ANKLE ARTHROSCOPY FOR OSTEOCHONDRAL LESIONS OF THE TALUS: THE EFFECT OF LIMITED ANKLE RANGE OF MOTION ON ANTERIOR AND POSTERIOR ARTHROSCOPIC ACCESSIBILITY

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Ankle Arthroscopy for Osteochondral Lesions of the Talus: The effect of limited ankle range of motion on anterior and posterior arthroscopic accessibility

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Our disclosures are on the AOFAS website
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Background

- Osteochondral lesions of the ankle (OLAs) are a source of chronic pain and disability
- Treatment includes non-operative and operative interventions
- Ankle arthroscopy – multiple advances towards increasing accessibility
  - Distraction
  - Osteotomies
  - Pre-operative planning
  - Complications
- Controversies – arthroscopic accessibility for central lesions
- Purpose of study: Determining whether ankle position and non-invasive distraction improves OLAs

<table>
<thead>
<tr>
<th>Talar Zone</th>
<th>OLT Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>0.5</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>2.3</td>
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<td>53.0</td>
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<tr>
<td>5</td>
<td>8</td>
<td>1.9</td>
</tr>
<tr>
<td>6</td>
<td>110</td>
<td>25.7</td>
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<tr>
<td>7</td>
<td>29</td>
<td>6.8</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>1.4</td>
</tr>
<tr>
<td>9</td>
<td>23</td>
<td>5.4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>82</td>
<td>100</td>
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</tbody>
</table>

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Materials

- 14 fresh frozen below knee cadavers
- 2.7 mm arthroscopic camera
- 3.0 mm cannula
- Hemostat
- Goniometer
- Ankle distractor (strap, tension bar, calibrated force scale), strap, calibrated
- Pediatric Biomet vision ankle spanning external fixator
- 5.0 mm and 4.0 mm Schantz pins
- 3D Surface scanner

Methodology

- Anterior arthroscopy
- Posterior arthroscopy
- Intra-articular working space
- Surface laser digitizer and 3 x 3 scan
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Results

- Average cadaver age 57.9 yr
- Anterior accessibility
  - Overall 58%
  - maximum plantarflexion = 61% 30 degrees plantarflexion = 62% percent
  - neutral = 43%
- Posterior accessibility:
  - Overall – 50%
  - neutral = 50%
  - maximum dorsiflexion = 49%
  - Statistically significant greater anterior accessibility (p = 0.001)
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Results 3x3 grid

- Anterior accessibility
  - Statistically significant less posterior zone accessibility (15.53%) vs central (87.7%) and anterior zones (100%)

- Posterior accessibility:
  - Statistically significant less anterior zone accessibility (3.2%) vs central (74.4%) and posterior zones (100%)

- Distraction
  - Increasing anterior intraarticular distraction correlated with increasing talar dome accessibility (Beta = 6.54 ±1.29; p = <0.0001)
  - Increasing posterior intraarticular distraction correlated with increasing talar dome accessibility (Beta = 7.04 ±2.76; p = 0.0255)
  - Statistically greater posterior distraction space versus anterior (p <0.001)
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<table>
<thead>
<tr>
<th>Zone</th>
<th>Frequency of talar dome with zero accessibility</th>
<th>Percent</th>
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</thead>
<tbody>
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<td>0%</td>
</tr>
<tr>
<td>2</td>
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<tr>
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<tr>
<td>7</td>
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<td>50%</td>
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<tr>
<td>8</td>
<td>8/14</td>
<td>57.1%</td>
</tr>
<tr>
<td>9</td>
<td>8/14</td>
<td>57.1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Zone</th>
<th>Frequency of talar dome with zero accessibility</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
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<td>78.6%</td>
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<td>12/14</td>
<td>85.7%</td>
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<tr>
<td>3</td>
<td>12/14</td>
<td>85.7%</td>
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<tr>
<td>4</td>
<td>0/14</td>
<td>0%</td>
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<tr>
<td>5</td>
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<tr>
<td>6</td>
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<td>7</td>
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<tr>
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<td>0/14</td>
<td>0%</td>
</tr>
<tr>
<td>9</td>
<td>0/14</td>
<td>0%</td>
</tr>
</tbody>
</table>

- Frequency analysis showed that the posterior-third of the talus was completely inaccessible 55% of cadavers.
- Frequency analysis showed that the anterior-third of the talus was completely inaccessible 83% of cadavers.
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Discussion

• Our results supported our hypothesis that increasing ankle range of motion will significantly increase the area of anterior arthroscopic accessibility of the talar dome.

  • Limited accessibility due to congruency of ankle joint, convexity of the talar dome, lack of saline insufflation, increased capsular tension with distraction

  • Previous studies have shown that plantarflexion significantly correlated with in vivo arthroscopic visualization

  • Previous studies showed that 25% of the central region talar surface remained inaccessible with combined approaches during perpendicular accessibility through arthrotomies

  • Our study- utilized arthroscopic accessibility

Discussion

• Our results did not support the hypothesis that varying ankle positions affects posterior arthroscopy
  • Previous studies have shown similar amount of posterior arthroscopy accessibility

• Our results supported the hypothesis that increasing intra-articular distraction amount improves arthroscopic accessibility for anterior and posterior arthroscopy

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Conclusions
• Anterior arthroscopy - dependent on ankle plantarflexion up to 30 degrees
• Posterior arthroscopy – accessibility not dependent on ankle position
• Ankle distraction - increased anterior and posterior arthroscopic accessibility

Strengths
• Matched specimens
• Randomized protocol
• Clinically relevant
• 3x3 grid

Limitations
• Non-blinded study
• Below knee cadavers
• Did not assess anatomic variants