Pes Planovalgus Reconstruction with Calcaneonavicular Coalition Resection

Kyle S. Peterson, DPM
Emily A. Quinn, DPM
Christopher F. Hyer, DPM
My disclosure is in the Final AOFAS Mobile App. I have no potential conflicts with this presentation.
Tarsal Coalition

- Approximately 1% of the general population are affected by tarsal coalitions with 50-80% bilateral\textsuperscript{1,2}
- Clinically present with rigid flatfoot, limited hindfoot motion, calcaneal valgus, peroneal muscle spasms\textsuperscript{2-6}
Treatment of Calcaneonavicular Coalition 7-13

- Isolated resection
- Coalition resection with interposition of graft
- Coalition resection with pes planovalgus reconstruction
  - Favorable outcomes with talocalcaneal coalition
  - Calcaneonavicular coalition unstudied in literature
- Coalition resection with arthrodesis
Purpose of Study

1. To examine radiographic hindfoot alignment from preoperative to postoperative between 2 groups of patients.
   - Group A: Isolated CN Bar resection
   - Group B: CN bar resection with concomitant flatfoot reconstruction

2. Report frequency of complications including infection, hardware failure and coalition recurrence
# Retrospective Study

**IRB-approved**
- January 2006 – June 2013

**Inclusion**
- CN coalition with pes planovalgus
- Isolated resection with or without interpositional spacer
- Concomitant pes planovalgus deformity reconstruction
- Age 14 or older

**Exclusion**
- Hindfoot fusion
- Revisional procedures
- Age 13 or younger

**Radiographic measurements**
- AP view
  - Talo-1\textsuperscript{st} met
  - Talonavicular uncoverage
- Lateral View
  - Calcaneal Inclination
  - Talo-1\textsuperscript{st} met

Pre-operative, post-op measurements compared using paired t-tests (p<0.05)
# Clinical Results

<table>
<thead>
<tr>
<th></th>
<th>Overall (n=27)</th>
<th>Group A: Isolated CN Bar Resection (n=20)</th>
<th>Group B: CN Bar Resection with Concomitant Flatfoot Reconstruction (n=7)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographic Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>12 (44.4%)</td>
<td>5 (25.0%)</td>
<td>7 (100.0%)</td>
</tr>
<tr>
<td>Female</td>
<td>15 (55.6%)</td>
<td>15 (75.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Age at surgery in years, median (range)</td>
<td>18.1 (14.0 – 61.3)</td>
<td>20.3 (14.4 – 61.3)</td>
<td>18.1 (14.0 – 56.4)</td>
</tr>
<tr>
<td>Body mass index (BMI), median (range)</td>
<td>27.4 (16.1 – 41.3)</td>
<td>25.5 (16.1 – 41.3)</td>
<td>30.3 (27.4 – 38.7)</td>
</tr>
<tr>
<td>Tobacco use, n (%)</td>
<td>1 (3.7%)</td>
<td>1 (5.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Diabetes, n (%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td><strong>Surgical Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right side, n (%)</td>
<td>14 (51.9%)</td>
<td>10 (50.0%)</td>
<td>4 (57.1%)</td>
</tr>
<tr>
<td>Calcaneonavicular coalition, n (%)</td>
<td>8 (29.6%)</td>
<td>7 (35.0%)</td>
<td>1 (14.3%)</td>
</tr>
<tr>
<td>w/ biological interpositional graft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>w/o biological interpositional graft</td>
<td>19 (70.4%)</td>
<td>13 (65.0%)</td>
<td>6 (85.7%)</td>
</tr>
<tr>
<td><strong>Surgical Complications</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infection, n (%)</td>
<td>1 (3.7%)</td>
<td>1 (5.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Hardware failure, n (%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Recurrence of coalition, n (%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
</tbody>
</table>
# Radiographic Results

<table>
<thead>
<tr>
<th>Overall (n=27)</th>
<th>Group A: Isolated CN Bar Resection (n=20)</th>
<th>Group B: CN Bar Resection with Concomitant Flatfoot Reconstruction (n=7)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-op</td>
<td>Post-op</td>
</tr>
<tr>
<td><strong>Mean Radiographic Angles in Degrees, mean (SD)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcaneal inclination</td>
<td>16.0 (6.1)</td>
<td>16.4 (6.0)</td>
</tr>
<tr>
<td>Talo-1(^{st}) metatarsal angle – lat</td>
<td>9.1 (8.3)</td>
<td>9.4 (7.6)</td>
</tr>
<tr>
<td>Talo-1(^{st}) metatarsal angle – AP</td>
<td>14.7 (9.0)</td>
<td>13.7 (10.0)</td>
</tr>
<tr>
<td><strong>Talonavicular Coverage as Percent Coverage, mean (SD)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talonavicular uncoverage</td>
<td>22.9 (11.8)</td>
<td>18.9 (11.6)</td>
</tr>
</tbody>
</table>

Table 2. Mean radiographic angles, in degrees, and talonavicular coverage among patients whom underwent calcaneonavicular coalition resection with or without concomitant reconstruction of a flatfoot deformity from January 2006 through June 2013, preoperatively and at last postoperative follow up.
Radiographic Results

**Pre-op to Post-op (Table 2)**

- Overall talonavicular uncoverage from 22.9° to 18.9°
  - p=0.011

- Group A: mean talonavicular uncoverage decreased from 21.1° to 18.1°
  - p=0.046

- Group B: mean calcaneal inclination angle increased from 10.1° to 12.9°
  - p=0.013

- Mean calcaneal inclination angle in Group A decreased by 0.3° and increased in Group B by 2.7°
  - p=0.005
Discussion

• First study evaluating pes planovalgus reconstruction with CN Bar resection
• Radiographic measurements
  – Significantly reduced overall TN uncoverage from preop to post op
  – Group B significant increase in calcaneal inclination
• Low complication rate (3.7%) and no recurrence of coalition
Conclusion

Pes planovalgus deformity reconstruction in the setting of CN coalition resection does improve radiographic parameters of the tri-tarsal complex.