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

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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.

Success of lateral column lengthening

Good hindfoot alignment ?

Good anteroposterior radiographic parameters

Good lateral 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 Median</th>
<th>Last followup Median</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</td>
<td>0.20</td>
<td>0.3968</td>
</tr>
<tr>
<td><strong>The moment arm</strong></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>AP radiograph</th>
<th>Preoperative</th>
<th>Last followup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talonavicular coverage angle</td>
<td>21.0</td>
<td>9.0</td>
</tr>
<tr>
<td>(Range, 1 to 59.0)</td>
<td>(Range, 1.0 to 42.0)</td>
<td></td>
</tr>
<tr>
<td>Talo-1st metatarsal angle</td>
<td>14.5</td>
<td>7.0</td>
</tr>
<tr>
<td>(Range, 1 to 43)</td>
<td>(Range, 1 to 22)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lateral radiograph</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcaneal pitch angle</td>
<td>11.5</td>
<td>16.0</td>
</tr>
<tr>
<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>
</tr>
<tr>
<td>(Range, 29.0 to 68.0)</td>
<td>(Range, 29.0 to 55.0)</td>
<td></td>
</tr>
<tr>
<td>Talo-1st metatarsal angle</td>
<td>12.0</td>
<td>7.0</td>
</tr>
<tr>
<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.
Conclusion

✓ 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.
References


