Outcome of midfoot derotational osteotomy for mid-forefoot varus deformities

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Disclosure statement

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Introduction

- Midfoot-forefoot varus deformities
  - uncommonly found after chronic rheumatoid arthritis or after deformity correction of cavovarus deformities
- Many midfoot osteotomies has been introduced
  - Derotational osteotomy first described at 1997


- The purpose of this study
  - to evaluate the clinical and radiological outcomes of the series of midfoot-varus deformity patients who have undergone mid-foot derotational osteotomy for plantigrade foot
Material and Method (I)

- Duration: September 2006 – June 2013
- Indication
  - Varus deformity of midfoot and forefoot
  - Plantar pressure pain on weight bearing
  - Already had been treated with insoles or shoe modification
- 8 ankles (6 patients)
  - of midfoot varus deformity
- Performed by single surgeon (HGJ)
Material and Method (II)

- Age: 39.1 yo (11 - 58)
- F/U period: 29.1 mo (12 - 70)
- M : F = 5 : 1
- Right : Left = 4 : 4
- Diagnosis

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Post-traumatic</td>
<td>2 cases</td>
</tr>
<tr>
<td>2. Poliomyelitis</td>
<td>3 cases</td>
</tr>
<tr>
<td>3. Rheumatoid arthritis</td>
<td>1 case</td>
</tr>
<tr>
<td>4. Idiopathic cavo-varus</td>
<td>2 case</td>
</tr>
</tbody>
</table>
Material and Method (III)

- **Simultaneously performed procedures**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bony procedure</strong></td>
<td></td>
</tr>
<tr>
<td>Lateral sliding calcaneal osteotomy</td>
<td>8</td>
</tr>
<tr>
<td>Ankle fusion</td>
<td>1</td>
</tr>
<tr>
<td>Proximal phalanx rotational osteotomy</td>
<td>1</td>
</tr>
<tr>
<td>Midfoot wedge osteotomy</td>
<td>2</td>
</tr>
<tr>
<td><strong>Soft tissue procedure</strong></td>
<td></td>
</tr>
<tr>
<td>Achilles tendon lengthening</td>
<td>1</td>
</tr>
<tr>
<td>Modified Chrismann-snooak</td>
<td>3</td>
</tr>
<tr>
<td>Flexor digitorum longus tenotomy</td>
<td>1</td>
</tr>
<tr>
<td>Extensor digitorum longus shortening</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>18</td>
</tr>
</tbody>
</table>
Evaluation

• Clinical outcome
  – **VAS** pain score
  – **AOFAS** ankle-hindfoot score
  – **Satisfaction** level:
    • very satisfied, satisfied, unsatisfied, very unsatisfied

• Radiological outcome

  Joint-sparing corection of cavus foot
  - Jung et al., Foot Ankle Clin N Am 2013 -
Operative Technique

• Incision
  – Medial: Tibialis anterior ~ Tibialis posterior
  – Lateral: Crossed dorsal lateral aspect of the calcaneo-cuboid joint
• Transverse cut after fluoroscopic confirmation
• Rotate distal portion of foot
• Fixation with screws and/or plate
• Apply short-leg cast for 6 weeks
Results (I) – Clinical outcome

**VAS Pain score**
- Preop: 6.8
- Postop: 1.6
(\(P < 0.05\))

**AOFAS Functional score**
- Preop: 45
- Postop: 83
(\(P < 0.05\))

- 1. Very satisfied: 1
- 2. Satisfied: 7
- 3. Unsatisfied: 0 (0%)
- 4. Poor: 0 (0%)

No revisional surgery
One complication
- Superficial infection (treated with IV antibiotics)
Results (II) – Radiological outcome

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Preoperative</th>
<th>Final follow-up</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcaneal pitch angle (°)</td>
<td>16.3 (8.9 to 23.9)</td>
<td>14.7 (6.1 to 19.8)</td>
<td>0.327</td>
</tr>
<tr>
<td>Meary angle (°)</td>
<td>2.8 (-20.3 to 16.8)</td>
<td>4.6 (1.2 to 11.9)</td>
<td>0.484</td>
</tr>
<tr>
<td>Arch angle (°)</td>
<td>28.9 (3 to 42)</td>
<td>33.9 (21.8 to 42)</td>
<td>0.107</td>
</tr>
<tr>
<td>Tibio-calcaneal angle (°)</td>
<td>23.7 (3.2 to 66.7)</td>
<td>10.3 (1.8 to 27.6)</td>
<td>0.012*</td>
</tr>
<tr>
<td>Navicular height (mm)</td>
<td>47.2 (32.8 to 67)</td>
<td>43.7 (30.1 to 60.8)</td>
<td>0.012*</td>
</tr>
</tbody>
</table>

*Denotes statistical significance.
Case

- M/44
- Residual polio
- Plantar pressure pain

VAS  7 → 1
AOFAS 34 → 80
Summary

• Many of similar modifications of midfoot biplanar osteotomy
  – Steindler, Saunders, Cole, Akron dome midfoot osteotomy
  – Drawbacks: shortening of the foot, rocker-bottom deformity, etc

• Limitations
  – Study population small
  – Follow-up period relatively short

Conclusion
  – Midfoot derotational osteotomy is a favorable surgical option for treating mild/moderate midfoot varus deformity