Distal versus Proximal Metatarsal Osteotomy for the Correction of Hallux Varus as Complication of Hallux Valgus Surgery

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

- Surgical options of hallux varus following surgery for hallux valgus
  - Medial capsular release
  - Corrective osteotomy
  - Tendon transfer
  - Arthrodesis

No studies comparing the results of corrective metatarsal osteotomy at different level

The Purpose of this study

- To compare the clinical and radiological outcomes of two types of metatarsal osteotomy in hallux varus deformity as complication of hallux valgus surgery
  : Distal chevron vs Proximal chevron
Material and Methods(I)

- Hallux varus correction following hallux valgus surgery by a single surgeon

- Underwent chevron metatarsal osteotomy with medial displacement and a medial closing wedge osteotomy along with a medial capsular release, but without tendon transfer

- Two groups based on their operative treatment
  - **Group A**
    - Distal chevron metatarsal osteotomies
    - 22 patients
    - Mean F/U of 23 months (14 to 42)
    - All females
    - Mean age 46.7 years
  - **Group B**
    - Proximal chevron metatarsal osteotomies
    - 26 patients
    - Mean F/U of 20 months (12 to 47)
    - All females
    - Mean age 42.5 years
Case

Group A
F/49
Pre-op. Post-op.

Group B
F/52
Pre-op. Post-op.
Material and Methods (II)

Clinical and radiographic assessment
- American Orthopaedic Foot and Ankle Society (AOFAS) scoring system
- Hallux valgus angle (HVA)
- First-second intermetatarsal angle (IMA)
- Distal metatarsal articular angle (DMAA)
- Mean relative length ratio of the first and second metatarsals

Statistical analysis
- Paired t-test and independent t-test
- Mann-Whitney’s U-test
- P < 0.05
- SPSS 12.0 for windows
Results(II) – Intragroup comparison

Clinical Assessment

- **AOFAS score**

![Graph showing AOFAS score for Group A and Group B with Pre-op and Post-op bars, indicating a significant change P<0.05.]

Radiographic Assessment

- **Group A**

![HVA, IMA, DMAA graphs showing angular measurements indicating significant change.]

- **Group B**

![HVA, IMA, DMAA graphs showing angular measurements indicating significant change.]

- Mean relative length ratio of the 1st. and 2nd. metatarsals

<table>
<thead>
<tr>
<th></th>
<th>Pre OP</th>
<th>Post OP</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group A</strong></td>
<td>1.01</td>
<td>0.98</td>
<td>P&lt;0.05</td>
</tr>
<tr>
<td><strong>Group B</strong></td>
<td>0.98</td>
<td>0.97</td>
<td>P&lt;0.05</td>
</tr>
</tbody>
</table>

*, Paired t-test. The p values are for intragroup comparisons.
## Results(II) – Intergroup comparison

<table>
<thead>
<tr>
<th>Pre- and Post-operative data</th>
<th>Group A (N = 22)</th>
<th>Group B (N = 26)</th>
<th>P-value *</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOFAS</td>
<td>77 → 92</td>
<td>72 → 90</td>
<td>0.482</td>
</tr>
<tr>
<td>HVA, degree</td>
<td>-11.9 → 5.1</td>
<td>-13.1 → 4.8</td>
<td>0.885</td>
</tr>
<tr>
<td>IMA, degree</td>
<td>-0.5 → 2.7</td>
<td>-1.5 → 8.3</td>
<td>0.041</td>
</tr>
<tr>
<td>DMAA, degree</td>
<td>11.7 → 1.2</td>
<td>8.5 → 5.7</td>
<td>0.033</td>
</tr>
<tr>
<td>Mean relative length ratio of the 1st. and 2nd. metatarsals</td>
<td>1.01 → 0.98</td>
<td>0.98 → 0.97</td>
<td>0.297</td>
</tr>
</tbody>
</table>

*, Mann-Whitney U-test & independent t-test. The p values are for intergroup comparisons.
Discussion(I)

- Combined causes of hallux varus following surgery for hallux valgus
  - Excessive lateral release
  - Excision of the lateral sesamoid or lateral head of the FHB
  - Overcorrection of the IMA
  - Excessive medial capsulorrhaphy
  - Excessive resection of the medial eminence

Main cause from the radiographs of the 48 feet in our study:
- Overcorrection of the IMA
- Excessive excision of the medial eminence with overcorrection of the IMA
- Soft-tissue imbalance with an IMA > 0°

∴ We performed metatarsal osteotomy rather than soft tissue procedure alone.
Chevron ostetotomy with a medial closing wedge is a reliable operation for improvement of the DMAA, IMA and joint congruity.

We found that

- **Proximal chevron osteotomy with medial closing wedge**
  - “6.6° greater increase in the correction of the 1st. And 2nd. IMA”

- **Distal chevron osteotomy with medial closing wedge**
  - “7.7° greater decrease in the correction of DMAA”

Hallux valgus had been treated by scarf osteotomy in 30 patients (63%) and proximal chevron osteotomy in 18 patients (37%), but we could not determine which type of osteotomy is more likely to lead to hallux varus.
Conclusion

- Both distal chevron and proximal chevron osteotomy...

  - Capable of adequately correcting hallux varus
  - Not significantly different except for the correction power of the first-second IMA and DMAA

  - Precautious review should be taken into consideration when choosing the level of metatarsal osteotomy due to different correction power associated with each technique.