

# Functional and Radiographic Outcomes Following Minimally Invasive Bunion Correction

Bradley M. Lamm, DPM, FACFAS, Jordan J. Ernst, DPM, MS, AACFAS, Travis M. Johnson, DPM, AACFAS, Nachika Ibekwe MS4  
Foot and Ankle Deformity Correction Fellowship Program

Level of Evidence: Therapeutic, Level IV: Case Series

## Statement of Purpose

The touted advantages of percutaneous and minimally invasive surgery include quicker operative times, decreased tissue trauma, less scarring, expedited rehabilitation, and fewer complications. The aim of this study was to assess radiographic and functional outcomes in patients after undergoing minimally invasive bunion correction with screw fixation and percutaneous soft tissue rebalancing.

## Methodology Continued

was performed to identify any complications including revision surgery, hardware removal, and post-operative infection. A paired samples t-test was used to compare preoperative and postoperative radiographic measurements with  $p < .05$  on two-tailed t-testing considered statistically significant. Statistical analyses were performed using Microsoft Excel.

Angle	Preoperative Mean	Postoperative Mean	Change from baseline	p-value
First Intermetatarsal	14.1° ± 2.7	4.8° ± 3.1	-9.3°	<.05*
Hallux Abductus	26.4° ± 7.8	5.2° ± 4.9	-21.2°	<.05*
Tibial Sesamoid Position	4.2 ± 1.5	2.1 ± 1.2	-2.1	<.05*

Table 1: Change from baseline in radiographic angle measurements pre- to post-operative minimally invasive HAV correction (n = 31)  
Data are reported as mean ± standard deviation. \*denotes statistical significance

## Results

31 bunion correction procedures on 25 patients were reviewed including 22 right and 9 left feet, 3 males and 28 females. Mean age 48.8, 12 month follow up. Radiographic findings are in Table 1. Average MOFQ score was 94/100. All patients were satisfied with their decision to undergo surgery. All but two patients rated their 1<sup>st</sup> MTP motion as superior compared to their pre-operative baseline. There were no reported complications of non-union, avascular necrosis, deep infection or osteomyelitis.

## Conclusions

This is the first study to report outcomes and radiographic angles following MIS bunion correction with the exclusive use of internal fixation and soft tissue balancing. The advantages of MIS bunionectomy are many, including reduced risk of avascular necrosis, reduced post-operative pain and edema, decreased scar tissue, lack of need for tourniquet, faster operative times, ability to correct frontal plane deformity, and preservation of joint function. Our modified technique combines osseous and soft tissue correction, addressing the complete deformity as a whole. The findings of this study are comparable to the available literature data.

## Methodology & Procedures

31 Bunions were corrected in 25 patients utilizing a minimally invasive approach between 2016 and 2018. The method of fixation was a single partially-threaded, cannulated 4.0mm screw (Figure 1). Medial capsular reefing was performed via a percutaneous approach. Full weightbearing was allowed in a post-op shoe on day one. The average follow up was 12 months. Pre-operative and most recent post-operative digital weight bearing radiographic measurements were made with McKesson Radiology Suite including the first IM angle, hallux abductus angle, and sesamoid position (Table 1). The distal metatarsal articular angle was not measured secondary due to its poor inter and intra-observer reliability (1). Functional outcomes were measured with a Manchester-Oxford Foot Questionnaire. A Retrospective chart review (cont'd)

## Surgical Technique

First, a 10mm medial central first metatarsal neck incision is made. The osteotomy is performed with 1.8mm wire perforation and osteotome. This minimizes soft tissue trauma and preserves blood supply. Next an elevator is inserted to the intramedullary canal to lateralize the capital fragment. A percutaneous proximal to distal screw is then inserted across the osteotomy. 0-Vicryl suture is then percutaneously passed from the metatarsal neck incision distally through the MTPJ capsule across the joint, then passed back through the same exit hole proximally out the original medial neck incision and tied with the hallux rectus to reef the medial first MTPJ capsule. A percutaneous release was typically performed of the lateral first MTPJ capsule with a #64 Beaver blade.



Figure 1: Preoperative radiograph, intraoperative surgical technique and post operative radiograph

## Literature Review

Bosch et al reported on 98 bunions treated with a minimally invasive approach citing excellent radiographic outcomes at 8.75 years (2). Magnan and colleagues popularized the Bosch technique, publishing average pre and postoperative IM angles of 13 and 7, hallux abductus angles 33 and 16 (3). A systematic review of percutaneous osteotomies for HAV found an average improvement in the IM angle from 14.6 degrees to 8.6 degrees, hallux valgus angle from 29.6 to 13.2 (4). Khosroabadi and Lamm published their modified percutaneous hallux abductovalgus correction technique which utilized percutaneous screw and Steinman pin fixation that was later removed once the osteotomy healed (5). In this study we used internal fixation exclusively. Brogan found significant improvement in MOFQ scores in 45 cases at 6 month follow up from MIS bunion correction (6). The MOxFAQ has been validated for HAV and has shown to have better responsiveness than AOFAS scores (7).

## References

- Chi TD, Davitt J, Younger A, Holt S, Sangeorzan BJ. Intra- and inter-observer reliability of the distal metatarsal articular angle in adult hallux valgus. *Foot Ankle Int* 2002; 23:722-726
- Bösch P, Wanke S, Legenstein R. Hallux valgus correction by the method of Bösch: a new technique with a seven-to-ten-year follow-up. *Foot Ankle Clin*. 2000;5(3):485-98, v-vi
- Magnan B, Samaila E, Viola G, Bartolozzi P. Minimally invasive retrocapital osteotomy of the first metatarsal in hallux valgus deformity. *Oper Orthop Traumatol*. 2008;20(1):89-96
- Bia A, Guerra-Pinto F, Pereira BS, et al. Percutaneous Osteotomies in Hallux Valgus: A Systematic Review. *J Foot Ank Surg* 2018; 57: 123-130
- Khosroabadi A, Lamm BM. Modified Percutaneous Hallux Abductovalgus Correction. *J Foot Ankle Surg*. 2016;55(6):1336-1342.
- Brogan K, Voller T, Gee C. Third-generation minimally invasive correction of hallux valgus: technique and early outcomes. *International Orthopedics*. 2014; 38(10): 2115-212
- Dawson J, Coffey J, Doll H, et al. A patient-based questionnaire to assess outcomes of foot surgery: validation in the context of surgery for hallux valgus. *Qual Life Res*. 2006;15(7):1211-22.