Differences in Walking Mechanics Between Ankle Disarthrodesis and Primary Total Ankle Replacement

Robin M. Queen, PhD
Abigail L. Carpenter, MS
Samuel B. Adams, Jr, MD
Mark E. Easley, MD
James A. Nunley, MD
James K. DeOrio, MD
Robert J. Butler, DPT, PhD
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Robin M. Queen, PhD

No Conflict of Interest for this poster

Disclosures are in the Final AOFAS Program Book
Background & Purpose

• Satisfactory walking mechanics and patient reported outcomes have been reported following primary TAR\textsuperscript{1-4}

• Takedown of the ankle arthrodesis and conversion to a total ankle replacement has emerged as another surgical option to a painful or unsuccessful ankle fusion. \textsuperscript{5-7}

• No literature examining how a tibiotalar arthrodesis conversion to TAR alters walking mechanics.

Purpose

Examine the differences in walking mechanics from pre-surgery through 1-year post-surgery in patients with an arthrodesis takedown to a TAR when compared with an age, gender and BMI matched group of primary TAR patients.
Methods

23 Disarthrodesis Subjects initially identified from a prospective database

Exclusion Criteria:
- Unable to walk without the use of an assistive device
- Bilateral ankle arthritis
- Diagnosed rheumatoid arthritis
- Did not complete a lower extremity gait assessment at one of the time points
Methods

• 3D lower extremity kinematics, kinetics and spatiotemporal measures were assessed during self-selected speed level walking
• Same procedures completed pre-operatively and 1-year following TAR
• 2 X 2 mixed model repeated measure ANOVAs were used to determine significant differences (p <0.05)

<table>
<thead>
<tr>
<th></th>
<th>Disarthrodesis</th>
<th>Primary TAR</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>59.4 ± 7.9</td>
<td>58.4 ± 8.6</td>
<td>0.812</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.67 ± 0.09</td>
<td>1.67 ± 0.05</td>
<td>0.840</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>82.2 ± 22.6</td>
<td>81.1 ± 12.7</td>
<td>0.910</td>
</tr>
<tr>
<td>BMI</td>
<td>29.2 ± 5.1</td>
<td>28.9 ± 4.6</td>
<td>0.917</td>
</tr>
</tbody>
</table>
Results

No significant difference between pre-op and 1 year post-op or between groups (Primary TAR and Disarthrodesis) for:

- Single Support Time
- Double Support Time
- Propulsive Vertical Ground Reaction Force (vGRF)
- Peak DF Angle
- Ankle Angle at Contact
- Peak PF moment
- Peak PF power.

Difference across time, but not between groups (p=0.012)
Differences Across Time

<table>
<thead>
<tr>
<th>Measure</th>
<th>Pre-op</th>
<th>1 year</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step Length (m)</td>
<td>0.60</td>
<td>0.66</td>
<td>P=0.050</td>
</tr>
<tr>
<td>Stride Length (m)</td>
<td>1.20</td>
<td>1.30</td>
<td>P=0.039</td>
</tr>
<tr>
<td>vGRF (BW)</td>
<td>1.00</td>
<td>1.10</td>
<td>P=0.038</td>
</tr>
</tbody>
</table>
Differences Across Time

Ankle ROM (Deg)

P=0.050

Pre-op
1 year

ROM (Deg)
Primary TAR patients had increased ankle ROM when compared to the Disarthritis patients independent of time (pre-op or 1 year post-op)
Conclusions

• Significant improvements in many of the gait parameters for both groups across time

• While both groups increased ankle ROM over time, the takedown group displayed decreased ROM both pre-operatively and 1-year post-TAR when compared with their primary TAR peers.

• The limited differences between the groups could indicate no differences between groups, however, this study is underpowered to detect group differences and the results need to viewed cautiously.

• Additional work needs to be done to increase the sample size to better understand the differences that exist between these two patient groups with regards to functional recovery following surgery.
References


4) Queen RM, De Biassio JC, Butler RJ, DeOrio JK, Easley ME, Nunley JA. J. Leonard Goldner Award 2011: changes in pain, function, and gait mechanics two years following total ankle arthroplasty performed with two modern fixed-bearing prostheses. Foot Ankle Int. 2012 Jul;33(7):535-42


