Early Results of Immediate Weightbearing following 1st Tarsometatarsal Joint Arthrodesis with Planar Locking Plate and Dorsal Compression Screw
Construct for Treatment of Hallux Valgus

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Abstract

Background: Fusion and bridging of the 1st tarsometatarsal (TMT) joint is accepted for many indications within the foot and ankle surgical community. 1st TMT fusion has been used to primarily correct a bunion or during a modified Lapidus procedure to allow the medial column (medial column) to align the 1st TMT arthritis, plantar locking, and in trauma, interm, the 1st TMT can be bridged or primarily fused. Fusion of the 1st TMT can planarize and decompress the 1st metatarsus in human literature, can it be used in revision procedures. Many approaches have been found to be effective, including, but not limited to, single-screw constructs, dorsal plate and screw, medially plate and screw, two plate constructs, planer plate with incoporated compression screw, planter plate with a dorsal compression screw, and staples, to name a few. We present our solution to the decompression of the 1st metatarsal is hallux valgus with a planarly applied locking plate and dorsal compression screw, allowing immediate weightbearing and resulting in minimal complications.

Methods: Retrospective analysis was performed and charts were reviewed for patients treated at our institution with plantar locking plate at the 1st TMT joint. All patients were treated with the same plantar 1st TMT plating system by N. Podiatric Surgeons Inc in Rockford, Illinois from August 2014 to December 2017. Our indications for use of the plate were analyzed. These included hallux valgus, hallux limitus, the foot and shoe foot reconstruction, 1st TMT arthritis, traumatic injury, 1st TMT instability, revision plantar, medial, and dorsal metatarsal procedures, 1st TMT joint procedures, and flat foot correction. The rationale for using the plantar plate fixation construct at the 1st TMT was often multi-factorial and a primary indication was selected for each patient. For purposes of this study, inclusion criteria were: all surgical patients that underwent TMT arthrodesis using the same planter plate locking and dorsal compression screw during the allotted time period with a primary indication for treatment of hallux valgus. Patients were excluded if they had traumatic injuries, 1st TMT arthritis, hallux limitus, hallux ossus, or ray avulsion/leveler neurapathies, plantarflexed first ray, and tarsal TMT procedures as the primary indication for the surgery without significant hallux valgus deformity. In all, 80 patients underwent surgery with plantar plate fixation but only 63 females and 6 males underwent surgery to correct for hallux valgus as a primary indication. 4 female patients underwent bilateral surgery on separate dates. 11 female surgical outcomes occurred demographically data in Table 1. Following surgery patients were all allowed to bear weight in a short leg walking cast. Patients were followed for 6 weeks to 3 years. Outcomes were analyzed and included pre-operative X-rays and X-rays at 12 weeks follow-up, and post-operative radiographic imaging (intermetatarsal angle -IMA, axial alignment position –TSP, and medial longitudinal -MLP), which assessed by two independent surgeons (three-safe Reliability in Table A.) and any complications that occurred intra-op and post-operatively were noted. Complications anticipated included talus anterior tendon rupture, nonunion, delayed union, post-operative infection requiring surgery, hardware removal, dehiscence, and hardware versus or overcorrection.

Results: In all, 80 patients (65 specimens) examined underwent 1st TMT arthrodesis and met the inclusion criteria for a retrospective chart review (Table 1). As noted, 6 female patients underwent bilateral surgery. Follow-up was 6 to 121 weeks and the average age at the time of the intervention was 48 years (3 to 92 years). Average preoperative IA was 18.64 average of 48 to 10) were reduced significantly (p < 0.001) to a mean 12 week follow-up score of 2.71 (range of 0 to 10). Patients transitioned to their regular shoe gear at 6 weeks postoperatively. Radiographic union was sustained at 6 weeks and continued until 12 weeks in 96.27% of cases. No talus anterior tendon ruptures or significant tendon weaknesses occurred as a result of surgery and no significant 1st metatarsal elevation was observed after immediate weightbearing. Furthermore, no hardware failure or screw migration was noted. Radiographic measurements were used to assist in diagnosing union, to confirm preservation of correct DMA and LMP, verify TSP, and indicate any hardware breakdown. IMA was reduced on average from a preoperative mean of 17.99 to a postoperative mean of 7.38, significance (p < 0.001). Average TSP (0–5) decreased from preoperative score of 6.02 to a postoperative score of 2.71, significance (p < 0.001) (Table 2).

Discussion: A literature search regarding talus anterior tendon (TA) rupture risk with plantar plating revealed several reports which could be solely performed without damaging the plantar tendon insertion of the TA. Our study confirms no significant damage to the TA excursion with the 1st TMT arthrodesis including that no tension, delayed union, or dorsal surgical of the 1st metatarsal (intermetatarsal) toe. These toe are associated with secondary hallux valgus correction, bone grafting, and plantar derotation. Our approach attempts to decrease the TA hematoma and specifically reduce the TA to minimize the potential for a TA rupture. The aformentioned TA rupture, appears to be very common among foot and ankle surgeons, is significant damage to the TA insertion en vivo with no TA ruptures or associated loss of strength post-operatively. Thus, the study did not have a disproporionately low number of patients, patients with diabetes and patients with non-previous surgery was performed. Table 1: Results

Conclusions: The 1st TMT joint fusion, with planar locking plate and dorsal compression screw, was a viable construct to primarily correct a bunion and we were able to achieve immediate weightbearing without significant complications. Furthermore, the use of this type of surgery allowed for the suturing of the adductor hallucis muscle and was not allowed to bear weight at 6 weeks post-op, which is significant advantage for the patient. Our surgery, perform fusion of the 1st TMT joint, in conjunction with minimal biologic and surgical intervention, which helps to explain the lower rate of complications. Given the increasing rate of diabetes, vascular disease, and obesity, the number of patients who present with hallux valgus continues to rise. The results of this study also support the findings of other studies. However, we did not have the exclusion criteria, such as severe deformities, which can lead to higher complication rates. Further studies are needed to evaluate the long-term outcomes and patient satisfaction. For instance, a review of 3,200 patients with hallux valgus indicated that the TA rupture rate was not a significant factor in the outcome of hallux valgus surgery. However, it is important to note that this study was performed on a specific group of patients who underwent hardware removal, acceptability of early weightbearing and the surgical construct for the treatment of hallux valgus.

References

On any of the 53 feet, plantar procedures included 17 (31.86%) data specimen with either screws, staples, and endodontic locking plate or and to bone performed on 30 feet (65.21%) data specimen with either screws, staples, and endodontic locking plate performed in 2016, 36.09% of feet were remanufactured as part of revision surgery. Patient-reported outcomes and preoperative Visual Analog Scale (VAS) scores were analyzed as patients whose interm, including nonunion, nonunion, and clinical instability has been treated postoperatively in this study. Furthermore, no significant damage to the TA excursion with the 1st TMT arthrodesis including that no tension, delayed union, or dorsal surgical of the 1st metatarsal (intermetatarsal) toe. These toe are associated with secondary hallux valgus correction, bone grafting, and plantar derotation. Our approach attempts to decrease the TA hematoma and specifically reduce the TA to minimize the potential for a TA rupture. The aformentioned TA rupture, appears to be very common among foot and ankle surgeons, is significant damage to the TA insertion en vivo with no TA ruptures or associated loss of strength post-operatively. Thus, the study did not have a disproporionately low number of patients, patients with diabetes and patients with non-previous surgery was performed. Table 1: Results

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Surgical Technique

[Ti correct HAV - Case Example - Pre-operative Radiographs]

- Increase planing, planter 1st TMT joint - 1, 2, 3
- Oblique 1st TMT capsulotomy at anterior edge of TA insertion – 4
- Medial 1st TMT capsulotomy and lateral release – 5
- Removal of medial eminence – 6
- Arthrotomy and reduction of 1st bone – 7
- TMT joint resection – 8
- TMT joint prep for fusion – 9
- Provisional fixation, placement of dorsal compression screw and medized plate - 10, 01, 12

Other Indications for Plantar Plating

[Revision HAV] [Flat Foot] [Revision TMT]

[Revision Flat Foot] [Instability] [IF Stupination]

Plantar Plating for Hallux Valgus

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