

Statement of Purpose

Minimally invasive foot and ankle surgery (MIS) has been around for over 60 years with an upward trend globally and even more in the United States. Hallux valgus correction has traditionally been focused on open metatarsal osteotomies or fusions requiring a lengthy recovery and bone healing. Open foot incisions inherently lend a patient to potential post-operative infections, significant scarring, and increased pain over the post-operative course. Minimally invasive foot and ankle techniques have allowed surgeons to enhance treatment options in forefoot reconstruction. This case series showcases the experience of an early adopter of minimally invasive hallux valgus correction with a unique system highlighting the results such as significantly less pain, improved range of motion and early return to function.

Literature Review

Minimally invasive foot and ankle surgery has been performed for over 150 years. The earliest reported cases stem from 1836 by Dr. Gernet. A myriad of forefoot and hindfoot procedures have been described in the literature with various success rates. (1) A systematic review by Trnka, Krenn, and Schuh have elucidated the evidence for and against MIS foot procedures. They found 1750 patients with over 2000 procedures performed for hallux valgus only. A vast majority of these publications were level IV studies with little follow-up or unreported complications. Malunions and non-unions were often left undescribed. Only one level II study and three level III studies were mentioned. Three comparative studies (2-4) between open and MIS hallux valgus correction studies have been performed. All three studies had similar radiographic outcomes between the two groups. The clear distinction made was the time of the operation. As described by Maffulli to be 19 minutes versus 42 minutes, MIS vs. open. Roukis (5) performed a systematic review of minimum incision metatarsal osteotomies and found only 3 case series with over 12-month follow-up were included. But all did have structural maintenance of correction, high degree of patient satisfaction, and no more complications than an open hallux valgus repair. The literature supports the opportunity that MIS hallux valgus correction provides to patients, but with the appropriate training and education.

Methods and Design

Patients underwent elective hallux valgus correction at a single institution by a the author with a small 2 x 20 mm irrigated burr and fully-threaded headless screws. Patients followed a consistent post-operative course with serial radiographs until osseous healing. Pre- and post-operative intermetatarsal angle, hallux valgus angle and sesamoid position were recorded. Visual analog scores (VAS) were recorded for post-operative pain. Complications and time to pre-operative activity were also reported.

Operative Technique

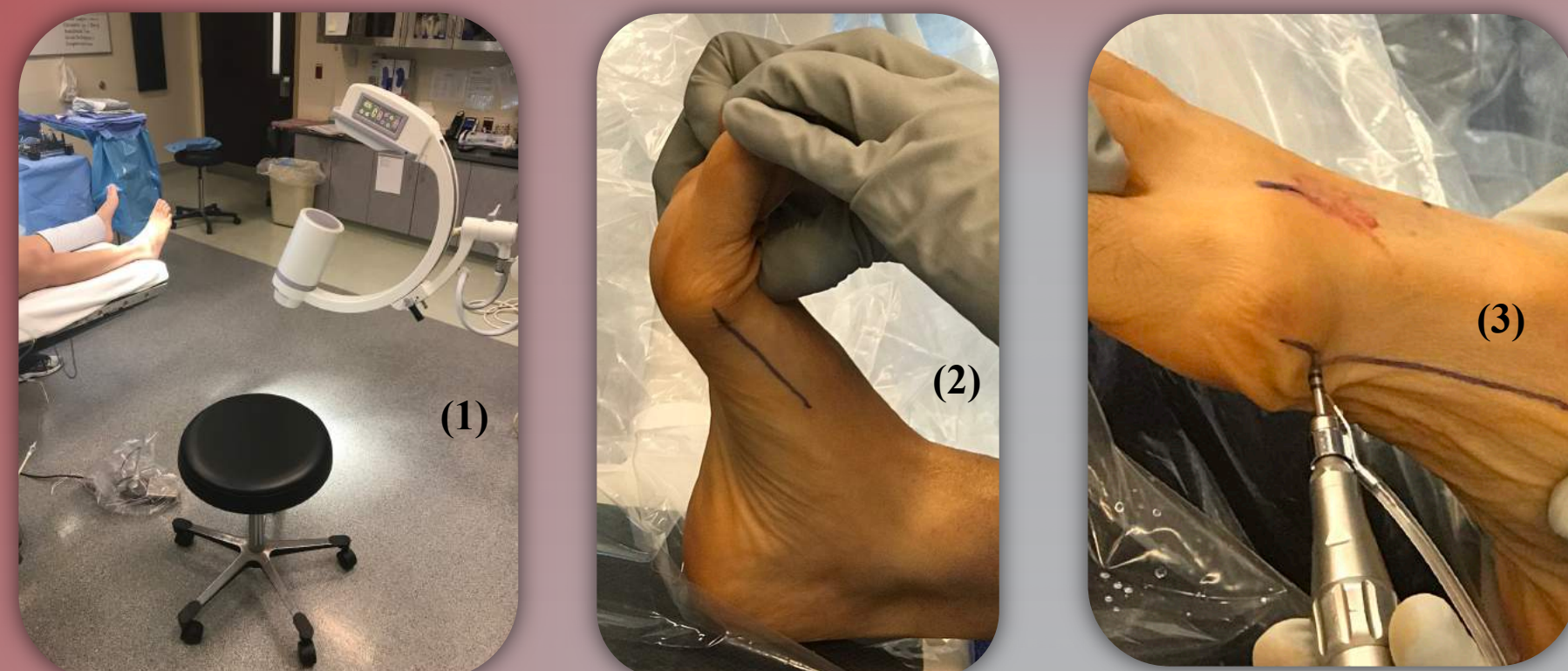


Fig. 1) OR Set up is critical Fig. 2) Metatarsal mapped Fig. 3) 2x20 mm burr utilized to create osteotomy

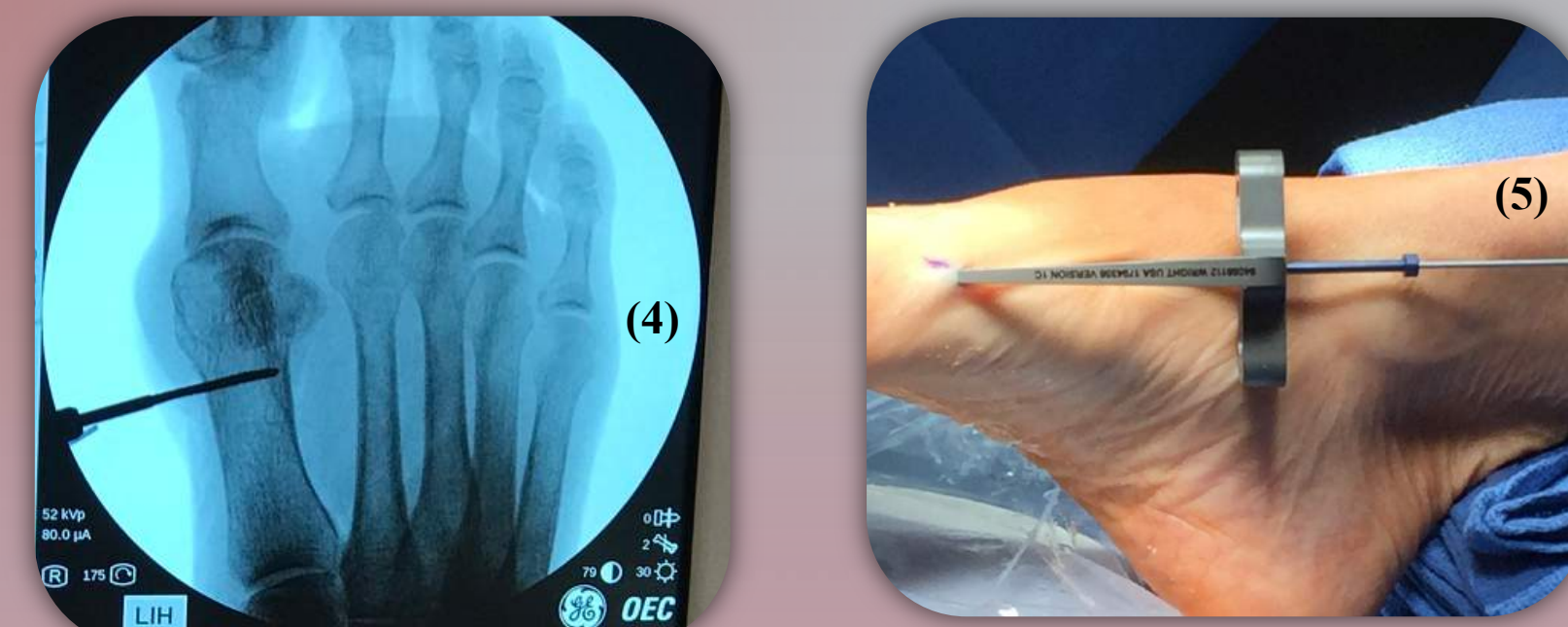


Fig. 4) Straight metatarsal osteotomy created to avoid shortening Fig. 5) Targeting guide centrally applied



Fig. 6) Screw wires through guide Fig. 7) Translator used to shift capital fragment



Fig. 8) Screws maintained in central metatarsal



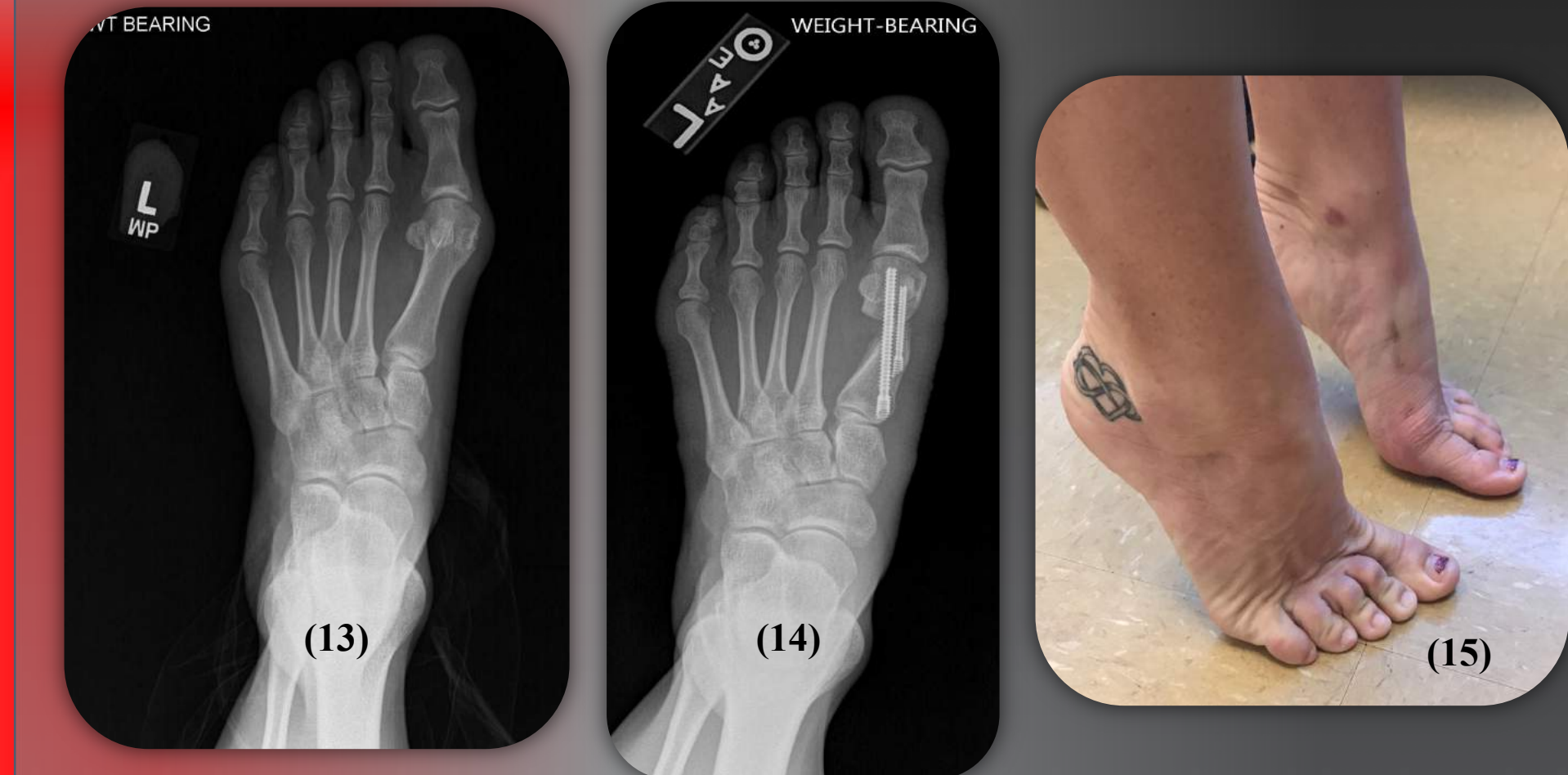
Fig. 9) Correction confirmed



Figures 10-12) Pre-operative, 2-w & 10w Post-operative Radiographs after MIS hallux valgus correction. IMA 11 → 6 & VAS 7 → 0 & TSP 3 → 1 & RTP @ 6 weeks

Results

10 consecutive patients underwent minimally invasive hallux valgus correction with a unique targeting guide and headless screws over the mean course of 12 months follow-up. 7 Females; 3 Males with a mean age of 51 years old were included. Mean post-operative VAS scores were 1.5. The mean radiographic osseous healing was 12.5 weeks. No revision cases or infections were reported. Patient returned to pre-operative activity at 6 weeks. One patient required subsequent hardware removal. The learning curve with improved surgical time was reduced around 5-6 cases for a isolated first metatarsal osteotomy. All radiographic angles improved from pre-operative to over 1 year follow-up. All patients would have the surgery performed again.



Figures 13-15) Pre-operative and 12 w Post-operative Radiographs after MIS hallux valgus correction. Toe Raise with near-normal ROM. IMA 13 → 7 & VAS 8 → 1 & TSP 6 → 1 & RTP @ 4 weeks

Discussion

Early experience with a unique hallux valgus correction system has allowed a traditionally painful and limiting surgery to become nearly seamless. The near-absence of post-operative pain and maintenance of range of motion is critical in patient deformity correction. Anecdotally, the surgical time was reduced after the first five cases. The low complication rate was also a compelling argument to continue with this procedure. This minimally invasive technique and screw system allows trained foot and ankle surgeons to perform a reproducible procedure optimizing patient outcomes.

References

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