

Statement of Purpose

We propose bunion correction with an isolated 1st TMT arthrodesis along with a transfixation screw from the 1st metatarsal to the intermediate cuneiform, in the presence of metatarsus adductus along with a single central metatarsal osteotomy, results in correction of the metatarsus adductus deformity without need for adjunctive procedure. We feel this may lead to improved treatment options for bunion correction in the presence of metatarsus adductus with less need for fusion and continue to allow for adequate reduction of the foot deformity.

Introduction and Literature Review

This is a retrospective case review study which analyzed the results of using a transfixation screw from the first ray to the intermediate cuneiform by fixing the deformity at the lesser tarsus. Metatarsus adductus is historically defined as a uniplanar transverse plane deformity where the metatarsals are adducted at the Lisfranc joint. The diagnosis of metatarsus adductus is determined by both clinical and radiographic evidence. (1) Ayier and colleagues found a prevalence of metatarsus adductus in approximately 30% of patients in a series of 587 patients undergoing hallux valgus surgery. Further, it has been suggested that patients with metatarsus adductus are approximately 3.5 times more likely to develop hallux valgus. (2) Lapidus described a fusion between the base of the first and second metatarsal and stated that this may help maintain deformity correction. (3) A cadaveric study by Galli et al showed a statistically significant increase in sagittal stability of the medial column with a 1st metatarsal to middle cuneiform screw along with standard Lapidus fixation of two crossing screws. (4) In another study by An et al. they showed that there is statistically significantly increased frontal plane stability when using a 1st metatarsal to intermediate cuneiform screw along with the Lapidus cross screw procedure. (5) With significant literature supporting Lapidus procedures with HAV with an M1-C2 screw, it was theorized that adding a central metatarsal osteotomy could potentially correct a metatarsus adductus deformity without the need for larger more invasive surgical procedures. Demographic data, PMH, physical exam and imaging studies will all be studied and included in this study.

Materials and Methods

All patients in the study underwent first TMT fusion (Lapidus) procedure with intercuneiform screw fixation along with distal metatarsal osteotomy. In total, 6 adults diagnosed with metatarsus adductus and bunion deformity undergoing surgery were treated and followed for greater than 12 months. Serial radiographs were taken noting improvement of Metatarsus Adductus Angle and Intermetatarsal angle. The metatarsus adductus angle was defined using the standard literature definition. It has been previously defined as the angle between the longitudinal axis of the metatarsus and the longitudinal axis of the lesser tarsus. The longitudinal axis of the lesser tarsus is defined as a line perpendicular to the transverse axis of the lesser tarsus, this in turn is a line connecting the midpoint of two lines defining the lateral and medial borders of the lesser tarsus. The medial line extends between the medial extremes of the talonavicular and the first tarsometatarsal joint. The lateral line extends between the lateral extremes of the calcaneocuboid and the 5th metatarsal-cuboid joints. (6) The intermetatarsal angle was defined as the angle between the first and second metatarsals in accordance with tradition definition. All patients included in the study were surgical patients from one board certified Foot and Ankle Surgeon. All radiographic angles were measured by one Podiatric surgery resident. All references were found via searching PubMed (2010-2024) for reference to intercuneiform fixation with 1st TMTJ arthrodesis. Read and analyzed multiple papers and decided which were most relevant to include. Articles were discarded if they did not include additional fixation of the medial column. Analyzed all sources for clinical significance. Demographic data, PMH, physical exam and imaging studies will all be studied and included in this study.

Results

Following surgical 1st TMT Arthrodesis with transfixation screw and Central Metatarsal Osteotomy, patients with metatarsus adductus and bunion deformities resulted in radiographically decreased MAA and IMA without need for additional surgical intervention. The average IMA decreased from 20 degrees pre-operatively to 11 degrees post-operatively with MAA decreasing from an average pre-operative value of 20.3 to 14.2 post-operatively. All patients had 12-month follow-up except one who was lost to lack of follow-up 3 months after surgery. It was found that a TMT fusion with an intercuneiform fixation screw along with a central metatarsal osteotomy reduces the IMA and MAA in the setting of metatarsus adductus.



Discussion

This study aims to provide insight and analysis of metatarsus adductus correction in the setting of Hallux valgus. We propose fixing the TMT fusion to the lesser tarsus results in a degree of correction of the overall forefoot metatarsus adductus deformity allowing the distal osteotomy to further reduce the retrograde force at the metatarsal. This fixation has been shown to contribute to successful deformity correction with less complications and time to heal compared to more involved midfoot fusions or osteotomy procedures. This study provides valuable insights into these types of deformities and outlines an improved manner to evaluate these patients and may potentially lead to improved understanding of how to correct these deformities. While the significance of this type of correction remains to be understood. We welcome further long-term studies to review outcomes and patient pain scores. We feel this may provide an area of study for future advances in metatarsal surgery. The results provide insight for more effective treatment strategies to treat these deformities for foot and ankle surgeons.

References

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