First Metatarsophalangeal Arthrodesis Malunion Revision to Silicone Implant Arthroplasty

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Purpose & Literature Review

First metatarsophalangeal joint (MTPJ) arthritis has been reported in approximately 2.5 to 7.8% of people in the US (1,2). If conservative treatment fails, surgeons have the option of performing either a joint salvage procedure, or fusion for treatment of arthritis. First MTPJ fusion is currently the most common surgical treatment option for arthritis of the first MTPJ. If a first MTPJ fusion is performed, complications can arise if excess bone is resected. This may lead to a shortened MTPJ fusion. A shortened MTPJ fusion can be a debilitating complication of an arthrodesis. It often results in the transfer pain to the lesser metatarsals, which can cause stress fractures and cortical thickening. Current recommended treatment of this complication, is re-establishing length of the first MTPJ (3). It is most commonly performed with a bone graft, however, calxus distraction has been described in the literature. In the setting of a first metatarsal cuneiform fusion, re-establishing length of the fusion may not be the most optimal option. The purpose of this paper is to present a case of patient who underwent a two-staged procedure for a shortened first MTPJ malunion. The procedure included re-establishing length as well as motion on the joint with a silicone implant. To our knowledge this has not been reported in the literature.

Case Presentation

A 32-year-old male was seen by the senior author (JUS) for a burning, tingling and pain in his left foot. The patient is an active member of the military, in 2006 he underwent a first MTPJ fusion for a stiff joint. Following the procedure, he had continued pain and loss of hallucus purchase. In 2013, he underwent a first metatarsal cuneiform fusion for continued pain. However, this procedure did not provide him with relief. Becoming increasingly frustrated, because the pain is restricting his duties, he is seen in our office (JUS). Upon initial evaluation, it was noted that there was diminished vibratory sensation of nerve distribution of L5-S1, the remaining neurological exam was unrewarding. The first ray was shortened and rigid with loss of halluc purchase. Callus was noted plantar to metatarsal heads two through five on the left foot. Electromyography and nerve conduction studies were ordered, results from the studies were negative for any neurological abnormalities. It was discussed with patient at this time that the pathology was caused by the first MTPJ malunion. The patient elected for surgical takedown of the malunion for a distraction arthroplasty. The patient was placed supine on the operating room table with an ipsilateral hip bump. A pneumatic calf tourniquet was applied for hemostasis.

Pre-op Xray

Intra-op

After sterile preparation and exsanguination, approximately an eight centimeter linear incision was made over the dorsal aspect of the first metatarsal crossing the first MTPJ. Shaped dissection was continued reflecting the periosteum and capsule from the first MTPJ. All previous first MTPJ hardware was removed. An osteotomy was made through the first MTPJ fusion. Four threaded pins were placed, two in the proximal phalanx, two in the metatarsal, and a monorail fixator was applied. The joint was distracted one centimeter. The incision was irrigated and a layered closure was performed. The patient remained non-weight bearing following the procedure. Over the next month the patient distracted the newly created joint by 0.25 millimeters daily. The patient returned to the operating room one month following the initial procedure. The patient was positioned in a similar manner as to the previous surgery. The external fixator was removed non-sterilely. The extremity was then steriley prepped.

Case Presentation

Using the prior incision a full-thickness incision was made. Full thickness flaps were created. The fibrocartilage was debried from the joint. A pseudo silicone implant was placed in the recreated first MTPJ. The joint was irrigated, a graftjacket allograft was wrapped around the implant to create joint capsule. The incision was irrigated a second time and a layered closure was performed. During the recovery period underwent aggressive physical therapy. He was fitted for orthotics three months after surgery and has reported an improvement in his level of pain. Fifteen months following the procedure the patient’s pain has improved. He is able to return to his duties in the military while wearing an orthotic.

References