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Question of Reduction: Percutaneous Reduction Improves Modified Radiographic Union Scores for Intercalary Femoral Fractures at 12 weeks

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Abstract:

Diaphyseal intercalary (“butterfly”) fragments are common in comminuted femoral shaft fractures, yet the benefits of fragment reduction remains uncertain. We hypothesized that percutaneous intraoperative reduction would improve early radiographic healing. We retrospectively reviewed adults treated with intramedullary nailing for AO/OTA 32B femoral shaft fractures at a Level I trauma center.

Early healing was quantified using the Modified Radiographic Union Score at 12 weeks (mRUST-12). Demographics (age, sex, BMI) and operative variables (percutaneous reduction and adjunct fixation) were recorded, and postoperative anteroposterior radiographs were used to assess fragment displacement. Associations with mRUST-12 were tested using multivariable linear regression; displacement constructs were modeled separately because of collinearity. mRUST-12 was available for 47 patients (mean age 37.3±19.0 years; BMI 27.4±5.1). In a complete-case adjusted model (n=32), percutaneous reduction was independently associated with higher mRUST-12 (B=+1.62, 95% CI 0.28–2.96; p=0.020), while increasing age predicted lower scores (B=−0.039 per year; p=0.026). In adjusted displacement models (n=47), greater postoperative proximal and fragment displacement were associated with lower mRUST-12 (p=0.009 and p=0.022, respectively).

Complications were uncommon and did not differ by percutaneous use. Percutaneous reduction may enhance early union without increasing complications, but incomplete 12-week follow-up may introduce selection bias and warrants validation in larger cohorts.

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