Treatment Outcomes of Chronic Lateral Ankle Instability Associated with Mild Cavovarus Deformity

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

• Hindfoot varus an anatomic risk factor that promotes chronic lateral ankle instability  
  
  Larsen E. Clin Orhop, 1990  
  Klammer et al. Foot Ankle Clin N Am, 2012

• Hindfoot varus is present in 8% of patients with ankle instability

• Isolated soft tissue reconstruction of the lateral ankle ligaments in patients with cavovarus deformity often will fail, if the foot deformity is not addressed  
  
  Fortin et al. Foot Ankle Int, 2002

Purpose

➢ To evaluate clinical & radiographic outcomes of the modified Broström operation & additional procedures for chronic lateral ankle instability with mild cavovarus deformity
• Aug. 2009 ~ Sep. 2013

• Consecutive patients with chronic lateral ankle instability
  • Modified Broström operation (MBO) with ankle arthroscopy
  • Additional procedures for the cavovarus deformity

• **12 cases** were retrospectively reviewed

• Generalized laxity, Obesity, Ankle osteoarthritis, and Neurological cause of cavovarus deformity were excluded

• Mean F/U: **39.5** (range, 32 to 78) months
### Physical Assessment

**Function and Specific tests**
- Anterior drawer & Varus stress test

**Inspection**
- Foot posture during walking & in a standing position ("Peek-a-boo" sign)
- Forefoot posture after manual correction of hindfoot neutral

**Function and Specific tests**
- Range of motion
- Silfverskiöld test
- Coleman block test

### Clinical Assessment

**Clinical Outcomes**
- 6 weeks, 3 and 6 months, annually
  - Visual Analog Scale (VAS) for pain
  - AOFAS ankle and hind foot score
  - Karlsson-Peterson ankle score
Radiographic Assessment

**Stress X-ray**
- the varus tilt angle
- the anterior drawer displacement

**Lateral standing radiographs**
- the 1st metatarsal - talus angle (Meary angle)
- the arch height: medial cuneiform - 5MT base
- the calcaneal pitch angle

**Heel alignment view**
Results

Demographic characteristics (n=12)

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>25.7 ± 8.7 (19-49)</td>
</tr>
<tr>
<td>Sex (M:F)</td>
<td>12 : 0</td>
</tr>
<tr>
<td>Side (R:L)</td>
<td>6 : 6</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>24.34 ± 1.92</td>
</tr>
</tbody>
</table>

Additional procedures

<table>
<thead>
<tr>
<th>Procedures</th>
<th># of feet / % patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Metatarsal dorsiflexion osteotomy</td>
<td>9 (75%)</td>
</tr>
<tr>
<td>Calcaneus lateral closing wedge osteotomy</td>
<td>6 (50%)</td>
</tr>
<tr>
<td>*Both 1st metatarsal &amp; calcaneus osteotomy</td>
<td>3 (25%)</td>
</tr>
<tr>
<td>Gastrocnemius lengthening</td>
<td>2 (16.7%)</td>
</tr>
</tbody>
</table>
### Results

#### Clinical outcomes

<table>
<thead>
<tr>
<th>Patient Data</th>
<th>Pre-op</th>
<th>Last follow-up</th>
<th>p - value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS</td>
<td>5.5±1.8</td>
<td>1.7±1.5</td>
<td>0.002</td>
</tr>
<tr>
<td>AOFAS score</td>
<td>61.0±15.3</td>
<td>85.3±8.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Karlsson – Peterson score</td>
<td>56.8±11.2</td>
<td>83.1±10.6</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
## Results

### Radiographic findings

<table>
<thead>
<tr>
<th>Test</th>
<th>Pre-op</th>
<th>Last follow-up</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varus stress test (°)</td>
<td>12.28 ± 3.35</td>
<td>5.60 ± 3.10</td>
<td>0.001</td>
</tr>
<tr>
<td>Ant. drawer test (mm)</td>
<td>7.91 ± 2.72</td>
<td>4.84 ± 2.91</td>
<td>0.007</td>
</tr>
</tbody>
</table>
## Results

### Radiographic findings

<table>
<thead>
<tr>
<th></th>
<th>Pre-op</th>
<th>Last follow-up</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st MT-Talus angle (°)</strong></td>
<td>10.73 ± 5.50</td>
<td>5.47 ± 3.41</td>
<td><strong>0.001</strong></td>
</tr>
<tr>
<td><strong>Arch Height</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Cuneiform &amp; 5th MT base (mm)</td>
<td>19.99 ± 8.43</td>
<td>15.65 ± 7.51</td>
<td><strong>0.003</strong></td>
</tr>
<tr>
<td><strong>Calcaneal Pitch angle (°)</strong></td>
<td>26.38 ± 4.27</td>
<td>25.23 ± 4.10</td>
<td>0.066</td>
</tr>
</tbody>
</table>

[Image of a radiograph of a foot showing the relevant angles and distances.]
Discussion

- Cavovarus position places the ATFL and the peroneal tendons on stretch during normal gait
  - lead to lateral ankle instability, stress fractures of lateral metatarsals and peroneal tendon tears


- Correction of the cavovarus may help to normalize forces acting across the ankle, aiding in the effectiveness of a lateral soft tissue reconstruction

  Fortin et al. Foot Ankle Int, 2002

- Our results
  12 feet with CLAI with mild cavovarus deformity
  - MBO ± Calcaneal osteotomy ± 1st MT osteotomy
  - Good clinical outcomes (AOFAS 61 to 85.3, 31.5m f/u), No recurrence
Conclusion

Patients with **Comprehensive examination & additional procedures** for mild cavovarus deformity should be performed for **avoiding recurrent chronic ankle instability**

**Modified Brostrom operation with the calcaneal osteotomy and/or 1st MT dorsiflexion osteotomy** depending on the examination → could be **favorable** treatment options

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**References**