No Difference in Early Outcomes Comparing Intramedullary versus Extramedullary Fibular Fixation in Operative Ankle Fractures

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INTRODUCTION: The purpose of this study was to compare postoperative complications and outcomes of minimally invasive intramedullary fixation(IMF) versus plate fixation(PF) in the treatment of distal fibular fractures.

METHODS: A retrospective review was performed from identifying all consecutive ankle fracture patients aged ≥18 years old surgically managed between August 2017 to September 2022 at a tertiary care center with minimum 6 months clinical follow-up. Patients were grouped into those receiving intramedullary versus extramedullary fibular fixation. The primary outcomes were relevant demographic factors (diabetes, osteoporosis, charlson comorbidity index[CCI]), surgical time, complication rates, reoperation rates. Secondary outcomes included time to definitive fracture fixation, fracture characteristics (AO/OTA and Lauge-Hansen classification), syndesmotic instability requiring fixation and discharge disposition.

RESULTS: Forty-one IMF patients(average age 55.3±18.10yrs) and 162 PF patients(47.7±17.4yrs) were identified and included in this study. Within the IMF group, 25 patients received IM nailing and 16 patients received percutaneous screw fixation. A greater proportion of IMF patients had diabetes(39%vs22%, p<0.001), osteoporosis(22%vs3%, p<0.001), and moderate or severe CCI(41%vs23%, p=0.017). Surgical time was significantly reduced when using IMF technique (80.4±43.1min vs 99.1±43.1min, p=0.012). Overall complication rates or time to complication did not differ significantly between groups(p=0.578 and p=0.082); however, when sub-stratified, IMF patients trended towards experiencing fewer wound related complications versus PF patients(5% vs 9%,p=0.291). No IMF patients experienced deep or superficial infections and only 2(5%) patients experienced wound dehiscence. Reoperation rates(15%vs10%, p=0.267) and time to fracture union (2.7±2.2vs3.1±2.0mos, p=0.301) did not differ significantly. At final follow-up (IMF: 15.0±12.2mos vs PF: 28.5±19.5mos), Olerud and Molander ankle score was significantly higher in IMF compared to PF (87.1±14.2 vs 76.2±22.6, p=0.002).

DISCUSSION AND CONCLUSION:

Patients in the IMF group at baseline had several comorbid medical conditions that put them at high risk for wound related complications, however, postoperatively they demonstrated higher functional scores and similar complication rates compared to the PF group. It is important to note, however, while we expected a higher rate of wound issues with the PF group, there were no significant differences in infection rates. Either IMF and PF is reliable for fixation and outcomes, and thus with proper soft tissue, biologically friendly technique, either IMF or PF is a reliable choice in the fixation of fibula fractures.

Table. Postoperative data

	Intramedullary Fixation (n=41)	ORIF (n=162)	*P-value*
Length of hospital stay (days), mean ± SD	3.7 ± 3.7	4.0 ± 8.3	0.779
Discharge disposition, n(%)			<0.001
Home	26 (65%%)	144 (89%)	
Subacute rehab facility	13 (33%)	9 (6%)	
Acute rehab facility	1 (3%)	5 (3%)	
Long term acute care hospital	0 (0%)	1 (1%)	
Time to fracture union (months), mean ± SD	2.7 ± 2.2	3.1 ± 2.0	0.301
Time to full weightbearing (weeks), mean ± SD	7.2 ± 3.5	7.0 ± 2.8	0.824
All Complications, n (%)	9 (22%)	36 (22%)	0.578
Symptomatic hardware relating to fibular fixation	0 (0%)	3 (2%)	0.445
Symptomatic hardware not relating to fibular fixation	1 (2%)	7 (4%)	
Deep vein thrombosis	0 (0%)	2 (1%)	
Fibular nonunion	0 (0%)	1 (1%)	
Medial malleolar nonunion	0 (0%)	1 (1%)	
Superficial infection	0 (0%)	2 (1%)	
Deep infection	0 (0%)	5 (2%)*	
Hardware failure	0 (0%)	3 (2%)*	
Syndesmotic hardware failure	0 (0%)	1 (1%)	
Wound dehiscence	2 (5%)	5 (3%)	
Heel pressure ulcer	1 (2%)	0 (0%)	
Charcot arthropathy	1 (2%)	0 (0%)	
Partial tear of deltoid ligament	1 (2%)	0 (0%)	
Delayed wound healing requiring antibiotics	0 (0%)	3 (2%)	
Medial malleolus hardware infection	1 (2%)	0 (0%)	
Persistent stiffness	0 (0%)	1 (1%)	
Plantar blisters	0 (0%)	1 (1%)	
Peroneal tendinitis	0 (0%)	1 (1%)	
Plantar fasciitis	0 (0%)	2 (1%)	
Sub-group: Wound related complications, n(%)	2 (5%)	15 (9%)	0.291
PROM: Olerud and Molander	87.1 ± 14.21	76.2 ± 22.6	0.002
ΔMF vs PF: Olerud and Molander at final follow-up	10.9		–
MCID: Olerud and Molander @ 1year [Terwee et al. 2022]	10.47		–
PROMIS: Global 10 - Physical T-score	54.1 ± 0.3	50.7 ± 9.8	0.061
PROMIS: Global 10 - Mental T-score	52.1 ± 9.2	51.7 ± 9.3	0.423
Follow-up (months), mean ± SD	15.0 ± 12.2	28.5 ± 19.5	<0.001
Time to complication (months), mean ± SD	1.9 ± 1.9	6.5 ± 7.2	0.082
Reoperation rates, n(%)	6 (15%)	16 (10%)	0.267
Time to reoperation (months), mean ± SD	2.8 ± 3.3	2.8 ± 3.3	0.165

PROM, patient reported outcome measure; PROMIS, patient reported outcomes measurement information system