The Agility Total Ankle: A Long-Term Follow-up Outcome Study

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Disclosure

• None of the authors have any disclosures or pertinent conflicts of interest
Ankle Arthritis, Arthrodesis, and Arthroplasty

- Ankle arthritis has a significant impact on quality of life
- Prevalence is estimated at 2.0 per 100 people
- Distinct differences compared to hip/knee counterparts
  - Younger patients
  - Post-traumatic

Perceived degree of impairment = CHF, ESRD

- Gold standard has been considered arthrodesis

- Agility total ankle originally designed in late 1970s
  - Was the most popular implant design in US
  - Has undergone 4 generations of design modifications
  - > 20 years of experience
Study Purpose and Design

• Purpose: To Review long term results of patients undergoing TAA with the Agility system

  Design:
  - Retrospective review
  - 127 consecutive Agility TAA between 2001-2010
    - Patient Demographics
    - Pre & Post-operative Patient Scores
    - VAS, SF12, FAAM
    - 5-view ankle series
    - Categorized Patients
      - Success: Retained primary TAA
      - Failure: Revision, Fusion, BKA
Study Design

- Radiographic Assessment:
  - Sagittal Plane Measurements
    - Overall arc of motion
    - Arc of motion at implant
    - Osteolysis
    - Subsidence
  - Frontal Plane Measurements
    - Osteolysis
    - Subsidence
Results

- 90 (78.2%) of 115 available for follow up had retained TAA
- Average follow up 9.1 years (4.1-13.8)
- 25 (26.6%) had primary implant removed
  - 11 (9.7%) revision arthroplasty
  - 9 (7.1%) conversion arthrodesis
  - 5 (3.9%) below knee amputation

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Survived</th>
<th>Failed</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>90</td>
<td>25</td>
<td>NA</td>
</tr>
<tr>
<td>Age</td>
<td>65.2 (42 - 83)</td>
<td>60.3 (36 - 74)</td>
<td>0.0094</td>
</tr>
<tr>
<td>Gender</td>
<td>M=48</td>
<td>M=13</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>F=42</td>
<td>F=12</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>28.3 (18 - 38.3)</td>
<td>29.4 (19.5 - 39.3)</td>
<td>0.27</td>
</tr>
<tr>
<td>Diagnosis (Post-traumatic,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atraumatic, Inflammatory)</td>
<td>63:25:2</td>
<td>9:11:5</td>
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<tr>
<td>Diabetes</td>
<td>Yes=8</td>
<td>Yes=2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No=82</td>
<td>No=23</td>
<td></td>
</tr>
<tr>
<td>Steroid Use</td>
<td>Yes=4</td>
<td>Yes=4</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>No=84</td>
<td>No=21</td>
<td></td>
</tr>
<tr>
<td>Tobacco</td>
<td>Yes=7</td>
<td>Yes=1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No=83</td>
<td>No=24</td>
<td></td>
</tr>
</tbody>
</table>
Results

• Of surviving 80 patients with retained implant:
  • Average FAAM-ADL = 82.4 (range 40.5-100)
  • Average FAAM-Sport = 55.3 (6.25-100)
  • VAS pain score = 12.7 (0-100)
  • SF-12 Physical Score = 45.8 (25.8-65.94)
  • SF-12 Mental Score = 56.1 (20.5-65.3)
Results

Osteolysis by Zone

<table>
<thead>
<tr>
<th>Average # of Zones</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP</td>
<td>1.81</td>
<td>46.55%</td>
<td>25.86%</td>
<td>13.79%</td>
<td>18.97%</td>
<td>25.86%</td>
</tr>
<tr>
<td>Lateral</td>
<td>0.4828</td>
<td>20.69%</td>
<td>8.62%</td>
<td>18.97%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

- Osteolysis evident in average of 2.3 zones
- Most common zones 1 and 6
- No significant differences found for rate or location of subsidence

Subsidence by Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Mean(mm)</th>
<th>Max(mm)</th>
</tr>
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<tbody>
<tr>
<td>Medial Tibial AP</td>
<td>0.9258621</td>
<td>6.3</td>
</tr>
<tr>
<td>Lateral Tibial AP</td>
<td>1.1896552</td>
<td>8.8</td>
</tr>
<tr>
<td>Anterior Tibial Lateral</td>
<td>0.9086207</td>
<td>8.7</td>
</tr>
<tr>
<td>Posterior Tibial Lateral</td>
<td>0.6862069</td>
<td>4.9</td>
</tr>
<tr>
<td>Medial Talar AP</td>
<td>0.7913793</td>
<td>8</td>
</tr>
<tr>
<td>Lateral Talar AP</td>
<td>1.0086207</td>
<td>7.6</td>
</tr>
<tr>
<td>Anterior Talar Lateral</td>
<td>0.8931034</td>
<td>5</td>
</tr>
<tr>
<td>Posterior Talar Lateral</td>
<td>1.05</td>
<td>9</td>
</tr>
</tbody>
</table>
Statistical Analysis

- Linear Regression Analysis
  - Younger age at time of surgery, inflammatory, and atraumatic arthritis are predictive of need for revision surgery
  - Radiographic parameters are NOT predictive of implant survival or patient outcome scores

Kaplan-Meier survivorship curve. The solid line represents the calculated survivorship to 14 years (70.4%) with the hatched lines representing the 95% confidence interval (60.6-81.7%)
Defining Success?

<table>
<thead>
<tr>
<th>Outcome Measured</th>
<th>Score</th>
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<tbody>
<tr>
<td>Length of Follow-up</td>
<td>73</td>
</tr>
<tr>
<td>Pre-operative VAS Score</td>
<td>65</td>
</tr>
<tr>
<td>Post-operative VAS Score</td>
<td>56</td>
</tr>
<tr>
<td>FAAM-ADL Score</td>
<td>42.86</td>
</tr>
<tr>
<td>FAAM-Sport Score</td>
<td>9.38</td>
</tr>
<tr>
<td>SF12 Physical Health Score</td>
<td>27.79</td>
</tr>
<tr>
<td>SF12 Mental Health Score</td>
<td>59.28</td>
</tr>
<tr>
<td>Talar Component Alignment</td>
<td>3° (varus)</td>
</tr>
<tr>
<td>*Follow-up is measured in months</td>
<td></td>
</tr>
</tbody>
</table>

*Good radiographic appearance Poor satisfaction scores*

*Poor radiographic appearance Good satisfaction scores*
Conclusion

• 70.4% survivorship at an average of 8 years follow up

• Patients with original implant function at high levels of satisfaction based on validated outcome scores

• Level of satisfaction is independent of radiographic appearance of their implant
References


• Kopp FJ, Patel MM, Deland JT. Total ankle replacement with the Agility prosthesis: Clinical and radiographic evaluation. Foot Ankle Int. 2006; 27: 97-103.


• Hurwitz, Ei; Gould, J; Fleissig, GS; Fowler, R: Outcome analysis of Agility total ankle replacement with prior adjunctive procedures: two to six year follow-up. Foot Ankle Int. 28(5):308 – 12, 2007.


