Can the success of scarf osteotomy be evaluated with IMA, DMAA and HVA?

Alper Deveci, Ahmet Fırat, Serdar Yılmaz, Ozdamar Fuad Oken, Ahmet Özgür Yıldırım, Ahmet Ucaner, Murat Bozkurt
Can the success of scarf osteotomy be evaluated with IMA, DMAA and HVA?

Alper Deveci

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

• The most frequently encountered complication after hallux valgus surgery has been reported to be recurrence of the deformity (1).
• Factors such as high values for the HVA, first IMA, and distal metatarsal articular angle (DMAA), the sesamoid bone positions, and the degree of preoperative joint congruity have been cited as predictors of recurrence in such cases (2–4).
• In an effort to further explore the factors associated with recurrence of the deformity after scarf osteotomy for correction of hallux valgus deformity, we undertook a retrospective cohort study to analyze the preoperative and postoperative clinical and radiologic early results after bunionectomy.
• We hypothesized that hallux abductovalgus after scarf osteotomy recurs because of the presence of preoperative joint incongruity.
Methods

- 50 feet of 43 consecutive patients (36 females [83.72%] and 7 males [16.28%]) who presented with hallux valgus deformity and underwent scarf osteotomy from August 2009 to October 2012.
- The mean patient age was 47.7 years (range 21 to 65), and the mean follow-up duration was 26.2 months (range 18 to 36).
- Scarf osteotomy was applied to moderate and severe hallux valgus deformities with HVA of ≥ 20º, together with cosmetic complaints and pain.
- The Akin osteotomy was performed on 19 (38%) of the 50 feet.
- Using preoperative and final follow-up standing standard anteroposterior (AP) and lateral radiographs, evaluation was made of HVA, IMA, DMAA, IPA, difference in length between the first and second metatarsal, and the congruity of the metatarsophalangeal joint and the tibial sesamoid positions.
- Clinical evaluation preoperatively and at the final follow-up was made using American Orthopaedic Foot and Ankle Society Hallux Metatarsophalangeal-Interphalangeal Score (AOFAS) and visual analog scale (VAS) scores.
- The statistical significance level was defined as $p \leq .05$. The data were tested with a logistic regression model to determine preoperative predicting factors.
## Results

**Table 1. Clinical and radiographic results (n = 50 feet)**

<table>
<thead>
<tr>
<th></th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROM</td>
<td>41.90°±13.05°</td>
<td>39.26°±6.96°</td>
<td>.080*</td>
</tr>
<tr>
<td>AOFAS</td>
<td>50.66±4.92</td>
<td>80.00±7.93</td>
<td>&lt; .001*</td>
</tr>
<tr>
<td>VAS</td>
<td>7.52±1.15</td>
<td>2.48±1.03</td>
<td>&lt; .001*</td>
</tr>
<tr>
<td>HVA</td>
<td>36.82°±8.41°</td>
<td>11.56°±7.00°</td>
<td>&lt; .001*</td>
</tr>
<tr>
<td>IMA</td>
<td>13.92°±2.63°</td>
<td>5.94°±3.17°</td>
<td>&lt; .001*</td>
</tr>
<tr>
<td>Tibial Sesamoid Position</td>
<td>1.29±0.37</td>
<td>0.34±0.19</td>
<td>&lt; .001*</td>
</tr>
<tr>
<td>Metatarsal length difference</td>
<td>2.02±2.28</td>
<td>1.04±2.26</td>
<td>.053*</td>
</tr>
<tr>
<td>IPA</td>
<td>7.46°±4.99°</td>
<td>4.46°±2.25°</td>
<td>&lt; .001*</td>
</tr>
</tbody>
</table>
Results

- When the preoperative radiological parameters causing recurrence were examined, 13 (26%) of the 50 feet displayed incongruity of the joint (9 (69.23%) subluxed, 4 (30.77%) deviated). Of the 9 feet with preoperative subluxed incongruity, 5 (55.56%) continued to have joint incongruity postoperatively.
Results

The joint congruity determined at the postoperative final follow-up was determined as a statistically significant development compared to the preoperative period ($p = .016$)

<table>
<thead>
<tr>
<th></th>
<th>Postoperative joint congruency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Congruent</td>
</tr>
<tr>
<td>Preoperative joint congruency</td>
<td></td>
</tr>
<tr>
<td>Congruent</td>
<td>37</td>
</tr>
<tr>
<td>Incongruent</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
</tr>
</tbody>
</table>

Table 2 Comparison of preoperative and postoperative joint congruency results

(n = 50 feet in 43 patients)
Results

• The preoperative HVA, IMA, DMAA, difference in metatarsal length, sesamoid position and joint incongruity were defined as predicting parameters which may cause recurrence. An HVA value > 15° was taken as a recurrence criteria and regression analysis was applied according to this.

• The most important factor affecting recurrence was found to be preoperative joint congruity ($p = .002$).

**Table 3 Variables in the equation**

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable(s) entered on step 1: Preoperative joint congruency (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Step 1</td>
<td>Preoperative joint congruency (1)</td>
</tr>
<tr>
<td></td>
<td>Constant</td>
</tr>
</tbody>
</table>

*Logistic Regression Analysis

a. Variable(s) entered on step 1: Preoperative joint congruency.
Discussion

• The most significant finding of this study was that joint incongruity is a preoperative predicting factor of recurrence.
• The success criteria are generally evaluated by the HVA and IMA values and the improvement in the functional score (5-8).
• Attempts have been made to correlate the radiological improvement obtained in HVA and IMA with clinical success.
• This does not explain cases which show sufficient recovery in terms of HVA and IMA and then develop recurrence.
Discussion

- In the current study, in cases with high preoperative DMAA, no effect was determined on the increase in postoperative HVA, recurrence or clinical results. A high DMAA of the metatarsal head may have excellent metatarsophalangeal joint congruity. Even when the HVA is very high, there may be congruity of the joint. This situation is related to the size of the DMAA.
Conclusion

• Scarf osteotomy is a method which can be safely applied to achieve an effective angular improvement in hallux valgus deformities, with good stabilisation, early weight-bearing and regained function.

• Recurrence of HVA following scarf osteotomy is thought to develop in cases with poor preoperative first metatarsophalangeal joint congruity rather than from angular deformities.

• When good surgical technique is applied and recurrence and bad functional results are encountered, poor joint congruity should be taken into consideration rather than high HVA.
References