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ABSTRACT BOOK

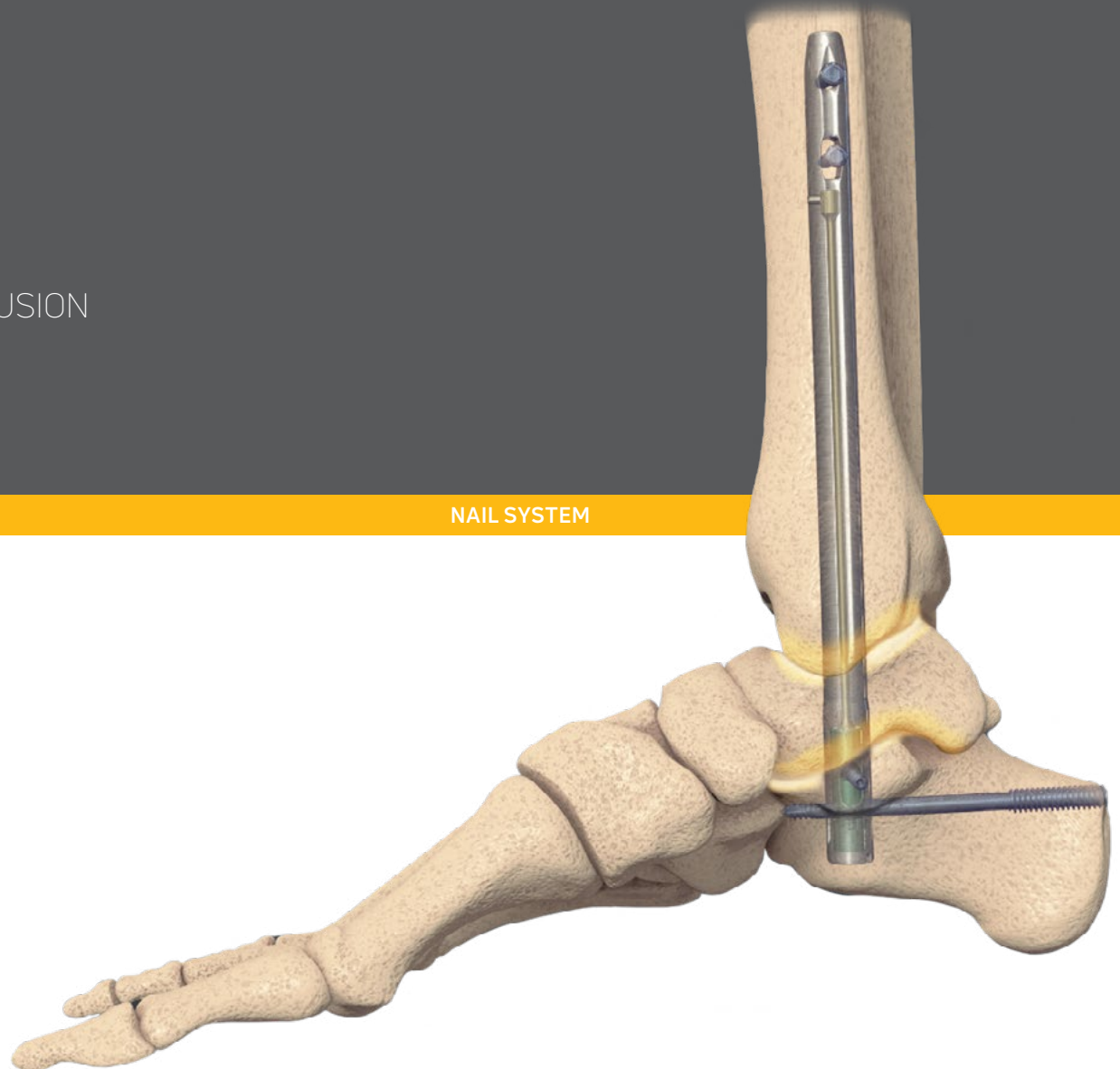


MEDSHAPE®

# DYNANAIL®

ACTIVE, ADAPTIVE HEALING FOR TTC FUSION

NAIL SYSTEM



### TIBIOTALOCALCANEAL ARTHRODESIS UTILIZING A TITANIUM INTRAMEDULLARY NAIL WITH AN INTERNAL PSEUDOELASTIC NITINOL COMPRESSION ELEMENT: A RETROSPECTIVE CASE SERIES OF 33 PATIENTS

Kent Ellington, MD, Samuel Ford, MD (OrthoCarolina Foot & Ankle Institute), and John Kwon, MD (Harvard Medical School)

Source: Journal of Foot & Ankle Surgery, 2019 Jan

**Study Type:** Retrospective Case Series

**No. of Patients:** 33 (30% Diabetic, 24% Charcot, 24% Talar AVN)

#### SUMMARY:

- Fusion defined as >50% bony bridging on CT scan
- 90% fusion of all arthrodesis surfaces
- 71% fusion in patients with Charcot neuroarthropathy
- 21% re-operation rate (0% for non-union)

Access the full abstract and article through the

**The Journal of Foot and Ankle Surgery.**

“The DynaNail® is safe and effective in generating axial compliance across [...] both joints, [...] even in the setting of challenging clinical scenarios.”

### REVISION TIBIOTALOCALCANEAL ARTHRODESIS WITH A PSEUDOELASTIC INTRAMEDULLARY NAIL: A CASE STUDY

Dann Latt, MD (University of Arizona)

Source: Foot & Ankle Specialist, 2017 Feb; 10 (1): 75-81

**Study Type:** Case Report

**No. of Patients:** 2

#### SUMMARY:

- Tibiotalocalcaneal arthrodesis revision surgery with the DynaNail
- 2/2 fusion on CT at 3 months post-surgery (both diabetic with Charcot neuroarthropathy)
- At 1+ year follow-up, alignment maintained with no reported issues

“These cases provide early evidence that sustained compression via an intramedullary nail can lead to rapid successful hindfoot fusion when standard approaches have failed.”

### TOTAL ANKLE REPLACEMENT CONVERSION TO TIBIOTALOCALCANEAL ARTHRODESIS WITH BULK FEMORAL HEAD ALLOGRAFT AND PSEUDOELASTIC INTRAMEDULLARY NAIL PROVIDING SUSTAINED JOINT COMPRESSION: A CASE REPORT

Mark Conklin, MD (Panorama Orthopedics, Denver, CO)

Source: Foot & Ankle Orthopaedics, 2018 Dec; 3 (4): 1-7

**Study Type:** Case Report

**No. of Patients:** 2

#### SUMMARY:

- First report describing successful conversion of failed total ankle replacement to TTCA using the DynaNail® and femoral head allograft
- 2/2 patients achieved fusion on CT by 6 months post-surgery
- Time to weight-bearing: 6 weeks
- At two years post-surgery, function was restored and both patients were satisfied with procedure

“The pseudoelastic nail’s combined sustained compression and ability to immediately dynamize at time of surgery potentially mean [...] greater load sharing between hardware and bone, which could limit the risk of hardware failure and potentially allow for earlier safe weight bearing.”

### TECHNIQUE FOR USE OF TRABECULAR METAL SPACERS IN TIBIOTALOCALCANEAL ARTHRODESIS WITH LARGE BONY DEFECTS

Chris Kreulen, MD, Eric Giza, MD (UC Davis)

Source: Foot & Ankle International, 2017 Jan; 38 (1): 96-106

**Study Type:** Case Series

**No. of Patients:** 6

#### SUMMARY:

- First report describing use of the DynaNail with Trabecular Metal spacers for TTCA to treat large bony defects
- 100% fusion in all 6 patients (2 with failed TARs and 2 with Charcot neuropathy)
- Average fusion time: 8 weeks
- No reported complications

“2 types of compression from the intramedullary TTC nail help stabilize this construct to ensure favorable outcomes.”

### TIBIOTALOCALCANEAL ARTHRODESIS USING A NITINOL INTRAMEDULLARY HINDFOOT NAIL

Andrew Hsu, MD, Kent Ellington, MD (OrthoCarolina Foot & Ankle Institute), and  
Sam Adams, MD (Duke University)

Source: Foot & Ankle Specialist, 2015; 8(5): 389-96

**Study Type:** Expert Opinion

#### SUMMARY:

- Describes design rationale, performance, and surgical technique for the DynaNail®
- Demonstrates that the DynaNail maintains compression for over 6 mm of simulated bone resorption compared with another internal compression nail that loses compression after 1 mm

#### CASE EXAMPLE:

- Chronic smoker underwent TTCA to revise failed tibiotalar arthrodesis
- Fusion confirmed on CT scans at 3 months post-surgery
- Weight-bearing at 6 weeks in a CAM boot
- At 18 months follow-up, patient had no residual pain or other symptoms

“...we have found that the nail is safe, reliable, and has promising clinical and radiographic results in settings of hindfoot arthritis, complex deformity, Charcot arthropathy, and talar avascular necrosis.”

### MEASUREMENT OF NITINOL RECOVERY DISTANCE USING PSEUDOELASTIC INTRAMEDULLARY NAIL IN TIBIOTALOCALCANEAL ARTHRODESIS

Chris Gross, MD, Sam Adams, MD, Selene Parekh, MD, and Beau Kildow, MD  
(Duke University)

Source: Foot & Ankle Specialist, 2016 Dec; 9 (6): 494-499

**Study Type:** Retrospective Case Series

**No. of Patients:** 15 (60% revisions, 27% smokers, 27% diabetics)

#### SUMMARY:

- First study to describe method for measuring the recovery distance of the DynaNail Compressive Element on radiographs
- Average follow-up time: 195 days
- Compressive Element recovered an average of 5.58 mm
- 86% of total recovered distance occurred within the first 40 days

“The movement of the NiTiNOL element suggests continuous compression at the arthrodesis site.”

### COMPARISON OF TIBIOTALOCALCANEAL ARTHRODESES USING A SUSTAINED DYNAMIC COMPRESSION NAIL VERSUS NONDYNAMIZED NAILS

John Steele, MD, Beau Kildow, MD, Daniel Cunningham, MD, Travis Dekker, MD, James DeOrio, MD, Mark Easley, MD, James Nunley, MD, Selene Parekh, MD, MBA, and Samuel Adams, MD (Duke University)

Source: Foot & Ankle Specialist, 2020 Jun; 13(3):193-200

**Study Type:** Level III – Retrospective Comparative Study

**No. of Patients:** 86 - 50 DynaNail® vs. 36 nondynamized nail recipients

#### SUMMARY:

- First report internally comparing clinical outcomes between the DynaNail and statically locked intramedullary nails
- DynaNail had significantly faster time to union by 3.9 months in a more challenging, high-risk patient group despite using less supplemental hardware than nondynamized nails
- DynaNail achieved 78% fusion rate while nondynamized nails had 75% fusion rate

“The [DynaNail] has been shown to achieve successful arthrodesis in a population at high risk for nonunion, using less hardware, and at a faster rate than [nondynamized] nails.”

### TIBIOTALOCALCANEAL ARTHRODESIS FOR SEVERE TALAR AVASCULAR NECROSIS

James Lachman, MD, and Samuel Adams, MD

Source: Foot and Ankle Clinics. 2019 Mar 1; 24(1):143-61

**Study Type:** Expert Review

#### SUMMARY:

- Discusses surgical treatment of severe avascular necrosis with TTCA
- Presents two case examples of patients with significant co-morbidities who received the DynaNail with either a femoral head allograft or 3D-printed spherical cage
- Both patients were weight-bearing at 3 months post-surgery and fused at 6 months

### TIBIOTALOCALCANEAL ARTHRODESIS WITH INTRAMEDULLARY NAILS – MECHANOBIOLOGICAL BACKGROUND AND EVOLUTION OF COMPRESSIVE TECHNOLOGY

Naohiro Shibuya, DPM, and Jason Bariteau, MD

Source: Global Journal of Orthopedics and Research. 2019; 1(5):873-84

**Study Type:** Expert Review

#### SUMMARY:

- Discusses mechanobiological processes and foundations of arthrodesis
- Reviews the benchtop and clinical studies involving the DynaNail® in which patients achieve complete fusion in as early as 4-6 weeks
- Average follow-up of all studies combined was 195 days with the NiTiNOL Element fully recovering an average of 5.59 mm

“These benchtop, modeling, and clinical results as a whole suggest that the [DynaNail]...can produce favorable clinical outcomes in accordance with foundational mechanobiological principles.”

### THREE-DIMENSIONAL PRINTED CAGE IN PATIENTS WITH TIBIOTALOCALCANEAL ARTHRODESIS USING A RETROGRADE INTRAMEDULLARY NAIL

Lorena Bejarano-Pineda, MD, Akhil Sharma, BS, Samuel Adams, MD, and Selene Parekh, MD, MBA

Source: Foot & Ankle Specialist. 2020 May 11:1938640020920947

**Study Type:** Retrospective Case Series

#### SUMMARY:

- Describes use of three-dimensional printed cage with the DynaNail in hindfoot arthrodesis of extremely challenging patient population
- Average time to weight-bearing was 3.5 months post-surgery
- 6/7 patients (85%) achieved fusion as evaluated by CT imaging with 5 patients achieving greater than 85% fused area

“This technique has shown a high rate of union, which results in better functional outcomes for patients at high risk of nonunion.”

## COMPARISON OF 3D PRINTED SPHERICAL IMPLANTS VERSUS FEMORAL HEAD ALLOGRAFTS FOR TIBIOTALOCALCANEAL ARTHRODESIS

John Steele, MD, Rishin Kadakia, MD, Daniel Cunningham, MD, Travis Dekker, MD, Beau Kildow, MD, and Samuel Adams, MD

Source: The Journal of Foot and Ankle Surgery. Epub 2020 Aug 21

**Study Type:** Level III – Retrospective Comparative Study

**No. of Patients:** 8 3D printed spherical implant recipients vs. 7 femoral head allograft recipients

### SUMMARY:

- Compared fusion rates between bulk bone defect TTC arthrodesis groups that were treated with either femoral head allografts or 3D printed spheres
- 88% of both tibial and calcaneal articulations fused with a 3D Sphere vs. 71% for a femoral head allograft
- Results can be compared with other bulk defect TTCA studies which showed only ~50% fusion rate using femoral head

“..this study demonstrates that 3D custom sphere metal implants are a safe, noninferior alternative to the use of femoral head allograft during TTC arthrodesis procedures.”



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