Treatment of Hallux Rigidus

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What is Normal?

• **Hallux MTP function**
  - Cam-shaped condylar hinged joint
  - Alignment: 5° varus to 15° valgus
  - ROM:
    - 40°-100° DorsiFlexion
    - 3°-43° PlantarFlexion

Pathogenesis

• **Traumatic**
  - Intra-articular fracture, crush/direct jamming injury, OsteoChondral Defect

• **Inflammatory**
  - Gout
  - RA, Lupus, etc
Pathogenesis

• **Idiopathic:**
  - Predisposing factors may cause increased joint stress with swelling, synovitis, degeneration
    - Metatarsus elevatus: > 5 mm may predict hallux rigidus (Bouaicha et al 2010)
    - Long 1st ray
    - Pes planus
    - ? Significant hallux valgus interphalangeus

Clinical Presentation

Physical Examination

• Spectrum of painful, stiff MTP ROM
  - Dorsiflexion impingement with pain and stiffness
  - Plantarflexion also painful
  - Pain with axial grind
• Shoe wear difficult because of dorsal osteophytes
  - Dorsal skin irritation 2/2 spur

Clinical Presentation

Physical Examination

• Difficulty with push off during gait
• Stress transfer with 1st ray unloading
  - Avoidance gait

![Hallux Rigidus](image1.png)  ![Normal](image2.png)
Clinical Presentation
Radiographic Features

• Early
  – X-rays may be normal initially
  – Only soft-tissue swelling and dorsal osteophytes seen on oblique view only
  – Sharpening of lateral phalanx base

• Moderate disease
  – Squaring of Met head
  – Dorsal osteophytes
  – Narrowed dorsal joint space
    (Symmetric or asymmetric)

Clinical Presentation
Radiographic Features

• Advanced disease
  – Minimal joint space
  – Osteophytes at dorsal base of proximal phalanx
  – Joint narrowing
  – Subchondral cysts
  – Dorsal metatarsal osteophytes

Non-Operative Treatment

• Avoidance of offending activities
• NSAIDs
• Shoe modification
  – Rocker sole shoe (running)
  – Steel shank shoe
  – Spring steel/ Carbon graphite plate insole
  – Metatarsal bar
• End-stage joint, before fusion, cortisone injections may buy time
Operative Treatment

Cheilectomy

- Remove 1/3 to 1/2 of dorsal portion of joint
- Plantar and distal cartilage may be intact
- Should have 60°-90° dorsiflexion in OR
- Final ROM will be typically 50% of intra-op
- >90% good to excellent results in grade 1 or 2

Operative Treatment

Cheilectomy

- Results (Coughlin & Shurnas 2003)
  - 9.6 year follow-up, 93 feet (80 patients)
  - 96% good-to-excellent results
  - Outcomes correlated with stage
  - Approximately 20° average improvement in ROM
  - Cheilectomy does not alter natural progression of disease

Operative Treatment

Moberg Procedure

- Young patient with limited MTP dorsiflexion (especially avid runners)
- Dorsal closing wedge at base of proximal phalanx (Moberg 1979)
- Cheilectomy for those lacking dorsiflexion
- Must have adequate MTP plantarflexion
- Can add Akin ("Mo-Akin/Akinberg") if HV interphalangeal present
Operative Treatment

Moberg Procedure

- **Results** (Easley et al 1999)
  - 57 patients (75 feet), minimum 3-year follow-up
  - AOFAS score improved from 45 to 85 points (90%-96% satisfaction)
  - Dorsiflexion improved ~20°
  - Progression of grade in >50% with time

Operative Treatment

Other Osteotomy Options

- Valenti Procedure
  - Preserves plantar plate
- Watermann Osteotomy
  - Rotates functional cartilage dorsal
- Green-Watermann
  - Modified chevron + dorsal cheilectomy

Operative Treatment

Resurfacing- Allograft ECM Scaffold

- Dermal acellular matrix as spacer/cover over MT head
- Berlet et al 2008
  - 9 consecutive pts with Coughlin grade 3
  - Avg 12.7 mo fu = AOFAS 87.9 (63.9 pre-op) and pain subscore 34.4 (17.8 pre-op)
Operative Treatment
Prosthetic Joint Arthroplasty

- Total vs Hemiarthroplasty
- Contraindications:
  - Moderate-severe hallux valgus/varus
  - ? metatarsus elevatus
- Avoid in very active people (e.g., athletes)
  - Early loosening/failure

Contraindications:

- Moderate-severe hallux valgus/varus
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Operative Treatment
Prosthetic Joint Arthroplasty

Avoid in very active people (e.g., athletes)
- Early loosening/failure
Operative Treatment
Prosthetic Joint Arthroplasty

• Results (Rahman et al 1993)
  – 71% of silicone 1st MTP hemi-implants have evidence of silicone granulomatous disease

• Results (Townley and Taranow 1994)
  – >90% good or excellent results with hemi

• Results (Ghalambor et al 2002)
  – Metallic wear debris and osteolysis can occur with titanium hemi-implants

• Results (Erdil et al 2013)
  – Hemiarthroplasty results comparable to total arthroplasty at short-term follow-up

Operative Treatment
Prosthetic Joint Arthroplasty

• Results (Fuhrmann et al 2003)
  – Overall results of MPJ replacement disappointing at 3-year follow-up

• Results (Dawson-Bowling et al 2012)
  – Reoperation rate of 25% at 8 years with MOJE ceramic TJA; 52% showed loosening

• Results (Morgan et al 2012)
  – 83 patients (108 feet) with total silastic implants, 8.5-year follow-up; prosthesis removal in 3 feet (3%); osteolysis (23%) not correlated with function

Operative Treatment
First MTP Arthrodesis

• Shown to be effective long-term solution – 95% good/excellent results
• Considered “gold standard” for severe DJD
• Remove spurs and diseased cartilage
• Fuse joint together – no motion remains
• Reduces pain and size of the joint
Operative Treatment
First MTP Arthrodesis

- Many methods of cutting and fixing
- 15° dorsiflexion (to ground)
  - True radiographic dorsiflexion varies based upon foot morphology (cavus vs pes planus)
- 5°-10° valgus
  - Must avoid overcrowding of 2nd digit
- Partially determined by shoewear desires
- Bone graft usually unnecessary
- Adequate IP flexion required for success

Operative Treatment
First MTP Arthrodesis

- Some limitation in activities: can’t tolerate squatting, high heels
- Changes in gait pattern: decreased step length, earlier heel-off
- Possible nonunion, DJD of neighboring joint

Complications of 1st MTP Fusion

Too dorsiflexed    Too plantarflexed
Operative Treatment
Arthrodesis of 1st MTP Joint
Operative Treatment
First MTP Arthrodesis

- Results (Coughlin and Abdo 1994)
  - 6.7-year follow-up, 34 feet (30 patients)
  - 94% fusion rate
  - 100% good to excellent results
- Results (van Doeselaar et al 2010)
  - 62 patients (27 with hallux rigidus)
  - 95% fusion rate
  - 82% would have procedure again
Treatment of Hallux Rigidus

Conclusions

- Second most common condition effecting Hallux MP joint
- Variety of surgical options available depending on degree of pathology
- Ultimate treatment based upon patient factors (age, activity level, shoewear desires, etc) and understanding of risk of recurrence/durability of treatment