Adult Hallux Valgus I: The Underlying Factors

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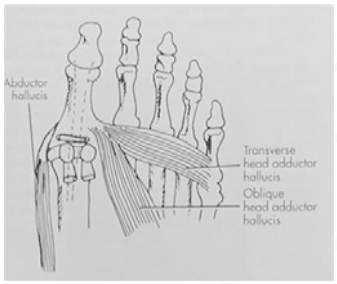
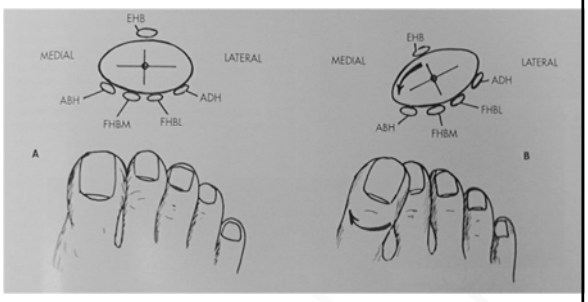
What is the Deformity?

- Lateral Deviation of the Hallux
- Prominence of the Metatarsal Head
- *Pronation* of the Toe

Anatomy - Abductor / Adductor



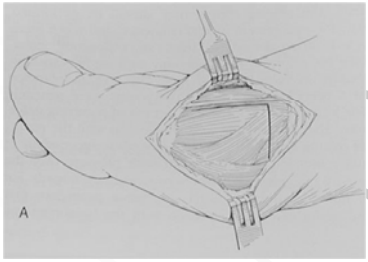
Anatomy - Active Deformers



Pronation makes matters Worse!

Anatomy - Passive Restraints

The Medial Capsule



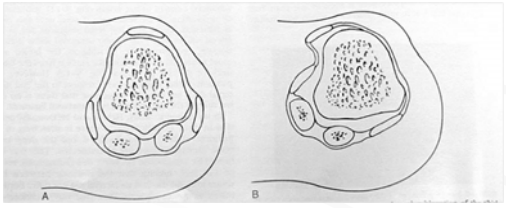
Summary Slide

- Anatomy - Passive Restraints

Anatomy - Passive Restraints

The 2nd Toe

Anatomy - Passive Restraints



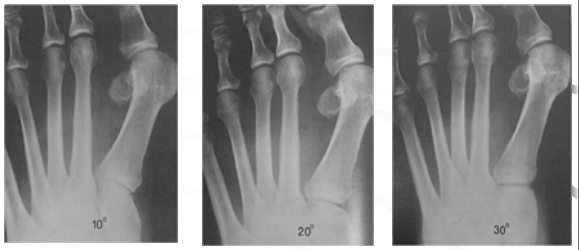
The Crista

Anatomy - Static Alignment

Metatarsus Primus Varus

Intermetatarsal Facet or Os Intermetatarsarium

Anatomy - 1st MTC Obliquity

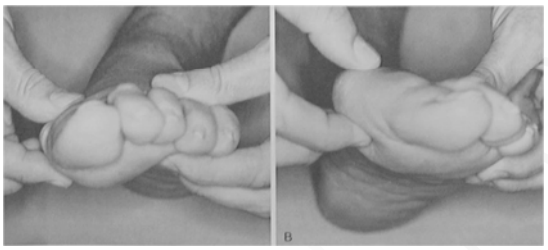


Can be difficult to evaluate. Consistent radiographic technique!

Anatomy - 1st MTC Instability

Standing Lateral

Anatomy - 1st MTC Instability



Anatomy - Joint Congruency

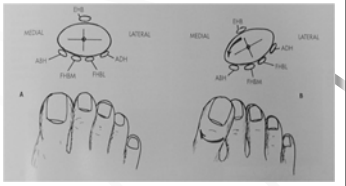
Anatomy - Interphalangeus

Anatomy - Metatarsus Adductus

Positive Feedback - Established Deformities Get Worse

Medially Directed Dynamic Force

Pronation Worsens the Angle of Pull



1st MTP Fusion Usually Results in a Decrease of the IM 1-2 angle

Sources of Pain in Hallux Valgus

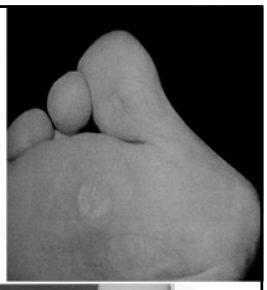
- Medial Eminence
- 2nd Toe
- Metatarsosesamoid Articulation
- Dorsomedial Cutaneous Nerve
- Transfer Metatarsalgia

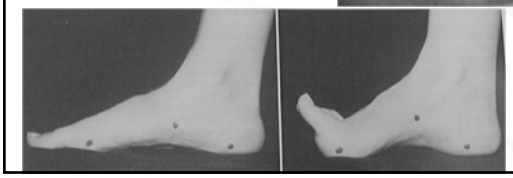
Dorsomedial Cutaneous Nerve

- Terminal Branch of SPN (occasionally saphenous)
- Subcutaneous, palpable
- Often directly impinged upon by shoewear

Transfer Lesion

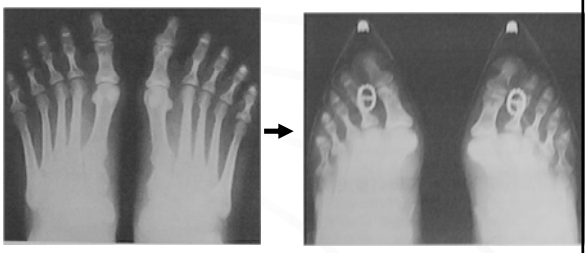
Windlass mechanism is disrupted by severe hallux valgus





So What Causes It?

Shoewear - The Primary Culprit



- Lam and Hodgson - JBJS 1958, China
  - Prevalence of Hallux Valgus
    - 1.9% in unshod populations
    - 33% in shod populations

Japanese experience - little hallux valgus until 1970's. Number of factories making western shoes exceeded those making traditional clogs.

Multiple Studies of unshod populations find a low incidence of mild hallux valgus with metatarsus primus varus . . .

MacLennan, New Guinea

Wells, South African natives

Barnicot and Hardy, West Africa

Eagle and Morton, Belgian Congo

James, Solomon Islands

First Descriptions of Hallux Valgus

- France, 1700's. Correlated with early development of modern shoewear.

In Sum . . .

- Hallux valgus usually occurs due to constrictive shoewear in susceptible individuals. The "dose-response" curve is unknown.
- The other factors may dictate how susceptible a person is and how the deformity is to be treated.

Treatment Algorithm

- IM 1-2 Angle of 13 degrees or less
  - Distal Osteotomy
    - Chevron (Austin) typically
      - Once considered problematic in older patients
      - Allows early weightbearing

- IM 1-2 Angle of over 13 degrees
  - Proximal osteotomy

- Intermediate Angles (possibly) of 13-16 degreeg
  - Chevron with Akin
  - Shaft Osteotomy (SCARF)

- Instability of the 1st TMT
  - "Hypermobility of the 1st Ray"
  - Lapidus Procedure

- Increased DMAA
  - Closing wedge distal osteotomy
    - Or in combination

- Hallux Valgus Interphalangeus
  - Akin Procedure

- DJD or Spasticity (CP, Head Injury)
  - 1st MTP Fusion

Chevron and Lateral Release

- Blood flow to the metatarsal head after chevron bunionectomy (Kuhn et. al. - FAI 2006)
  - Intraoperative laser doppler on 20 patients
    - 45% decrease after medial capsulotomy
    - 13% decrease after lateral release and adductor tenotomy
    - 13% decrease after chevron osteotomy
  - 0% AVN
  - 100% union rate

Case #1

45 year old female
stockbroker

Case #1

45 year old female
Stockbroker

High IM Angle
Intermetatarsal Facet
No DJD

Case #1

45 year old female
Stockbroker

High IM Angle
Intermetatarsal Facet
No DJD

Proximal Osteotomy

Case #2

60 y.o. homemaker

Case #2

Severe Deformity
1st TMT Instability

Case #2

Severe Deformity
1st TMT Instability

Lapidus Procedure

Case #3

35 y.o. laborer

Case #3

35 y.o. laborer

Metatarsus Adductus
2nd MTP DJD

Case #3

35 y.o. laborer

Metatarsus Adductus
2nd MTP DJD

Correction Limited by any Method, likely TMT Fusion
Decompress 2nd toe

Case #4

45 y.o. realtor

Case #4

45 y.o. realtor

Mild Deformity
Sesamoid Subluxation

Case #4

45 y.o. realtor

Mild Deformity
Sesamoid Subluxation

Distal Chevron

Case #5

20 y.o. student

Case #5

20 y.o. student

Congruent Joint
Hallux Valgus Interphalangeus

Case #5

20 y.o. student

Congruent Joint
Hallux Valgus Interphalangeus

Akin Procedure

Hallux Varus

- Vast Majority are Iatrogenic following failed Bunion Surgery

Hallux Varus

- Bony Causes –
  - Negative IM 1-2 Angle

Hallux Varus

- Bony Causes –
  - Overresection of metatarsal head

Hallux Varus

- Bony Causes –
  - Lateral Tilt of Metatarsal Head

Hallux Varus

- Soft Tissue Causes
  - Overtightening of medial structures
  - Excessive lateral release
  - Postoperative Dressing

Hallux Varus - Treatment

- Correct Underlying Bony Causes
- Medial Release
- Consider Fusion if excessively stiff, arthritic, or lack of bone stock
  - Also most reliable

Hallux Varus - Treatment

- Tendon Transfers – Multiple options described
  - EHL
  - EMB
  - Adductor
  - Abductor

Question *From OITE 2007*

- Which of the following procedures is most likely to result in a recurrence when used to correct a hallux valgus deformity with a 14-degree intermetatarsal angle, a 35-degree hallux valgus angle, and a preoperative incongruent joint?
- 1- Proximal Chevron osteotomy
- 2- Proximal crescentic osteotomy
- 3- First tarsometatarsal fusion (Lapidus)
- 4- Isolated distal soft-tissue reconstruction (modified McBride)
- 5- Proximal oblique metatarsal osteotomy (Ludloff)

Question *From OITE 2006*

- 111. A 28-year-old woman who previously underwent excision of the lateral (fibular) sesamoid for a painful intractable plantar keratosis now has a painful hypertrophic callus under the medial (tibial) sesamoid. Shoe modification and symptomatic treatment have failed to provide relief. She is now requesting excision of the remaining sesamoid. What is the most common surgical complication from this procedure?

- 1- Claw toe deformity
- 2- Painful neuroma
- 3- Painful scar
- 4- Hallux varus
- 5- Hallux valgus

Question *From OITE 2006*

- A 44-year-old woman has a symptomatic bunion and a painful plantar callus under the second metatarsal head that continues to limit her activity and shoe wear despite the use of shoe modifications. Radiographs show an intermetatarsal angle of 18 degrees, a hallux valgus angle of 38 degrees, and a first metatarsal that is shorter than both the second and third metatarsals. When considering surgical options, each of the following first metatarsal procedures are appropriate for this patient EXCEPT

- 1) Z osteotomy (Scarf)
- 2) oblique proximal osteotomy (Ludloff)
- 3) distal chevron osteotomy
- 4) proximal crescentic osteotomy
- 5) Lapidus procedure

Question *From OITE 2002*

A 60-year-old woman has a painful bunion. Her foot examination is normal except for the hallux valgus deformity. A standing AP radiograph is shown in Figure 12. Because the patient would like definitive correction of the deformity, the best course of action should be…

- 1-resection arthroplasty (Keller arthroplasty).
- 2-arthrodesis of the metatarsophalangeal joint.
- 3-distal soft-tissue realignment procedure and a proximal metatarsal osteotomy.
- 4- distal metatarsal osteotomy (chevron procedure).
- 5- distal metatarsal osteotomy (chevron procedure) and a proximal phalangeal osteotomy (Akin).

Question *From OITE 1999*

A 48-year-old man has a painful hallux valgus deformity that has failed to respond to nonsurgical management. A standing AP radiograph of the foot shows an intermetatarsal angle of 20 degrees and a hallux valgus angle of greater than 40 degrees. Which of the following procedures will most likely result in the greatest amount of patient satisfaction?

- 1. Keller arthroplasty
- 2. Distal first metatarsal osteotomy
- 3. Arthrodesis of the first metatarsophalangeal joint.
- 4. Double-stemmed Silastic implant arthroplasty
- 5. Distal soft-tissue reconstruction and a proximal metatarsal osteotomy

Question *From OITE 1999/2000*

The development of a hallux varus deformity after bunion surgery is most commonly related to

- 1. undercorrection of the intermetatarsal angle
- 2. inadequate repair of the lateral capsule of the metatarsophalangeal joint
- 3. the development of osteonecrosis of the metatarsal head
- 4. excessive resection of the medial eminence of the metatarsal head
- 5. failure of the sesamoids to their normal position

Question *From OITE 2002*

138. Six months after undergoing a distal soft-tissue realignment procedure to correct a hallux valgus deformity, the patient notes progressive deformity and shoe wear problems. A standing radiograph is shown in Figure 32. What is the most likely cause of this problem?

- 1- Under correction of the intermetatarsal angle
- 2- Inadequate repair of the medial capsule of the metatarsophalangeal joint
- 3- Excessive release of the lateral capsular soft tissues
- 4- Contracture of the flexor hallucis longus
- 5- Contracture of the medial metatarsosesamoid ligament

Question *From OITE 2000*

- A 21-year-old patient with cerebral palsy and lower extremity spasticity has a painful bunion deformity. Shoe wear modification has failed to provide relief. A standing AP radiograph of the foot shows a large bunion deformity with an intermetatarsal 1-2 angle of 14° and a hallux valgus angle of 30°. Surgical treatment of the hallux should consist of a

- 1- metatarsophalangeal arthrodesis.
- 2- metatarsophalangeal resection arthroplasty.
- 3- distal chevron bunionectomy.
- 4- first metatarsal-tarsal fusion with distal soft-tissue realignment.
- 5- simple bunionectomy with an Akin osteotomy of the proximal phalanx.

Question *From OITE 2003*

What is the most frequently encountered complication following juvenile hallux valgus correction?

- 1- Recurrence of the deformity
- 2- Hallux varus
- 3- Transfer metatarsalgia
- 4- Nonunion of the first metatarsal osteotomy
- 5- Osteonecrosis of the first metatarsal head

Question *From OITE 2000*

Which of the following findings is considered a contraindication to soft-tissue release and proximal crescentic osteotomy of the first metatarsal in a patient with a juvenile bunion?

- 1- A hallux valgus angle of greater than 40°
- 2- A distal metatarsal articular angle of greater than 15°
- 3- An intermetatarsal angle of 14°
- 4- An incongruent metatarsophalangeal joint
- 5- Hypermobility of the first ray