Hallux Abducto Valgus
Surgical Treatment & Postoperative Management

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History – Hallux Abducto Valgus

- 1781 Nicholas LaForest
- 1881 Reverdin
- 1887 Wyeth
  - Arthrodesis of the 1st MPJ
- 1904 Keller
- Arthroplasty of the 1st MPJ
History – Hallux Abducto Valgus

♦ 1919 Juvara
  – Described 1st osteotomy
♦ 1925 Akin, Lapidus
♦ 1942 American College of Foot Surgery
♦ 1952 Swanson
  – Implant
♦ 1981 Austin
Bunion 735.0

♦ Hallux abducto valgus
♦ aka Hallux valgus
♦ Medial eminence at the 1st MTP joint with/without hallux deviation
Bunion: hallux abducto valgus

- Increased 1st intermetatarsal angle (IM)
- Increased hallux abductus angle (HA)
- Deviated sesamoid position
HAV Symptoms

♦ Dull 1\textsuperscript{st} metatarsal phalangeal joint pain
  – Dorsal pain due to limited dorsiflexion
  – Plantar pain due to sesamoid dislocation
  – Medial pain due to stress on neurovascular structures
  – Joint pain due to cartilage erosion
HAV Symptoms

- Aggravated by
  - Shoes
  - Ambulation
  - Exercise
Anatomy of the 1st MTP joint

♦ Collateral ligaments
♦ Sesamoidal ligaments
♦ Deep transverse ligament
♦ Capsule
♦ Sesamoids within the capsule and Flexor Hallucis Brevis
Anatomy of the 1st MTP joint

- Synovial ellipsoid joint
- 65-70 degrees dorsiflexion
- 1st metcuneiform joint
  - Synovial planar
Anatomy of hallux valgus

- Laterally deviated proximal phalanx
  - Adductor hallucis
- Extensor hallucis longus bowstrings laterally
  - Dorsiflexion of the hallux
- Erosion of crista plantarly
Etiology of Hallux Valgus

♦ Biomechanical
  – Primarily hereditary
♦ Arthritic
  – Rheumatoid
♦ Neuromuscular
  – Cerebral palsy
♦ Genetic
Biomechanics of HAV

♦ Hypermobile 1\textsuperscript{st} ray
  – Weak peroneus longus
♦ increased pronation during propulsion
♦ Lateral subluxation of the proximal phalanx
  – Transverse head of the adductor hallucis
Biomechanics of HAV

- Sesamoids migrate laterally
- 1st metatarsal deviates medially
  - Metatarsus primus adductus
- Retrograde force from proximal phalanx
  - Hallux abductus
Biomechanics of HAV

- Compensated forefoot varus
- Compensated rearfoot varus
- Flexible flatfoot deformity
- Ankle joint equinus
- Torsional deformity
  - Metatarsus adductus
Physical Exam of the HAV patient

♦ Gross examination
♦ Joint range of motion
  – 1\textsuperscript{st} MPJ
  – 1\textsuperscript{st} metatarsocuneiform joint
♦ Trackbound ROM
♦ Subtalar, Ankle ROM
♦ Equinus
♦ Gait evaluation
Physical Exam of the HAV Patient

♦ Associated deformities
  – Hammertoes
  – Tailors bunion
  – Hallux limitus
  – 1st metcuneiform exostosis
  – Pes planus
Radiographic Evaluation

- Weightbearing x-ray
- AP and lateral views
- 1st Intermetatarsal angle (IM)
  - Normal 0-8 degrees
- Hallux abductus angle (HA)
  - Normal 0-15 degrees
Radiographic Evaluation

- Proximal Articular Set Angle (PASA)
- Distal Articular Set Angle (DASA)
  - Normal 0-8 degrees
  - Measures articular cartilage changes
Radiographic Evaluation

- Hallux Interphalangeus angle (HI)
  - Normal 0-10 degrees
  - Determines if proximal phalangeal correction necessary
Radiographic Evaluation

- Metatarsus Adductus angle (MA)
  - Greater effective IM angle than measured
Radiographic Evaluation

- Tibial sesamoid position
  - Normal 1-3
Radiographic Evaluation

- Length of 1st metatarsal
- Shape of 1st metatarsal head
Radiographic Evaluation

- Bone density
- Cortical thickness
- Cystic changes
- Joint space
- Subchondral sclerosis
- Osteophytes
Deformity Types in HAV

- Structural deformity
- Positional deformity
- Combined deformity
Deformity Types in HAV

- Congruous
- Structural
  - Increased PASA
  - Increased DASA
  - PASA+DASA=HA
  - Articular surface primary cause of deformity
Deformity Types in HAV

- Deviated or Subluxed
- Positional
  - Normal PASA
  - Normal DASA
  - HA increased
  - Soft tissue contracture primary cause of deformity
Deformity Types in HAV

- Deviated or Subluxed
- Combined
  - Increased PASA
  - Increased DASA
  - PASA+DASA<HA
  - Both articular cartilage position and soft tissue contracture involved
Surgical Treatment for HAV

♦ Goals of Surgery
  – Pain relief
  – Pain free and adequate range of motion
  – Congruent joint
  – IM angle < 10 degrees
  – Reduction of sesamoid dislocation
  – Normal cosmetic appearance
Surgical Treatment for HAV

“A number of operations are possible only on paper, in drawings, or blueprints. Behind some of them lurks the desire of the progenitor to perpetuate his name by linking it to a supposedly new method.”

- Kelikian
Surgical Treatment for HAV

- Outpatient
- IV sedation (MAC)
- Local anesthetic block
- Preoperative antibiotics
  - Internal hardware
  - High risk patient
- Preop NSAID loading
  - Celebrex
Surgical Treatment

- Mild to moderate deformity (IM<16°)
  - Ostectomy with soft tissue release
  - Metatarsal head osteotomy
    - metaphysis
  - Proximal phalanx osteotomy
Surgical Treatment

♦ Mild to Moderate deformity
  – Reverdin 1881
  – Silver 1923
  – Hohman 1924
  – McBride 1928
  – Mitchell 1945
  – Wilson 1963
  – Austin 1981
Postoperative Course

♦ Mild to Moderate deformity
  – Immediate weightbearing following surgery
  – Bandaging, Surgical shoe/boot x 2 weeks
  – Transition to athletic shoe at 2-3 weeks
  – No high impact exercise x 3 months
  – Physical therapy initiated once incision healed
    • Reduce edema
    • Increase 1st MPJ ROM
    • Improve overall function
Surgical Treatment – Mild Deformity

- McBride
  - Simple ostectomy
  - Removal of fibular sesamoid
  - Adductor hallucis release
- Modified McBride
  - Fibular sesamoid not removed
Surgical Treatment – Mild Deformity

- Modified McBride
  - Older patient
  - Mild deformity
    - Positional type
  - IM angle 8-10 degrees
  - HA angle <40 degrees
Surgical Treatment – Mild Deformity

- Modified McBride
  - Immediate weightbearing
  - ROM exercises initiated immediately
    - Passive x 2 weeks
    - Active x 3 months
  - 6-8 weeks recovery
Surgical Treatment – Mild to Moderate Deformity

- Austin bunionectomy
  - Chevron osteotomy
  - Adductor release
  - Lateral shift of capital fragment
  - Kirchner wire
  - Single screw fixation
  - Indicated for mild to moderate structural or combined deformity
Surgical Treatment – Mild to Moderate Deformity

- **Austin bunionectomy**
  - Shorten/lengthen metatarsal
  - Dorsiflex/plantarflex metatarsal
  - Correct for abnormal PASA
Axis Guide

- K-wire placed centrally to metatarsal head
  - Sagittal plane
    - Dorsiflexion
    - Plantarflexion
    - Transverse plane only
Axis Guide

- Transverse plane
  - Shorten
  - Lengthen
  - No change in length
Austin Bunionectomy
Surgical Treatment – Mild to Moderate Deformity

♦ Kalish osteotomy (1987)
  - Provides for 2 screw fixation
  - More stable
  - Immediate weightbearing
  - 8-12 weeks recovery
Kalish bunionectomy
Kalish bunionectomy
Surgical Treatment

♦ Screw fixation – AO/ASIF principles
♦ Association for the Study of Internal Fixation (1958 Switzerland)
  – Compression of osteotomy allows for primary healing
  – Rigid stable fixation
  – Bone able to bear load
  – Decrease swelling, pain
  – Faster bone healing
Surgical Technique

♦ Lag screw
  - Allows for compression across osteotomy
Lag Screw technique
Akin osteotomy

- Adjunct to head procedure
- Wedge resection from the proximal phalanx
- Wedge base is medial with apex laterally
- Fixated with pins/wire or screw
  - Oblique cut with screw fixation
Akin osteotomy

- Proximal wedge
  - Increased DASA

- Distal wedge
  - Increased hallux interphalangeus (HI) angle
Akin osteotomy

- Oblique cut allows for screw fixation
Surgical Treatment

- Moderate deformity
  - IM 14-16 degrees
  - Shaft osteotomy
    - diaphysis
Surgical Treatment – Moderate Deformity

- Scarf bunionectomy
  - Very stable
  - 2 screw fixation
  - Ideal for medial incision
Surgical Treatment – Moderate Deformity

- Scarf Bunionectomy
  - Requires adequate bone stock
  - Risk of troughing
  - Risk of stress risers
Scarf Bunionectomy
Scarf bunionectomy
Scarf bunionectomy
Surgical Treatment

- Moderate to severe deformity (IM>16°)
- 1st metatarsal base osteotomy
- 1st metatarsocuneiform arthrodesis
- 1st MPJ arthrodesis
- 1st MPJ arthroplasty
Surgical Treatment – Severe Deformity

♦ Outpatient
♦ Nonweightbearing cast immobilization x 8-12 weeks
♦ Aggressive physical therapy
  – 1st MPJ ROM
  – Equinus
  – Strength, function
Closing Base Wedge Osteotomy

- Transverse wedge
- Fixation with wire or rigid plate fixation
- Very unstable
Surgical Treatment – Severe Deformity

♦ Juvara
  - Type A
    • Most common
    • Allows screw fixation
  - Type B
  - Type C
Juvara bunionectomy type A

- CBWO (Modified Closing Base Wedge Osteotomy)
  - 15 degree wedge resection
  - Intact medial hinge
  - More stable than transverse osteotomy
Juvara bunionectomy – Type B

- Similar to type A
- No medial cortical hinge
- Allows for sagittal plane manipulation
- Allows for shortening or lengthening
Juvara bunionectomy – Type C

♦ Oblique osteotomy without wedge
♦ Allows for swiveling and sliding
Juvara bunionectomy

♦ Disadvantages
  – Very unstable
  – Cast immobilization x 8-10 weeks
  – Metatarsal primus elevatus

♦ Advantages
  – Allows for screw fixation
  – Avoids epiphysis in juvenile HAV
Surgical Treatment – Severe Deformity

- Open base wedge osteotomy
  - Requires bone graft or special plate
- Proximal chevron
- Crescentic
  - Extremely unstable
  - Requires specific blade
Lapidus bunionectomy

- Fusion of the 1\textsuperscript{st} metatarsal-cuneiform joint
- Very unstable
- Ideal for hypermobile 1\textsuperscript{st} ray
Lapidus bunionectomy
Lapidus bunionectomy
Lapidus Bunionectomy
Lapidus Bunionectomy
Lapidus bunionectomy

- Shortens 1\textsuperscript{st} metatarsal
- Risk of 1\textsuperscript{st} metatarsal elevatus
  - Lesser metatarsalgia
- Larger incision required
- 10-12 weeks nonweightbearing shortleg fiberglass cast
1st MPJ arthrodesis

- Viable option for arthritic or severe deformity
- Positioning
  - 15-20 degrees dorsiflexion
  - 10-15 degrees abduction
- 8-10 weeks NWB cast
Keller bunionectomy

- Removal of the base of the proximal phalanx of the hallux
- Indicated for severe arthritis with bunion
- Indicated for older patient
Keller bunionectomy

- With or without K wire fixation
- Immediate partial to full weightbearing
- Reduction of pain vs. cosmetic result
Postoperative Management

- 1st MPJ Range of Motion
  - Iatrogenic hallux limitus

- Reduction of edema
  - Ice

- Return to normal gait
  - Compensation pain to lateral column
Postoperative Management

♦ 1st MPJ ROM
   – Theraband
   – Dynamic splinting
     • Increased ROM to 1st MPJ
     • Prolonged low load stretch
     • Better compliance than ROM exercises
Complications

♦ Infection
♦ Delayed union
♦ Avascular necrosis
♦ Noncompliance
♦ Hallux varus
Complications

♦ Gas gangrene
♦ Abscess
  – Usually within 3 days
♦ osteomyelitis
Complications

♦ Delayed union
  – >3 months
  – Bone stimulator

♦ Avascular necrosis (AVN)
  – Due to aggressive soft tissue debridement
  – Loosening of fixation
Complications
Complications
Bone will eventually heal
Complications

♦ Noncompliance with postop instructions
♦ Trauma
♦ Excessive activity
Complications

♦ Hallux varus
  - Over tightening of medial capsule
  - Staking the head
Complications

- Wrong procedure
  - Choosing the ‘easier’ procedure to accommodate the patient
Key Surgical Principle

- Surgery should be customized to each patient. Do not treat an “x-ray”
- Knowing how to do the surgery is “easy” but knowing what procedure to choose and when to perform that procedure is the real challenge
- Not all patients are good surgical candidates
Case Study

- IM angle 20 degrees
- Head procedure or base procedure?
Kalish bunionectomy
Kalish bunionectomy
Kalish bunionectomy
Kalish bunionectomy
Conclusion

- Vast majority of bunion procedures are modifications of the Austin bunionectomy
  - Immediate partial or full weightbearing
  - No cast
  - Early Range of Motion essential
  - Early surgical intervention prevents more complex procedure and prolonged postop recovery
Thank You