Comparison Between With K-Wires Only And Combined Screw Fixation In Proximal Reverse Chevron Osteotomy (PCMO) For Hallux Valgus Deformity

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Disclosure

NO CONFLICT TO DISCLOSE

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We have no potential conflicts with this presentation.
Comparison Between With K-Wires Only And Combined Screw Fixation In PCMO For Hallux Valgus Deformity

- **Surgical methods for hallux valgus more than 100**
  - correction of deformity (cosmetic)
  - pain relief
  - restoration of 1st MT joint function
  - Ozkurt B et al, Foot Ankle Int, 2008

- **Fixation for PCMO : K-wire, Screw, Plate**
  - K-wire : Loosening or pull-out (osteoporotic↑)
  - Plate : no accurately contoured to the bone (loss of correction↑)

- Moderate to severe HV: Proximal metatarsal osteotomy
- Few reports according to comparison of fixation method
  - K-wire or screw only comparison
  - Biomechanical study

- **Hypothesis:** Additional fixation
  - Better outcome, Better stability
  - Early weight-bearing, Lower recurrence

- **Purpose of study:**
  - Osteotomy site fixation : K-wires only vs. Combined screw
  - Compare to K-wire only
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- **Retrospectively enrolled patients**
  - K-wires only : Group A (2008.02 ~ 2011.01)
  - K-wires×2 + additional screw : Group B (2011.11 ~ 2013.03)

- **Inclusion criteria**
  - Moderate to severe hallux valgus (by Mann)
  - Proximal reverse chevron osteotomy(PCMO)
  - At least 1 year follow-up

- **Exclusion criteria**
  - Revision of hallux valgus
  - Any other previous foot surgery
  - Patients using plate

- **Conducted by a single surgeon**
- K-wires only (Group A) / Additional screw (Group B)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Fixation group</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>K-wires only</td>
<td>K-wires + Screw</td>
</tr>
<tr>
<td>Age(yrs)</td>
<td>45.7</td>
<td>55</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>8 (8.2%)</td>
<td>1 (2.5%)</td>
</tr>
<tr>
<td>Female</td>
<td>90 (91.8%)</td>
<td>39 (97.5%)</td>
</tr>
<tr>
<td>Side operated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td>59 (50.4%)</td>
<td>30 (53.6%)</td>
</tr>
<tr>
<td>Left</td>
<td>58 (49.6%)</td>
<td>26 (46.4%)</td>
</tr>
<tr>
<td>Follow-up(mo)</td>
<td>17</td>
<td>16.3</td>
</tr>
</tbody>
</table>

- **Surgical procedure**
- Post-op shoe for 6 weeks
- Early weight bearing & ambulation

- **Clinical evaluation**
  - AOFAS hallux MTP-IP scores
  - Visual Analog Scale(VAS) pain score
  - Subjective Patient satisfaction criteria (4 groups)
    1) Very Satisfied
    2) Satisfied
    3) Satisfied with some reservation
    4) Unsatisfied

- **Radiologic evaluation**
  - Hallux valgus angle (HVA)
  - Intermetatarsal angle (IMA)
  - Medial sesamoid position (MSP) : 4 position assessment
  - 1st to 5th metatarsal width (1-5MTW)
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- Patient Satisfaction

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<th>Variable</th>
<th>Fixation group</th>
<th>p-value</th>
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<tbody>
<tr>
<td></td>
<td>K-wires only (A)</td>
<td>Additional Screw (B)</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>1</td>
<td>53 (45.3%)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>46 (39.3%)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>12 (10.3%)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>6 (5.1%)</td>
</tr>
</tbody>
</table>

1: Very Satisfied, 2: Satisfied, 3: Satisfied with some reservation, 4: Dissatisfied

- K-wires only (Group A): about 85% (more than satisfied)
- Additional screw (Group B): about 93% (more than satisfied)
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**Hallux Valgus Angle**

- **K-wires Only (A)**
  - Preop: 34.7°
  - Final: 9.1°
- **Additional Screw (B)**
  - Preop: 38.5°
  - Final: 9.2°

**Medial Sesamoid Position**

- **K-wires Only (A)**
  - Preop: 2.6
  - Final: 0.5
- **Additional Screw (B)**
  - Preop: 2.7
  - Final: 0.4

**1st to 5th Metatarsal Width**

- **K-wires Only (A)**
  - Preop: 95.9 mm
  - Final: 83.6 mm
- **Additional Screw (B)**
  - Preop: 96.8 mm
  - Final: 84.8 mm

**Intermetatarsal Angle**

- **K-wires Only (A)**
  - Preop: 14.5°
  - Final: 6.4°
- **Additional Screw (B)**
  - Preop: 18.0°
  - Final: 5.3°
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- IMA increase between post-op 6 weeks & final follow up

![Intermetatarsal Angle Chart]

- K-wires only (A): $p < 0.05$
- Additional screw (B): $p > 0.05$
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Discussion

- **Reverse chevron method**:
  - COR of correction (more proximal than chevron)

- **K-wires only (Group A) & Additional screw (Group B)**
  - Both favorable outcome: Radiologic & Clinical evaluation ($p<0.05$)

- Proximal Chevron Osteotomy
  - **K-wire fixation < Screw fixation**
    - Anderson RB et al., Foot Ankle Int, 1997

- Proximal crescentic osteotomy
  - **K-wire fixation < Screw fixation**

- Ludloff osteotomy: the load-to-failure
  - 2 screws > 1 Screw + two K-wires ($p>0.05$)

- Crescentic osteotomy: the load-to-failure
  - 1 screw < 1 Screw + two K-wires ($p=0.05$)
    - Jung HG., et al, Foot Ankle Int, 2005
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- IMA increase between post-op 6 weeks & final follow up
  K-wires only (Group A) : 5.1° → 6.4° ($p < 0.05$)
  Additional screw (Group B) : 5.0° → 5.3° ($p > 0.05$)

- Stability for fixation : K-wires + screw > K-wires

- Decreasing recurrence rate?
  Final HVA > 20° or $\Delta$HVA (post-op 6 weeks – final f/u) > 10°

<table>
<thead>
<tr>
<th>Method</th>
<th>Recurrence Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-wires only (Group A)</td>
<td>2.6%</td>
</tr>
<tr>
<td>Additional Screw (Group B)</td>
<td>1.8%</td>
</tr>
</tbody>
</table>

$($p > 0.05$)$

Limitation of study
- Different population between group A & B
  - Period
  - Radiologic variable
  - Pain
  - Count of cases
- Unable to assess inter-observer reliability tests
- Follow up period is relatively short
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Conclusion

1. PCMO with K-wires & PCMO with K-wires & Additional Screw (Barouk ®)
   - Radiologic & Clinical outcome: Both Same Satisfactory results

2. IMA difference between post-op 6weeks & last follow up
   - K-wires only: 5.1 → 6.4 (\( p < 0.05 \))
   - Additional screw: 5.0 → 5.3 (\( p > 0.05 \))

3. Future study warranted
   - Additional screw for better stability
   - Early weight-bearing & ambulation
   - Decrease of recurrence rate
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References

12. Taik-Seon Kim, M.D., Kyu-Bok Kang, M.D., Jong-Woo Kang, M.D., Hak-Jun Kim, M.D.: The Differences between Fixation Devices for Proximal Chevron Osteotomy in Hallux Valgus Surgery