Diabetic foot ulcers (DFUs) account for a large portion of morbidities around the world, affecting those who have them with functional deficits and decreased quality of life. According to the American Diabetes Association, there were 30.3 million Americans with diabetes in 2015 with 1.5 million new cases each year.1 Patients with Diabetes Mellitus and subsequent neuropathy commonly present with non-healing ulcers on the plantar aspect of the foot. These ulcers, even if treated can re- ulcerate and become infected leading to osteomyelitis causing further complications and the need for removal of the necrotic underlying structures. This case study presents a pan metatarsal head resection (PMHR) with Achilles lengthening as a practical alternative to transmetatarsal amputations (TMAs) or isolated ray resection (IRR) in order to preserve forefoot length and mechanics, cosmetic appearance, as well as prevent further ulceration.

Treatment of infectious non-healing diabetic ulcers with PMHR and Achilles tendon lengthening has been briefly discussed in literature with limited comparisons to TMA and isolated ray resections. Throughout the gait cycle forefoot mechanics are necessary to allow for propulsion and subsequent ground reactive force to dissipate over the surface area in contact. The PMHR procedure has been utilized to retain said propulsion and preserve forefoot mechanics successfully since first being published in 1911 as the Hoffman procedure.2 The use of PMHR in patients versus TMA or isolated ray resections provides maintenance of proper gait, preserve cosmesis appearance, reduce re-ulceration and infection rates, and return to bipedal ambulation with minimal functional loss.3,4,5,6,7 Preservation of foot length is vital in diabetic patients whose morbidity consistently affects micro vascularization and has implications as sensory neuropathy and high plantar pressures causing the forefoot to be one of the most common sites of ulceration leading to osteomyelitis.3,5,6,7

Literature states that limited ankle dorsiflexion has been implicated as a causative factor to forefoot plantar ulcerations during ambulation as well as re-ulceration in diabetic patients who have undergone a Pan Metatarsal Head Resection (PMHR). A literature review of TMA and Achilles tendon lengthening should be considered on diabetic patients at high risk for ulceration or who have undergone surgery for plantar ulcerations as an effective strategy to reduce plantar pressure and promote healing of the foot. Peak pressures on the forefoot have been substantially reduced 27% after Achilles tendon lengthening, allowing decreased breakdown of the skin and increasing the efficacy of wound healing measures following forefoot surgery.8,9,10

Non-healing recurring diabetic foot ulcers have generally been treated with IRR or TMA’s however both have the tendency to progress to more proximal amputations due to the subsequent change in pattern of weight bearing. A review of TMA’s and Achilles tendons lengthening as a form of re- amputation and operation for TMAs was very high within the first 6 months postoperatively. PMHR, accompanied with Achilles lengthening provided adequate forefoot offloading resulting in improved healing and high patient satisfaction over the first 4 years of the postoperative period.11,12,13,14,15

Case Study

We present a case of a 28-year-old female with a history of uncontrollable Type I Diabetes Mellitus, severe anemia of chronic disease, chronic kidney disease, and a history of an uncontrolled diabetic plantar ulceration of 2.5 weeks located sub 3rd and 4th metatarsal heads and to the medial aspect of the 4th digit (Fig 1).

Figure 1: Initial presentation of the wound on the right foot with non-healing ulceration sub 3rd & 4th metatarsal heads and positive probe to bone.

Figure 2: Ulceration following incision and drainage procedure, prior to PMHR.

Figure 3: AP radiograph following incision and drainage procedure, prior to PMHR.

Figure 4: AP radiograph following 2nd incision and drainage procedure, prior to PMHR.

Figure 5: AP radiograph of PMHR and Achilles lengthening immediately post-op

Figure 6: Wound healing progression 10 days post-operatively.

Figure 7: Wound healing progression 5 weeks post-operatively.

References