

## Early Clinical Outcomes of Triplanar Modified Lapidus Arthrodesis with Immediate Weight Bearing

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**Introduction/Purpose:** There are numerous corrective procedures for hallux valgus deformity. The majority of procedures prioritize correction in the transverse plane based on anteroposterior (AP) radiographs. Long-term results demonstrate high recurrence rates ranging from 8-78% with various metatarsal osteotomy techniques. Recent evidence suggests that hallux valgus is a multi-planar deformity with significant contributions from the sagittal and frontal planes. Correction of hallux valgus at the first tarsometatarsal joint (modified Lapidus) offers a powerful method to restore anatomic alignment in all three planes and correct hallux valgus at the apex of the deformity. The purpose of this study is to investigate early clinical and radiographic outcomes and complications of triplanar tarsometatarsal (TMT) arthrodesis with immediate weight-bearing.

**Methods:** After receiving IRB approval, charts and radiographs were retrospectively reviewed for 37 patients (30 female, age 54.8 years) undergoing triplanar tarsometatarsal (TMT) arthrodesis for hallux valgus deformity correction at our institution between June 2016 and June 2017. All patients were allowed immediate weight-bearing as tolerated in a boot walker. Radiographic imaging at 4 months and 12 months was compared to pre-operative imaging. Clinical outcomes were evaluated using the American Academy of Orthopaedic Surgeons Foot and Ankle questionnaire (AAOS FAQ), Quality of Life 12 (QOL-12), and the patient-reported outcomes measurement information system 10 (PROMIS 10). Demographics included age, gender, body mass index, and medical comorbidities. The time in days to weight-bearing, wearing athletic shoes, and return to full activity were noted. Any complications were recorded. For statistical analysis, t-tests were performed for continuous variables and chi-square tests were performed for categorical variables using JMP 11.0.0 (SAS Institute Inc., Cary, NC).

**Results:** Although improvements were noted in the AAOS FAQ and PROMIS 10 at 3 and 6 months post-operative, these results were not significantly different compared to baseline scores (Table 1). From the time of procedure, average time to weight-bearing was  $2.75 \pm 7.2$  days. Patients returned to wearing athletic shoes an average of  $48.3 \pm 12.1$  days after the procedure. Return to full activity without restrictions was  $130.9 \pm 37.0$  days from surgery. Radiographic results demonstrated significant improvement in IMA and HVA at final follow-up ( $p < 0.001$ ). 35 patients (94.6%) demonstrated evidence of radiographic union by final follow-up. Regarding complications, one patient (2.7%) required hardware removal for soft-tissue irritation, and there were three cases (8.1%) of hardware failure that did not require re-operation.

**Conclusion:** In this study, early clinical and radiographic outcomes of triplanar tarsometatarsal corrective arthrodesis (modified Lapidus) with immediate weight-bearing were promising with low complication rates. Patients were able to return to normal shoe wear approximately 7 weeks after the procedure and return to full activity a little more than 4 months after surgery. Radiographic results demonstrated high union rates, low recurrence rates, and significant improvements in HVA and IMA at final follow-up. Longer follow-up is necessary to determine the long-term radiographic and clinical outcomes of triplanar tarsometatarsal arthrodesis to correct hallux valgus deformity.

**Table 1: Clinical Outcomes for Triplanar Tarsometatarsal Arthrodesis with Immediate Weight-Bearing**

	<b>Baseline</b>	<b>3 months</b>	<b>p-value</b>	<b>Baseline</b>	<b>6 months</b>	<b>p-value</b>
<b>AAOS FAQ Core</b>	32.3 ± 9.2	36.8 ± 10.9	0.1481	32.3 ± 9.2	34.7 ± 12.8	0.3018
<b>AAOS FAQ Shoe</b>	34.9 ± 7.6	37.7 ± 8.2	0.2154	34.9 ± 7.6	38.7 ± 11.5	0.1756
<b>PROMIS 10 Physical</b>	47.3 ± 5.7	48.9 ± 6.7	0.2738	47.3 ± 5.7	47.9 ± 8.2	0.4058
<b>PROMIS 10 Mental</b>	54.5 ± 8.0	50.8 ± 3.8	0.0784	54.5 ± 8.0	53.5 ± 7.9	0.3805
<b>QOL 12 Physical</b>	45.8 ± 8.8	48.1 ± 6.5	0.2313	45.8 ± 8.8	43.1 ± 9.9	0.2347
<b>QOL 12 Mental</b>	52.2 ± 5.4	51.3 ± 3.6	0.3059	52.2 ± 5.4	49.9 ± 8.9	0.2272

American Academy of Orthopaedic Surgeons Foot and Ankle Questionnaire (AAOS FAQ); patient-reported outcomes measurement information system 10 (PROMIS 10); Quality of Life 12 (QOL-12)