

Advancing Forefoot Reconstruction: The Clinical Case for the ARROW-LOK® Forefoot Fixation System

Introduction

Lesser toe deformities, including hammertoes and mallet toes, represent a significant portion of clinical foot pathologies. While traditional Kirschner wires (K-wires) have served as a standard of care, their limitations—ranging from high complication rates to patient discomfort—necessitate a more robust, permanent solution for some patients. The ARROW-LOK® Forefoot Fixation System provides a stable, stainless steel intramedullary (IM) alternative designed for superior fixation in both primary and revision scenarios, even in patients with significant comorbidities.

The Challenge in Forefoot Reconstruction

The historical reliance on K-wire fixation for digital arthrodesis presents several clinical hurdles:

- **Complication Rates:** K-wires are associated with pin-tract infections in up to 7%¹ of cases and pin migration in roughly 5.5%².
- **Stability Deficits:** A lack of torsional stability can lead to recurrent deformities in 5.6% to 9.5%³ of patients.
- **Physical discomfort:** Protruding hardware causes significant anxiety and physical discomfort.
- **Premature Removal:** Since K-wires must be removed in a secondary procedure at 4–6 weeks regardless of fusion progress, the resulting loss of fixation can compromise the final surgical outcome.
- **High-Risk Profiles:** Patients presenting with osteoporosis, diabetes, or neuropathy face amplified risks of K-wire failure, necessitating a more reliable internal fixation method.

The ARROW-LOK® Solution

The ARROW-LOK® Hybrid is a permanent IM implant constructed from biocompatible ASTM F138 Stainless steel. It is engineered to mimic the stability of an IM nail in long bones by providing fixation far from the resection site to resist bending and torsional forces.

Key Technical Advantages

- **Versatility:** The system is available in 17 lengths ranging from 13mm to 50mm, allowing for PIPJ, DIPJ, and multi-joint fusions with a single device.
- **Anatomic Alignment:** A 10° plantar angle option provides a natural anatomic bend to the fusion.

- **Superior Fixation:** The "arrowhead" design facilitates easy insertion while providing high resistance to pull-out and rotation by engaging the dense subchondral bone.
- **Intraoperative Adaptability:** For patients with narrow IM canals, surgeons can trim the arrowhead wings to ensure a precise fit.

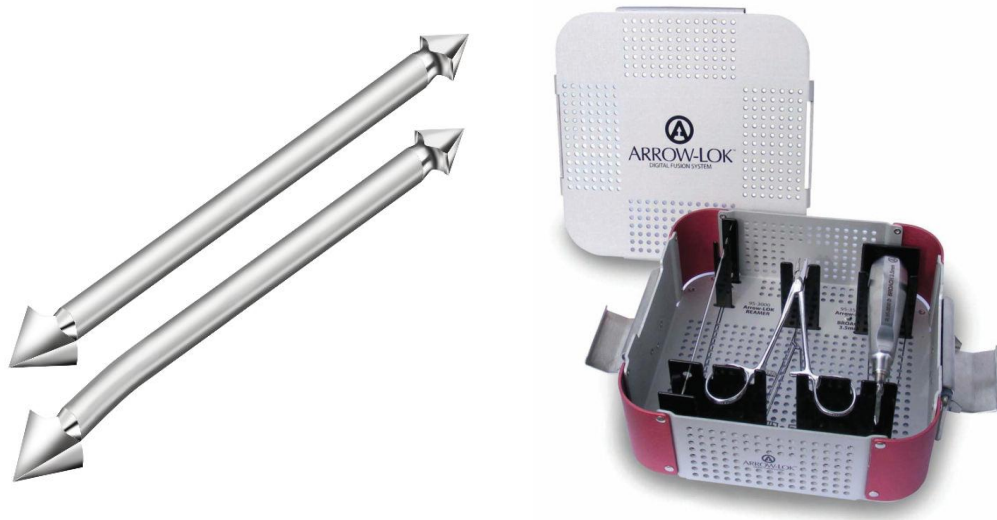


Figure 1: ARROW-LOK Hybrid Design Implants & Tray. Note the optional 10° plantar angle on the lower image on the left. Surgical tray displayed on right image.

Clinical Case Studies

The following cases highlight the efficacy of the ARROW-LOK® system across diverse patient demographics and complex surgical requirements.

Case 1: Complex Revision with Neuropathy

- **Patient Profile:** 78-year-old female with hypertension and neuropathy.
- **Clinical Indication:** Revision of iatrogenic hallux varus and hammertoes 2 through 5.
- **Procedure:** 1st MPJ Fusion combined with PIPJ arthrodesis of digits 2-5 using ARROW-LOK implants.
- **Outcome:** 4-month follow-up confirmed stable integration and maintained correction despite the patient's neuropathic status.



Figure 2A: Pre-operative X-ray.



Figure 2B: Intra-operative X-ray.



Figure 2C: 4-month Post-operative X-ray.

Case 2: Multi-Toe Congenital Correction

- **Patient Profile:** 64-year-old female.
- **Clinical Indication:** Congenital Hallux Varus with multi-toe hammertoe deformities and medial deviation at the MPJ.
- **Procedure:** Reverse Mau Osteotomy for 1st MPJ relocation; PIPJ arthrodesis of digits 2-5 with ARROW-LOK.
- **Outcome:** 14-month follow-up demonstrated a restored natural toe parabola and long-term stability.



Figure 3A: Pre-operative X-ray.



Figure 3B: Intra-operative X-ray.



Figure 3C: 14-month Post-operative X-ray.

Case 3: Bilateral DIPJ

- **Patient Profile:** 51-year-old female with rheumatoid arthritis, hypertension, & gout
- **Clinical Indication:** Chronic mallet toe of the 2nd digit on both feet.
- **Procedure:** Bilateral DIPJ Arthrodesis utilizing the Legacy short ARROW-LOK implant.
- **Outcome:** Fixation was stable during the intraoperative phase; long-term fusion confirmed after 9 months in follow-up imaging.



Figure 4A: Pre-operative X-rays.



Figure 4B: Intra-operative X-rays.



Figure 4C: 9-month Post-operative Follow-up X-ray.

Case 4: Long-term Durability in the Elderly

- **Patient Profile:** 84-year-old female with neuropathy and arthritis.
- **Clinical Indication:** 4th hammer toe repair.
- **Procedure:** Standard PIPJ fusion with ARROW-LOK.
- **Outcome:** 5-year follow-up highlighting the exceptional durability and lack of fatigue failure in the permanent IM implant.



Figure 5A: Pre-operative X-ray.



Figure 5B: Intra-operative X-ray.



Figure 5C: 5-year Post-operative X-ray.

Case 5: High Comorbidity and Osteoporosis

- **Patient Profile:** 63-year-old female with osteoporosis and hypertension.
- **Clinical Indication:** Painful bunion with elongated 2nd metatarsal and hammertoes 2-5.
- **Procedure:** Modified McBride bunionectomy and multi-toe PIPJ arthrodesis (digits 2-5).
- **Outcome:** 4-month follow-up showed stable fixation and alignment despite compromised bone density from osteoporosis.



Figure 6A: Pre-operative X-ray.



Figure 6B: Intra-operative X-ray.



Figure 6C: 4-month Post-operative X-ray.

Conclusion

The ARROW-LOK® Forefoot Fixation System represents a significant advancement over traditional wire-based fixation. By providing a permanent, stable, and versatile intramedullary solution, it addresses the primary concerns of recurrence and complication in forefoot reconstruction. As demonstrated across various clinical cases—from long-term follow-ups to complex revisions in diabetic and neuropathic patients—the system ensures reliable outcomes and improved patient comfort.



Dr. Scott R. Roman, DPM

Dr. Scott R. Roman, DPM, is a highly regarded podiatrist at the Ankle & Foot Centers of America, specializing in advanced reconstructive foot and ankle surgery.

Known for his precision and innovation, he has made significant contributions to the field, holding sixteen patents for fixation and implantation devices. Dr. Roman has also served as a faculty member and past chairman of The Podiatry Institute, reflecting his commitment to education and advancing surgical excellence.

He earned his Doctor of Podiatric Medicine from the Ohio College of Podiatric Medicine and completed his residency at Emory-Northlake Medical Center.

His approach to patient care is rooted in meticulous attention to detail and a dedication to achieving exceptional outcomes.

References

1. Waizy H, Olender G, Mansouri M, et al. Digital arthrodesis with an intramedullary stainless steel fusion device: a retrospective study. *Foot Ankle Spec.* 2015;8(2):101-108.
2. Bouché RT, Heit EJ. Combined digital arthrodesis and metatarsophalangeal joint arthroplasty for the treatment of hammertoe deformity. *J Foot Ankle Surg.* 2007;46(3):141-147.
3. Zimmerman TL, Sferra JJ. Hammertoe and mallet toe deformities: etiology and treatment. *Orthop Clin North Am.* 1996;27(2):237-251.