Evaluation of Achilles Tendon Rotation Relative to the Bimalleolar Axis: An MRI Study

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Disclosures

NO CONFLICT TO DISCLOSE

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Ryan DeBlis, MD

My disclosure is in the Final AOFAS Mobile App.

I have no potential conflicts with this presentation.
Background

- Acute, mid-substance Achilles tendon ruptures are common orthopaedic injuries.

- The rotation of the Achilles tendon relative to the bimalleolar axis has important implications in the surgical treatment of ruptures.

- Does the Achilles tendon have a significant rotation relative to the bimalleolar axis?
Objectives

1. To evaluate magnetic resonance imaging (MRI) studies of ruptured and non-ruptured Achilles tendons to determine the rotation of the tendon relative to the bimalleolar axis

2. To assess whether there is a difference in the rotation of ruptured and non-ruptured tendons
Hypotheses

1. The proximal Achilles tendon is externally rotated relative to the bimalleolar axis

2. There is no difference in the rotation of ruptured and non-ruptured tendons
Methods: Study Cohort

- Retrospective review of > 300 MRI studies of the foot and ankle from Jan. 2009 to Dec. 2014
- Controls: 50 MRI studies with an intact Achilles tendon
  - Average age 43.5 (range, 20.2 to 80.7) years
  - 30 males, 20 females
- Ruptures: 21 MRI studies with mid-substance Achilles tendon ruptures
  - Average age 40.5 (range, 22.7 to 69.7) years
  - 20 males, 1 female
Methods: Measurements

- Axial rotation of the Achilles tendon relative to the bimalleolar axis was measured
  - Controls: at 10 cm proximal to the tendon calcaneal insertion
  - Ruptures: at 5 cm proximal to the tendon rupture
    - Mean height of rupture: 5.75 cm
  - Both cohorts: at level of the ankle

Bimalleolar axis measurement

Tendon rotation measurement
Results

- At level of ankle: ruptures showed greater rotation than controls
- At 10 cm proximal to calcaneal insertion: no difference in rotation between ruptures and controls

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Ankle</th>
<th>10 cm Proximal to Insertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controls</td>
<td>50</td>
<td>5.9 ± 2.5</td>
<td>6.1 ± 3.6</td>
</tr>
<tr>
<td>Ruptures</td>
<td>21</td>
<td>15.8 ± 4.5</td>
<td>11.0 ± 4.7</td>
</tr>
<tr>
<td>p-value</td>
<td></td>
<td>0.008</td>
<td>0.139</td>
</tr>
</tbody>
</table>

*Values given as mean ± 95% CI. Error bars indicate 95% CIs.
Conclusions

- Achilles tendon rotation is 10 degrees external to the bimalleolar axis at 10 cm proximal to the calcaneal insertion.

- Rupture causes an increase of Achilles tendon rotation from 6 to 16 degrees external to the bimalleolar axis at the ankle.

- This should be taken into account when passing sutures with limited-open and percutaneous Achilles tendon repair systems to maximize tendon capture.
References


