

Hallux Valgus Correction Using a Novel 3D Printed Plate: Retrospective Case Series with Two Year Follow-up Data. Surgical Technique Guide and Outcomes.

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BACKGROUND

Bunion correction has been an evolution over the past 150 years¹ with now well over one hundred described techniques for correcting this common foot deformity^{2,3}. Modern attempts at bunion correction with less invasive joint sparing approaches, such as suture-button techniques, have introduced additional complications like second metatarsal fracture^{4,5}. Suture fixation techniques have evolved in an attempt to avoid these complications⁶. We present our results, with up to 26 months of radiographic follow-up including initial correction and complications, with a device (FastForward) which utilizes a 3D printed titanium plate on the lateral cortex of the second metatarsal without bony violation, and reduces the 1-2 intermetatarsal angle using suture tape passed through drill holes in the first metatarsal with PEEK interference screw fixation.

OBJECTIVES

- Describe technique for use of bunion correction device
- Review initial clinical and radiographic outcomes
- Review long term outcomes
- Discuss complications unique to this technique

METHODS

- This study includes 33 feet in 31 patients. A single board-certified and fellowship trained orthopedic foot and ankle surgeon performed all operations over the course of 18 months at a single institution.
- Dual dorsal/medial incision; Modified McBride performed in standard fashion
- FastForward plate on lateral aspect of second metatarsal shaft. FiberTape looped around/through plate. Reduction of 1-2 intermetatarsal space by manual pressure or reduction clamp. FiberTape passed through two drill holes in first metatarsal shaft and held under tension with interference screw fixation.
- Imaging: intraoperative fluoroscopy, two week non-weight-bearing, 6 week weight-bearing, and at least one final set of weight-bearing x-rays a minimum of three months post-op.
- IRB approval was obtained for retrospective chart review to look at initial and final outcomes with regards to correction of 1-2 IMA and HVA, along with complications and clinical outcomes per chart review.

Medial to lateral view of the FastForward device implanted on a plastic foot skeleton model. The plate on the second metatarsal does not require drilling or cutting the bone as it is held in place with the looped suture tape. The first metatarsal is fixated with two drill holes and interference screws holding the suture tape under tension.



Dorsal view of the FastForward device implanted on a plastic foot skeleton model. The tension on the suture tape is used to hold the reduction of the 1-2 interspace after bunionectomy. This is performed with a two-incision technique approaching the second metatarsal from a dorsal approach and the first metatarsal from a medial approach.



CASE EXAMPLES

Case 1 – 60 year old female
Pre-op IMA 16.5°; HVA 35.6°
Sx: FastForward, Bunionectomy, Akin



Post-op IMA 7.7°, HVA 6.1°
Good Initial Correction



Final follow-up IMA 13.4°; HVA 15.5°
Mild recurrent deformity, no complications



Case 2 – 45 year old female
Pre-op IMA 13.2°; HVA 26.2°
Sx: FastForward, bunionectomy



Post-op IMA 4.8°, HVA 13.2°
Excellent initial correction



Final follow-up IMA 10.3°, HVA 22.2°
Complication: 2nd metatarsal stress fracture
Revision Sx: Scarf and ORIF 2nd metatarsal



RESULTS

- Average patient age was 50 years (range 15-75y) and 87% were female.
- Average radiographic follow-up length was 14.9 months (range 2-26mo) representing either evidence of failure or final successful follow-up.
- Average measurements of HVA and 1-2 IMA were as follows:
 - Pre-op WB – 31.4 / 16.0 degrees
 - 2 week post NWB – 11.3 / 7.1 degrees
 - 6 week post WB – 14.5 / 8.2 degrees
 - Final WB – 24.3 / 13.7 degrees
- At final follow-up, 30 of 33 feet (91%) had at least mild radiographic recurrence, defined in our series as a 1-2 IMA greater than 10 degrees or HVA greater than 25 degrees.
- 7 patients (22.5%) had revision for recurrent deformity, fracture, or hardware irritation. There were no infections.

CONCLUSION

Although there was powerful initial correction of both the HVA and IMA with this minimally invasive technique, the rate of radiographic recurrence, fracture, and revision surgery should preclude the use of this device in treating bunion deformity.

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DISCLOSURES

- Justin Brohard DO – no disclosures
- Ryan Callahan DO – no disclosures
- Jason Lin, MD – at the time of performing surgery on the patients included in this study, Dr. Lin was a consultant for MedShape, the producer of the FastForward device. He has discontinued use of this device in his practice and is no longer a consultant.