

Bridge Plate Fixation Results in Better Functional Outcomes Than Transarticular Screw Fixation for Low-Energy Lisfranc Injuries

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Introduction/Purpose: Open reduction and internal fixation (ORIF) with transarticular screws or bridge plating is the standard of care for unstable Lisfranc injuries. There are no studies comparing the clinical outcomes of fixation with transarticular screws or bridge plates in young, athletic patients who sustained low-energy injuries.

Methods: All low-energy Lisfranc injuries that underwent ORIF between 2010 and 2015 were reviewed. Injuries were classified as low-energy if they occurred during athletic activity, ground level twisting, or a fall from less than three feet (typically stairs or curbs). Tarsometatarsal (TMT) joint fixation with transarticular screws or bridge plating was documented. Transarticular screws were typically removed between four and six months postoperatively. Injury characteristics, complication rates, pain scores, and Foot and Ankle Ability Measure (FAAM) scores were compared. All continuous variables were compared with a two-tailed Student t-test. All categorical variables were compared using the Chi Squared test.

Results: Of the fifteen patients identified, nine were fixed with transarticular screws and six with bridge plates. Average patient age was 27 years old. 12 of 15 were primarily ligamentous injuries. Implant removal was performed in the entire transarticular screw group and three out of six in the bridge plate group ($p=0.018$). Secondary arthrodesis for arthritis was recommended in two of the transarticular screw group and none of the bridge plate group ($p=0.21$). Mean FAAM scores were significantly higher in all subscales (ADL 96.2 v 76.7 $p=.035$, ADL SANE 92.5 v 72.6 $p=.055$, Sport 89.5 v 62.5 $p=.027$, Sport SANE 90 v 58.7 $p=.024$) in the bridge plate group at an average of 43 months follow up.

Conclusion: In this study, ORIF with bridge plate fixation of the TMT joints had a lower rate of HWR and higher medium term FAAM scores than fixation with transarticular screws. A statistically significant difference in rates of secondary arthritis could not be established in this small cohort. Prospective studies are necessary to confirm these findings.

Patient	Age	Gender	Military	1 ^o Ligamentous	NC Instability	TMT Fixation	Complications	Pain Score	Months of Follow-up	FAAM ADL	ADL SANE	FAAM Sport	Sport SANE
2	34	Male	Yes	Yes	No	Bridge Plate	DP Anesthesia	0	43	100	95	100	90
3	39	Male	Yes	Yes	No	Bridge Plate	None	3	19	94	80	70.5	80
5	19	Male	Yes	Yes	Yes	Bridge Plate	Superficial Infection	0	37	98.8	100	100	100
9	23	Male	Yes	Yes	No	Bridge Plate	None	0	20	100	95	100	95
13	24	Male	Yes	Yes	Yes	Bridge Plate	None	0	12	98.8	100	96.9	100
14	33	Male	Yes	No	No	Bridge Plate	None	1	12	85.7	85	69.8	75
Mean	29	100%	100%	83%	33%			0.7	24	96	93	90	90
15	20	Male	Yes	No	No	Screws	DP Anesthesia	2	35	44	30	34.4	30
1	26	Male	Yes	Yes	No	Screws	DP Anesthesia	1	40	86.9	85	65.6	75
4	33	Male	Yes	Yes	Yes	Screws	None	0	54	96.4	85	75	65
6	25	Male	Yes	Yes	No	Screws	Midfoot Collapse	3	55	65.5	80	34.4	35
7	26	Female	No	Yes	No	Screws	None	0	76	81	85	73.4	85
8	27	Female	No	Yes	Yes	Screws	None	2	78	97.6	98	100	100
10	20	Female	No	No	No	Screws	None	Unknown	64	98.8	100	93.8	98
11	34	Male	Yes	Yes	No	Screws	Superficial Infection	7	45	82.1	50	60.9	30
12	25	Female	No	Yes	No	Screws	Midfoot Collapse	4	57	38.1	40	25	10
Mean	26	56%	56%	78%	22%			2.375	56	76.71111111	72.55555556	62.5	58.66666667
p-value	1	0.057	0.057	0.79	0.63			0.1	<.001	0.035	0.055	0.027	0.024

Table 1: Patient and injury details, surgical implants, and outcomes. Two sided student t-tests were used.

NC = Naviculocuneiform. TMT = Tarsometatarsal. FAAM = Foot and Ankle Ability Measure. ADL = Activities of Daily Living. SANE = Single Assessment Numerical Evaluation