

# A PROSPECTIVE COMPARISON OF COMBINATION WEIL METATARSAL OSTEOTOMY AND DIRECT PLANTAR PLATE REPAIR VERSUS WEIL METATARSAL ALONE FOR FOREFOOT METATARSALGIA

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## STATEMENT OF PURPOSE

Contracted hammertoes and plantar forefoot pain is frequently associated with an abnormal metatarsal parabola. While many surgeons feel shortening osteotomies are appropriate in these instances, there is still ambiguity regarding when to repair and imbricate the damaged plantar plate and when to leave it alone. While some authors have recommended operative protocols that are specific to the grade of plantar plate injury, others feel there is value in imbricating and advancing the plantar plate in nearly all instances where a shortening osteotomy is performed. In this prospective study, we compared patient-reported outcomes among patients in our practice undergoing combination Weil metatarsal osteotomy and direct plantar plate repair (WMO+PPR) from a dorsal approach versus Weil metatarsal shortening osteotomy alone (WMO) at one year.

## LITERATURE REVIEW

- It is unclear what factors contribute to tears of the plantar plate, but recent work suggests that a longer 2<sup>nd</sup> metatarsal protrusion distance observed on x-rays may be associated with plantar plate injuries involving the 2<sup>nd</sup> toe.<sup>1,2,3</sup>
- Due to its centralized location and insertions, the plantar plate provides much of the stabilization at the MTP joint. The plantar plate however, is prone to damage. Trauma, overload to the second ray, inflammatory arthropathies, even long term use of high heeled shoes may contribute to attenuation or rupture of the plantar plate.<sup>4</sup>
- While there are various options for repair of plantar plate disruption, regardless of repair technique, patients generally report less pain with improved function.<sup>5</sup>

## METHODOLOGY

- We enrolled consecutive adult subjects who were seen for isolated forefoot metatarsalgia and sub 2<sup>nd</sup> MTP joint pain from Jan. 1, 2014 to April 30, 2017 at our foot and ankle specialty clinic
- The decision to perform WMO alone versus WMO+PPR was made on a case by case basis and was based primarily on the intraoperative appearance of the plantar plate and surgeon preference
- Patients were assessed with Foot and Ankle Outcome Scores (FAOS) preoperatively and again at 1 year postoperatively.
- Radiographic parabola and alignment of the operative digit was also assessed preoperatively and at 1 year.
- Wilcoxon rank sum and Fisher exact tests were used to examine for between group differences. Mann Whitney U test was used to test for within group differences.

## RESULTS

- 86 patients (86 feet): 21 WMO only, and 65 WMO+PPR. Seventy seven percent (66/86) were treated for isolated sub 2<sup>nd</sup> MTP joint pain, while the remainder (23%, 20/86) were seen for a combination of pain under the 2<sup>nd</sup> and 3<sup>rd</sup> MTP joints.
- The mean age of the cohort was 61 +/- 11 yrs (range, 32 to 84), and most were women (77%, 66/86).
- Preoperative length of the 2<sup>nd</sup> metatarsal using Nilsson's method of measurement was not different between the two groups (WMO: -6.5 +/- 3.4 mm vs WMO+PPR: -5.2 +/- 3.0 mm, p=0.308). Similarly, postoperative length of the 2<sup>nd</sup> metatarsal was not different between the two groups (WMO: -2.5 +/- 3.9 mm versus WMO+PPR: -2.4 +/- 2.9 mm, p=0.910)
- There were no group differences in any of the 5 FAOS subscales at baseline, and there were no group differences in preoperative radiographic alignment of the operative toe (P>0.05 for all).
- WMO+PPR group demonstrated significant improvements pre- to postoperatively in 4 of the 5 FAOS subscales (Pain, Symptoms, S&R, and QoL, all p<0.05), and higher QoL and Pain subscale scores at one year compared to those in the WMO only group (QoL: 68.6 +/- 26.7 vs. 49.7 +/- 28.5, respectively [p=0.01]; Pain: 83.2 +/- 14.5 vs. 73.6 +/- 19.9, respectively [p=0.04]).

Table 1) Comparison of radiographic measurements and FAOS scores at 1 year postoperative

	WMO (n=21)	WMO+PPR (n=65)	P-value
<b>Radiographic measurements</b>			
Met. Protrusion (mm)	-2.5 ± 3.9	-2.4 ± 2.9	0.910
TRVS joint deviation (°)	-4.9 ± 11.6	-1.2 ± 13.8	0.354
Sagittal joint deviation (°)	29.4 ± 7.9	29.6 ± 9.0	0.762
<b>FAOS Scores</b>			
Pain	73.6 ± 19.9	83.2 ± 14.5	<b>0.043</b>
Symptoms	77.7 ± 19.2	80.6 ± 20.8	0.342
ADLs	81.7 ± 20.1	89.8 ± 13.0	0.162
Sports/Recreation	67.4 ± 27.7	79.9 ± 23.4	0.060
Post-op QoL	49.7 ± 28.5	68.6 ± 26.7	<b>0.010</b>

Values in the table are presented as mean +/- sd. P-values were derived using Wilcoxon rank sum test

## FIGURES

Figure 1)



Figure 2)

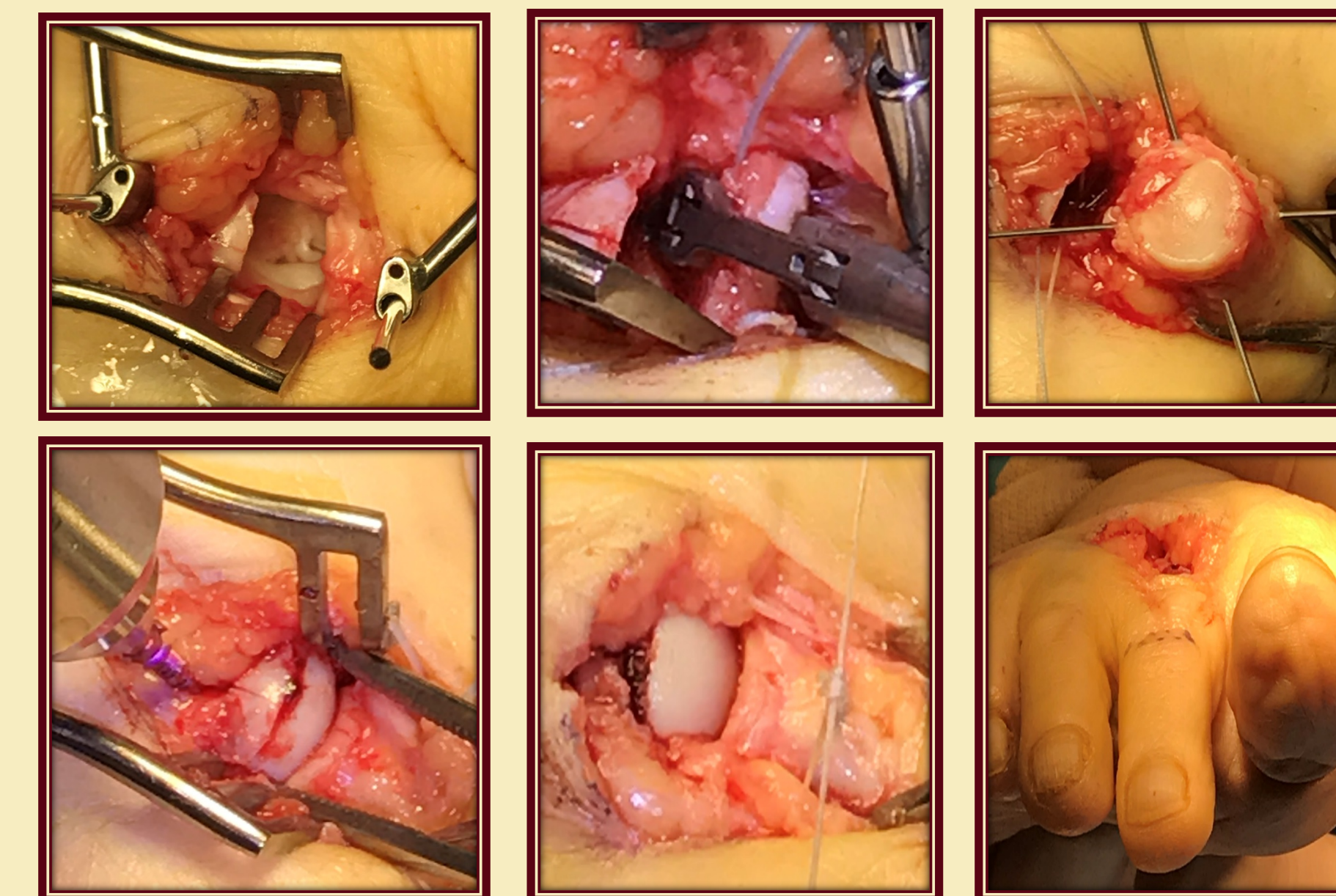


Figure 1) Metatarsal protrusion index as described by Nilsson

Figure 2) Plantar plate repair operative technique

## DISCUSSION

- In our patients presenting with a primary complaint of metatarsalgia associated with a long 2<sup>nd</sup> metatarsal, those undergoing a concomitant plantar plate repair in addition to a shortening osteotomy reported significantly better FAOS (QoL and Pain) scores at 1 year
- As toe alignment was similar between groups, it is possible these improvements were mediated through denervation of the plate/joint similar to rotator cuff surgery.
- As lower grade tears were generally observed in the WMO only group, our results may suggest that imbricating and advancing the plantar plate when a shortening osteotomy is performed may be valuable regardless of injury grade in the plate.

## CONCLUSION

This study supports the notion that patients undergoing a concomitant plantar plate repair in addition to a shortening osteotomy for metatarsalgia may experience better patient-reported outcomes at 1 year than those receiving osteotomy alone.

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