

Oblique Metatarsal Head Osteotomy for Correction of Transverse Plane Digital Deformity



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Introduction

Transverse plane deformity of the lesser digits is a challenging clinical pathology to treat, this complex issue has limited understanding of its etiology and current treatments have been proven refractory to maintained correction^{2,3}. The most common affected digit is the second as classically demonstrated with the cross over toe, but the other rays are also affected and equally challenging to treat. Transverse plane digital deformity is defined as the medial or lateral deviation of the longitudinal axis of the proximal phalanx compared with that of the longitudinal axis of the metatarsal. With multiple procedures highlighting the rerouting of tendons and balancing of the capsular soft tissues, these procedures remain hard to reproduce results and challenging to maintain correction. We present a modified oblique osteotomy of the metatarsal that extrinsically balances the digits through the pull of the flexor and extensor tendons.

Methods

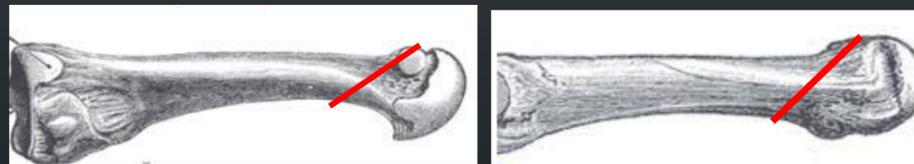
A radiographic retrospective review was performed at our institution of patients undergoing this oblique metatarsal osteotomy for the management of digits with transverse plane deformity. Patients were excluded if they did not have preoperative and post operative weightbearing radiographs, greater than twelve months of follow up. Patients were included if they had adjunctive procedures done on either the toe or adjacent rays including a PIPJ arthrodesis, FLD transfer, Lapidus, or Austin Bunionectomy. Preoperative and post operative measurements of the phalangeal deviation were performed by a single author (DB). Using a two sample T-test the preoperative versus post operative mean were then compared.

Results

With 20 patients and 24 digits having transverse plane deformity undergoing an oblique metatarsal osteotomy there were 16 associated PIPJ Arthrodesis, 4 arthroplasties, and 10 FDL tendon transfers. The mean preoperative transverse plane digital angle was 22 degrees and mean post operative angle was 6 degrees. Performing a one sided T test with a P value of <.05 comparing preoperative and post operative transverse plane digital angle the post operative angles were determined to be statistically significantly.

Table 1 Associated Digital Procedure			
Digit Affected	PIPJ Arthrodesis	PIPJ Arthroplasty	Flexor Tendon Transfer
2 (N=20)	12/20	4/20	8/20
3 (N=4)	4/4	0/4	2/4

Table 2 Transverse Plane Digital Angles		
Mean Preoperative	Mean Postoperative	Mean Correction
22	6	16



The mean follow up at the time of the last radiographic evaluation was 13.5 months. There were 18 females and 2 males in the sample group, the average of the patients was 56 years. There were no nonunions or delayed unions. All osteotomies were fixated with screw fixation. Determining the angle of the osteotomy was difficult to determine based off of radiographic evaluation and therefore was not included in our results analysis.

Discussion

The deviation of the lesser digits in the transverse plane has been described as a “predislocation syndrome” by Yu and Judge⁶. They described that the deviation is caused by the repetitive trauma of the capsular structures due to biomechanical overloading causing further inflammatory synovitis leading to imbalance^{1,4}. Addressing this deformity is challenging, with a multitude of options including soft tissue releases or osteotomies results are mixed. Simple MTPJ capsulotomy has been described but is rarely effective for complete correction as to why bony procedures have been found to have greater effect by transposing the flexor apparatus changing the pull on the digit. The transpositional Weil has been previously described providing that it has intrinsic stability, ease of fixation, low risk for non union, and the ability to weight bear the patient post operatively⁷. We believe that with our modification of the oblique cut dorsally allows for greater shift with bony apposition to be achieved. The osteotomy sill allows for shortening and translation of the metatarsal head.



Figure 3 & 4 : Preoperative and postoperative imaging demonstrating medial deviation of the 2nd Toe followed by correction with oblique metatarsal osteotomy and FDL transfer

References

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