Clinical and Operative Factors Related to Successful Revision Arthrodesis in the Foot and Ankle

Sandra Klein MD
Kathryn O’Connor MD
Jeremy McCormick MD
Jeffrey Johnson MD
Disclosures

• The authors have no conflicts to disclose relative to this study:

*Clinical and Operative Factors Related to Successful Revision Arthrodesis in the Foot and Ankle*

• Disclosures for all authors are listed in the Final AOFAS mobile app

• Washington University acknowledges OMeGA Medical Grants Association and the support of Zimmer, DePuy Synthes, and Biomet Orthopedics for their generous Foot & Ankle Fellowship grant.
Introduction:

- Rates of nonunions in foot and ankle surgery range from 0-47%
- Very little literature focuses on outcomes of nonunion revisions
- Unclear what the roll of orthobiologics are in foot and ankle fusion surgery
Aim:

- To determine the rate of persistent nonunion in foot and ankle surgery
- To determine if there are any patient specific clinical factors that are risk factors for persistent nonunion
- To determine if there are any operative factors that may be related to improved fusion in the setting of revision surgery

Design:

- Retrospective review of three fellowship trained foot and ankle surgeons of all cases of revision arthrodesis for nonunion from 2007-2015
Methods:

• Retrospective review of 82 subjects who underwent revision arthrodesis for failed fusion were reviewed

• Patient specific clinical factors reviewed:
  • Diabetes, smoking, inflammatory arthropathy, history of infection, charcot, neuropathy, post traumatic arthritis, prior attempts at revision.

• Operative specific factors reviewed:
  • Location of nonunion, use of autograft, use of allograft, type of instrumentation, use of orthobiologics

• Imaging at final follow up was reviewed to determine if patients had gone on to radiographic union by a consensus reading by radiology and attending physician

<table>
<thead>
<tr>
<th></th>
<th>Nonunion Subjects (n = 19, 23%)</th>
<th>Union Subjects (n = 63, 77%)</th>
<th>Total (P Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>2 (25%)</td>
<td>6 (75%)</td>
<td>8 (1.00)</td>
</tr>
<tr>
<td>Charcot</td>
<td>2 (100%)</td>
<td>0 (0%)</td>
<td>2 (0.051)</td>
</tr>
<tr>
<td>Neuropathy</td>
<td>7 (58%)</td>
<td>5 (42%)</td>
<td>12 (.005)</td>
</tr>
<tr>
<td>Inflammatory arthropathy</td>
<td>3 (30%)</td>
<td>7 (70%)</td>
<td>10 (.690)</td>
</tr>
<tr>
<td>Posttraumatic</td>
<td>7 (26%)</td>
<td>20 (74%)</td>
<td>27 (.886)</td>
</tr>
<tr>
<td>Tobacco use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At initial surgery</td>
<td>1 (12%)</td>
<td>7 (88%)</td>
<td>8</td>
</tr>
<tr>
<td>At revision surgery</td>
<td>1 (25%)</td>
<td>3 (75%)</td>
<td>4</td>
</tr>
<tr>
<td>Infection</td>
<td>4 (36%)</td>
<td>7 (64%)</td>
<td>11 (.270)</td>
</tr>
<tr>
<td>Nonunion in medical history</td>
<td>2 (40%)</td>
<td>3 (60%)</td>
<td>5 (.328)</td>
</tr>
</tbody>
</table>
Results:

- 82 cases of nonunion revisions were identified.
- 60 cases had consensus interpretation by radiology and the attending orthopaedic surgeon.
- 22 cases had indeterminate radiology reports which upon further review were clarified as healed or not healed.
- Contingency tables and logistic regression analysis were performed to identify variables at a level of p<.05.
- In review, all cases were revised to internal fixation, no frames were used during this study period.
Results:

- Overall nonunion rate in the cohort was 23% during revision arthrodesis.
- The two statistically significant factors in predicting nonunion were the number of attempts at fusion at the site and a history of neuropathy.
- Charcot arthropathy approaches significance for nonunion.
- Location of procedure did not influence rate of nonunion.
- Use of iliac crest, orthobiologics and allograft did not affect rate of nonunion.
Limitations

• Retrospective review
• Very diverse set of patients:
  • Various locations of nonunions
  • Various types of allografts
  • Inconsistent use of orthobiologics
  • Various methods of autograft
Conclusions:

- Rates of nonunion in revision surgery is approximately 23%.
- Neuropathy is a key medical factor in nonunion.
- In patients with previous failed attempts at revision for nonunion, in each successive attempt the risk of nonunion increases 3x.
- Charcot disease may be a risk factor for nonunion but would need further study in a larger cohort.
- Variation in techniques for revision surgery (orthobiologics, autograft, etc) need further review to help determine the optimal combination to promote healing.
References:


...
References