A new scoring system for sesamoid displacement in hallux valgus

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

• Inadequate reduction of sesamoids can lead to recurrence of hallux valgus

• Proper reduction of the sesamoids realigns flexor hallucis brevis

• Multitude of different grading systems;
  – Sesamoid rotation angle
  – Hardy Clapham/tibial sesamoid position

Okuda et al. Post operative incomplete reduction of the sesamoids as a risk factor for recurrence of hallux valgus. 2009. JBJS (Am)
Sesamoid ratio

• Simple to do
• Ratio = lateral / medial sesamoid diameter
Aim

• To assess for a difference in sesamoid ratio between normal feet radiographs and those with hallux valgus
• To assess for a correlation between sesamoid ratio and increasing hallux valgus deformity
• To assess inter and intra observer reliability
Methods

• 277 AP weight bearing radiographs analyzed
  – 103 normal
  – 87 hallux valgus, pre operative
  – 87 hallux valgus, post operative
• HVA, IMA, medial and lateral sesamoid width
• Sesamoid ratio severity groups defined
• Images sent on disc to four separate F&A surgeons for inter observer error
• Randomized images measured again 3 months later for intra observer error
Results

<table>
<thead>
<tr>
<th></th>
<th>Ses. Ratio</th>
<th>HVA (°)</th>
<th>IMA (°)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>1.00</td>
<td>18.49</td>
<td>9.28</td>
</tr>
<tr>
<td>Median</td>
<td>0.99</td>
<td>15.70</td>
<td>8.90</td>
</tr>
</tbody>
</table>

- Significant negative correlations seen with sesamoid ratio and both HVA and IMA
  - HVA $r = -0.24$ (p < 0.05)
  - IMA $r = -0.17$ (p < 0.05)

- Thus as the deformity increases, the ratio decreases
Severity grading as per HVA and IMA

<table>
<thead>
<tr>
<th>Grade</th>
<th>HVA (°)</th>
<th>IMA (°)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt; 15.9</td>
<td>&lt; 8.9</td>
</tr>
<tr>
<td>Moderate</td>
<td>16 - 24.9</td>
<td>9 - 13.9</td>
</tr>
<tr>
<td>Severe</td>
<td>&gt; 25</td>
<td>&gt; 14</td>
</tr>
</tbody>
</table>
Sesamoid ratio means according to HVA and IMA severity groupings

<table>
<thead>
<tr>
<th>Severity groups</th>
<th>HVA Mean</th>
<th>IMA Mean</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>0.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>0.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>0.96</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Creation of sesamoid ratio grading system

Sesamoid Ratio Means

Severity groups

Normal > 1.03

Moderate = 1.02 – 0.95

Severe < 0.94

ANOVA p <0.05

HVA Mean

IMA Mean

95% CI
Inter/intra observer reliability

- 60 images (10 normal, 25 pre op, 25 post op)
- 4 Foot & Ankle Consultants
- Inter observer error:
  - Fleiss’ kappa = 0.37 (0.10 – 0.53, 95% CI)
  - Intra class correlation = 0.43
- Intra observer error:
  - $\rho$ 0.67
Conclusion

• Sesamoid ratio
  – Lateral/medial sesamoid diameter (mm)
• Easy to do
• Significant difference between normal and hallux valgus
• Correlates with hallux valgus deformity
• Fair inter observer reliability
• Good intra observer reliability