Fracture Classification Predicts Functional Outcomes in Supracondylar Humerus Fractures: A Prospective Study

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Purpose: This study was conducted to prospectively evaluate the relationship between fracture classification and functional outcome in children with supracondylar humerus fractures (SCHFX) using validated outcome measures.

Methods: An IRB-approved prospective enrollment of consecutive patients with operative SCHFX was performed over a 3-year period. Fracture pattern and Gartland classification were recorded by the treating surgeon at the time of surgery. Functional outcome was assessed at final follow-up using the Pediatric Outcomes Data Collection Instrument (PODCI) and the QuickDASH Outcome Measure, an abbreviated version of the Disabilities of the Arm, Shoulder and Hand questionnaire. Multiple regression analysis was used to determine the relationship between fracture classification / pattern and functional outcome while controlling for other injury parameters including patient age, neurologic deficit, vascular abnormality, and presence of an open fracture.

Results: 752 patients were enrolled during the study period of whom 199 (average age 6.7 years) completed functional outcome measures at final follow-up. Of these, 10 patients (5%) sustained flexion injures and 189 (95%) sustained extension injuries of which 62 (33%) were Type II fractures and 127 (67%) were Type III fractures. 65 (34%) of the extension injuries were posteromedially displaced, 58 (31%) were posterolaterally displaced, 54 (29%) were posteriorly displaced without coronal plane deformity, and 12 (6%) were multidirectionally unstable. The average PODCI global functioning scale score and QuickDASH scores for the entire cohort were 93.5 and 10.5 respectively indicating excellent function. No differences in outcome scores were noted between patients with Type II fractures, Type III fractures, and those with multidirectional instability. For extension injuries, no difference in outcome was identified based upon fracture pattern. Flexion injuries demonstrated significantly lower PODCI transfer and basic mobility (93.9 vs 98.7, $P < 0.001$) and PODCI pain and comfort scores (77.8 vs 94.8, $P < 0.3$) than Type III extension injuries. As a whole, extension injuries demonstrated significantly higher PODCI pain and comfort scores (94.8 vs 77.8, $P < 0.02$) than flexion injuries.

Conclusion: This is the first study to prospectively determine an association between fracture classification and functional outcome using validated outcome measures following the operative treatment of children with SCHFX. While children generally have excellent functional outcomes following the operative treatment of SCHFX, flexion injuries may be predictive of poorer outcomes with regards to pain and mobility when compared to extension injuries at final follow-up.