

CASE SERIES

Silverback™ Ankle Fusion Plating System Case Series: Primary, Revision, and Extended Hindfoot Fusion



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FEATURED PRODUCTS: Silverback™ Ankle Fusion Plating System and Monster® Hindfoot Screw System

Introduction

Ankle fusion remains a gold standard option for end stage ankle arthritis.¹ Although total ankle replacement is demonstrating sustained growth and improved survivorship with current generation prostheses, a cohort of ankle arthritis patients remain who are either not a candidate, or do not elect for total ankle replacement as the definitive treatment option for the arthritic ankle.¹ In my experience, a well-positioned ankle arthrodesis can provide a durable long-term solution for pain relief with limited impact on gait alteration. Nonunion rates for ankle arthrodesis may vary by technique and have been reported at over 10% for crossed screw constructs; whereas, anterior locked plate fixation has demonstrated nonunion rates under 5%.²

Features and Benefits

The Silverback™ Ankle Fusion Plating System provides numerous anatomically contoured options for ankle fusion including multiple approaches, tibio-talar and tibio-talo-calcaneal, short and long, and contoured and flat plate architectures. Multiple screw size options also exist for the various osseous applications including Ø3.5 and Ø4.2mm locking and non-locking screw options for the talus and Ø4.2 and Ø5.2mm locking and non-locking screw options for the tibia and calcaneus. A specific Ø4.7mm Compact locking and non-locking screw is designed for the proximal tibia for optimal cortical bone insertion. Precision® Guide technology allows for placement of a Ø5.5 mm or Ø7.0mm Monster® Hindfoot Screw outside of the plate while avoiding interference with all on-axis plate screws. Lag screws are commonly known to aid in stability or compression across joint spaces. A series of three cases are included to demonstrate various applications of the Silverback™ Ankle Fusion Plating System for primary, revision and extended hindfoot fusion.



CASE 1: Primary Ankle Arthrodesis

A 78-year-old female presents who has been treated conservatively with Arizona bracing for the past 18 months by me. She previously underwent Bridle reconstruction for drop foot deformity in 2015 at an outside institution. She unfortunately developed rapid valgus deformity with progressively worsening ankle arthritis over the first two years after the Bridle procedure. She elected to move forward with ankle arthrodesis for definitive management of the valgus ankle arthritis to negate the need for the daily bracing and improved pain control (Figure 1).

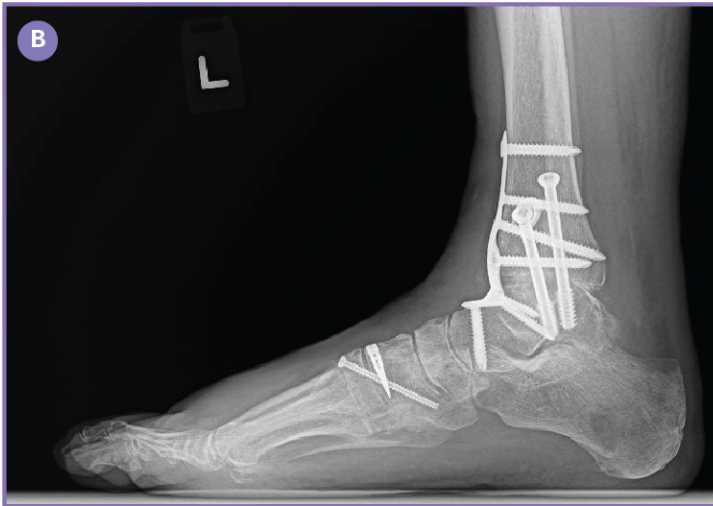
Figure 1: Weightbearing pre-operative radiographs demonstrating valgus ankle deformity with progressive arthritic change (A) AP and (B) Lateral.



On clinical examination reduction of her valgus ankle deformity to a neutral position revealed associated varus deformity of the medial column and forefoot. When the anterior approach with the Silverback™ Ankle Fusion Plate was performed, she underwent concomitant ancillary procedures including tendo-Achilles lengthening, Titan 3-D™ cotton osteotomy, and calcaneal autograft augmentation. The calcaneal autograft was supplemented with V92™ cellular bone matrix for additional orthobiologic supplementation. CT scan confirmed bony union was achieved at three months and the patient is pain free at six months follow-up without further requirement for bracing (Figure 2).



Figure 2: Weightbearing radiographs 10 weeks post-operative demonstrating mature fusion following anterior approach primary ankle fusion (A) AP, (B) and Lateral. CT scan imaging confirming mature osseous integration 3 months post-operative at the ankle fusion site (C) Coronal and (D) Sagittal.



CASE 2: Revision Ankle Arthrodesis

A 75-year-old non-diabetic, non-smoking male presents who underwent primary ankle arthrodesis in 2016 at an outside institution with an open trans-fibular crossed-screw technique. His early post-operative course was unremarkable with no incisional dehiscence or infection. Unfortunately, nonunion ensued (Figure 3).

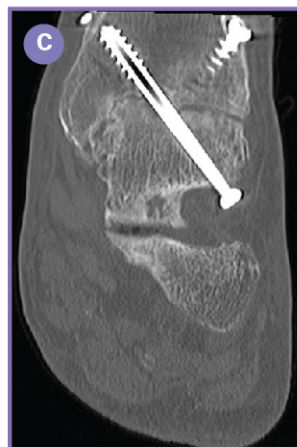


Figure 3: Pre-operative weightbearing radiographs demonstrating nonunion following prior attempted lateral approach ankle fusion with fibular takedown from outside institution (A) AP and (B) Lateral. CT scan imaging confirming nonunion of initial ankle fusion attempt (C) Coronal and (D) Sagittal.

He ambulated with bracing, but experienced continued pain over the next three years. Revision ankle arthrodesis was performed via an anterior approach with the Silverback™ Ankle Fusion Plating System with additional procedures including hardware removal, calcaneal autograft harvesting, and tendo-Achilles lengthening. The calcaneal autograft was supplemented with V92™ cellular bone matrix and cancellous allograft chips to backfill any residual bone defect after the hardware removal and debridement of non-united joint. CT scan confirmed bony union was achieved at three months and the patient is pain free at six months follow-up without further requirement for bracing (**Figure 4**).

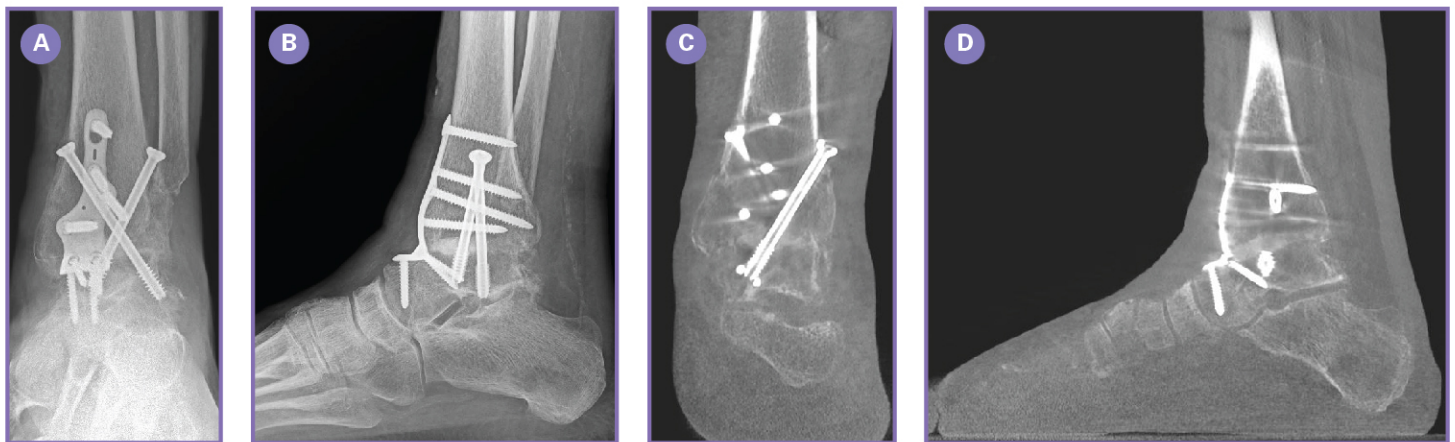


Figure 4: Weightbearing radiographs 10 weeks post-operative demonstrating mature fusion following anterior approach revision ankle fusion (**A**) AP and (**B**) Lateral. Weightbearing CT scan imaging confirming mature osseous integration 3 months post-operative at the ankle fusion site (**C**) Coronal and (**D**) Sagittal.

CASE 3: Dual Approach Plate Fixated Tibio-Talo-Calcaneal Arthrodesis

A 64-year-old male with contralateral ankle fusion presents with painful ankle and subtalar joint arthritis with varus deformity. After failure of conservative care and diagnostic injections revealing painful symptoms to both the ankle and subtalar joints, total ankle replacement versus tibio-talo-calcaneal (TTC) arthrodesis was discussed. The patient elected to proceed with TTC arthrodesis as he functioned well with his contralateral ankle fusion and knows people who unfortunately had poor results with ankle replacement (**Figure 5**).

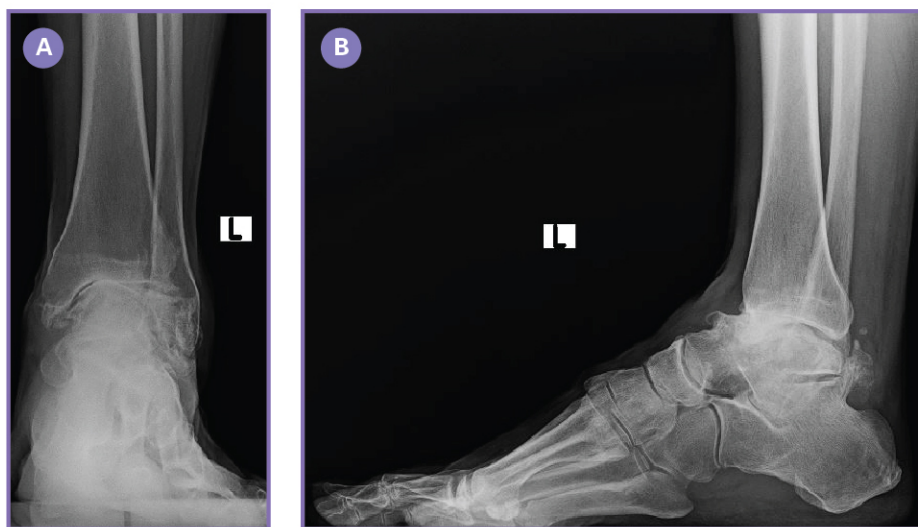


Figure 5: Weightbearing pre-operative radiographs demonstrating varus ankle arthritis with advanced concomitant subtalar joint arthritis (**A**) AP and (**B**) Lateral.

A dual approach (sinus tarsi and anterior ankle) was performed for the hindfoot fusion addressing the deformities at each joint level independently and sparing the fibula from resection. Additional procedures included tendo-Achilles lengthening and calcaneal autograft procurement. The calcaneal autograft was supplemented with V92™ cellular bone matrix. The subtalar joint was fixated with two Ø7.0mm Monster® Hindfoot screws and the ankle joint with the anterior Silverback™ Ankle Fusion Plate. For surgeons who choose, there is an anterior TTC plate option (not shown) available which assists in targeting the subtalar joint fixation and provides subtalar joint fixation through the anterior ankle fusion plate with a Ø7.0 mm Monster® Hindfoot screw. CT scan bony union at both joint segments was achieved at three-month follow-up (**Figure 6**).



Figure 6: Weightbearing post-operative radiographs demonstrating mature fusion following dual approach ankle (anterior) and subtalar (lateral) with fibular sparing technique (**A**) AP and (**B**) Lateral. Weightbearing CT scan imaging confirming mature osseous integration 3 months post-operative across both joint segments (**C**) Coronal and (**D**) Sagittal.

References

- ¹ Tai, Kerry, et al. "A Survey for End-Stage Ankle Arthritis Treatment: Ankle Arthrodesis Versus Ankle Arthroplasty." *The Journal of Foot and Ankle Surgery* 59.2 (2020): 330-336.
- ² Prissel, Mark A., et al. "Ankle arthrodesis: a retrospective analysis comparing single column, locked anterior plating to crossed lag screw technique." *The Journal of Foot and Ankle Surgery* 56.3 (2017): 453-456.

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