Mid-Term Results of Triple Osteotomy in Hallux Valgus with Highly Increased Distal Metatarsal Articular Angle

Kyung Tai Lee, M.D., Ki Won Young, M.D.*, Young Uk Park, M.D., Hyuk Jegal, M.D., Jin Su Kim, M.D. *

Foot & Ankle Service, KT Lee’s Orthopedic Hospital, Seoul, Korea
Foot & Ankle Clinic, Department of Orthopedic Surgery
Eulji Medical Center, Eulji University School of Medicine, Seoul, Korea *
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Hyuk Jegal, M.D.

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

Distal Metatarsal Articular Angle (DMAA)

- Difficult to measure
  longitudinal rotation & varus deviation

  * normal < 6 degree or less
  6.3 ~ 13 degrees
  poor interobserver reliability

- Proximal metatarsal osteotomy
  \( \rightarrow \) more increase DMAA

- Cause of “Recurrence “& “1st MTP stiffness”
  after hallux valgus surgery

Many reports for Highly Increased DMAA

✓ Biplanar distal chevron osteotomy
  Coughlin, Surgery of the Foot & Ankle 1993

✓ Double osteotomy
  Caio Nery et al, Foot Ankle Int 1998

✓ Triple osteotomy
  Bruyn J Foot Ankle Surg 1993

Coughlin, Foot Ankle Int 1999

Kyung Tai Lee, J Korean foot ankle 2007
The Purpose of this study

1. To Evaluate the "midterm" clinical & radiological results

2. Compare the results with short term results
Material & Methods

- From Oct. 2003 to Apr. 2005
- 459 hallux valgus surgery by a single surgeon
- 11 feet of 10 patients underwent Triple osteotomy
- 9 feet of 7 patients available follow up (3 moderate / 6 severe)
- Median age 45.5 years
- The median follow-up 74 months
- 6 women / 1 man

Operative Technique

- Proximal chevron osteotomy
- Biplane distal chevron osteotomy
- Akin osteotomy
**Clinical Evaluation**
- AOFAS Hallux score / VAS score
- ROM of 1st MTP joint
- Overvalll Patient satisfaction
- Shoe selectivity

**Radiographic Evaluation**
- HVA, IMA, DMAA
- Length of 1st metatarsal
- Ratio of 1st & 2nd metatarsal length
Case F/28

Pre-op.  2003-10-20 Immediate postop.  2004-7-19 POD 9M  2010-10-30 POD 7Y
Results (I)

Clinical Outcome - midterm

- **AOFAS Hallux score**
  - Pre-op: 66.4
  - 74M: 90.5
  - P = 0.0002

- **VAS score**
  - Pre-op: 4.3
  - 74M: 1.2
  - P = 0.005

- **ROM of 1st MTP Joint**
  - Pre-op: 52.7°
  - 74M: 52.5° (overall)
  - (34.3°/18.5° → 33°/18°, DF/PF)

- **Satisfaction**
  - 6 excellent, 3 good

- **Shoe selectivity**
  - None (0/9) → 6/9

- **Transfer metatarsalgia**
  - 4 → 1
Results (II)

Radiographic Outcome - midterm

- The overall ratings for 9 feet improved

Significant difference between mid- and short term results

ROM of 1st MTP joint is increased at the mid term follow-up

Transfer metatarsalgia: None 1 (p = n.s.)
**Discussion**

The subjective results were closely related to the motion at the first MTP joint

Johnson and colleagues J Pediatr orthop 2004;24(4) : 359-62

There are no correlation between satisfaction and 1st MTP joint motion in our study ( r = 0.65, p = ns )

<table>
<thead>
<tr>
<th></th>
<th>HVA correction</th>
<th>IMA correction</th>
<th>DMAA correction</th>
<th>satisfaction</th>
<th>Transfer metatarsalgia</th>
<th>1st MTPJ Stiffness</th>
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<tbody>
<tr>
<td>MJ Coughlin</td>
<td>23°</td>
<td>9°</td>
<td>14°</td>
<td>81%</td>
<td>1</td>
<td>4 of 21</td>
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<td>33 months f/u</td>
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<td>1999</td>
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Our Study

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<th>Good ~ Excellent</th>
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<tr>
<td>74 months</td>
<td>26.2°</td>
<td>6.5°</td>
<td>23.3°</td>
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▪ **Complications after Triple osteotomy**

- Stiffness : most common complication
- major determinant of patient satisfaction
  Peterson, 1993
- AVN
- Shortening & Transfer metatarsalgia
- Recurrence

ROM of 1st MTP joint is increased at the mid term follow-up

34.3°/18.5° → 25°/13.5° → 33°/18° (DF/ PF)

Preoperative total ROM averaged 86° → 69° at a minimum 1 year → 86° at 8 year follow-up

Veri et al Foot Ankle Int 2001
Conclusion

Triple osteotomy …

- Functional improvement with good satisfaction at midterm follow up

- Reliable treatment option

for the moderate to severe hallux valgus with increased DMAA

* Clinician must be aware of the DMAA in all patients to optimize the success of surgical correction
3. Corte-Real NM; Moreira RM: Modified biplanar chevron osteotomy. Foot Ankle Int. 30:1149-53, 2009
5. Coughlin MJ; Carlson RE: Treatment of hallux valgus with an increased distal metatarsal articular angle: evaluation of double and triple first ray osteotomies. Foot Ankle Int. 20:762-70, 1999
6. El Said AG; Tisdel C; Donley B; Sferra J; Neth D; Davis B: Foot Ankle Int. 27:1041-8, 2006
10. Nery C; Barroco R; Ressio C: Biplanar Chevron osteotomy. Foot Ankle Int. 23:792-8, 2002
12. Robinson AH; Cullen NP; Chhaya NC; Sri-Ram K; Lynch A: Variation of the distal metatarsal articular angle with axial rotation and inclination of the first metatarsal. Foot Ankle Int. 27:1036-40, 2006.