Nail versus Plate for Distal Femur Fracture: A Propensity-Score-Matched Analysis

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Purpose: Reoperation rates after distal femur fracture remain high. Some surgeons have advocated for the use of intramedullary nails over lateral plate constructs as they may provide more biologically and mechanically favorable fixation. The purpose of this study was to compare reoperation and early radiographic healing outcomes in a matched cohort of distal femur fractures treated with isolated nail or lateral plate constructs.

Methods: A multicenter retrospective cohort study was undertaken. Patients presenting to 1 of 10 tertiary care referral centers with a distal femur fracture (OTA 33A or C) between 2012 and 2019 with at least 3 months of clinical follow-up were eligible for inclusion. Patients treated with an isolated intramedullary nail (not a "hybrid" nail-plate construct) were selected and were propensity score-matched 1:1 to patients treated with a lateral plate. Propensity scores were based on 12 covariates potentially influencing the decision of whether to use a nail or plate: age, sex, body mass index (BMI), smoking status, diabetes, chronic kidney disease, osteoporosis, intra-articular fracture, vascular injury, medial comminution, periprosthetic fracture, and open fracture. Matched groups were compared statistically on four outcomes: all-cause reoperation, reoperation to promote union, reoperation for infection, and modified Radiographic Union Scale for Tibia fractures (mRUST) scores at the 3-month time point.

Results: 245 distal femur fractures treated with an intramedullary nail were matched to 245 fractures treated with a lateral plate (Table). Covariates and propensity scores were well balanced between groups. Comparing the nail group to the plate group, all-cause reoperation occurred in 22% vs 17% of fractures (P = 0.2 for comparison), reoperation to promote union in 8.2% vs 9% (P = 0.9), and reoperation for infection in 5.7% vs 6.5% (P = 0.9). 3-month mRUST scores exhibited a mean of 9 in each group (P = 0.2 for comparison).

Conclusion: In a propensity-matched cohort of 490 distal femur fractures treated with a nail or lateral plate, no differences were noted between constructs with respect to all-cause reoperation, reoperation to promote union, reoperation for infection, or 3-month mRUST scores. Lateral locked plating and intramedullary nail fixation remain viable and reasonable surgical options for the treatment of distal femur fractures.

Table 1: Baseline characteristics and outcomes of lateral plate and nail groups

Variable	Lateral plate (N = 245)	Nail (N = 245)	p-value
Age	53 (18)	53 (19)	0.7
Female	136 (56%)	131 (53%)	0.7
Race/Ethnicity			0.4
American Indian or Alaska Native	2 (0.8%)	2 (0.8%)	
Asian	2 (0.8%)	4 (1.6%)	
Black or African American	81 (33%)	69 (28%)	
Hispanic or Latino	13 (5.3%)	24 (9.8%)	
Native Hawaiian or Other Pacific Islander	0 (0%)	0 (0%)	
White	139 (57%)	135 (55%)	
Other	8 (3.3%)	11 (4.5%)	
Tobacco	70 (29%)	76 (31%)	0.6
BMI	28 (9)	28 (10)	>0.9
Diabetes	61 (25%)	56 (23%)	0.7
Chronic kidney disease	24 (9.8%)	20 (8.2%)	0.6
Osteoporosis	32 (13%)	28 (11%)	0.7
Intra-articular	85 (35%)	79 (32%)	0.6
Vascular injury	9 (3.7%)	10 (4.1%)	>0.9
Medial comminution	136 (56%)	127 (52%)	0.5
Open fracture			0.9
No	170 (69%)	168 (69%)	
Type 1/2	33 (13%)	37 (15%)	
Type 3	42 (17%)	40 (16%)	
Periprosthetic fracture	23 (9.4%)	28 (11%)	0.6
Outcome			
Any reoperation	42 (17%)	54 (22%)	0.2
Reoperation to promote union	22 (9.0%)	20 (8.2%)	0.9
Reoperation for infection	16 (6.5%)	14 (5.7%)	0.9
3 month mRUST score	9 (2)	9 (3)	0.2