Alignment characteristics associated with a new generation ankle replacement: evaluation of the first 15 cases

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Garrett M. Wobst

My disclosure is in the final AOFAS mobile app. I have no potential conflicts with this presentation.
INTRODUCTION

• During ambulation
  - Ankle joint is subjected to extreme tensile forces

• Following total ankle replacement (TAR)
  - Off-center forces can result in aseptic mechanical loosening, implant migration, and premature implant failure (1-3)
INTRODUCTION

• To maximize prosthesis longevity and patient outcomes, proper implant alignment is required
  ○ Minimize shear and angular forces
  ○ Decrease stress on the underlying cancellous bone

• Recently, a resurfacing TAR system, utilizing a lateral transfibular approach for implantation became available
PURPOSE

To evaluate alignment characteristics associated with a TAR system implanted through a lateral approach.

HYPOTHESIS

• Given the exceptional joint exposure that can be achieved through a lateral approach, the authors hypothesized that proper alignment would obtained with this new generation TAR system.
# Materials & Methods

## Medical Record Review

### Inclusion Criteria

- ≥ 18 years of age
- Diagnosed with end-stage ankle arthritis
- Exhausted conservative treatments
- Elected to undergo surgical treatment with this new generation prosthetic

### Procedure

- Via a lateral approach, a fibular osteotomy was performed, the TAR was implanted, and the fibula was internally fixated
Materials & Methods

Outcomes

• Tibial component alignment
  • Neutral = 90° for the tibial component
  • Anterior distal tibial angle (aDTA) (Figure 1A)
  • Lateral distal tibial angle (lDTA) (Figure 1B)
  • Misalignment = implant deviation > 5° from 90°

• Talar component alignment
  • Talar inclination = angle between a line draw from the most superior posterior aspect of the subtalar joint to the most superior aspect of the cartilaginous surface of the talar head and a line drawn from the most superior posterior aspect of the subtalar joint to the most anterior aspect of the talar component (Figure 1B)
## Results

### Patient Demographics

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>15 (100.0)</td>
</tr>
<tr>
<td>Age (yr)</td>
<td>55.6 ± 15.0</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)</td>
<td>32.3 ± 6.8</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>12 (80.0)</td>
</tr>
<tr>
<td>Male</td>
<td>3 (20.0)</td>
</tr>
<tr>
<td>Injury Side</td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>8 (53.3)</td>
</tr>
<tr>
<td>Right</td>
<td>7 (46.7)</td>
</tr>
</tbody>
</table>

Data presented as mean ± standard error or count (%).

### Etiology

- Osteoarthritis: 6 (40.0)
- Post-traumatic arthritis: 9 (60.0)
## Results

### Alignment Summary

<table>
<thead>
<tr>
<th>Component</th>
<th>Measurement</th>
<th>Misalignments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tibial Component</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>aDTA (°)</td>
<td>89.3 ± 6.6</td>
<td>5 (33.3)</td>
</tr>
<tr>
<td>IDTA (°)</td>
<td>90.9 ± 1.8</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td><strong>Talar Component</strong></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Talar Inclination (°)</td>
<td>5.2 ± 5.1</td>
<td></td>
</tr>
</tbody>
</table>

Data presented as mean ± standard error or count (%).

Abbreviations: aDTA, anterior distal tibial angle; IDTA, lateral distal tibial angle; N/A, not applicable.
Discussion

• Lateral Distal Tibial Angle
  o Zero misalignments
  o Appears as though the alignment jig effectively reduces varus / valgus deformity

• Anterior Distal Tibial Angle
  o Five misalignments
  o Sagittal plane alignment may not be accurately defined using aDTA due to the “resurfacing” nature of the curved tibial component

• Talar Inclination
  o Average angle suggests a slightly posterior tilt of the talar component
Discussion

• Collectively, data suggest that proper prosthetic alignment can be achieved with TAR utilizing a lateral approach
• More studies are needed to determine proper sagittal plane alignment for curved tibial components
• Long term follow up is necessary to determine what constitutes proper alignment of the talar component using this measurement methodology
• Additional outcome studies are warranted to further evaluate proper alignment over time with this TAR system
REFERENCES

