Tibiotalocalcaneal Arthrodesis Nails: A Comparison of Nails With and Without Internal Compression Utilizing the RAIN Database

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Our disclosures are in the Final AOFAS Mobile App. There is a potential conflict with this presentation due to: Consultant, Biomet (TMP)
Introduction

• Tibiotalocalcaneal (TTC) arthrodesis is a salvage procedure indicated for a variety of hindfoot pathology:
  – Severe degenerative, inflammatory, or post-traumatic arthritis
  – Unstable angular deformity of the ankle
  – Failed ankle arthroplasty
  – AVN of the talus
  – Neuropathic conditions (e.g. Charcot)

Left: severe hindfoot arthritis with obliteration of the tibiotalar and subtalar joints; Right: stabilization with TTC arthrodesis
Introduction (cont)

- Goals of TTC arthrodesis:
  - relieve pain in the ankle and hindfoot
  - provide a stable plantigrade foot that will allow for continued ambulation
- Multiple methods for TTC arthrodesis
- Retrograde intramedullary nail (IMN) for TTC arthrodesis has recently increased in popularity
- Advantages of retrograde IMN
  - Minimal soft tissue destruction
  - Superior biomechanical properties
- Adequate, sustained compression paramount to success of procedure
- Failure leads to additional surgery, often BKA
Introduction (cont)

- TTC arthrodesis IMN’s have evolved to improve compression
- 1\textsuperscript{st} generation nails: external compression
- 2\textsuperscript{nd} generation nails: internal compression
- Biomechanical studies have demonstrated superior compression of 2\textsuperscript{nd} generation nails\textsuperscript{6}
- There are currently no clinical studies that compare 1\textsuperscript{st} generation and 2\textsuperscript{nd} generation nails with respect to time to fusion
Materials & Methods

- Data was extracted from the Retrograde Arthrodesis Intramedullary Nail (RAIN) Database at OFAC.
- The database contains 219 patients who underwent TTC arthrodesis between July 2003 and June 2011.
- The procedures were performed by five different surgeons that are fellowship trained in foot and ankle surgery.
Materials & Methods (cont)

• Follow up X-rays were reviewed; time of TTJ and STJ fusion was determined by earliest radiographic evidence of bony union
• After excluding pts with inadequate or incomplete radiographs, 198 pts remained
• 145 pts without internal compression, 53 pts with internal compression
## Results

<table>
<thead>
<tr>
<th></th>
<th>Overall (N=198)</th>
<th>Received TTC Fusion Nails that Lacked Internal Compression (N=145)</th>
<th>Received TTC Fusion Nails with Internal Compression (N=53)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age at surgery in years, mean(SD)</strong></td>
<td>56.7 (12.5)</td>
<td>57.0 (11.6)</td>
<td>55.8 (14.8)</td>
</tr>
<tr>
<td><strong>Male, N(%)</strong></td>
<td>105 (53.0%)</td>
<td>76 (52.4%)</td>
<td>29 (54.7%)</td>
</tr>
<tr>
<td><strong>Smoker, N(%)</strong></td>
<td>37 (18.7%)</td>
<td>29 (20.0%)</td>
<td>8 (15.1%)</td>
</tr>
<tr>
<td><strong>Diabetes, N(%)</strong></td>
<td>84 (42.4%)</td>
<td>70 (48.3%)</td>
<td>14 (26.4%)</td>
</tr>
<tr>
<td><strong>Chronic steroid use, N(%)</strong></td>
<td>25 (12.6%)</td>
<td>18 (12.4%)</td>
<td>7 (13.2%)</td>
</tr>
</tbody>
</table>
Results

<table>
<thead>
<tr>
<th></th>
<th>Without Internal Compression</th>
<th>With Internal Compression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Time to STJ Fusion</td>
<td>104</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td></td>
<td>111</td>
</tr>
<tr>
<td>Median Time to TTJ Fusion</td>
<td>93</td>
<td>93</td>
</tr>
</tbody>
</table>

(Days)
Discussion

• Time to union was faster for both TTJ and STJ in the group with internal compression, however after accounting for confounding factors (specifically diabetes), there was no statistically significant difference

• Limitations
  • Retrospective study
  • Fusion determined by x-ray review only
  • Variability in joint preparation technique
Conclusion

• Retrograde hindfoot fusion nails are a viable treatment option in degenerative joint disease of the hindfoot
• A follow up study incorporating a controlled prospective design with inclusion of both CT and clinical evidence of union would be beneficial to determine if second generation nails have an advantage
References


