# INTERMEDIATE-TERM FOLLOW UP FOR THE MODIFIED MAU OSTEOTOMY FOR THE CORRECTION OF HALLUX VALGUS: A STUDY OF 190 FEET

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## DISCLOSURES

- I have no personal disclosures

## INTRODUCTION

- Hallux valgus is a common complaint
- 140 described surgical techniques

## INTRODUCTION

- Paucity of literature regarding the Mau Osteotomy in the treatment of hallux valgus.
- Neese et al 1989 series of 21 patients
- Glover et al 2008 series of 24 patients
- Thangarajah et al 2013 series of 23 patients

## INTRODUCTION

- 1926 – Mau introduced his osteotomy for intrinsic stability.

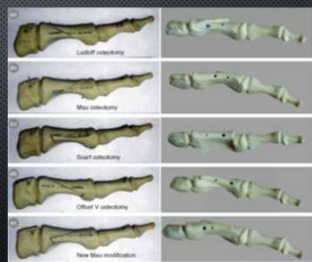
## BIOMECHANICS

- Highest stiffness and load to failure[1]
- Intrinsically stable with forefoot loading[2]
- Highest stiffness, Significantly stiffer than Scarf[3]

1. Trnka 2000
2. Acevedo 2002
3. Unal 2010

## BIOMECHANICS

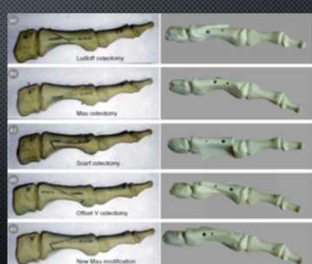
- Acevedo et al 2002 – Proximal Chevron, Scarf and Mau intrinsically stable with forefoot loading



Unal 2010

## BIOMECHANICS

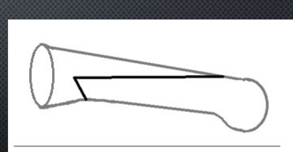
- Unal 2010 – Mau highest stiffness, modified Mau significantly stiffer than Scarf



Unal 2010

## INTRODUCTION

- 2007 – Sammarco introduced a modification of the Mau osteotomy
- July 2008 – we began using this technique



## OUR INDICATIONS

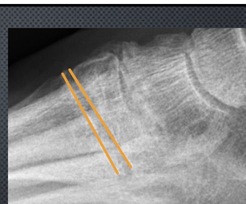
- First MTP congruence
  - Distal chevron versus Silver with Akin

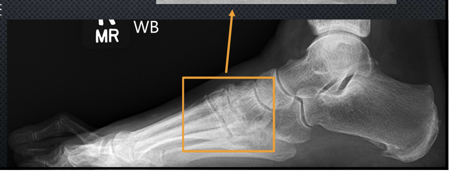
## OUR INDICATIONS

- First MTP Incongruence
  - Modified Mau with associated Distal Soft Tissue Release +/- Akin

## OUR INDICATIONS

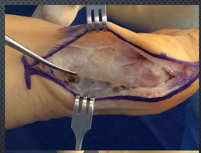
- First TMT sag/Hypermobility
  - First TMT fusion with associated Distal Soft Tissue Release

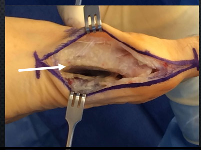




## MODIFIED MAU TECHNIQUE

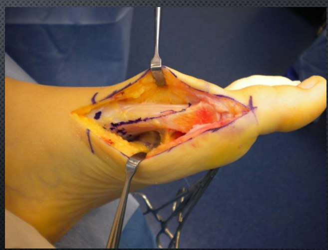
- Modified Mau performed after medial eminence resection and distal soft tissue release
- Osteotomy apex at or just above abductor ridge 1cm distal to 1st TMT





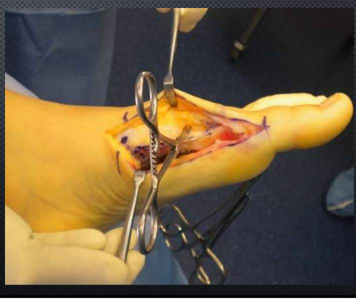
## MODIFIED MAU TECHNIQUE

- Exit proximal to distal metaphyseal flare
- Plantar limb acute to long limb



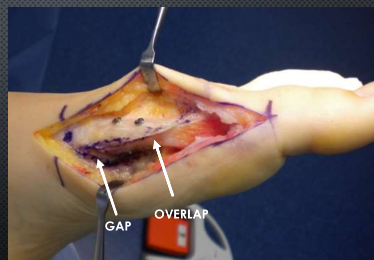
## MODIFIED MAU TECHNIQUE

- Rotate with proximal axis +/- slight lateral translation and clamp



## MODIFIED MAU TECHNIQUE

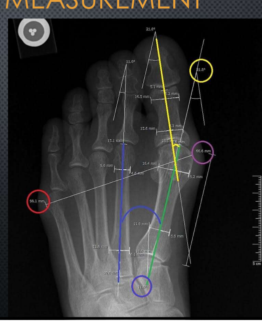
- Fixation with 2.4mm screws




## MODIFIED MAU TECHNIQUE


## WB RADIOGRAPHIC MEASUREMENT

- Hallux Valgus Angle (HVA)
- 1-2 Intermetatarsal Angle (1-2 IMA)
- First Metatarsal Length
- Forefoot width



## OUR STUDY

- Study Period: July 2008 - November 2015
- Inclusion: Modified Mau osteotomy, >18 yo, pre- and post-op WB XR available

## OUR PATIENTS

- 176 pts, 190 feet (18 m, 158 f; 90 r, 100 l)
- Average age 56 years (18-84 y)
- Average follow up 11.46 months (1.13-73.3 m)
- 86/190 included Akin Osteotomy

## RESULTS

Table 1. Pre-operative, post-operative and final follow up measurement data.

| | | Pre-operative | | | | Post-Operative | | | | Final Follow-Up | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | n | Mean | SD | Min | Max | Mean | SD | Min | Max | Mean | SD | Min | Max | Δ | p-value* |
| 1-2 IMA (°) | 190 | 14.9 | 3.3 | 6.5 | 25.8 | 7.9 | 4.3 | -3.0 | 19.7 | 9.3 | 4.4 | -2.8 | 21.3 | 5.6 | <0.0001 |
| HVA (°) | 190 | 30.3 | 7.8 | 2.2 | 55.2 | 13.4 | 9.5 | -12.5 | 35.4 | 12.8 | 11.5 | -24.5 | 40.6 | 17.5 | <0.0001 |
| (a) w/ isolated 1st met osteotomy | 104 | 29.9 | 7.9 | 2.2 | 47.0 | 15.1 | 9.9 | -9.0 | 35.4 | 13.9 | 12.3 | -24.5 | 38.6 | 16.1 | <0.0001 |
| (b) w/ Akin osteotomy | 86 | 30.7 | 7.7 | 14.7 | 55.2 | 11.2 | 8.5 | -12.5 | 33.1 | 11.5 | 10.3 | -14.6 | 40.6 | 19.2 | <0.0001 |
| Δ 1st Metatarsal Length (mm) | 190 | 67.0 | 5.4 | 51.9 | 83.0 | 66.8 | 5.9 | 52.4 | 85.1 | 65.2 | 5.9 | 52.4 | 83.8 | 1.9 | <0.0001 |
| Δ Forefoot Width (mm) | 190 | 100.8 | 7.7 | 84.3 | 126.2 | 91.2 | 8.5 | 70.3 | 119.5 | 93.3 | 8.2 | 74.5 | 123.6 | 7.4 | <0.0001 |
| (a) w/o bunionette treatment | 179 | 100.7 | 7.8 | 84.3 | 126.2 | 91.4 | 8.3 | 74.6 | 119.5 | 93.6 | 8.1 | 74.5 | 123.6 | 7.1 | <0.0001 |
| (b) w/ 5th met lateral condylectomy | 8 | 102.1 | 5.0 | 91.8 | 106.3 | 89.7 | 10.9 | 73.9 | 101.1 | 91.2 | 8.4 | 75.8 | 103.5 | 11.0 | 0.0095 |
| (c) w/ 5th met condylectomy & osteotomy | 3 | 99.4 | 5.0 | 94.0 | 103.8 | 82.2 | 11.1 | 70.3 | 92.2 | 82.0 | 5.7 | 75.5 | 86.3 | 17.5 | 0.009 |

* comparison from final f/u to pre-operative baseline

## RESULTS

| DEFORMITY | AVERAGE PREOP 1-2 IMA | AVERAGE FINAL 1-2 IMA | Δ 1-2 IMA | Δ HVA | Δ 1st MT LENGTH | Δ FOREFOOT WIDTH |
|---|---|---|---|---|---|---|
| Mild (n=47) | 11.1° | 7.63° | 3.5° | 13.98° | -1.89mm | -6.53mm |
| Moderate (n=79) | 14.2° | 8.97° | 5.21° | 16.89° | -2.44mm | -7.69mm |
| Severe (n=64) | 18.5° | 10.90° | 7.62° | 20.85° | -1.17mm | -7.77mm |

## COMPLICATIONS

- No infections requiring operative debridement
- No cases of "Troughing"

Coetzee, 2003

## COMPLICATIONS

17 PTS (8.9%) WITH COMPLICATIONS REQUIRING REVISION SURGERY

- Hallux Varus: 7
- 1ST MTP contracture: 3
- HV recurrence: 2
- 1ST MT FX about a screw: 2
- Delayed union: 1
- Malunion: 1
- Nonunion: 1
- Symptomatic hardware: 1
- Hardware failure: 1

## Hallux varus: ↓ incidence with time

- Corrective power initially underappreciated

## Discussion

- Neese et al: 21 pts, all deformities, no comps listed
- Glover et al: 24 pts, moderate-severe, 20% undercorrected, 37% nonunion
- Thangarajah et al: 23 pts, moderate-severe, no undercorrection or nonunion

## Discussion

- Glover et al 2008 series of 24 patients
- Moderate to severe deformity
- 20% undercorrected
- 37% nonunion rate

## DISCUSSION

- THANGARAJAH ET AL 2013 SERIES OF 23 PATIENTS
- MODERATE TO SEVERE DEFORMITY
- NO CASES OF UNDERCORRECTION OR NONUNION

## DISCUSSION

- LARGEST STUDY GROUP IN LITERATURE BY 8-FOLD
- MILD, MODERATE, AND SEVERE INCONGRUENT DEFORMITIES
- 8.9% COMPLICATION RATE

## CONCLUSIONS

- LARGEST CONSECUTIVE CASE SERIES
- VERSATILE OSTEOTOMY
- MILD, MODERATE AND SEVERE DEFORMITY

## Conclusions

- Comparable correction to Scarf and Proximal Chevron osteotomies
- Equivalent complication rates

## Conclusions

- Allows large degree of correction
- Maintains 1st MT length
- Allows for lengthening if desired

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