

# Conversion of a Failed First Metatarsophalangeal Joint Arthrodesis to a Dual Stem Silastic Total Joint Implant: A Case Report

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## INTRODUCTION

Hallux rigidus of the first metatarsophalangeal joint (MPJ) is a painful and often debilitating pathology that is a challenge to treat. The etiology is multifactorial and is characterized by repetitive trauma to the joint. The symptoms are progressive and characterized by decreased range of motion and pain secondary to degenerative changes within the articulation (1). Conservative treatment often fails, requiring surgical intervention. There are many options available to the surgeon, including soft tissue and implant arthroplasty, arthrodesis, cheilectomy, and first metatarsal osteotomies. All of these options have their own shortcomings and complications.

We report a case of hallux rigidus with a history of failed soft tissue and implant arthroplasties and arthrodesis that was successfully revised with a dual stem silastic total joint implant. To our knowledge the use of a silastic total joint implant in the revision of a failed first MPJ arthrodesis has not been reported in the literature. We report this procedure as a viable alternative to revisional arthrodesis of the first MPJ in patients at high risk for nonunion.

## CLINICAL SUMMARY

A 57-year-old female physical education teacher presented to the primary surgeon with a report of right hallux pain. The patient had undergone several procedures for correction of hallux rigidus beginning with a Keller-Brandes type resectional arthroplasty with soft tissue interposition in 1983. This initial procedure was successful in controlling her symptoms for several decades, although she eventually developed pain and difficulty in performing her activities of daily living. She then underwent placement of a proximal hallux hemi-implant in 2005. The implant failed to relieve her pain and required several revision procedures for unclear reasons, ultimately failing. The implants were removed in 2009 and converted to a first MPJ arthrodesis with bone allograft. This initial arthrodesis attempt failed, progressing to a nonunion. The nonunion was revised in 2010 using iliac crest bone autograft. The revision arthrodesis was

successful in achieving a partial union of the joint, although in a plantar flexed position of the hallux. This malunion resulted in significant pain while ambulating, resulting in her initial presentation to the primary surgeon. At the time of presentation, her primary symptoms were pain to the plantar distal hallux and plantar first metatarsal head during ambulation. Evaluation revealed a plantar-flexed first MPJ partial union with evidence of hardware failure (Figures 1,2).

The patient desired surgical intervention as her discomfort while ambulating was interfering with her ability to perform her duties as a physical education teacher. The decision was made to convert the arthrodesis of the first MPJ to a Silastic total joint implant arthroplasty (Figures 1,2). The procedure was performed uneventfully with an unremarkable postoperative course. The patient was able to return to work with modified duties and shoe gear 3 weeks after the procedure. The first MPJ was found to have a pain-free range of motion of 25 degrees of dorsiflexion with 5 degrees of plantar flexion. There was no active range of motion of the joint due to damage of the flexor and extensor tendons that occurred during her multiple previous procedures. The patient was so pleased with the result of the procedure that she underwent the identical procedure on her left first MPJ, which had achieved fusion several years earlier. At one year follow-up there was minor plantar first metatarsal head pain with prolonged weight-bearing. At this time her main complaint was transfer metatarsalgia of the second metatarsal head, controlled conservatively with orthotics. She had returned fully to her activities of daily living and her employment as a physical education teacher.

## DISCUSSION

End stage osteoarthritis of the first MPJ, or hallux rigidus, results in an exophytic process with degenerative joint changes and limitation of motion. The condition is progressive and often disabling. Hallux rigidus is a common problem for the foot and ankle surgeon to encounter, as exhibited by the 14 described classification symptoms for the pathology (2). The case we present is unique in the many types of failed procedures the patient had undergone.



Figure 1A. Preoperative anterior-posterior radiograph.



Figure 2A. Postoperative anterior-posterior radiograph.



Figure 1B. Preoperative lateral radiograph.



Figure 2B. Postoperative lateral radiograph.

Both resection and implant arthroplasties had been performed and failed, which were later converted to salvage arthrodesis as is the recommendation in the literature (3-5). The initial attempt at salvage arthrodesis failed, becoming a symptomatic nonunion. The following revision arthrodesis achieved union in a maligned plantar flexed position accompanied with hardware pain. While hardware removal after salvage arthrodesis appears to be surprisingly common (4), a plantar malunion in first MPJ arthrodesis is not. A

meta-analysis revealed a malunion rate of 8.5%, with dorsal malunion responsible for 87% and the remainder being valgus malunion (6).

With the extensive past surgical history of the joint, which included a history of nonunion, the decision was made to choose a surgical procedure that would not require osseous fusion. This would require revision of the arthrodesis into an arthroplasty, which had the benefit of removing the painful hardware as well as addressing the

painful plantar-flexed position of the hallux. The total silastic implant had an advantage over a biologic spacer as it provides stability through encapsulation that is similar to a capsuloligamentous system (7).

This case is consistent with many findings in the literature. Salvage arthrodesis after failed arthroplasty is technically difficult and often requires bone grafting, as did our patient who went on to nonunion. Higher nonunion rates of 75-90% (3,8,9) have been reported when compared with 5.4% for primary arthrodesis (6). The successful second attempt at fusion using iliac crest autograft is consistent with the evidence to support higher union rates with its use in salvage arthrodesis (10). The need to remove painful hardware after salvage arthrodesis is also consistent with the reported high re-operation rates of up to 40% after salvage arthrodesis, mostly for removal of painful hardware (4).

Although it was not the case with the patient we present, it is important to note that only 32% of first MPJ nonunions are symptomatic (6). Of those that are symptomatic, revision arthrodesis may not always be necessary. Hope et al reviewed a series of patients who were treated for symptomatic first MPJ nonunion with hardware removal and debridement alone without attempts at revision arthrodesis (11). They reported that 8 of the 12 patients they reviewed were satisfied with the debridement alone with the other 4 going on to revision arthrodesis. This technique would have the same advantage as the implant arthroplasty we presented in patients at high risk for nonunion, lack of need for osseous fusion. While we are not advocating our presented technique for revision of all first MPJ nonunions, we are suggesting its consideration in patients with a history of nonunion at high risk for failure of revision arthrodesis.

In conclusion, we presented a patient with an extensive surgical history of both soft tissue and implant arthroplasty and salvage arthrodesis with a history of nonunion that

culminated in a painful malunion of the first MPJ. The malunion was addressed with a silastic total joint implant, effectively relieving her symptoms without requiring osseous fusion. In patients at particularly high risk for nonunion, conversion to silastic total joint implant arthroplasty may be an acceptable alternative to revision arthrodesis.

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