

SUBSPECIALTY PROCEDURES

HAMMER TOE CORRECTION WITH PROXIMAL INTERPHALANGEAL JOINT ARTHRODESIS

Eric Olsen, BS, Jesse King, MD, Jordan R. Pollock, BS, Mathieu Squires, MD, Ramzy Meremikwu, MD, David Walton, MD

Published outcomes of this procedure can be found at: *Foot Ankle Int.* 2000 Feb;21(2):94-104.

Investigation performed at the University of Michigan, Ann Arbor, Michigan

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Abstract

Background: First described by Soule in 1910, arthrodesis of the proximal interphalangeal joint is a common operative method of treatment of hammer toe, or fixed-flexion deformity of the proximal interphalangeal joint of the lesser toes¹. The deformity is often caused by imbalance in intrinsic and extrinsic muscle function across the interphalangeal joint and metatarsophalangeal joint^{2,3}, which can be effectively addressed through proximal interphalangeal joint straightening and arthrodesis in conjunction with soft-tissue balancing of the metatarsophalangeal joint.

Description: Following longitudinal skin incision over the joint, a transverse extensor tenotomy and capsulotomy reveal the proximal interphalangeal joint and provide appropriate exposure of the head of the proximal phalanx. With the soft tissues protected, the proximal and middle phalanges undergo resection of the articular surfaces to allow osseous apposition. This step can be performed with a rongeur sagittal saw or with osteotomes^{4,5}. The head of the proximal phalanx is resected proximal to the head-neck junction, and the proximal portion of the middle phalanx is removed to expose the subchondral bone. Often, there is a dorsal contracture of the metatarsophalangeal joint that is elevating the toe, which is addressed with use of a longitudinal incision over the metatarsophalangeal joint, a Z-lengthening of the long extensor tendon to the toe, and a subsequent capsulectomy. If there is an angular component to the deformity, the collateral ligaments are released from the metatarsal neck, and the toe can be balanced. If there is residual subluxation of the joint that is incompletely corrected by soft-tissue procedures, a metatarsal osteotomy should be considered. Fixation is then performed with use of a smooth Kirschner wire. The wire is inserted from the middle phalanx out the tip of the toe and subsequently inserted retrograde across the proximal interphalangeal joint, often into the metatarsal head and neck, holding the metatarsophalangeal joint in appropriate position. This step can also be completed with use of novel methods including screws, bioabsorbable pins, or intramedullary implants⁶⁻⁸.

Alternatives: Nonoperative treatments for hammer toe deformity are generally pursued prior to surgery and include shoe modifications such as a wide toe-box, soft uppers, and padding of osseous prominences^{3,9,10}. Alternative surgical treatments include proximal interphalangeal arthroplasty, soft-tissue capsulotomy, extensor tendon lengthening, and amputation¹¹.

Disclosure: The Disclosure of Potential Conflicts of Interest forms are provided with the online version of the article (<http://links.lww.com/JBJSST/A399>).

Rationale: Although nonoperative treatment can alleviate symptoms temporarily, surgical treatment is often necessary for definitive treatment of hammer toe. Soft-tissue procedures such as tendon lengthening can provide a stabilizing benefit, but the degenerative bone changes associated with hammer toe are better addressed with use of resection of the proximal interphalangeal joint³. Arthroplasty allows for some retained motion; however, this motion may lead to deformity and pain over time². Arthrodesis provides less painful and more reliable fixation as well as equal outcomes compared with other operative techniques. Patient satisfaction rates after this procedure are high, with pain relief in up to 92% of patients and rare complications⁷⁻¹².

Expected Outcomes: Outcomes of this procedure are favorable, with rates of osseous fusion ranging from 83% to 98%^{2,4,11,13}. Patient satisfaction rates range from 83% to 100%^{4,11}. Historically, patients have expressed dissatisfaction with pain and the appearance of exposed hardware, but novel internal fixative devices provide a more natural appearance to the toe without the need for secondary surgical procedures for pin removal^{8,14}. Patients are often able to return to regular activity at 6 weeks postoperatively; however, there may be persistent pain or swelling in the toe. Wide shoes and activity modifications are frequently continued for several more weeks postoperatively, and some patients may benefit from formal physical therapy and at-home rehabilitation.

Important Tips:

- Avoid vascular compromise by ensuring adequate resection of bone at the proximal interphalangeal joint.
- A longitudinal incision across the joint provides greater exposure but can lead to scar contracture that elevates the toe. One alternative is the use of an elliptically shaped incision over the proximal interphalangeal joint, which can improve cosmesis but does restrict exposure.
- Excessive osseous resection can lead to a cosmetically undesirable short toe.
- If using an implant for the arthrodesis, ensure the implant is not too big for the toe. Most implants are too big for fifth-toe arthrodesis.
- In toes with severe deformity, fixation with a Kirschner wire is often preferred because excessive stretching of the neurovascular bundle can lead to toe compromise and if Kirschner wire is used the pin can easily be removed at bedside.
- For flexible deformities, a nonoperative approach is recommended, such as stretching exercises, shoe-wear modifications, and metatarsal pads. A tenotomy of the flexor digitorum brevis is a soft-tissue procedure that can be considered if nonoperative treatment is insufficient to correct the deformity. If flexor digitorum brevis tenotomy does not adequately treat proximal interphalangeal joint deformity, a proximal interphalangeal joint arthrodesis should be the next step.

Acronyms and Abbreviations:

- MTP = metatarsophalangeal
- PIP = proximal interphalangeal

Eric Olsen, BS¹

Jesse King, MD²

Jordan R. Pollock, BS³

Mathieu Squires, MD²

Ramzy Meremikwu, MD²

David Walton, MD²

¹University of Michigan Medical School, Ann Arbor, Michigan

²Department of Orthopaedic Surgery, University of Michigan, Ann Arbor, Michigan

³Department of Orthopaedic Surgery, Mayo Clinic, Phoenix, Arizona

Email for corresponding author: erolsen@med.umich.edu

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