

Primary Arthrodesis vs. Temporary Bridge Plating in Unstable Lisfranc Injuries: 10-Year Results of a Randomized Controlled Trial

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INTRODUCTION:

Displaced or unstable Lisfranc injuries typically require surgery. Primary arthrodesis (PA) of the medial tarsometatarsal (TMT) joints provides stabilization but compromises motion. In contrast, open reduction and internal fixation (ORIF) with bridge plating (BP) offers extra-articular stabilization, preserving joint surfaces and mobility, though requiring later hardware removal. Preservation might be particularly advantageous for the first TMT joint, which has greater physiological motion than TMT 2 and 3. This study evaluates the long-term clinical and radiographic outcomes of PA versus BP for first TMT joint stabilization in unstable Lisfranc injuries. We hypothesized that BP would result in superior clinical outcomes and lower adjacent joint osteoarthritis rates compared to PA, given its potential to maintain joint mobility.

METHODS:

This study presents the long-term follow-up of an IRB-approved randomized controlled trial comparing PA to BP of the first TMT joint in patients with acute, unstable Lisfranc injuries. Eligible patients, aged 18-65, had unstable Lisfranc injuries without fractures in relation to the first TMT joint. Instability was defined as either primary displacement or a positive manual stress test under fluoroscopy. Exclusion criteria were polytrauma, open injuries, diabetes, and neuropathy. Patients were randomized to PA of the first TMT joint or BP with plate removal at four months; all underwent PA of the second and third TMT joints. Blinded examiners assessed AOFAS midfoot score, MOxFQ, VAS pain scores, SF-36, return to activity, work, and orthotic use. CT scans were evaluated for union and secondary midfoot osteoarthritis. We used Wilcoxon rank-sum and t-tests for continuous variables, chi-square or Fisher's exact tests for categorical data, and Spearman's correlation for associations ($P < .05$ significant).

RESULTS:

Of 48 enrolled patients, 41 (85%) completed clinical and radiographic follow-up at a mean of 10.8 years (SD 1.2) post-injury. Groups did not differ in age, BMI, or gender. All clinical scores, complication/ reoperation rates, return to activity, occupational status, and orthotic use showed no significant differences. Osteoarthritis was most prevalent in the naviculocuneiform (NC) joints, without between-group differences. NC2/3 osteoarthritis severity correlated with poorer clinical outcomes, strongest for AOFAS ($\rho = -0.57$, $p = 0.0002$) and VAS at activity ($\rho = +0.51$, $p = 0.0009$). Orthotic use increased with osteoarthritis severity ($\rho = 0.3612$, $p = 0.0152$). In the BP group, one patient underwent secondary TMT1 fusion, however, per-protocol analysis showed no altered results; 75% had mild/moderate and 10% severe TMT1 osteoarthritis, with a negative correlation between return to activity and TMT1 osteoarthritis ($\rho = -0.6292$, $p = 0.0072$).

DISCUSSION AND CONCLUSION:

This 10-year follow-up of a randomized controlled trial found no significant differences in clinical or radiographic outcomes between PA and BP for unstable Lisfranc injuries. Based on our results, preserving the first TMT joint which requires additional surgery (hardware removal) does not appear to provide added benefit. Given the comparable clinical outcomes and the potential for progressive TMT1 degeneration with BP, PA should be considered the preferred treatment for displaced or unstable Lisfranc injuries.

Table 1. Clinical outcomes, complications, reoperations, and radiological results.

	Primary Arthrodesis (PA)	Bridge Plating (BP)	P value
AOFAS midfoot score	89.3 (SD 14.4)	92.6 (SD 10.3)	P = 0.66
Manchester–Oxford Foot Questionnaire (MOxFAQ) Index	15.6 (SD 22.6)	12.0 (SD 20.2)	P = 0.57
MOxFAQ Walking/Standing	15.4 (SD 23.4)	12.1 (SD 23.3)	P = 0.49
MOxFAQ Pain	21.0 (SD 27.9)	18.1 (SD 25.0)	P = 0.77
MOxFAQ Social/Interaction	9.4 (SD 16.6)	4.9 (SD 10.3)	P = 0.37
Visual Analogue Scale (VAS) at rest	0.8 (SD 1.7)	0.4 (SD 1.2)	P = 0.59
Visual Analogue Scale (VAS) at rest	2.1 (SD 2.6)	1.4 (SD 2.0)	P = 0.53
SF-36 Physical Component Score (PCS)	39.8 (SD 4.6)	42.3 (SD 5.5)	P = 0.11
SF-36 Mental Component Score (MCS)	47.1 (SD 6.8)	44.5 (SD 8.6)	P = 0.43
Complications	3	4	P = 1.00
Reoperations (including unplanned ROH)	7	5	P = 0.43
Osteoarthritis NC 1 (None / Mild-Moderate / Severe)	11 / 8 / 1	8 / 13 / 0	P = 0.27
Osteoarthritis NC 2-3 (None / Mild-Moderate)	9 / 11	9 / 12	P = 1.00

