Ankle Arthrodesis: Techniques and Outcomes

Jeff Smith MD
Ankle Arthritis

- Primary ankle arthritis much less common than hip and knee
- Most often post traumatic
- Thinner articular cartilage, smaller contact areas than knee and hip. Relies heavily on congruence
- Saltzman et al:

<table>
<thead>
<tr>
<th>Type of Arthritis</th>
<th>Number of Patients</th>
<th>Percentage of Total</th>
<th>Average</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Septic</td>
<td>10</td>
<td>1.6</td>
<td>56.7</td>
<td>16.94</td>
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<tr>
<td>Rheumatoid</td>
<td>76</td>
<td>11.9</td>
<td>58.7</td>
<td>12.6</td>
</tr>
<tr>
<td>Osteonecrosis</td>
<td>14</td>
<td>2.2</td>
<td>49.5</td>
<td>14.91</td>
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<tr>
<td>Neuropathic</td>
<td>31</td>
<td>4.9</td>
<td>53.8</td>
<td>13.95</td>
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<tr>
<td>Hemophiliac</td>
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<td>1.9</td>
<td>24.3</td>
<td>16.86</td>
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<tr>
<td>Gouty</td>
<td>5</td>
<td>0.8</td>
<td>46.0</td>
<td>18.1</td>
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<tr>
<td>Primary</td>
<td>46</td>
<td>7.2</td>
<td>67.2</td>
<td>12.4</td>
</tr>
<tr>
<td>Post-traumatic</td>
<td>445</td>
<td>70.0</td>
<td>51.5</td>
<td>14.4</td>
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</table>

<table>
<thead>
<tr>
<th>Presentation</th>
<th>Number</th>
<th>Percentage</th>
<th>Average</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tibial and fibular shaft</td>
<td>18</td>
<td>4.0</td>
<td>54.9</td>
<td>11.5</td>
</tr>
<tr>
<td>Tibia fracture</td>
<td>38</td>
<td>8.5</td>
<td>49</td>
<td>16.3</td>
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<tr>
<td>Plafond fracture</td>
<td>40</td>
<td>9.0</td>
<td>43.1</td>
<td>11.5</td>
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<tr>
<td>Rotational ankle fracture</td>
<td>164</td>
<td>37.0</td>
<td>50.8</td>
<td>14.2</td>
</tr>
<tr>
<td>Talar fracture</td>
<td>38</td>
<td>8.3</td>
<td>46.9</td>
<td>14.5</td>
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<tr>
<td>Osteochondritis dissecans</td>
<td>21</td>
<td>4.7</td>
<td>44.6</td>
<td>12.62</td>
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<tr>
<td>Recurrent ankle instability</td>
<td>65</td>
<td>14.6</td>
<td>57.7</td>
<td>13.29</td>
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<tr>
<td>Single sprain with continued pain</td>
<td>61</td>
<td>13.7</td>
<td>50</td>
<td>16.17</td>
</tr>
<tr>
<td>TOTAL</td>
<td>445</td>
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</tbody>
</table>
Ankle Arthritis

• Bracing: off the shelf, custom, exoskeleton
• Weight loss
• NSAIDs
• Injections
• Arthroscopic debridement
• Ankle replacement
• Fusion
TAR vs Fusion

• Ankle replacement implants continue to improve
• Replacement preferable, replace when possible
• But not always a great option
  • History of infection
  • Poor soft tissue envelope
  • Deformity
  • Young age, laborer, high impact activities
  • Instability
Outcomes

- Nonunion rates published between 60-100%
- 50% adjacent joint arthritis after 7 years
- Muir et al:

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking on uneven ground</td>
<td>22</td>
<td>79</td>
</tr>
<tr>
<td>Difficulties with stair ascent or descent</td>
<td>21</td>
<td>75</td>
</tr>
<tr>
<td>Modify the way they pick objects up off the floor</td>
<td>20</td>
<td>71</td>
</tr>
<tr>
<td>After use of driving pedals</td>
<td>20</td>
<td>71</td>
</tr>
<tr>
<td>Aching with prolonged standing, working, or walking</td>
<td>18</td>
<td>64</td>
</tr>
<tr>
<td>Difficulty putting on boots</td>
<td>10</td>
<td>36</td>
</tr>
<tr>
<td>Difficulty getting out of a bath</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>Difficulty sleeping prone or supine</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>Swimming</td>
<td>3</td>
<td>11</td>
</tr>
</tbody>
</table>
Ankle Fusion

**PROS**
- Good pain relief with successful fusion
- Deformity correction
- History of infection, poor skin envelope
- Permanent (no need for future revision)

**CONS**
- Nonunion risk 60-100%
- Gait alteration
- Adjacent joint arthritis: 50% within 7 years
Technical Considerations

• Open vs arthroscopic
• Approach
• Flat cuts vs congruent joint
• Fibular osteotomy / preservation
• Bone graft
• Fixation
Main Job: Stable fusion with Good Alignment

• 5 degrees valgus
• Slight external rotation
• Neutral dorsiflexion
• Careful to avoid varus, internal rotation, equinus
Arthroscopic

- Minimal to no deformity
- Preserves blood supply
- Minimize soft tissue disruption
- Minimize wound complications
65M Chronic ankle instability, peripheral vascular disease, diabetes
65M history of open pilon, infection, wound complications, flap coverage
Mini Open

- Similar to arthroscopic but direct visualization, maybe quicker
- 2 incisions, enlarge arthroscopic portals
- Minimize wound complications
- Difficult to correct deformity
- Possibly add small plate to augment fixation
Open Approaches: Anterior

• Good joint visualization
• Generally familiar approach
• A little more power to correct deformity
• Strong fixation. Anterior or anterolateral plate, cannulated screws
• Wound complications with anterior approach, neurovascular bundle, bowstringing
64M with ankle instability, DM, BMI 40
55F post traumatic arthritis
Lateral approach

- Excellent visualization and deformity correction
- Remove fibula, use for bone graft or use fibula as biological plate/onlay graft
- Flat cuts vs maintain shape of joint
- Use small anteromedial accessory incision for prep of medial gutter, removal of bone if necessary for reduction
60M with CMT
Posterior Approach

- Use with tibiotalocalcaneal fusion
- Great for salvage, revision, poor soft tissue envelope
- Split achilles, good visualization of ankle and posterior facet
External Fixation

• Strong tool for salvage
• Fuse without internal fixation or use as supplement to internal fixation
• Chronic wounds, infection, poor soft tissues
• Sustained compression
• Allow weight bearing
• Requires compliance with pin care, compression struts
Post Operative Protocol

- NWB x 12 weeks
- Consider NWB 6-8 weeks for arthroscopic fusion in some patients
- Cast x 4-6 weeks
- CT at 3-4 months, consider bone stim if <25% of surface is fused
Thank you