

Factors that Predict Instability in Pediatric Diaphyseal Both Bone Forearm Fractures

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Background/Purpose: Diaphyseal forearm fractures are among the most common fractures in children. Significantly displaced or angulated fractures are treated with initial closed reduction and immobilization, with follow-up to determine if displacement occurs. The purpose of this study was to determine what factors upon initial presentation would predict failure of initial closed reduction and casting.

Methods: Radiographic and hospital records of skeletally immature patients who underwent closed reduction and casting of diaphyseal forearm fractures in the emergency department were evaluated. Demographic, time course, and radiographic data were evaluated at presentation and at varying time intervals until union was achieved. Univariate logistic regression analysis of these factors was performed to identify predictors of failure of initial closed reduction and immobilization as defined as requiring a repeat procedure.

Results: 188 patients meeting the inclusion criteria were identified and analyzed. 174 patients had adequate follow-up to union. The average patient age was 7.7 years old and 68% of patients were male. A total of 19 patients underwent a repeat procedure. Patients who underwent a repeat procedure had an average initial reduction time of 36.9 ± 22.2 minutes, whereas those patients who did not require additional procedures had an initial reduction time of 23.4 ± 11.8 minutes ($P < 0.0103$). Odds of requiring repeat reduction were the greatest in those patients who presented with fractures translated greater than or equal to 50% in any plane (odds ratio [OR] = 10.1; 95% confidence interval [CI] 3.1-33.1), age greater than 9 years (OR = 4.1; 95% CI 1.5-11.3), complete fracture of the radius (OR = 9.1; 95% CI 2.0-40.5), follow-up angulation of the radius $>15^\circ$ on lateral radiographs (OR = 5.0; 95% CI 1.3-18.6), follow-up angulation of the ulna $>10^\circ$ on AP radiographs (OR = 8.7; 95% CI 2.7-28.4), and follow-up translation of either bone $>50\%$ (OR = 13.5; 95% CI 4.5-40.2). There was no significant correlation with respect to initial angulation parameters and cast index.

Conclusion: Patients requiring lengthy initial reductions are at an increased risk of having a repeat procedure than those with short initial reduction times. Age, initial translation, complete fractures of the radius, and residual translation on follow-up are highly predictive of patients having repeat procedures. These patients require carefully monitored follow-up and families should be counseled appropriately as to their risk of repeat intervention.