Alteration of hindfoot alignment after lateral column lengthening of calcaneus for planoovalgus foot deformity

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Ji Yong Ahn, M.D.

My disclosure is in the Final AOFAS Program Book

I have no potential conflicts with this presentation.
Calcaneal Lengthening


To investigate radiographic changes of the hindfoot alignment with other radiographic parameters.
Materials and methods

✓ June 1999 ~ June 2011

✓ 46 feet of 28 patients with mean age of 9.7 (8 to 13)

✓ Indication: moderate to severe planovalgus foot deformity
  (not improved or aggravated even after 7-8 years old)

✓ Mean f/u: over 26 month (range: 12 to 171)

✓ Heel cord tightness (11 Feet, 7 patients)

  TAL: 3 feet, 2 patients. Strayer: 8 feet, 5 patients.
Operative technique

• TAL and Staryer procedure before the calcaneal lengthening

• Osteotomy: between the ant. and middle facet, 1.5cm proximal to CC joint

• Steinmann pin inserted into just distal fragment to prevent CC subluxation

• Amount of distraction : the restoration of medial arch and neutral heel

• Bone graft: auto bone (16 feet) + allo bone (30 feet)
  mean 10 mm (range, 8 to 12)

• Hindfoot alignment was kept to be in neutral position

• Peroneus brevis tendon was lengthened
  by Z-plasty in 9 feet, 6 patients.
How to evaluate?

Hindfoot alignment

preoperatively

Postoperatively: last f/u
Hindfoot alignment

<table>
<thead>
<tr>
<th></th>
<th>Preoperative</th>
<th>Last followup</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hindfoot alignment angle</strong></td>
<td>12 (Range, 0 to 26)</td>
<td>8 (Range, 0 to 22)</td>
<td>0.0049</td>
</tr>
<tr>
<td><strong>Hindfoot alignment ratio</strong></td>
<td>0.27 (Range, 0.01 to 0.52)</td>
<td>0.20 (Range, 0.01 to 0.50)</td>
<td>0.3968</td>
</tr>
<tr>
<td>The moment arm between the weightbearing axis of the leg and the contact point of the heel</td>
<td>15.1 (Range, 5.1 to 32.3)</td>
<td>7.9 (Range, -4.5 to 34.6)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Improved but not completely corrected in some cases**
# Flattening parameters

<table>
<thead>
<tr>
<th></th>
<th>Preoperative</th>
<th>Last followup</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AP radiograph</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talonavicular coverage</td>
<td>21.0</td>
<td>9.0</td>
<td>0.001</td>
</tr>
<tr>
<td>angle</td>
<td>(Range, 1 to 59.0)</td>
<td>(Range, 1.0 to 42.0)</td>
<td></td>
</tr>
<tr>
<td>Talo-1st metatarsal</td>
<td>14.5</td>
<td>7.0</td>
<td>0.001</td>
</tr>
<tr>
<td>angle</td>
<td>(Range, 1 to 43)</td>
<td>(Range, 1 to 22)</td>
<td></td>
</tr>
<tr>
<td><strong>Lateral radiograph</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcaneal pitch angle</td>
<td>11.5</td>
<td>16.0</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(Range, 1 to 30.0)</td>
<td>(Range, 8.0 to 28.0)</td>
<td></td>
</tr>
<tr>
<td>Talocalcaneal angle</td>
<td>44.0</td>
<td>41.5</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>(Range, 29.0 to 68.0)</td>
<td>(Range, 29.0 to 55.0)</td>
<td></td>
</tr>
<tr>
<td>Talo-1st metatarsal</td>
<td>12.0</td>
<td>7.0</td>
<td>0.001</td>
</tr>
<tr>
<td>angle</td>
<td>(Range, 1 to 41.0)</td>
<td>(Range, 1 to 28)</td>
<td></td>
</tr>
</tbody>
</table>
Male, 9 years old

All radiographic parameters were improved postoperatively.

Hindfoot alignment angle: $25^\circ \rightarrow 5^\circ$

Moment arm between the weightbearing axis of the leg and the contact point of the heel: $15 \rightarrow 7.82$

However, hindfoot alignment was slight valgus.
After lateral column lengthening of calcaneus for the planovalgus foot, hindfoot alignment was not neutralized completely but more neutralized, in spite of improvement of flattening parameters such as talo-first metatarsal angle, talonavicular coverage angle, the calcaneal pitch angle and talocalcaneal angle.

Conclusion
References


