Metatarsalgia after hallux valgus correction is associated with relative first metatarsal length

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Disclosure

No conflict to disclose

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Our disclosures are in the Final AOFAS Mobile App.
We have no potential conflicts with this presentation.
Background

✓ There has been no consensus regarding the ideal length of the first metatarsal during corrective osteotomy for hallux valgus.

✓ The aim of this study was to evaluate how the relative length of the first metatarsal influenced metatarsalgia after hallux valgus correction.
Patients:

- 51 patients (102 feet) (43 women)
- Median age: 58 years (11-80)
- Mean follow-up: 16 months (12-29)
- Inclusion criteria: symptomatic hallux valgus
- Exclusion criteria: previous surgery, rheumatoid arthritis, gout

Clinical evaluation:

- Japanese Society for Surgery of the Foot (JSSF) hallux scale\(^1,2\)
- Plantar callosities and Metatarsalgia (shown in the next slide)

\(^1, 2\) Niki et al. J Orthop Sci 2005
### Grading of plantar callosities

<table>
<thead>
<tr>
<th>Grade</th>
<th>Callosity</th>
<th>Metatarsalgia</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>beneath 1 joint</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>beneath 1 joint</td>
<td>+</td>
</tr>
<tr>
<td>3</td>
<td>beneath 2 joints or more</td>
<td>+</td>
</tr>
</tbody>
</table>
Radiological evaluation:

- Hallux valgus angle (HVA)
- Inter-metatarsal 1-2 angle (IMA)
- Distal metatarsal articular angulation (DMAA)
- Sesamoid position #1
- First metatarsal length #2
- Relative metatarsal length (RML)#3,4

#1 Smith et al. Foot Ankle 1984.
#2 Munuera et al. Int Orthop 2008
#3 Nilsonne H. Acta Orthop Scand 1930
#4 Morton D. Am J Surg 1930
Hallux valgus was corrected using biplane interlocking osteotomy. Fixation was performed with a ring screw (Nakashima Medical, Okayama, Japan) and locking plate (LPS or TOM plate; Wright Medical, Memphis, TN). The medial side of the capsule was plicated until the intraoperative HVA was smaller than 5 degrees. The abductor hallucis tendon was also plicated dorsally. A lateral release was performed through a separate dorsal incision.

Weil’s shortening osteotomy of the second metatarsal was additionally performed in 15 feet.
Results

Clinical evaluation

<table>
<thead>
<tr>
<th></th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>Paired Student's t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>JSSF hallux score</td>
<td>56 (24 to 84)</td>
<td>37.4</td>
<td>12.9</td>
</tr>
<tr>
<td>(points)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Callosity area</td>
<td>1 (0 to 16)</td>
<td>3.14</td>
<td>4.93</td>
</tr>
<tr>
<td>(mm²)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Callosity grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>grade 0</td>
<td>43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>grade 1</td>
<td>26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>grade 2</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>grade 3</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metatarsalgia</td>
<td>33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

60% of metatarsalgia improved (grade 2/3 → 0/1)
85% of painless callosities disappeared (grade 1 → 0)
# Radiographic evaluation

<table>
<thead>
<tr>
<th></th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>Paired Student t test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Range</td>
<td>SD</td>
</tr>
<tr>
<td>HVA (degree)</td>
<td>36.9</td>
<td>(20 to 60)</td>
<td>9.1</td>
</tr>
<tr>
<td>IMA (degree)</td>
<td>17.4</td>
<td>(8 to 28)</td>
<td>3.8</td>
</tr>
<tr>
<td>DMAA (degree)</td>
<td>8.0</td>
<td>(0 to 25)</td>
<td>4.6</td>
</tr>
<tr>
<td>RML (mm)</td>
<td>-1.6</td>
<td>(-9 to 3)</td>
<td>2.3</td>
</tr>
<tr>
<td>1st metatarsal length (mm)</td>
<td>60.6</td>
<td>(52 to 73)</td>
<td>4.7</td>
</tr>
</tbody>
</table>

Sesamoid position, n

<table>
<thead>
<tr>
<th></th>
<th>grade 0</th>
<th>grade 1</th>
<th>grade 2</th>
<th>grade 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>3</td>
<td>12</td>
<td>77</td>
</tr>
</tbody>
</table>

Postoperative RML was most significantly associated with the presence of postoperative metatarsalgia (P < .0001).
## Results

### ROC analysis for ideal RMP

<table>
<thead>
<tr>
<th>Cut point (mm)</th>
<th>Metatarsalgia</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC</td>
<td>0.884</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.88</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Cut point: -3 mm
We found the RML cut-off point was -3mm for avoiding postoperative metatarsalgia.
References


