The Slot Graft Technique for Foot and Ankle Arthrodesis in a High Risk Patient Group

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My disclosure is in the Final AOFAS Program Book. I have no potential conflicts with this presentation.
Introduction

- Arthrodesis in the foot and ankle is a common solution for end stage arthritis.
- Nonunion is a well-known potential complication of primary or revision arthrodesis.
- With advances in techniques, nonunion rates have improved but are still reported to up to 28%.
- Multiple risk factors for nonunion have been identified including tobacco use, AVN, infection and diabetes.
Purpose

- The purpose of this study was to evaluate fusion rates, risk of reoperation, post operative pain scores and patient satisfaction for a slot graft inlay arthrodesis technique used in a high risk group of foot and ankle patients.
Materials and Methods

- We retrospectively reviewed all ankle, hindfoot and midfoot arthrodesis by two foot and ankle surgeons at our institution between January 2000 and January 2009.
- 277 surgeries were reviewed of which 17 arthrodesis procedures in 16 patients used the slot graft technique.
- Patient charts were retrospectively reviewed.
- Postoperative radiographs were evaluated for successful arthrodesis.
- A phone questionnaire was administered to determine patient satisfaction.
Operative Technique

- The joints to be fused were exposed through standard approaches.
- Once prepared and fixed in appropriate alignment a rectangular trough was created across the joints to be fused.
Operative Technique

- All slots measured approximately 6 mm to 1.0 cm wide and 1.0 to 1.5 cm deep.
- The tricortical iliac autograft or allograft was cut to the appropriate dimensions.
Operative Technique

- The bone was impacted into place.
- Morselized bone graft was packed around the slot graft prior to final fixation.
- All patients were nonweightbearing in a cast for 6 weeks.
Results

- The charts of the 16 patients were reviewed for risk factors for nonunion.
- All patients had at least one risk factor and four patients had greater than one risk factor.

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Number of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rheumatoid Arthritis</td>
<td>2</td>
</tr>
<tr>
<td>Lupus</td>
<td>2</td>
</tr>
<tr>
<td>AVN of the talus</td>
<td>2</td>
</tr>
<tr>
<td>Avascular or fragmented navicular</td>
<td>7</td>
</tr>
<tr>
<td>Tobacco use</td>
<td>1</td>
</tr>
<tr>
<td>Diabetes with peripheral neuropathy</td>
<td>1</td>
</tr>
<tr>
<td>Prednisone use</td>
<td>2</td>
</tr>
<tr>
<td>Previous infection</td>
<td>1</td>
</tr>
<tr>
<td>Previous arthrodesis with nonunion</td>
<td>2</td>
</tr>
</tbody>
</table>
Results

- Successful radiographic union achieved in an average of 5 months in 13 of 17 procedures (76%)
- At final telephone followup, at an average of 5 years post operative (15 patients contacted)
  - Patients rated satisfaction as 8 out of 10 (10=most satisfied)
  - Pain score average was 3 (10=most severe pain)
  - 14 patients stated that they would undergo the procedure again
Results

- Postoperative complications
  - 1 infection
  - 4 nonunions
    - 3 of 4 had iliac crest autograft slot graft
    - 3 of 4 treated with revision
    - 2 of 3 successful fusion
  - 5 painful hardware requiring removal
  - 2 nerve pain requiring release
Discussion

- The slot graft technique is a consideration for high risk patients undergoing foot or ankle arthrodesis.
- Multiple other techniques have been studied in an effort to reduce the rate of nonunion:
  - Use of bone morphogenic protein
  - Bone stimulators
  - Vascularized fibular grafts
  - Dowel or inlay grafting
Discussion

- Our technique is modified from the inlay grafting technique initially described by Johnson.
- The slot graft seems to provide additional fixation through the press fit nature of the graft.
- In the midfoot, the dorsally placed bone graft may resist plantar midfoot collapse.
Conclusion

- High risk patients continue to present a challenge for the foot and ankle surgeon especially in complex foot and ankle arthrodesis.
- The slot graft technique for foot and ankle arthrodesis provided satisfactory results in this small group of patients with a low complication rate.
- We believe it is a technique modification worthy of consideration in a patient with high risk of nonunion.
- Patient satisfaction rates were high with low pain scores at an average of 62 months postoperatively.
References

8. Ishikawa, SN; Murphy, GA; Richardson, EG: The effect of cigarette smoking on hindfoot fusions. Foot Ankle Int. 23(11):996-998, 2002.