The Rheumatoid Forefoot: Joint-Sparing Vs. Joint-Ablation

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I) Background
A) Pathophysiology
   1) Synovitis, pannus
   2) Ligament attenuation, failure
   3) Joint erosions, cartilage loss, arthritis

B) Pathomechanics
   1) Hallux
      a) Progressive valgus
      b) Unloads hallux, transfers stress to lesser MTPs
      c) Loss of windlass mechanism, arch flattening, 1st TMT instability
   2) Lesser MTPs
      a) Progressive subluxation → dislocation
      b) Intrinsic minus, claw toe deformity
      c) Fat pad migrates distally – diminished padding
      d) Depresses metatarsal head → metatarsalgia, callus, ulceration

II) Historical Perspective
A) Pan-metatarsal head resection
   1) Keller (base proximal phalanx) or Mayo (1st metatarsal head)
   2) Lesser met head +/- phalangeal base resections
   3) Pain relief, improved shoewear
   4) Not as durable – valgus deformity tends to recur (esp. with Keller)
B) Implant arthroplasty 1st MTP
   1) Silastic implant
   2) Inconsistent pain relief, inadequate restoration hallux WB
   3) Durability concerns – particulate wear debris, inflammation and erosive synovitis, bone lysis
C) Arthrodesis 1st MTP with lesser MTP resection arthroplasties
1) Biomechanical advantage
   (a) Restores WB to medial column
   (b) Increased contact area & peak pressure under hallux
   (c) Offloads/ protects lesser MTPs
   (d) May decrease peak P-time integral – earlier toe-off in stance phase

2) Outcomes
   (a) Level II/III studies – most support fusion
      (i) Resection patients do have pain relief, satisfaction
         ● Some studies show no difference vs. fusion
      (ii) Various pedobarographic data support fusion > resection
      (iii) Fusion: better push off hallux, better cadence, more cosmetic, better correction splayfoot, more durable
   (b) Multiple Level IV series support 1st MTP arthrodesis
      (i) Fusion rate 90-100%
      (ii) Maintenance of deformity correction
      (iii) Excellent pain relief, shoewear tolerance, cosmetic improvement
      (iv) Durable – follow-up as long as 6 years
   (c) Grade B Recommendation

III) Joint-Sparing Alternatives
   A) Background
      1) DMARDs & biologics
         (a) Less severe forefoot disease on presentation
         (b) Preferential effects on smaller joint disease? (Nikiphorou et al)
      2) Limitations with lesser MTP resection arthroplasties long term
         (a) Spur formation, bony proliferation
         (b) Plantar callus
         (c) Recurrent deformity
      3) Thordarson et al series (2002) – high rate of failure, recurrent deformity if hallux MTP not fused, revised to fusion 45%
      4) Barouk described using Scarf & lesser Weils for joint-sparing in textbook (2005), later series in 2007
         (a) 95% satisfactory correction, 55° 1st MTP ROM
         (b) 15% floating toes, 10% metatarsalgia
         (c) Only 1/55 revised to fusion on 75 months follow-up
   B) Indications
      1) Mild to moderate deformity
      2) Severe claw toe, dislocation?
      3) Adequate bone stock
      4) Maintained joint space
      5) One or two lesser MTP joints affected
   C) Contraindications
1) Joint destruction, severe arthritis
2) Severe osteopenia – compromised fixation
3) Bone loss
4) More severe systemic disease?
5) Recurrence, revision situation

D) 1st MTP
1) Options
   (a) Scarf osteotomy
   (b) Proximal osteotomy
   (c) Distal osteotomy (chevron, Mitchell)
   (d) Lapidus procedure
2) Level IV series for each technique, no clear preference
3) Improvement in various outcomes scores (AOFAS, VAS, FFI, SF-36, etc.)
4) Angular correction which seems to hold up (max = 75 months)
5) Failure (conversion to fusion) 2%-5%
6) IP arthritis 20-30%

E) Lesser MTPs
1) Weil osteotomy / distal oblique osteotomy
   (a) Most evidence
   (b) 85% correction, 15% floating toes, 14% redislocation
   (c) Metatarsalgia 10% - 13%
2) Stainsby procedure
   (a) Retain met head, resect phalangeal base, reduce plantar plate and fat pad, extensor
tendon secured to flexor or through met head to stabilize toe
   (b) Multiple Level IV series, small numbers, short- to medium-term follow-up (59 months)
      (i) Pain relief 83-93%
      (ii) Satisfaction 80-90%
      (iii) Continued metatarsalgia 8-33%, recurrent deformity 17%
3) Grade B Recommendation –
   (a) Appears promising pending further study
   (b) Virtually all Level IV case series
   (c) No pedobarographic analyses

IV) Unanswered Questions
A) Refine indications
B) Optimal technique
C) Durability – longer term follow-up
D) Pedobarographic data – how well do joint-sparing techniques restore normal function?
E) Outcomes – higher level studies, compare to standard approach

V) Bibliography


Mann RA, Schakel ME. Surgical Correction of Rheumatoid Forefoot Deformities. Foot Ankle Int, 16: 1-6, 1995.


