Session One: The Forefoot
Part 2: The Little Piggies

Lesser Toes:
Moderator: William C. McGarvey, MD

3:30 – 3:40 pm  Bone Loss Following Hammertoe Correction: Can the Toe Be Salvaged?
   Gregory C. Berlet, MD

3:40 – 3:50 pm  Off With Its Head: Transfer Metatarsalgia in a World of Sacrifice
   Gregory C. Berlet, MD

Lesser Toe Problems

II. Incidence
   • 300,000 hammertoe procedures in 2003 (medicare data base)
   • up to 45% of all forefoot procedures

II. Terminology
   • Hammertoe
     o MPJ extension
     o PIP flexion
     o DIP extension
   • Clawtoe
     o MPJ extension
     o PIP flexion
     o DIP flexion
   • Mallet toe
     o Isolated DIP flexion

III. Bone Loss in Toe Surgery
   • Most common with PIP surgery for fixed deformity
   • PIP arthroplasty (Coughlin MJ: FAI 21(2), 2000):
     o Hemi-resection of the PIP joint
     o 84% satisfaction with k wire fixation
     o no difference in outcome fusion vs fibrous
     o poor result: numbness and mal-alignment
   • PIP fusion:
     o Less risk of recurrence / higher sacrifice of bone
     o Multiple techniques: peg and socket, metallic implant
     o All around 90% satisfaction

IV. Salvaging the Toe Gone Bad
   • Define the problem
     o pain
     o instability
• shortening / cosmetics
• Fusion – insitu or lengthening depending on the goals with cosmetic goals driving you towards lengthening
• Lengthening a foreshortened toe at the PIP
  o Internal fixation to maintain length
  o K wire or metallic implant
  o If implant must be one that is intramedullary to allow for graft to be placed around it for example stafuse or protoe
  o Once length is set unicortical bone graft with cancellous graft from calcaneous
  o Caution: I usually let the tourniquet down when I am setting the length to avoid vascular spasm and a compromised toe

V. MTP Instability as a part of the problem
• Both hammertoe and clawtoe have MTP extension as part of the definition
• If residual MTP extension after correction of the PIP then the MTP must be addressed
• Options for MTP residual subluxation (in order or execution):
  o MTP capsulotomy
  o +/- Extensor tendon lengthening
  o +/- Decompression metatarsal osteotomy
  o +/- Plantar plate repair

VI. Persistent Pain in the Metatarsals differential diagnosis:
• fat pad atrophy (probably not a real diagnosis)
• fat pad dislocation (limited evidence)
• capsulitis/ MTP instability
• metatarsal abnormalities

VII. Non Operative Options for Metatarsalgia

5. Metatarsal Pads
• Using a met pad at 2nd met neck (Mueller et al. Phys Ther 86(6), 2006):
  o Peak plantar pressure decreased significantly at metatarsal head
  o Peak plantar pressure increased 300% at the 2nd met shaft

VIII. Operative Management for Metatarsalgia
• Be careful to not over promise
• Hatcher, Goller, Weil: JAMA 68(6), 1978:
  o 238 metatarsal osteotomies for metatarsalgia and callouses
  o Overall success of 56.5%
  o Transfer lesions in 40%

Plantar Condylectomy:
  o 2-3 mm of plantar condyle
  o improvement in 73% (Duvries 1953)

Metatarsal Head Osteotomies:
Multiple different techniques described

- Weil is the best tolerated by patient (Trnka et al: FAI 20 (2), 1999)
  - Weil (n = 15); Helal (n = 15)
  - Patients evaluated with both clinical and radiographic scoring
  - Weil osteotomy had:
    - Sig higher satisfaction
    - Lower recurrent metatarsalgia
    - Fewer transfer lesions
    - Higher AOFAS scores

- Debate as to whether the Weil osteotomy increases (Snyder et al: FAI 26(2), 2005) or decreases (Vandeputte et al: FAI 21(5), 2000) the plantar pressure or does not change it

- Lau et al: CORR 421; 2004
- Study questions:
  - Does angle of osteotomy matter?
  - Does a 4 mm slice resection help?
  - How does these compare to met head excision
- Study groups: weil (parallel and oblique), weil + 4 mm slice, head resection
- Conclusion (plantar pressures):
  - Weil parallel = Weil oblique
  - Weil + 4 mm slice did not change pressure
  - Only met head excision sig pressure

IX. Metatarsal Head Excision
- Pan metatarsal head excision used with success in RA
  - Originally described by Hoffman
    - RA with met head excision
    - 85%-95% satisfaction
    - Best results in those that were pinned
  - Problems with met head excision (Thomas et al: JBJS Am 88(1), 2006):
    - Progressive deformity in up to 50% (usually lateral deviation)
    - Metatarsalgia
    - Recurrent plantar keratosis

- Individual metatarsal head excision
  - Leads to transfer metatarsalgia
  - Isolated excision not recommended
  - If limited joint involvement try arthrolysis, shortening osteotomy instead of excision

X. Salvaging the Shortened Metatarsal
- Shorten all the adjacent ones and convert to a pan metatarsal head excision with fusion of the 1st MTP
- Isolated MTP fusion can be done but not recommended
- Lengthening theoretically possible but not recommended

- Clinical and radiographic assessment same as hallux rigidus
- Consider peri-articular osteotomies in the case of asymmetric 1st MTP arthritis where a joint sparing alternative is desired
- Watch for evolving options like particulate cartilage grafting
- If you have 1st MTP arthritis after your bunion patient satisfaction will go down compared to primary bunion reconstruction
- Patient satisfaction for 1st MTP fusion as a salvage for arthritis after bunion is 72%

XI. Conclusions: Bad Toes and Bad Metatarsals

  - **Resection arthroplasty:**
    - Has stood the test of time for RA
    - Do best with 1st MTP fusion
    - All met heads must come out
    - Some momentum for met head preservation
    - Isolated met head excision does not work
    - An option for really bad forefoot deformity that nothing else will work on

  - **Bone Defects in Toes:**
    - Evidence supports bone preservation
    - PIP arthroplasty has the same clinical results as PIP fusion
    - Lengthening over an implant with bone graft can work
    - Be aware of risk of vascular spasm

NOTES