Tibialis Anterior Tendon Partial Release and Plantar Implant Placement for Midfoot Arthrodesis: Technique Tip

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Introduction/Purpose: Midfoot arthrodesis is a reliable procedure for deformity correction and pain relief. First tarsometatarsal arthrodesis can be used for correction of hallux valgus deformity with large intermetatarsal angles or first-ray hypermobility. Midfoot arthrodesis is also integral in correction of pes planovalgus deformity with midfoot collapse. First tarsometatarsal arthrodesis has a nonunion rate of 2-15%. Arthrodesis is completed traditionally through a dorsal approach. Due to high nonunion rates, recent studies have investigated plate based plates. These have been shown to have superior strength by creating a tension band construct as the foot is loaded. Tibialis anterior footprint is at risk when accessing first tarsometatarsal joint for arthrodesis. We explore whether the tibialis insertional footprint can be released and repaired with no deleterious effects.

Methods: Patients included were undergoing first tarsometatarsal joint or naviculocuneiform joint arthrodesis with a plantar based plate and screw construct for hallux valgus deformity with large intermetatarsal angle or first-ray hypermobility, and those with first TMT joint arthritis, pes planovalgus, Lisfranc injury, or Charcot neuroarthropathy. Medial based surgical approach is centered over the first tarsometatarsal joint. Saphenous neurovascular bundle is retracted dorsally. Release of the capsular structures allowed for complete visualization and distraction of the joint. The distal-most attachment of the tibialis anterior tendon onto the first metatarsal is release in line with the capsulotomy. Primary insertion on the medial cuneiform was preserved. A cuff of released insertional tissue is preserved and reflected distally for repair. Standard tarsometatarsal arthrodesis joint preparation was completed. Plantar plate then fixed and compressed. Deep fascial layers were then closed over the plated were previous tendon release was performed.

Results: In 62 patients, none had tibialis anterior tendon rupture, weakness, or irritation, with average follow-up of 36.2 months. Nine wound complications were recognized during the study. Twelve percent of patients experiencing delayed incisional healing that went on to heal with local wound care. Smokers accounted for six of the seven patients (OR 24.62, p<.05), and one of seven patients had Charcot (OR 2.08, p<.05). Deep wound complications, which required return to the operating room for formal irrigation and debridement, were seen in 3% (2 of 62). Both patients were active smokers and had removal of hardware at the time of debridement. Both underwent definitive coverage with split-thickness skin grafts and went on to successful arthrodesis and wound healing.

Conclusion: One advantage of applying a plate and screw construct plantarly for midfoot arthrodesis is biomechanical stability. Multiple studies have indicated this plantar construct may be superior. Another benefit may be less hardware prominence due to increased soft-tissue coverage. Subcutaneous positions of dorsal plates have been reported to contribute to incisional irritation and symptomatic hardware. Tibialis anterior tendon damage has been suggested as a limitation of the plantar approach for midfoot arthrodesis, and the tendon insertion must be released to prepare the joint adequately to apply implants. This series shows tendon release can be safely accomplished without any deleterious effects.
| Patient(s) | Diagnosis                          | Smoker | Diabetic | Joint(s) Fused         | Treatment                                        | Healed |
|------------|------------------------------------|--------|----------|------------------------|--------------------------------------------------|--------|
| 1          | Pes planus                         | Yes    | No       | NC                     | Local wound care and antibiotics                  | Yes    |
| 2          | Pes planus, Hallux valgus Subtalar and Midfoot Arthritis | Yes    | No       | TMT, 1-2 intermetatarsal | Local wound care and antibiotics^                | Yes    |
| 3          | Pes planus, Anterior impingement, NC/TN arthritis | Yes    | No       | TN, NC                 | Local wound care                                 | Yes    |
| 4          | Cavovarus, Subtalar and Midfoot Arthritis | Yes    | No       | TN                     | I&D with wound vac, required skin graft            | Yes    |
| 5          | Pes planus                         | Yes    | No       | 1st TMT                | Local wound care                                 | Yes    |
| 6          | Midfoot arthritis, Charcot         | No     | Yes      | 1st TMT                | Local wound care                                 | Yes    |
| 7          | Pes planus, 1st MT hypermobility   | Yes    | No       | TMT, 1-2 intermetatarsal | I&D with wound vac, required skin graft            | Yes    |
| 8          | Pes planus, midfoot arthritis      | Yes    | No       | 1st TMT                | Local wound care                                 | Yes    |
| 9          | Pes planus, Hallux valgus, Midfoot Arthritis | Yes    | No       | 1st TMT                | Local wound care                                 | Yes    |

*All medial wounds related to incision
^Early weightbearing against recommendations