

Unsuccessful Metatarsophalangeal Joint Replacement for Treating Arthritis of the Great Toe: Report of Three Cases

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Abstract

Metatarsophalangeal (MTP) joint fusion or replacement are commonly performed for treating advanced arthritis of the MTP joint of the great toe. However, results of MTP joint arthroplasty have shown no clear advantages compared to those of fusion. We present a 72-year-old woman (case 1), 66-year-old woman (case 2), and 64-year-old man (case 3) who underwent unsuccessful MTP joint replacement of the great toe and presented to our clinic with pain at 15, 1, and 20 years postoperatively, respectively. Operative resection has been scheduled for case 1, whereas symptoms were managed nonoperatively in case 2. In case 3, operative removal of the prosthesis and fusion led to resolution of symptoms at 6-month follow-up, but a nonunion was noted. Although MTP joint arthroplasty can be helpful for treating joints such as in the knee, surgeons should consider other operative procedures for treating MTP joint arthritis of the great toe.

Introduction

Metatarsophalangeal (MTP) joint fusion and joint replacement are the most common surgical procedures for treating advanced arthritis of the MTP joint of the great toe. MTP joint fusion has been found to result in pain relief and minimal activity limitation.^{1,2} Treated patients can run, bike, and play sports (Figures 1A and 1B). Despite successful results associated with MTP fusion, patients often undergo MTP joint replacement instead. However, treatment outcomes after MTP joint replacement have shown no improvement in function compared with those of MTP joint fusion.²

Although treatment with MTP joint replacement can result in retained motion at the MTP joint, high rates of prosthesis failure and unsuccessful subsequent procedures have been described.¹ The prosthesis has been

noted to break, loosen, and dislocate, which causes pain. Furthermore, reconstruction procedures performed after unsuccessful MTP joint replacement have less satisfactory results than those of primary MTP joint fusion. These outcomes are probably owing to loss of first ray length, transfer metatarsalgia, and difficulty in obtaining a fusion after removal of the failed prosthesis. An intercalary bone graft is sometimes required to compensate for the bone loss and resulting defect after removal of the failed prosthesis.¹

We describe three patients who presented to our clinic after undergoing unsuccessful MTP joint replacement, which were performed at outside institutions. We report on implant loosening, dislocation, and continued pain associated with MTP joint replacement. The patients were informed that the data concerning the case would be submitted for publication, and they provided verbal consent.



Figure 1. A patient who underwent metatarsophalangeal (MTP) joint fusion of her great toe. A) Lateral view of a properly positioned MTP joint fusion, showing about 10° of dorsiflexion relative to the floor. B) The patient can walk using 2.5-inch high-heels.

Case Reports

Case 1

A 72-year-old woman presented to our clinic at 15 years after undergoing MTP joint hemiarthroplasty for treating arthritis of her great toe. The base of the proximal phalanx had been replaced with a metallic implant. The patient indicated that her pain was not resolved after operative treatment. She developed increased pain in the 3 years

after the surgery, without any history of injury. Her great toe became extended and overlapped her second toe. She had almost no motion in the joint and felt pain with any attempt to move it. The second toe appeared shortened. Radiographs showed loosening of the prosthesis, with impingement and erosion of the first metatarsal head (Figures 2A and 2B). Our team discussed treatment options with the patient, including implant removal and possible revision to arthrodesis. At the time of this article, the definitive treatment plan is still being decided.



Figure 2. Radiographs of the right foot in case 1, obtained at presentation to our clinic and 1 year after initial treatment. A) Lateral view, showing loose metatarsophalangeal joint hemiarthroplasty that impinges on the first metatarsal head, resulting in pain and limited motion. The dorsal portion of the prosthesis is eroding the first metatarsal head. B) Anteroposterior radiograph demonstrating shortening of the great toe which is overlapping the second toe.

Case 2

A 66-year-old woman presented to our clinic at 1 year after undergoing silastic implant replacement of the great toe MTP joint for treating arthritis. She had pain and a sensation of fullness in the region of the joint. Her toe was shortened with mild extension and limited motion. Radiographs revealed that one limb of the prosthesis had dislocated from its position within the bone and was facing laterally toward the second metatarsal head (Figure 3). Her symptoms were managed with activity modification and orthotics.



Figure 3. Radiograph in case 2, obtained 15 years after metatarsophalangeal (MTP) joint hemiarthroplasty for treating arthritis. Shows dislocated and possibly broken limb of prosthesis at the MTP joint (arrow).

Case 3

A 64-year-old man presented to our clinic after undergoing replacement of the great toe MTP joint, using a two-piece prosthesis, for treating arthritis. The prosthesis had been placed more than 20 years previously. At an unknown point in time, the replacement prosthesis had dislocated, and the great toe was stuck in an extended position (Figures 4A and 4B). The position of the great toe resulted in an altered gait and pain.



Figure 4. Radiographs in case 3, obtained 20 years after metatarsophalangeal joint replacement of the great left toe. Shows bone erosion and dorsal dislocation of the great toe replacement prosthesis. A) Anteroposterior view. B) Lateral view.

The patient underwent removal of the prosthesis and fusion. Intraoperatively, metallic debris was found throughout the soft tissues of the great toe MTP joint (Figure 5). Bone allograft was used to fill the void created by the initial placement of the prosthesis. At 6-month follow-up, the fusion plate had broken and a nonunion existed (Figures 6A and 6B). However, the patient felt that his symptoms were resolved and that the toe position was more aligned with the metatarsal.



Figure 5. The removed prosthesis and metallic debris, which were found intraoperatively in case 3.



Figure 6. Radiographs at 6 months postoperatively in case 3. Shows failure of attempted great toe fusion with broken plate and screws, with the difficulty in obtaining a fusion after metatarsophalangeal joint replacement owing to bone loss from the prosthesis. A) Anteroposterior view. B) Lateral view.

Discussion

First MTP joint replacement was conceived as a potential alternative to joint arthrodesis, with the goal of maintaining the natural mechanics and motion of the great toe. Results of studies on these two treatment options have indicated more success with MTP joint fusion than replacement in clinical outcome and need for revision procedures.²⁻⁷

One study in the Netherlands prospectively analyzed the functional result in 62 patients undergoing first MTP joint arthrodesis.² Patients with concomitant operative treatment on the same or uninjured foot, inflammatory arthritis, or previous fusion using another technique were excluded. The authors found noted a high fusion rate (95%), an increase in function, and a decrease in pain after cross-screw arthrodesis.

Duncan et al³ reported the retrospective outcome data from a series of arthroplasty procedures using ToeFit-Plus (Smith & Nephew, London, UK) performed between 2006 and 2011. A total of 69 MTP joint arthroplasties were performed in 57 patients with at least 6-month follow-up. Six revisions were performed: two for treating symptomatic and progressive osteolysis; one for treating restricted range of motion associated with pain; and another that was dorsally dislocating. Radiolucency was noted to be seen in 23 cases, giving the concern for potential future loosening of implants. In a follow-up study⁴ of the same implant, a total of 86 arthroplasties in 73 patients were assessed in the same manner. Postoperative American Orthopaedic Foot and Ankle Society (AOFAS) scoring improved; however, a 24% revision rate was seen owing to implant loosening, progressive radiographic lucency, fracture, infection, and dislocation. Although the authors reported excellent outcomes in the successful arthroplasties, the unacceptably high revision rate forced the discontinuation of the ToeFit-Plus system.

A series by Dawson-Bowling et al⁵ studied a different MTP joint arthroplasty system. The MOJE ceramic implant (Petersberg, Germany) was used during 32 procedures in 30 patients throughout a 6-year period. Postoperatively, the patients were found to have mid-range functional scores. Range of motion was also assessed, with 15 patients having poor (< 36), nine with moderate (36-45), four with good (46-60), and one with excellent (> 60) range of motion. There was a 77% rate of either loosening or revision, leading the authors to believe in the superiority of arthrodesis compared with joint replacement.

To our knowledge, only one series⁶ directly compared arthrodesis and total replacement arthroplasty.⁶ Sixty-three patients with first MTP joint pain recalcitrant to conservative measures were recruited and randomly selected to undergo arthrodesis or MTP joint arthroplasty using an unconstrained BIOMET. Patients with arthrodesis did not have increased loading on the lateral side of their foot. In contrast, patients with arthroplasty had increased rates of lateral loading and transfer metatarsalgia. Arthroplasty was found to be more expensive than arthrodesis, with a cost of £4025 and £1980, respectively. The authors concluded arthrodesis resulted in decreased pain, better functional outcomes, decreased cost, and lower complication rates when compared to arthroplasty. The authors also concluded that the high early revision rate was unacceptable, and recommended against MTP joint arthroplasty.

Finally, Brewster⁷ investigated the outcomes of MTP joint arthroplasty versus arthrodesis, using a systematic retrospective review of the literature. The average follow-up in months were 27.8 for the arthroplasty group and 48.8 for the arthrodesis group. The median revision rate was 7% for arthroplasty and 0% for arthrodesis. The average AOFAS score after arthroplasty and arthrodesis was 83 and 82, respectively. However, the author expressed that the increased complication rate, expense, and long-term revision rate of arthroplasty made arthrodesis a more sensible option in the treatment of great toe MTP joint arthritis.

In case 1, we could not report patient outcomes after revision procedure because the patient has not yet decided. In case 2, the patient elected against a revision procedure because she experienced considerable relief from activity modification and orthotics. Results of the first two cases show morbidity associated with the failure of these implants. In case 3, the implant in the patient was removed and the joint was debrided; although his revision treatment was unsuccessful, the symptoms completely resolved. This is likely owing to the correction of the great toe deformity, which had developed because of the failed implant, and the removal of the reactive implant. Results of case 3 also

show the technical difficulty that surgeons face regarding revision procedures of failed MTP arthroplasty. This can lead to poor patient satisfaction and higher costs associated with treatment.

When patients present with end-stage first MTP arthritis, the condition is treated conservatively at first with shoe modifications, orthotics, and activity modification. If these fail, surgical options are discussed with the patients. Patient demographics can affect surgical treatments offered, but we routinely discuss all available options. The senior author favors arthrodesis but will recommend arthroplasty if preferred by the patient after discussing the current evidence-based medicine. More recent patient discussions have involved use of new polyvinyl alcohol implants (Cartiva, Alpharetta, GA). The senior author did not perform this procedure at the time of this article, and available studies on the topic are short term.

In patients with first MTP arthritis, pain-free range of motion is a treatment goal that replacement arthroplasty has addressed and a concept that has fared well with other joints in the body such as the knee and hip. However, findings of the current case report support other studies with findings suggesting that the risks of first MTP joint arthroplasty outweigh the benefits when compared to arthrodesis of the same joint.⁵⁻⁷ Implant failure, aseptic loosening, transfer metatarsalgia, hardware failure, infection, and persistent pain are all problems with great toe implant arthroplasty. In operatively treating MTP joint arthritis of the great toe, surgeons should consider other methods before performing MTP joint arthroplasty.

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Conflict of Interest

The authors report no conflicts of interest.

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