td>
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Source: Soroceanu et al.
Introduction

• Some surgeons believe that radiological gap-size between the proximal and distal remnants of the tendon has an influence on the suitability for non-operative management
• A limited number of studies have looked at this
• Both Weber et al. and Kotnis et al. have used the residual gap measured by dynamic ultrasound to determine need for operative treatment
  – Both treated ruptures with a gap size of up to 5mm non-operatively
  – Gap sizes greater than 5mm underwent operative treatment
  – Weber et al. used a non-operative regime of immobilisation and early weight-bearing, while Kotnis et al. used a functional rehabilitation regime
  – Both papers report comparable function in the operative and non-operative groups
  – Both papers report no difference in re-rupture between operative and non-operative although Weber et al. sample size was small
• There is no published data showing a correlation between the gap size and outcome
Methods

- Ethics approval was granted by Capital Health Research Ethics Board, Halifax, Nova Scotia.
- Using a 5% significance level test ($\alpha=0.05$) with 80% power ($\beta=0.2$), the required sample size was estimated to be 29 assuming a correlation coefficient of $r=\pm0.5$.
- All adult patients who attended the emergency department with a clinically suspected tendo-achilles rupture were placed in a plantarflexed cast, and underwent MRI scanning to confirm the diagnosis. Patients were counselled on the risks and benefits of operative versus non-operative treatment and those opting for the latter were asked to take part in the study.
Methods

• The patients were then treated using a functional rehabilitation programme, modified from that previously published by Willits et al.
• The primary outcome measure was the Achilles tendon Total Rupture Score (ATRS) recorded 12 months post injury
• Secondary outcome measures were strength at 12 months (determined by single limb heel raise height compared to contralateral side) and re-rupture at any time
• The gap sizes were determined from the MRI scans by a single musculoskeletal radiologist who was blinded to the clinical outcomes. The technique used to make the measurements was previously described by Fujikawa et al.
Results

- 69 patients were recruited into the study of which 40 had completed their one year review. There was no loss to follow up.
- The average age was 42.4 years (range 19-70).
- The average gap size recorded by MRI was 40.4mm (range 6-110).
- The average ATRS score was 80 (range 17-100) – a high score indicating a better outcome.
- Single limb heel raise percentage of contralateral side was 64.8% (range 4-115).
- There were two re-ruptures, one of which was related to a new injury, the other patient was non-compliant with the rehabilitation program.
Results

• The data was found to be non-parametric, therefore the Spearman rank correlation coefficient was used.
• The correlation coefficient for gap size and ATRS score was 0.272 (p=0.045) and for gap size and strength was 0.158 (p=0.165).
Conclusions

• This study shows a statistically significant weak positive correlation between MRI measured gap size of the ruptured tendo-achilles and the ATRS score at one year.
• No correlation could be demonstrated between gap size and strength at one year.
• These results suggest that the MRI measured gap size is unimportant in predicting outcome and hence suitability for non-operative treatment of tendo-achilles rupture using functional rehabilitation.
• There were too few patients in the sample to draw any conclusions about re-rupture rate.
Discussion

• This is the first study to attempt to correlate radiological gap size of the ruptured tendo-achilles and outcome. Interestingly, the findings for the primary outcome are the opposite of what one would expect, indicating the greater the radiological gap size, the better the patient reported outcome score (i.e. the larger ruptures with greater gaps had better outcomes).

• There could be a number of reasons for these findings. It could simply be a type 1 error, given the weak correlation, the low statistical significance and the fact that the power calculation was based on a coefficient value of $r=\pm0.5$.

• An alternative explanation could be that the term “gap” is a misnomer. The “gap” probably represents a zone of injury and a localised inflammatory response to trauma. It may be that a minimal inflammatory response results in poorer tendon healing and thus lower outcome scores. However given the weak correlation it is unlikely that this is of any clinical relevance.

• The most important conclusion is that there is no basis for recommending operative treatment for rupture of the tendo-achilles based solely on radiological gap size.
References


