Rate and Risk Factors for Delayed Healing Following Surgical Treatment of Lateral Condyle Humerus Fractures in Children

*Lissette Salgueiro Canetti, MD[1]; Joanna Roocroft, MA[2]; Tracey Bastrom, MA[2]; Eric Edmonds, MD[2]; **Andrew Pennock, MD**[2]; Vidyadhar Upasani, MD[2]; Burt Yaszay, MD[2];*
[1]University District Hospital, San Juan, PUERTO RICO;
[2]Rady Children's Hospital, San Diego, California, USA

Purpose: The purpose of this study was to evaluate the rate and risk factors for delayed healing of pediatric lateral condyle fractures after surgical fixation.

Methods: In this retrospective study of all operatively treated lateral condyle fractures at a single institution from 2006 to 2013, radiographic evaluation included: measured fracture displacement at presentation and after surgical fixation, fracture classification, and multiple parameters of pin configuration. Patients who had delayed healing were defined as those not yet healed by the 8th week of follow-up. The delayed healing group was compared to fractures that healed in less than 8 weeks to identify risk factors associated with delayed healing. Purposeful selection was utilized to identify factors for entry into a multivariate binary logistic regression model.

Results: 210 children were evaluated. Mean follow-up was 25 weeks (range, 4 weeks-5 years). Distribution of Weiss et al classification was as follows: type 1, 8 (4%); type 2, 61 (29%); and type 3, 141 (67%). There were 33 (16%) delayed unions, of which 7 (21%, 3% of the entire cohort) required further surgery to achieve healing. There was no significant difference in pin configuration and treating surgeon experience between the delayed healing group and the normal healing group (P = 0.64), however all 7 cases that underwent secondary surgery were initially treated by surgeons in their first 2 years of practice. Weiss classification, intraoperative fluoroscopy time, and intraoperative displacement after fixation met criteria for entry into the regression. While Weiss classification did not remain significant within the model, its removal resulted in a 30% change in the parameter estimate for intraoperative fluoroscopy time. For each second increase in fluoroscopy time, there was a 3% increase in the risk of delayed healing. For every 0.1-mm increase in intraoperative displacement after fixation, there was an 18% increase in the risk of delayed healing. Patients with 1 mm or more displacement after fixation had an increased risk of delayed healing (odds ratio [OR] 4.78, P = 0.007).

Conclusion: Delayed union of lateral condyle fractures is a matter of concern and in this series 3% required secondary surgery to achieve healing. Risks for delayed healing include amount of residual displacement after reduction and the difficulty in attaining that reduction, as defined by fluoroscopy time. Families with children who have severe fracture patterns, particularly in cases where anatomic reduction could not be obtained, should be counseled of the elevated risk of complications related to healing.