Amount of shortening following the Lapidus procedure (measure pre and post 1st metatarsal protrusion to determine shortening)

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The Lapidus

- First Metatarsal Cuneiform Joint Arthrodesis

Hallux Abductovalgus

- "Bunion"
- Carl Hueter
  - Subluxation of the 1st MPJ by lateral deviation of the great toe and medial deviation of the 1st metatarsal
  - Lateral deviation of the articular surface of met head with out subluxation

Anatomy

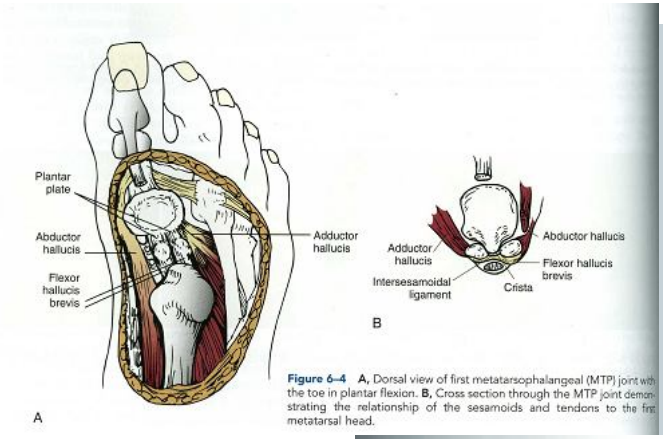


Figure 6–4 A, Dorsal view of first metatarsophalangeal (MTP) joint with the toe in plantar flexion. B, Cross section through the MTP joint demonstrating the relationship of the sesamoids and tendons to the first metatarsal head.

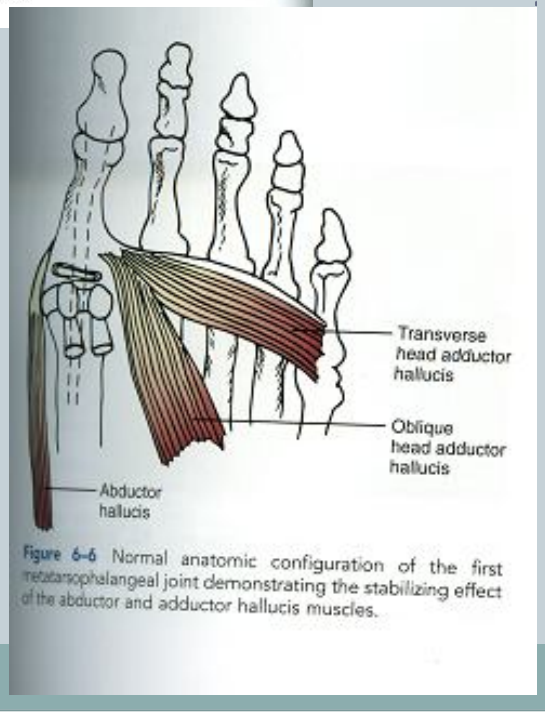
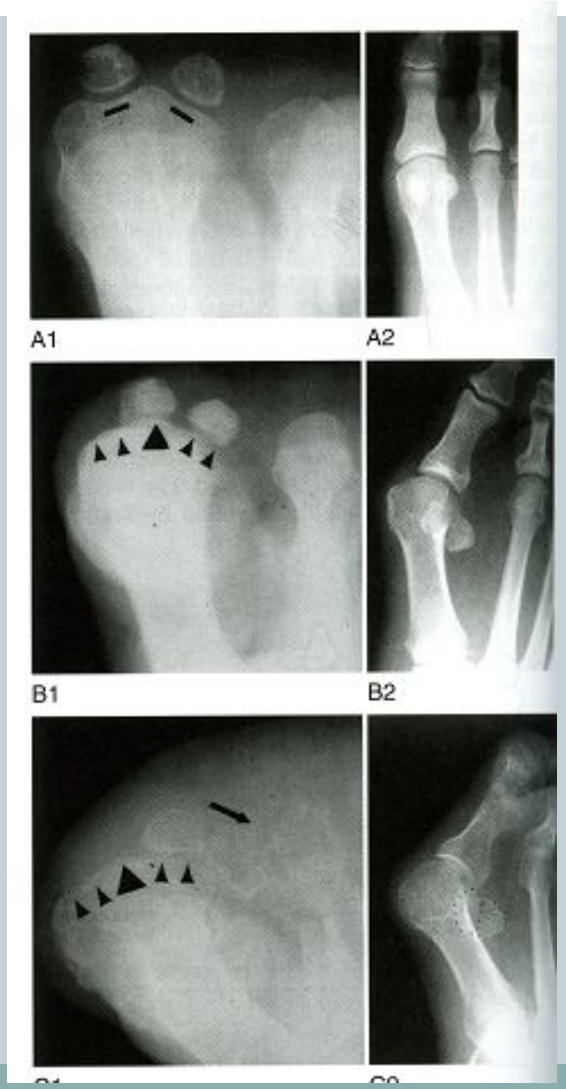


Figure 6–6 Normal anatomic configuration of the first metatarsophalangeal joint demonstrating the stabilizing effect of the abductor and adductor hallucis muscles.

- 4 muscle groups which move the Hallux
  - Dorsal Group
    - EHL anchored medially and laterally by the hood ligament
    - EHB inserts beneath the hood into the base of the proximal phalanx
  - Plantar Group
    - FHL passes centrally through the sesamoid complex
  - Abductor Hallucis
  - Adductor Hallucis

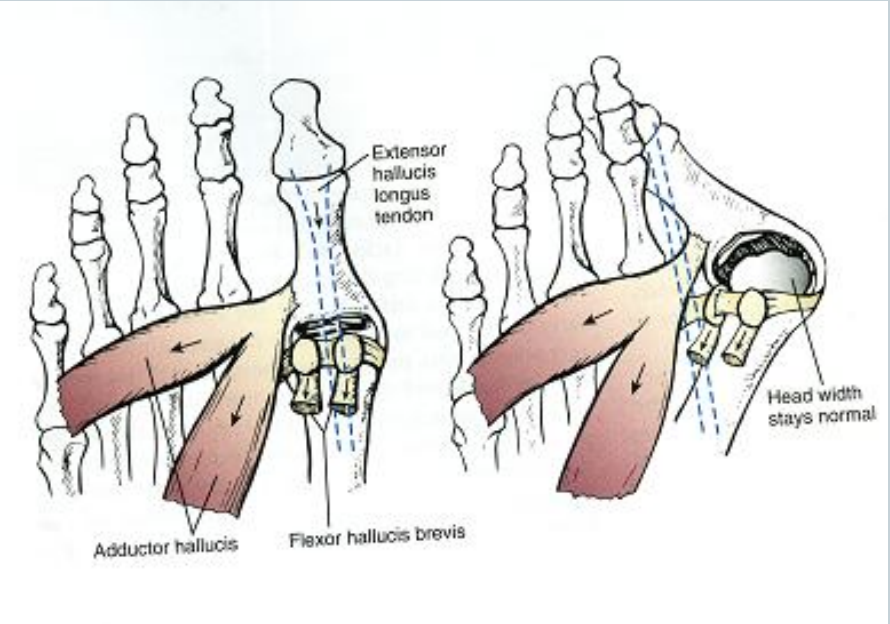
Pathoanatomy

- Metatarsal becomes destabilized → subluxate medially → Tendons about the MTP joint drift laterally
- Plantar aponeurosis and windlass mechanism contribute to stability of 1st ray but, with HAV deformity → decreased stability
- Lateral deviation of prox phalanx → metatarsal head medially → exposes sesamoids → crista eroded



Pathoanatomy

- EHL displaced laterally
  - Contraction causes extension and adduction
- Abductor Hallucis loses all abduction power
- FHL moves laterally adding to the deforming forces

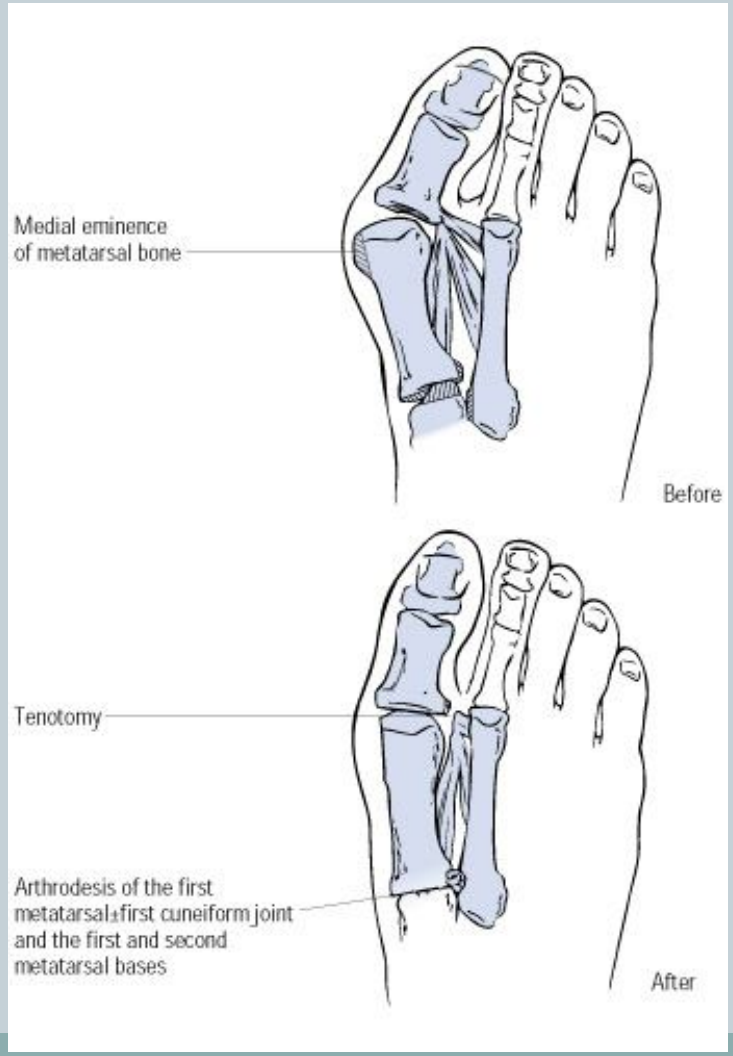


History

- First described by Albrecht in 1911 and published in Russian Literature
- Paul Lapidus (1934)
  - Described a procedure that was virtually identical to Albrecht's
  - Resection of the lateral base of the 1st metatarsal
  - Wrote multiple publications advocating the use of the 1st metatarsal fusion

The Lapidus

- Resection of the Medial Eminence
- Lateral Release
- Removal of cartilage from the base of the 1st metatarsal
- Wedge of bone is resected from the medial cuneiform to reduce the intermetatarsal angle



Indications

- Intermetatarsal Angle > 18 degrees
- Metatarsus Primus Varus
- Hypermobile First Ray

- Paralytic Hallux Valgus
- Osteoarthritis of the 1st metatarsal cuneiform joint

- Ancillary procedure for correction of pes planus

Contraindications

- Shortened First Ray
- Juvenile Hallux Valgus with an open epiphysis
- Moderate Hallux Valgus without excessive first ray hypermobility
- DJD of the 1st MPJ
- Young Athlete

Study

AMOUNT OF SHORTENING FOLLOWING THE LAPIDUS PROCEDURE

Hypothesis

- Many studies have shown that the Lapidus Bunionectomy leads to multiple lesser metatarsal problems, including but not limited, to a subluxed 2nd MPJ, stress fractures, and lesser metatarsal transfer lesions.

- Our study will prove that if with enough plantarflexion of the first metatarsal, even with first metatarsal shortening, none of the above will occur.

Purpose

- The purpose of this retrospective study is to determine the amount of shortening which occurs following the Lapidus Bunionectomy.
- The study will also be examining the amount of plantarflexion in the first metatarsal.
- Transfer lesions, correction of the hallux valgus deformity, and boney union will also be evaluated in this study.

Materials and Methods

- Retrospective study
- 2003-2007
- 61 patients, 66 feet
  - 48 female patients
  - 13 male patients

Radiographic Analysis

- First Metatarsal Protrusion Distance
- First Metatarsal Declination Angle
- Meary's Angle
- Hallux Abductus Angle
- First Metatarsal Cuneiform Joint Fusion

Clinical Analysis

- Transfer lesions
- Complications

Operative Procedure

1. 7 cm longitudinal incision at the dorsal aspect of the first metatarsal cuneiform joint (MTC) and medial to the EHL.
2. MTC capsule is incised at the dorsomedial aspect with subperiosteal dissection at the base of the 1st metatarsal, MTC joint is then exposed and identified.
3. Using a sagittal saw cartilage was removed from the base of the first metatarsal taking care to be perpendicular to the long axis of the first metatarsal and taking as minimal bone as possible.
4. A wedge of bone is removed from the medial cuneiform laterally in order to reduce the intermetatarsal angle, always taking care to take a minimal amount.
5. Using a 2.9 drill, holes were made to promote arthrodesis.
6. Small wedge of bone is removed from the lateral aspect of MTC joint

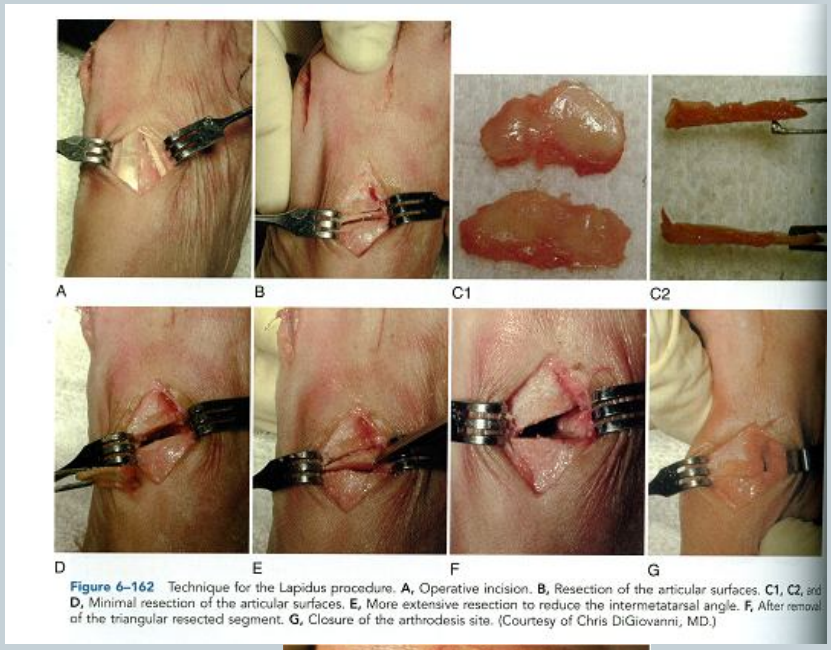
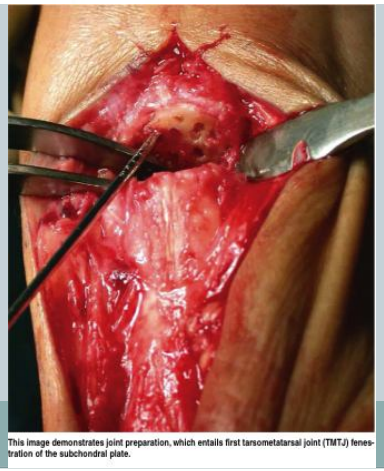


Figure 6–162 Technique for the Lapidus procedure. **A,** Operative incision. **B,** Resection of the articular surfaces. **C1, C2,** and **D,** Minimal resection of the articular surfaces. **E,** More extensive resection to reduce the intermetatarsal angle. **F,** After removal of the triangular resected segment. **G,** Closure of the arthrodesis site. (Courtesy of Chris DiGiovanni, MD.)


This image demonstrates joint preparation, which entails first tarsometatarsal joint (TMTJ) fenestration of the subchondral plate.

Operative Procedure

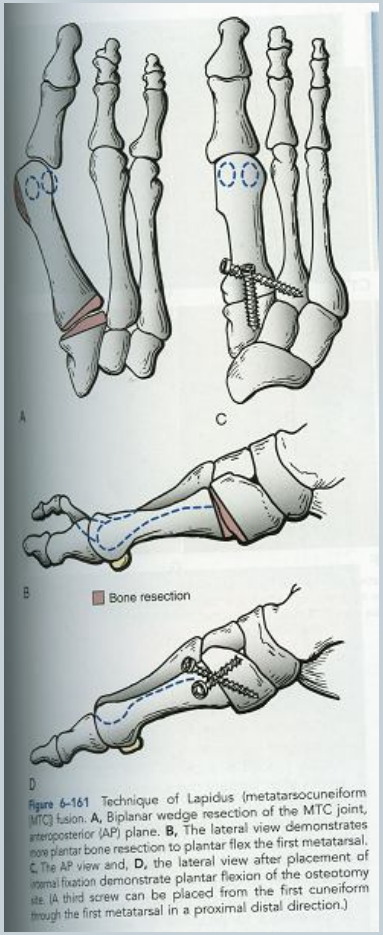
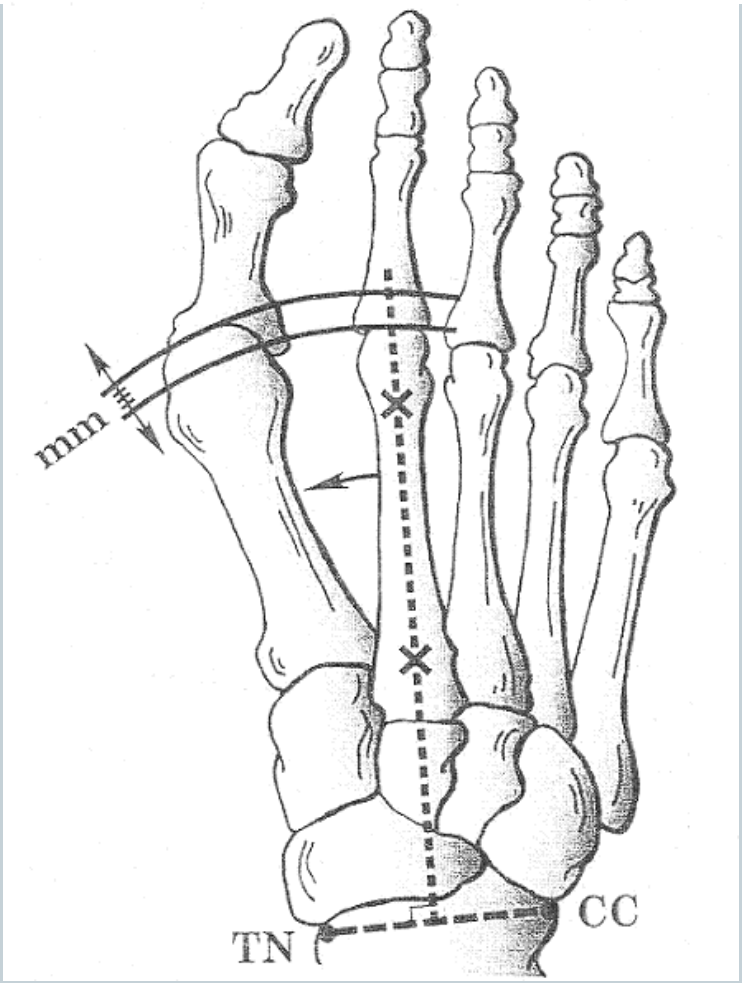


Figure 6-161 Technique of Lapidus (metatarsocuneiform [MTC] fusion. **A,** Biplanar wedge resection of the MTC joint, anteroposterior (AP) plane. **B,** The lateral view demonstrates more plantar bone resection to plantar flex the first metatarsal. **C,** The AP view and, **D,** the lateral view after placement of internal fixation demonstrate plantar flexion of the osteotomy site. (A third screw can be placed from the first cuneiform through the first metatarsal in a proximal distal direction.)

7. Stabilize arthrodesis site with 0.062 K-wires making sure to reduce the intermetatarsal angle and slightly plantar flex the first metatarsal. Confirm position with C-arm.
8. Three 4.5 screws were inserted; one from dorsal distal to plantar proximal across the first MTC, one from medial to lateral from the first metatarsal to the second metatarsal using a washer, and another proximal dorsal to distal medial across the first MTC, all done according to AO technique.
9. Confirm position with C-arm and remove K-wires.
10. Attention was the directed to the lateral aspect of the heel where a small stab incision was made. Soft tissue is dissected off the lateral calcaneus.
11. Using a 3.5 drill, holes were made into the cortex; a curette was used to remove multiple scoops of bone, thereby gathering a cancellous calcaneal bone graft. The area was then flushed and sutured with 4-0 nylon.
12. Using a bur, holes were made dorsally over the fusion site; the bone graft was then packed tightly in a shear strain graft fashion.
13. Final C-arm pictures can be taken. Deep closure with 3-0 vicryl, subcutaneous with 4.0 vicryl and skin closure with 4-0 nylon.

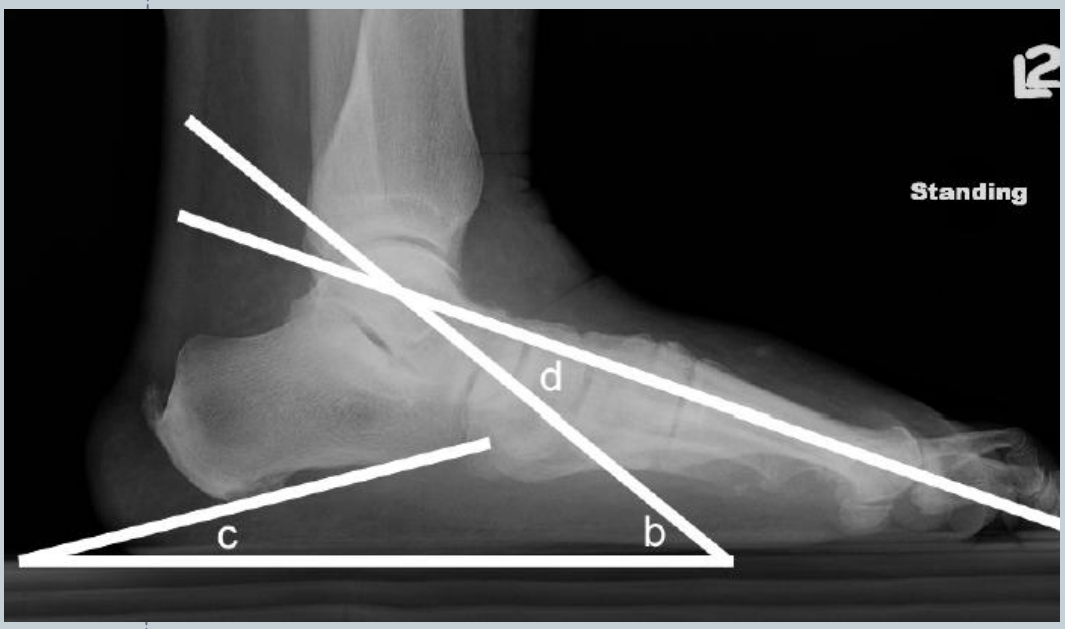
1st Metatarsal Protrusion Distance



- Results
  - Pre-op: 2.5mm
  - 1 week post-op: 4.7mm
  - 3 month post-op: 5.4mm

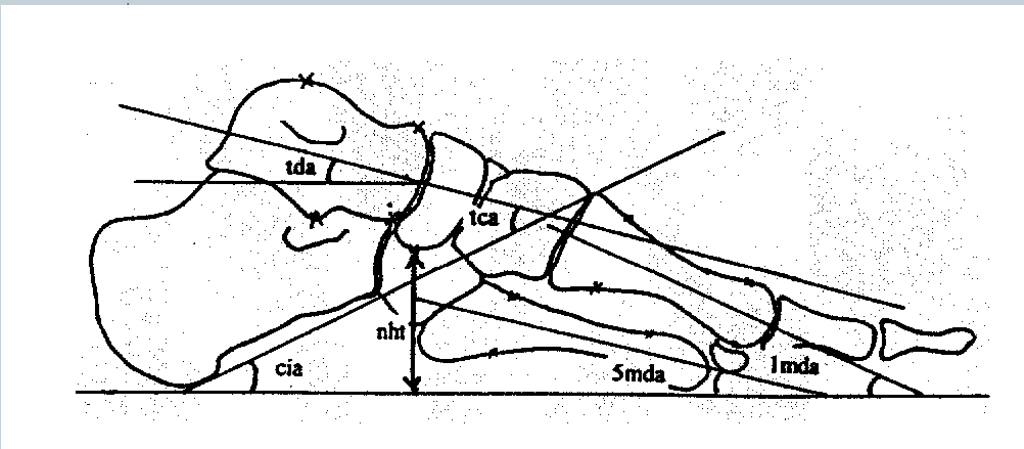
Meary's Angle

- Results (in degrees)
  - Pre-op: 7.2
  - 1 week post-op: 7.0
  - 3 months: 7.2
  - 6 months: 6.9
  - 12 months: 6.2



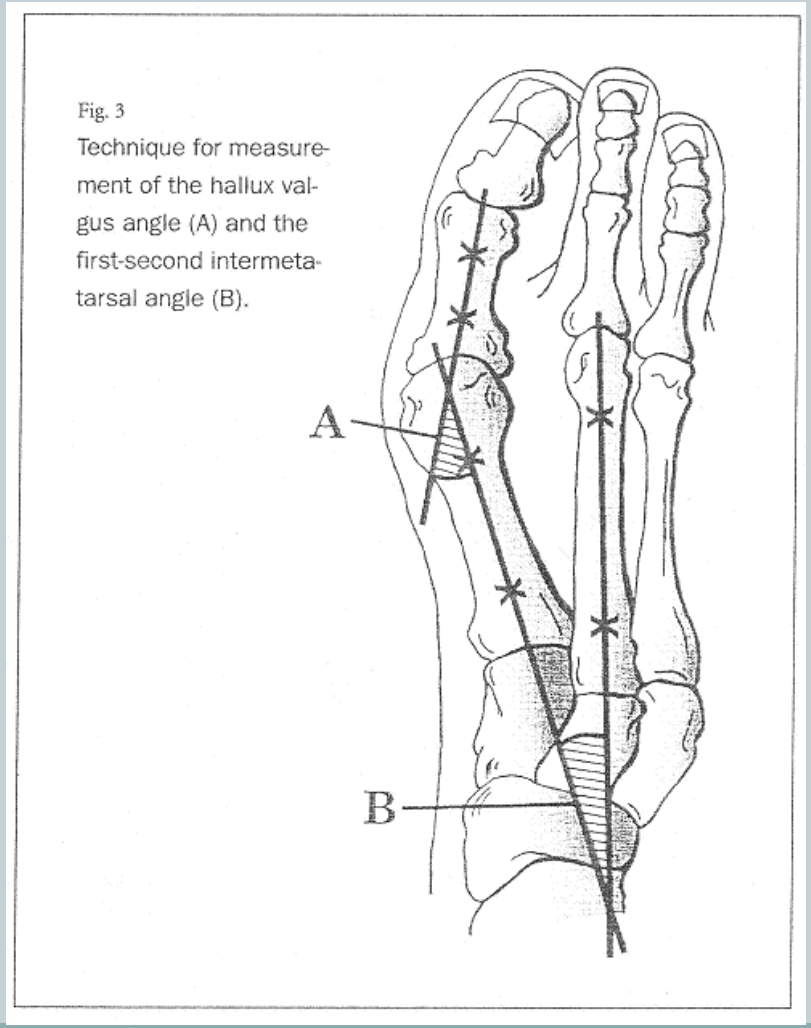
First Metatarsal Declination Angle

- Results (in degrees)
  - Pre-op: 20.0
  - 1 week post-op: 23.7
  - 3 months: 23.2
  - 6 months: 23.0
  - 12 months: 23.3



Hallux Abductus Angle

- Results (in degrees)
  - Pre-op: 22.5
  - 1 week post-op: 10.1
  - 3 months: 11.2
  - 6 months: 11.5
  - 12 months: 11.6



Clinical Results

- Transfer Lesions
  - Sub 3rd Metatarsalgia
- 100% fusion at the 1st met-cuneiform joint
  - No malunion
  - No non-union
- Complications
  - Screw breakage x3
    - No associated symptoms
  - Hallux Varus

Study Limitations

- Retrospective in nature
- Patient not in angle and base of gait
- Obfuscation by hardware or due to under/over exposure of radiographs were not included

Conclusion

- The Lapidus, when properly plantarflexed and fixated, is an excellent procedure for the correction of hallux abductovalgus with minimal risk of transfer lesions and lesser metatarsalgia.

- Although shortening of the 1st ray following the Lapidus is common, this did not cause further problems due to the adequate plantarflexion of the first metatarsal.

Thank You!

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