Midfoot Arthrodesis: Radiographic Fusion Following Stabilization with a Novel Hybrid Plating System: A Multi-center Study
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Summary: Hybrid plating, for arthrodesis of the midfoot, appears to offer consistent, reliable and reproducible results. It allows for multiple cortices of fixation, and aggressive surface preparation due to the construct, and it is technically simpler to obtain stable fixation than with transarticular screws. The healing rate and time to arthrodesis as well as the low complication rate compares favorably to published similar cohorts.

Introduction: Various techniques for arthrodesis of the midfoot have been described including transarticular screws, staples, longitudinal plates or external fixation. We present the results of a multicenter retrospective study with a novel plating system that stabilizes the central midfoot by arthrodesis of the metatarsals and cuneiforms in a single screw/plate construct.

Purpose: Evaluation of time to radiographic fusion of the midfoot following aggressive bone surface preparation and stabilization with a novel screw and plate construct. A subgroup of patients underwent CT validation of the fusion by an independent radiologist.

Method: A retrospective multicenter review of patients undergoing multi-joint arthrodesis of the midfoot were evaluated for the time to radiographic fusion of the midfoot. The only exclusion criteria was neuropathy regardless of etiology. Typically, multiple joints were arthrodesed, including various combinations of first, second and third metatarsocuneiform joints. Hybrid plating is defined as a construct that incorporates locked and non-locked/compression screws. Radiographic fusion is defined as bridged bone on one of three standard foot radiographs, and on computer tomography (CT) as 50% or greater bridged bone. A subset of patients underwent CT scans as a validation of the standard radiographs. Each patient was evaluated for:
1. Etiology of the arthritis.
2. Presurgical co-morbidities, BMI, and functional levels.
3. Post-operative complications.

Results: 78 patients were evaluated including a diagnosis of osteoarthritis (47), post-traumatic arthritis (16), instability (8), non-union (5), Paget's (1), and metatarsus adductus (1). Functional levels included: household ambulators (25), community ambulators (48), recreational athletes (4), and competitive athletes (1). Co-morbidities included hypertension, obesity, osteoporosis, or tobacco use in 65 patients. The average BMI was 31 with a range of 19-54. Bone graft was used as follows; no graft (20), local autograft (15), distant autograft (18), synthetic graft (6), allograft (16), and (3) with autograft and allograft combination. Time to radiographic union: 30 at 6 weeks, 29 at 9 weeks, 12 at 12 weeks, 3 at 16 weeks, and 4 greater than 16 weeks. The 4 that were unhealed at 16 weeks were considered nonunited. Thirteen of the united group were verified by CT scans. There were no complications in 64 patients, wound dehiscence in 4, neuropraxia in 4, hardware irritation in 2, screw breakage in 3, and tendon adhesion in 2.

Conclusion: Hybrid plating, for arthrodesis of the midfoot, appears to offer consistent, reliable and reproducible results. It allows for multiple cortices of fixation, and aggressive surface preparation due to the construct, and it is technically simpler to obtain stable fixation than with transarticular screws. The healing rate and time to arthrodesis as well as the low complication rate compares favorably to published similar cohorts.

Evidence level 3.