

# Rates of Postoperative Radiographic Hallux Valgus Recurrence at One Year: A Comparison of Distal Osteotomy versus First Tarsometatarsal Joint Fusion

Michael Matthews, DPM, AACFAS; Matthew Sorensen, DPM, FACFAS; Lowell Weil Jr., DPM, MBA, FACFAS; Lowell Weil Sr., DPM, FACFAS; Adam Fleischer, DPM, FACFAS

## STATEMENT OF PURPOSE

This study examines several radiographic outcomes, between two popular methods of hallux valgus correction in our practice – a distal first metatarsal osteotomy technique and a derotational first tarsometatarsal (TMT) fusion technique.<sup>1,2,3</sup>

## HYPOTHESIS

The hypothesis for this study was that no statistically significant differences in primary outcomes would be appreciated between the two study cohorts at minimum one year follow up.

## RESEARCH DESIGN

A retrospective cohort study was performed to examine radiographic outcomes at one year among two high-volume, board certified foot and ankle surgeons at our institute. Patients undergoing hallux valgus correction by either technique from Jan. 2015 to Dec. 2015 were included. Patients were evaluated via standard radiographic parameters consisting of: hallux valgus angle, first-second intermetatarsal angle, sesamoid position via the Hardy-Clapham scale, and second metatarsal protrusion distance via the Nilsson method.<sup>4</sup> Weight bearing radiographs were assessed preoperatively and again at least one year postoperatively.

Patients in the study were exposed to one of two techniques for correction of hallux valgus. The LWJ arm underwent distal first metatarsal osteotomy (scarf bunionectomy), with or without Akin osteotomy, as the preferred method of correction. The MDS arm of the study underwent derotational first TMT fusion with a joint sparing distal soft tissue release as the method of correction. A single rater (MM) assessed all radiographs using commercially available imaging software. Within group comparisons of radiographic angles were examined using paired t-test, and between group comparisons were assessed using independent t-test. Comparisons of the rate of radiographic recurrence (defined as hallux valgus angle >20 degrees at final follow up) and sesamoid position was examined using Fisher's exact test.

## METHODOLOGY

**Study Design:** Level III Therapeutic

**Conflict of Interest:** None.

**Population:** n=59 patients (30 distal first metatarsal arm, 29 TMT arm)

**Inclusion Criteria:** All patients who underwent HAV correction via one of two techniques employed by two of the study authors (MDS, LWJ)

**Exclusion Criteria:** Patients with less than 12 months of follow up at time of submission of this poster.

**Procedures:** Hallux Valgus correction utilizing either a distal first metatarsal osteotomy technique, or a derotational first tarsometatarsal joint fusion technique.

**Primary outcome:** Primary outcomes were four radiographic relationships: (1) hallux valgus angle, (2) first-second intermetatarsal angle, (3) sesamoid position, (4) second metatarsal protrusion distance via Nilsson Method.

**Methods:** Retrospective cohort study of all patients meeting the aforementioned inclusion criteria

## RESULTS

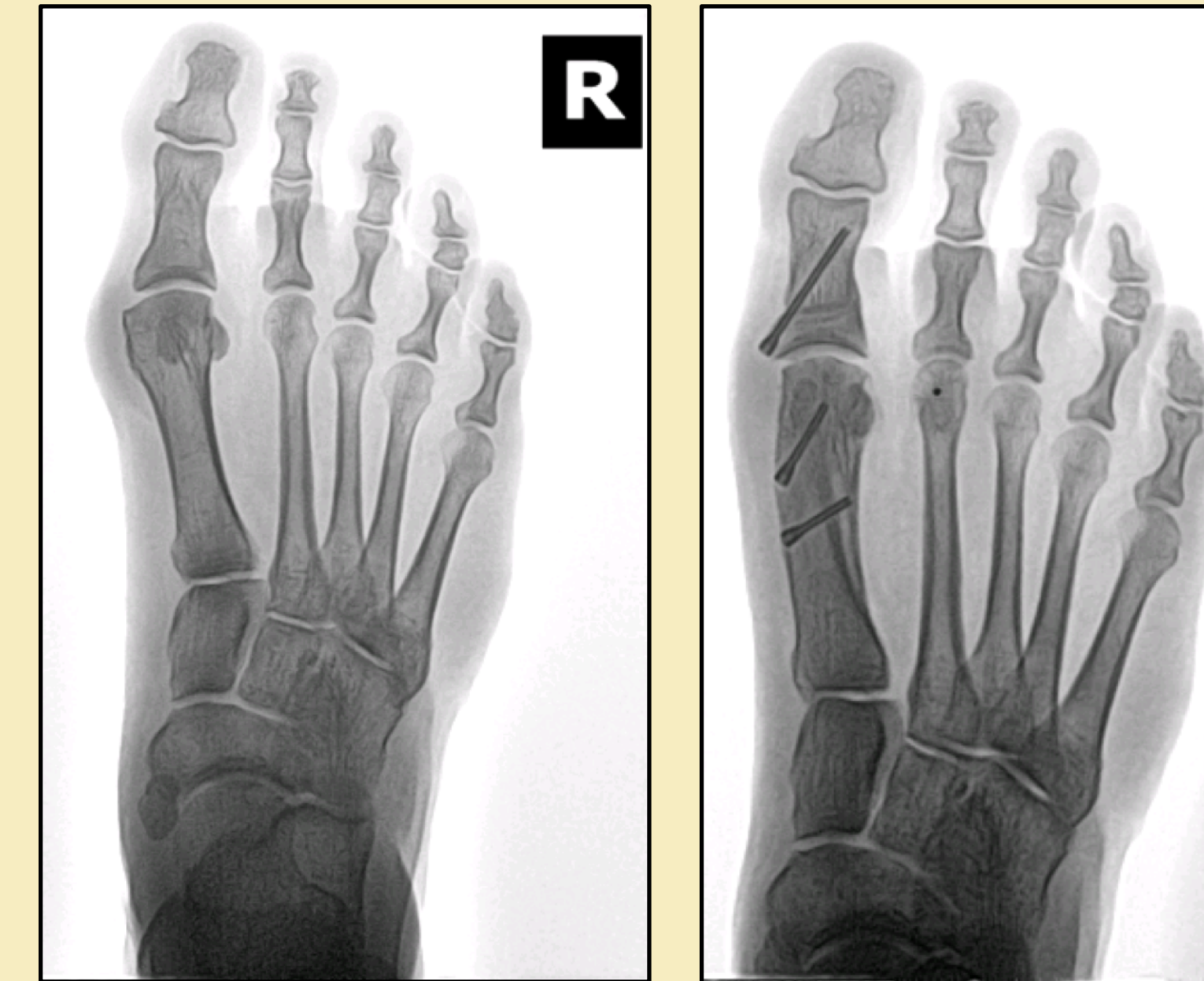
Table 1. Outcomes at 1 year Stratified by Bunionectomy Procedure (n=92).

		Distal Osteotomy N=30	1 <sup>st</sup> TMT Fusion N=29	P value
Age (yrs)		50.0 (15.8)	50.9 (10.7)	0.743
BMI (kg/m <sup>2</sup> )		25.4 (5.5)	26.7 (4.8)	0.340
Follow up (mos)		16.2 (4.3)	17.9 (4.1)	0.138
Hallux Valgus Angle (°)	Pre-op	22.8 (9.8)	27.1 (10.6)	0.113
	Post-op	6.7 (6.2)	13.6 (5.0)	<0.0001
	P value	<0.0001	<0.0001	
1-2 Inter-metatarsal Angle (°)	Pre-op	10.9 (3.8)	11.8 (4.9)	0.416
	Post-op	3.2 (2.5)	5.3 (3.1)	0.006
	P value	<0.0001	<0.0001	
Sesamoid Position	Pre-op	4.2 (1.6)	4.8 (1.8)	0.144
	Post-op	1.3 (0.99)	2.2 (1.2)	0.003
	P value	<0.0001	<0.0001	
Metatarsal Protrusion Distance (mm)	Pre-op	-3.6 (2.0)	-3.5 (2.8)	0.891
	Post-op	-5.3 (2.9)	-4.4 (3.6)	0.282
	P value	0.002	0.151	

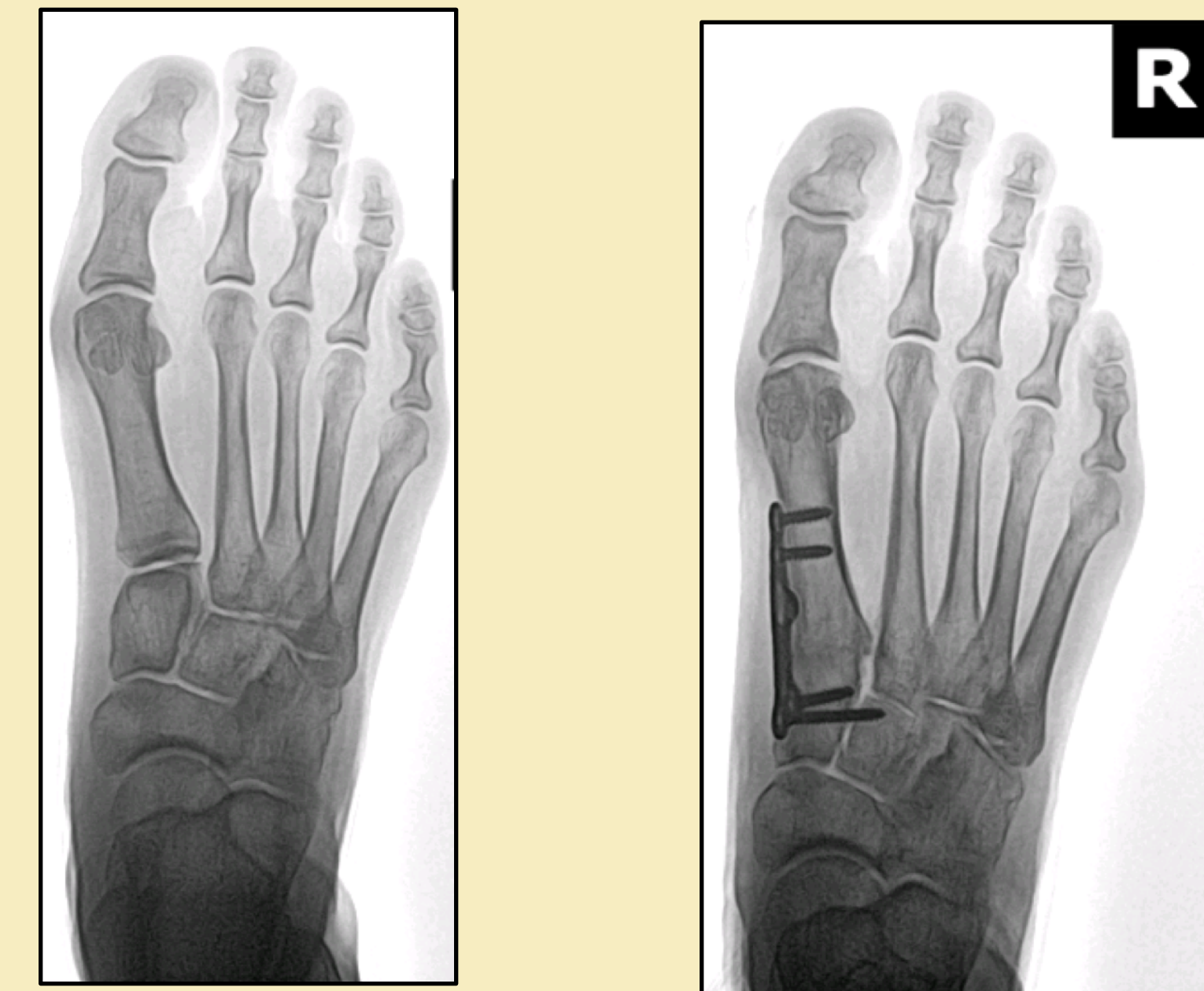
## PROCEDURES: DISTAL FIRST METATARSAL

### OSTEOTOMY VS FIRST TARSOMETATARSAL JOINT FUSION

Figures 1 and 2



Figures 3 and 4



Figures 1-2) Pre and one year Post-op DFMO

Figures 3-4) Pre and one year Post-op derotational TMT joint fusion

## ANALYSIS AND DISCUSSION

A total of 59 feet (30 in the distal first metatarsal arm and 29 in the TMT arm) met the inclusion criteria. Age, BMI, and preoperative radiographic measurements were similar for both groups (all  $p > 0.05$ ). Follow up for the cohort was mean 17 months, and was similar between the two groups ( $p > 0.05$ ). There was a statistically significant reduction in preoperative deformity in three of four radiographic measures (hallux valgus angle, 1-2 intermetatarsal angle, and sesamoid position) in both arms at one year postoperatively ( $p < 0.05$  for all), indicating successful hallux valgus correction for both groups. There was a statistically significant change in second metatarsal protrusion distance appreciated in the distal first metatarsal osteotomy group. While statistical significance was appreciated in both groups with regards to standard parameters, differences between the groups were appreciated. The distal first metatarsal osteotomy group had a significant reduction of the hallux valgus angle, the 1-2 intermetatarsal angle, and sesamoid position with respect to the first TMT fusion group. No difference was appreciated with regards to second metatarsal protrusion distance between the two groups.

It is often said that nothing ruins good results like good follow up. The precise time frame to which that statement applies has not yet been well established in the literature. Two techniques for hallux valgus correction were compared, one performed distally, and the other closer to the apex of the deformity.<sup>5,6</sup> The results of this study from a purely statistical standpoint are misleading. It is important to establish that both techniques successfully addressed the deformity deformity at hand. The differences that were appreciated between the groups were differences between values that fall within the range of normal. In essence, the differences appreciated between the two very small study arms amount to small differences in normal values, essentially the splitting of hairs. Differences in sesamoid position could potentially be evidence of recurrence in the long term, though long term sesamoid migration would require a study with at least five years of follow up.<sup>7</sup> Additionally, one of the more surprising findings was that the distal first metatarsal osteotomy group experienced a significant amount of shortening compared to the TMT group, which runs contrary to popular belief. Limitations with these findings include the lack of statistical differentiation for those patients who received Akin osteotomies, the short term nature of the study, and the lack patient reported outcome measures. The short follow up time combined with the small patient population from a statistical calculation standpoint could also exacerbate differences, some of the significance appreciated could have been a false positive. In addition, the study design does not allow the results to be extrapolated into the future, where logic would suggest that long term recurrence would be less in the first TMT fusion group. Following the two study cohorts to a longer follow up period to at least five years, would better clarify the chance of recurrence between the two techniques.

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