Comparing Outcomes of Plate Augmentation, Nail Exchange, and Nail Exchange with Plate Augmentation in the Treatment of Atrophic Femoral Shaft Nonunion After Intramedullary Nailing: A Multicenter Retrospective Study

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Purpose: This study aimed to compare the clinical and radiographic outcomes of exchange nailing, plate augmentation, and exchange nailing with plate augmentation for atrophic nonunion after intramedullary (IM) nailing in femoral shaft fractures, and to investigate the factors that affect persistent nonunion after reoperation for femoral shaft atrophic nonunion.

Methods: This study retrospectively analyzed the medical records of patients who developed atrophic nonunion after IM nailing for femoral shaft fractures and underwent reoperation. The study included patients from 5 university hospitals between June 2011 and June 2021. The patients were divided into 3 groups based on the type of reoperation performed: plate augmentation group (group P), exchange nailing group (group N), and combined treatment group (group C). Data on patient demographics, comorbidities, ambulatory level, nonunion site, follow-up time, and initial trauma were collected. Surgical data and clinical and radiographic outcomes were also analyzed. Univariate and multivariate logistic regression analysis was performed to identify factors affecting persistent nonunion.

Results: A total of 149 patients were included in the study, with 57 in group P, 64 in group N, and 28 in group C. There were no significant differences in patient demographics, comorbidities, nonunion site, or follow-up time between the groups. Autogenous bone grafting was performed more frequently in group P (80.7%) and group C (89.3%) compared to group N (9.4%). Group N had a significantly lower union rate than Group C, whereas there was no significant difference in the union rate and time to union between Group P and C. Of the 3 groups, group C had the longest operative time and required the most blood transfusions. Logistic regression analysis identified age, lack of bone grafting, and exchange nailing as independent risk factors for persistent nonunion.

Conclusion: Exchange nailing showed a low union rate as a treatment for atrophic nonunion after IM nailing in the femoral shaft. The efficacy of combined treatment requires further study, and persistent nonunion after reoperation may be influenced by age, bone grafting, and surgical technique. Surgeons should consider both restoration of the biologic environment and increased mechanical stability in revision surgery for atrophic femoral shaft nonunion.