A More Strict Alignment Tolerance Is Associated with Improved Pronosupination but Worse Patient-Reported Outcomes: A Prospective, Multicenter, Observational Study of Pediatric Both Bone Forearm Fractures

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INTRODUCTION: There is significant variation between centers with respect to treatment protocols for pediatric both bone forearm fractures. We investigated the association of alignment tolerances at two trauma centers with outcomes (radiographic alignment, pronosupination, and patient reported outcomes).

METHODS: We performed a prospective observational study of radiographically skeletally immature patients with both bone forearm fractures treated at two urban level 1 trauma centers. Center A employed relatively strict tolerances for alignment, favoring additional interventions if post-reduction malalignment was ≥ 10º, whereas Center B did not. We excluded those treated with ORIF and within < 2cm of the physis. We recorded patient data (age, hand dominance, and sex), injury variables (mechanism of injury and open fracture), and treatment variables (hospital location and number of anesthetic events), and radiographic measures of alignment. Outcomes assessed included forearm pronosupination, pediatric upper extremity PROMIS scores, and grip strength.

RESULTS:

We enrolled 112 children with both bone forearm fractures. Six were lost to follow up for a final study population of 106 (50 at Center A and 62 at Center B). Median age was 6, IQR 5-10. There was no difference in those enrolled at Centers A and B by patient age, hand dominance, or sex. Treatment Center (A vs B) was not associated with a difference in coronal malalignment (median 0º vs 0º, respectively, p = 0.86), sagittal malalignment (median 4.3º vs 8.5º, respectively, p = 0.19), or grip strength. Treatment at Center A was associated with a lower rate of pronosupination deficit > 10º (4/46, 8.7% vs. 9/33, 27.2%), but statistically worse patient reported outcomes (53.0 vs 55.9, p = 0.02).

DISCUSSION AND CONCLUSION:

We found a more strict post-reduction alignment tolerance limit of 10º for pediatric both bone forearm fractures was associated with a lower rate of pronosupination deficit, but statistically worse patient reported outcomes. Further research should include multiple outcome measures as interventions to optimize alignment may have disparate effects on pronosupination vs patient-reported outcomes.