

Radiographic Outcomes and Factor Analysis for Nonunion in Fragmentary Segmental Fractures of the Femur Shaft (AO/OTA 32C3) Treated With Reamed Antegrade Nailing

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Purpose: The study aimed to report the radiographic outcomes and evaluate the risk factors associated with nonunion.

Methods: We conducted a retrospective review of AO/OTA 32-C3 fractures from 3 Level I trauma centers. Radiological outcomes, including union and alignment, were evaluated. The risk factors for nonunion were investigated, including demographics and treatment-related characteristics, such as the number of interlocking screws, segmentation length, main third fragment length, distance of the main third fragment, width ratio, and exposed nail length in 1 cortex from immediate postoperative radiographs. Multivariate logistic regression was used for statistical analysis.

Results: Among 2295 femur shaft fracture patients, 51 met the inclusion criteria. The radiological union was achieved in 37 patients and the mean time to union was 10.7 ± 4.8 months. The acceptable axial alignment was observed in 30 patients. Multiple logistic regression analysis identified only exposed nail length as a significant risk factor for nonunion (odds ratio [OR]: 1.599, P = 0.003) and the cut-off value was 19.1 mm (Sn [sensitivity] 0.786; Sp [specificity] 0.811).

Conclusion: Intramedullary nailing for treating 32-C3 fractures showed high rates of nonunion (27%) and malalignment (41%). It is recommended to consider a supplementary intervention to improve outcomes in cases where the exposed nail length in 1 cortex is more than 19.1 mm or twice the nail diameter.

Logistic regression analysis of non-union risk factors

Variable	Univariate		Multivariate	
	Odds ratio (95% CI)	p-value	Odds ratio (95% CI)	p-value
Polytrauma	0.870 (0.713–1.063)	0.093	-	
Time to surgery	0.840 (0.675–1.046)	0.142	-	
Number of distal interlocking screws	1.008 (0.976–1.041)	0.116	-	
Width ratio	2.595 (0.300–22.458)	0.144	-	
Exposed nail length	1.626 (1.055–2.593)	0.023	1.599 (1.084–2.127)	0.003

CI: confidence interval

