Hammer Digit Syndrome: An Evidence Based Approach

By
Patrick A. DeHeer, DPM
FASPS, FACFAS

Trepel et al. JFAS 1999
Preferred Practice Guideline:
Hammer Toe Syndrome
Defining Terminology

- Hammer Toe
- Claw Toe
- Mallet Toe

- Overlapping 5th Toe
- Digiti Quinti Varus
- Clinodactyly
Goals and Objectives of Treatment

Relive Pain In & Out of Shoes
Improve Function
Prevent Morbidity
Reduce Deformity
Prevent Deformity Progression

Goals of Diagnosing & Treating HDS

Physician’s Objectives to Accomplish Goals of Diagnosing and Treating HDS

1. Accurately Diagnose HDS
2. Determine the etiologic factors contributing to, and/or exacerbating the deformity
3. Inform and educate the patient regarding treatment options
4. Determine and initiate the optimal treatment plan, with consideration of overall patient status and needs
5. Obtain appropriate consultation when indicated
6. Provide appropriate follow-up and rehabilitation, as necessary
Incidence of HDS

4-14 y/o
M = F
W: 1:3800
B: 1:700

31-60 y/o
F 2.5:M 1
W: 1:15
B: 1:5

15-30 y/o
F 9:M 1
W: 1:100
B: 1:33

60 + y/o
F 3:M 1
W: 1:10
B: 1:9

Risk Factors

- Pes Cavus
- Pes Planus
- Equinus
- Abnormal Metatarsal and/or Digital Length or Position
- Neuromuscular Dysfunction
- Arthritides
- Trauma
- Pressure or Deforming Force From Adjacent Digits (i.e. HAV)
- Metatarsus Adductus
- Hereditary Factors
- Biomechanical Dysfunction
- Improperly Fitted Shoes and/or Hosiery
## Flexor Stabilization
1. Most common etiology
2. Flexors tendons are supinators of RF
3. Pronation – fire earlier & longer to stabilize MTJ/STJ
4. Late stance phase FDL > Interossei (inefficient in pronated foot)
5. Clinically – excessive gripping of toes in stance with hammering/clawing, adductovarus 5th/4th digits

## Flexor Substitution
1. Least common etiology
2. FDL > Interossei when deep posterior lateral muscles substitute for a weak GSC (Achilles Insufficiency)

## Non-mechanical
1. Isolated HDS is usually static not dynamic
2. Long toe with retrograde shoe pressure, hallux under riding adjacent 2nd toe, ill-fitting shoes, female, advancing age

## Etiology

<table>
<thead>
<tr>
<th>01</th>
<th>02</th>
</tr>
</thead>
</table>

| 03 | 04 |

## Diagnosis & Evaluation

### Physical Examination
1. Comprehensive Lower Extremity Exam
   a. Lesions/Ulcers/Erythema/Infection
   b. Flexible/Semi-Reducible/Non-Reducible Deformity
   c. Secondary Pathology
2. Comprehensive Biomechanical Exam – WB/NWB

### History
1. PMHx
2. Surgical Hx
3. FSHx
4. Medications
5. Allergies
6. HPI – NALDOCATs
7. Type of shoe gear & hosiery

### Diagnostic Exams
1. X-rays – 3 WB views to assess deformity
2. Laboratory Tests – metabolic, inflammatory or infectious
3. NCVs/EMG – NM disease
4. Lower Extremity Arterial Exam
Sequelae of Non-Treatment

- Progression of deformities from flexible to rigid
- Pain
- Digital Clavi
- Toenail deformities
- Sub MTH HPK
- Bursitis/Synovitis
- Tendinitis
- Gait abnormalities with proximal structural symptoms
- Shoe gear limitations
- Degenerative joint disease
- Ulceration possibly leading to infection

Indications for Treatment

- Digital deformity with or without pain
- Associated lesion or finding
  - HPK
  - Adventitious Bursae
  - Ulceration
  - Erythema
  - Infections
  - Interdigital maceration/helloma
- Biomechanical instability of the toe and adjacent MPJ
- Arthrosis of toe and/or related MPJ
Treatment of HDS

**Non-Surgical**
1. Symptoms controlled conservatively
2. Patient does not desire Sx
3. Poor Sx candidate

- Routine HPK debridement
- Orthodigita
- Modification of shoe gear/hosiery
- Corticosteroid injections/NSAIDs/Oral Steroids
- Topical Keratolytics
- Orthosis
- Monitoring & Living With Deformity

**Surgical Indications**
- Conservative care unsuccessful, undesirable or impractical
- Pain/deformity/altered function affecting daily life
- Deformity involving any combination of MPJ, PIPJ and/or DIPJ documented by radiographs and/or physical examination
- Informed consent of the patient
Complications Associated with HDS Surgery

- Persistent edema
- Recurrence of deformity
- Residual pain
- Excessive stiffness

Less common complications:
- Numbness
- Flail toe
- Symptomatic osseous regrowth
- Malposition
- Malunion/nonunion
- Implant fatigue/failure/intolerance
- Infection
- Vascular impairment
- Gangrene

Flexor Digitorum Longus Transfer: Flexible/Semi-Flexible/Semi-Rigid HDS Deformities
Losa Iglesias et al. JAPMA 2012
Meta-analysis of Flexor Tendon Transfer for the Correction of Lesser Toe Deformities

Methods
1. 203 citations → 112 articles reviewed → 17 articles met study criteria
2. 515 procedures
3. Mean F/U = 54.21 mos. ± 20.64 mos.
4. Mean age = 51.01 ± 9.76

Results
1. Crude patient satisfaction = 86.7% (95% confidence interval, 81.7%-90.5%)
2. Low grade of heterogeneity - no influence of individual study

FDL transfer rationale – substitutes for lost intrinsic muscle function restoring digital function while removing deforming force of FDL

Primary Complication - stiffness (up to 60% reported by Pyper (alone did not detract from patient overall satisfaction); other reasons for poor results (excessive PIPJ/MPJ contracture, marked cavus deformity, RA and Pes Planus)

Bayod et al. JAPMA 2013
Stress at the Second Metatarsal Bone After Correction of Hammertoe and Claw Toe Deformity: A Finite Element Using an Anatomical Model

<table>
<thead>
<tr>
<th>Traction Stresses (MPa)*</th>
<th>P Value</th>
<th>Interpretation</th>
</tr>
</thead>
</table>
| NOF vs. FDLT vs. FDBT vs. PIPJ | <.01 NOF vs. FDLT vs. FDBT <.01 NOF vs. FDLT | 1. There are significantly higher traction stresses in PIPJ vs. NOF
2. There are increased traction stresses in FDLT vs. FDBT and NOF but lower than in PIPJ
3. There are the same traction stresses in FDLT vs. FDBT |

Note: P < .01, 95% confidence interval. The mesh was composed of 797,753 tetrahedral elements.
Abbreviations: FDBT, flexor digitorum brevis tendon transfer; FDLT, flexor digitorum longus tendon transfer; NOF, nonoperated foot; PIPJ, proximal interphalangeal joint arthrodesis.
*Data are given as mean ± SD (range).
Bayod et al. JAPMA 2013
Stress at the Second Metatarsal Bone After Correction of Hammertoe and Claw Toe Deformity: A Finite Element Using an Anatomical Model

There is a biomechanical advantage to performing FDLT or FDBT instead of PIPJA to surgically treat a hammertoe or claw toe deformity. In addition, tensile strain at the dorsal aspect of the second metatarsal bone when performing PIPJA increases the risk of metatarsalgia or stress fracture in patients at risk.

Arthroplasty vs. Arthrodesis: Semi-Rigid/Rigid HDS Deformities
Schrier et al. FAI 2016
Lesser Toe PIP Joint Resection Versus PIP Joint Fusion: A Randomized Clinical Trial

Level of Evidence: Level II, lesser quality RCT or prospective comparative study

- Both groups had K-wire fixation across MPJ x 4-6 weeks
- Both groups P/O FWB in surgical shoe

Table 1. Demographic Data.

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>PIP</th>
<th>Resection</th>
<th>PIP</th>
<th>Fusion</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>55</td>
<td>26</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender (male/female)</td>
<td>12/43</td>
<td>6/20</td>
<td>6/23</td>
<td></td>
<td></td>
<td>.83</td>
</tr>
<tr>
<td>Age (y), M (SD)</td>
<td>62 (9)</td>
<td>61 (9)</td>
<td>63 (9)</td>
<td></td>
<td></td>
<td>.50</td>
</tr>
<tr>
<td>Height (cm), M (SD)</td>
<td>170 (10)</td>
<td>172 (11)</td>
<td>169 (11)</td>
<td></td>
<td></td>
<td>.31</td>
</tr>
<tr>
<td>Weight (kg), M (SD)</td>
<td>80 (15)</td>
<td>86 (12)</td>
<td>75 (12)</td>
<td></td>
<td></td>
<td>.004</td>
</tr>
<tr>
<td>Side (left/right)</td>
<td>25/30</td>
<td>12/14</td>
<td>13/16</td>
<td></td>
<td></td>
<td>.80</td>
</tr>
<tr>
<td>ASA classification (1), M (A/III)</td>
<td>72/38/5</td>
<td>8/16/2</td>
<td>14/2/3</td>
<td></td>
<td></td>
<td>.33</td>
</tr>
</tbody>
</table>

Abbreviations: ASA, American Society of Anesthesiologists; M, mean; PIP, proximal interphalangeal joint; SD, standard deviation.

- Significant improvement in all categories pre-op to 3/12 months P/O
- No significant difference between 3 months & 12 months P/O
- No main effect between groups could be detected
- No interaction effects could be demonstrated

Figure 1. The course of the different outcome scores within time and comparison between the 2 groups. In parentheses is the number of patients per group (resection/fusion) with complete follow-up data per specific outcome score.
Schrier et al. FAI 2016
Lesser Toe PIP Joint Resection Versus PIP Joint Fusion: A Randomized Clinical Trial

**Figure 2.** The course of the different outcome scores within time and comparison between the 2 groups, with influence of hallux correction or no hallux correction.

- **Significant main effect with hallux in FFI B but not FFI C**
- **No main effect for VAS pain or AOFAS groups with hallux**
- **Patients with 1st ray correction had ↑ FFI B & FFI C scores to those w/o**
- **This 1st ray correction effect was equal between the 2 groups**

**Schrier et al. FAI 2016**
Lesser Toe PIP Joint Resection Versus PIP Joint Fusion: A Randomized Clinical Trial

**Complications**
- 11 K-wire related – no difference b/w groups
- 1 Pseudo-Arthrosis
- 1 Superficial skin necrosis
- 2 Sensory deficit
- 1 Infection
- 1 Recurrence
- 6 Floating toes (4 resection)
- 6 Maligned toes (4 resection)

12/26 Resection
18/29 Fusion
Total 30 of 55
Schrier et al. FAI 2016
Lesser Toe PIP Joint Resection Versus PIP Joint Fusion: A Randomized Clinical Trial

Table 2. Pre- and Postoperative Radiologic Toe Alignment.

<table>
<thead>
<tr>
<th>Alignment of PIPJ of Measured Toe</th>
<th>Preoperation</th>
<th>1 Year Postoperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sagittal (n = 47), M (SD)</td>
<td>63 (20)</td>
<td>30 (15)</td>
</tr>
<tr>
<td>Anteroposterior (n = 51), M (SD)</td>
<td>3 (12)</td>
<td>4 (11)</td>
</tr>
</tbody>
</table>

Abbreviations: M, mean; SD, standard deviation.

- PIPJ fusion resulted in a better alignment on the sagittal view, compared to PIPJ resection
- Second PIPJ alignment in an AP view, no significant effects were found
- 7 of 29 fusions resulted in nonunion with 1 symptomatic
- MPJ release did not influence of outcome of SP P/O PIPJ alignment

Sung et al. Foot & Ankle Specialist 2014
Retrospective Comparative Study of Operative Repair of Hammer Deformity
Sung et al. Foot & Ankle Specialist 2014
Retrospective Comparative Study of Operative Repair of Hammer Deformity

Average age = 60.0 ± 11.4
Average F/U = 53.8 mos. ± 32 mos.

125 other HDS repairs
53 lesser MT osteotomies
48 HAV corrections
7 TB Sxs
4 neumomas
2 – 1st MPJ implants
1 – 1st MPJ arthrodesis
43 cases MPJ releases, extensor tenotomy and/or MT osteotomy
Sung et al. Foot & Ankle Specialist 2014
Retrospective Comparative Study of Operative Repair of Hammer Deformity

Table 2.
Radiographic Values in the Sagittal Plane by Group.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Mean Preoperative LAT (SD)</th>
<th>Mean Postoperative LAT (SD)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthroplasty (n = 45)</td>
<td>46.9 (17.8)</td>
<td>31.5 (11.7)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Arthrodesis (n = 45)</td>
<td>46.4 (17.1)</td>
<td>24.7 (14.1)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Implant (n = 45)</td>
<td>49.1 (14.3)</td>
<td>24.2 (5.7)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>ANOVA</td>
<td>Not enough variance</td>
<td>Not enough variance</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: LAT, lateral angle; SD, standard deviation.

Table 3.
Radiographic Values in the Axial Plane by Group.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Mean Preoperative AP (SD)</th>
<th>Mean Postoperative AP (SD)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthroplasty (n = 45)</td>
<td>8.2 (7.9)</td>
<td>11.4 (7.7)</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Arthrodesis (n = 45)</td>
<td>7.2 (7.8)</td>
<td>5.4 (8.0)</td>
<td>.90</td>
</tr>
<tr>
<td>Implant (n = 45)</td>
<td>7.8 (7.0)</td>
<td>2.9 (5.5)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>ANOVA</td>
<td>Not enough variance</td>
<td>Significant variance</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: AP, anterior-posterior angle; SD, standard deviation.

Methods of Fixation
Kramer et al. FAI 2015
Hammer Toe Correction With K-Wire Fixation

Table 1. Associated Diagnoses and Observed Recurrence and Revision.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>No. (% of Total)</th>
<th>Observed Recurrence/Malalignment, No. (%)</th>
<th>Observed Revisions, No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total no. of toes</td>
<td>2698</td>
<td>205 (7.6)</td>
<td>94 (3.5)</td>
</tr>
<tr>
<td>Gross metatarsophalangeal instability</td>
<td>296 (11.0)</td>
<td>13 (4.4)</td>
<td>4 (1.4)</td>
</tr>
<tr>
<td>Previous hammertoe surgery</td>
<td>266 (9.9)</td>
<td>40 (15.0)</td>
<td>18 (6.8)</td>
</tr>
<tr>
<td>Medial or lateral deviation</td>
<td>264 (9.8)</td>
<td>34 (12.9)</td>
<td>14 (5.3)</td>
</tr>
<tr>
<td>Metatarsophalangeal dislocation</td>
<td>229 (8.5)</td>
<td>11 (4.8)</td>
<td>3 (1.3)</td>
</tr>
<tr>
<td>Crossover toe deformity</td>
<td>107 (4.0)</td>
<td>12 (11.2)</td>
<td>5 (4.7)</td>
</tr>
</tbody>
</table>

709 F : 167 M
Average age = 57.5 y/o
Average F/U = 20.8 mos.

2nd – 1011
3rd – 650
4th – 561
5th – 476

Kramer et al. FAI 2015
Hammer Toe Correction With K-Wire Fixation

Table 2. Additional Lesser Toe Procedures.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>No. (% of Total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total no. of toes</td>
<td>2698</td>
</tr>
<tr>
<td>Metatarsophalangeal capsulotomy</td>
<td>1198 (44.4)</td>
</tr>
<tr>
<td>Metatarsal head excision</td>
<td>645 (23.9)</td>
</tr>
<tr>
<td>Extensor tenotomy</td>
<td>602 (22.3)</td>
</tr>
<tr>
<td>Shortening metatarsal osteotomy</td>
<td>131 (4.9)</td>
</tr>
<tr>
<td>Flexor tenotomy</td>
<td>49 (1.8)</td>
</tr>
</tbody>
</table>

393 HV corrections (55.2%)
213 1st MPJ fusions (19.1%)
89 Kellers (8.0%)
45 Hallux IPJ fusions (4.0%)
22 HL Sx (2.0%)

67 TB Sx (6.0%)
31 Flatfoot Sx (2.8%)
31 Cavovarus Sx (2.8%)
26 Midfoot fusions (2.3%)
21 Triple arthrodesis (1.9%)
Kramer et al. FAI 2015
Hammer Toe Correction With K-Wire Fixation

- K-wires left in average of 39.2 days
- 118 (4.4%) K-wires required early removal
- 150 (5.6%) symptomatic recurrence of HDS with 94 (3.5%) requiring revisional Sx
- Asymptomatic or minimally symptomatic malalignment was noted in 55 toes (2.0%) at final follow-up
- 9 pin tract infections (0.3%)
- P/O Abx required in 124 of 1115 (11.1%)
- Vascular compromise occurred in 16 toes (0.6%) with 10 (0.4%) requiring amputation (8 additional amputations for other reasons)
- 2 toes with broken pins (0.1%), pin migration 94 toes (3.5%) with 59 (2.9%) completely extruded
- The expected rates and rate ratios (RRs) of patients requiring revision hammer toe correction, compared with the study population as a whole, were statistically significantly higher in patients who underwent an metatarsophalangeal joint capsulotomy (3.10 vs 0.97; RR, 3.20) and those who experienced K-wire-related complications (5.10 vs 1.80, RR, 2.84)
- No attempt to formally repair plantar plate in those toes with MTP dislocation – 6-weeks of joint immobilization with K-wire allows sufficient scarring and stabilization of soft tissues
- The cost of newer permanent toe implants can range from $500 to $1500 per implant. A K-wire typically costs between $10 and $40.

Figure 4. Number of toes, of 100, expected to need revision procedures in a given year for each subgroup. P values less than .05 were considered statistically significant and are marked with asterisks.
Canales et al. JFAS 2014
A Simple Method of Intramedullary Fixation for Proximal Interphalangeal Arthrodesis

Listing of the manufacturers of the devices in order of appearance: Acumed, Hillstone, OB, Arrowhead Medical Device Technologies, Columbia, TN; Arthros, Naples, FL; Bayer, Warsaw, IN; HistoPlex, Port Huron, MI; Wolfson, Port Huron, MI; Biomedical Innovations, San Antonio, TX; Comedox, Uxbridge, MA; DePuy International, Leeds, UK; Integer (U.K.), Middlesbrough, UK; Intermedilink Science, Paterson, NJ; Kaneka Medical, Wickliffe, OH; Medartis Medical, New Windsor, NY; MTF, Edgewood, NJ; Neometry Solutions, Warsaw, IN; Neometry Solutions, Warsaw, IN; OrthoBelt, Surgical Designs, Medina, OH; OrthoBlica, Warsaw, IN; OrthoPen, Salt Lake City, UT; OrthoMed, Addison, TX; Small Bone Innovations, Mentorville, FL; Smith & Neppane, Long, IL; Solima Surgical, Memphis, TN; Wykor, Kortasaran, MI; Synthes Medical, Westkontent Hoe Kerken, France; Torson, Amsterdam, The Netherlands; TriLucent Surgical, Houston, TX; Vires, McManusville, TN; Wright Medical Technology, Arlington, TN.
Canales et al. JFAS 2014
A Simple Method of Intramedullary Fixation for Proximal Interphalangeal Arthrodesis
Canales et al. JFAS 2014
A Simple Method of Intramedullary Fixation for Proximal Interphalangeal Arthrodesis

Hood et al. Foot & Ankle Specialist
Diverging Dual Intramedullary Kirschner Wire Technique for Arthrodesis of the Proximal Interphalangeal Joint in Hammertoe Correction
Hood et al. Foot & Ankle Specialist
Diverging Dual Intramedullary Kirschner Wire Technique for Arthrodesis of the Proximal Interphalangeal Joint in Hammertoe Correction

Catena et al. FAI 2014
Prospective Study of Hammertoe Correction With an Intramedullary Implant

29 patients
53 toes (29-2nd, 15-3rd, 9-4th) – Smart Toe Implants
Mean age = 63 y/o
21 F : 8 M
Mean F/U – 12 mos.

| Table 1. Clinical Parameters Pre- and Postoperative. |
|-----------------------------|-----------------------------|
| Parameter | Preoperative (avg/pt) | Postoperative (avg/pt) |
| Pain scale | 5.7 (range, 2-10) | 1.0 (range, 0-5) |
| AOFAS | 52 (range, 24-87) | 71 (range, 42-95) |

A study by Lehman et al. (FAI 1995) after PIPJ fusion defined a satisfied patient as one with an overall AOFAS score of 80 or higher.

5 patients were lost to F/U
K-wire inserted across PIPJ and MPJ in 34 toes and PIPJ only in 8 toes

Weil osteotomy 74%
(31/42) toes
MT resection 14%
(6/42) toes
Catena et al. FAI 2014
Prospective Study of Hammertoe Correction With an Intramedullary Implant

Table 2. Clinical Parameters Pre- and Postoperative.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Preoperative % (n/24 patients)</th>
<th>Postoperative % (n/24 patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dorsal pain</td>
<td>79 (19)</td>
<td>16 (4)</td>
</tr>
<tr>
<td>Tip toe pain</td>
<td>54 (13)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Alignment (good/excellent)</td>
<td>0 (0)</td>
<td>100 (24)</td>
</tr>
<tr>
<td>Fashionable shoes</td>
<td>3 (1)</td>
<td>58 (14)</td>
</tr>
</tbody>
</table>

Table 3. Radiographic Axial Alignment.

<table>
<thead>
<tr>
<th>Axial alignment (medial/lateral)</th>
<th>Preoperative % (n/42)</th>
<th>Postoperative % (n/42)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>81 (34)</td>
<td>100 (42)</td>
</tr>
<tr>
<td>Fair</td>
<td>13 (5)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Poor</td>
<td>7 (3)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Table 4. Radiographic Evaluation of Proximal Interphalangeal Joint.

<table>
<thead>
<tr>
<th>Radiographic parameter</th>
<th>% (n/42)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bony union</td>
<td>81 (34)</td>
</tr>
<tr>
<td>Fibrous union</td>
<td>19 (8)</td>
</tr>
<tr>
<td>Stable implant</td>
<td>93 (39)</td>
</tr>
<tr>
<td>Migration of implant</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Broken implant</td>
<td>5 (2)</td>
</tr>
<tr>
<td>Bone changes (osteolysis, bone necrosis)</td>
<td>12 (5)</td>
</tr>
<tr>
<td>Cortical disruption</td>
<td>2 (1)</td>
</tr>
</tbody>
</table>
Role of MPJ Release

Dhukaram et al. JBJS (Br) 2002
Correction of hammer toe with an extended release of the metatarsophalangeal joint

Fig. 3
Diagram showing the lateral view of the toe after the plantar plate has been reduced.

Fig. 4
Diagram of the anteroposterior view of the toe showing release of the extensor tendon and collateral ligaments.
Dhukaram et al. JBJS (Br) 2002
Correction of hammer toe with an extended release of the metatarsophalangeal joint

Methods
1. 84 patients (179 toes)
2. Type 2 toes
3. 69 patients for F/U
4. Mean F/U = 28 mos.

Results
1. AOFAS mean P/O = 83 (87% score > 60)
2. 83% satisfied
3. 17% dissatisfied
   a) MTPJ pain 11/78 feet (14%)

Table I. Classification of deformities of the toes. The PIPJ is tested in 20° plantar flexion in order to relax the long flexor tendon

<table>
<thead>
<tr>
<th>Type</th>
<th>MTPJ</th>
<th>PIPJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flexible</td>
<td>Flexible</td>
</tr>
<tr>
<td>2</td>
<td>Flexible</td>
<td>Rigid</td>
</tr>
<tr>
<td>3</td>
<td>Subluxed/dislocated and irreducible</td>
<td>Fixed</td>
</tr>
</tbody>
</table>

Results
a) 2 MTPJ instability (3%)
b) 7 callus formation (9%)
c) Poor alignment 10 (13%)
Thank You

DO GOOD wherever you are.
#PayItForward #GivelItUpForGood

padeheer@apma.org