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Changes in Management Based on X-rays after Pinning of Supracondylar Humerus Fractures: Rare, but More Common in Complex Injuries

Ashwin Madhan, MD¹; Yuyang Chu¹; Jason Anari, MD²; Michael Carter³; Jessica Heyer, MD⁴; Arianna Trionfo, MD⁵; Jordan Manning³; Amir Misaghi, MD⁶; Dallyn Udall, DO⁷; Neeraj Patel, MD, MPH, MBS¹

¹Lurie Children's Hospital, Chicago, IL; ²Children's Hospital of Philadelphia, PA; ³Drexel University, Philadelphia, PA; ⁴Hospital for Special Surgery, New York, NY; ⁵Nemours Children's Hospital, Wilmington, DE; ⁶Children's Hospital of Orange County, Orange, CA; ⁷Riverside University Health System, Riverside, CA

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Upper Extremity

Recipient: Ashwin Madhan, MD

Abstract

Purpose: Clinical practice, including utilization of postoperative x-rays, may vary after pinning of supracondylar humerus fractures in children. The purposes of this study were to: (1) evaluate the frequency at which postoperative radiography resulted in

management changes and (2) determine risk factors for such changes, as previous studies may be underpowered for such analyses.

Methods: This retrospective cohort study included skeletally immature patients that underwent pinning of a supracondylar humerus fracture at four tertiary children's hospitals. Skeletally mature patients or those requiring fixation with implants other than pins were excluded. Pre-, intra-, and postoperative data was collected, with attention to the frequency of postoperative x-rays as well as management changes based on such imaging. Statistical analysis included independent samples t-tests, chi-square tests, or Fisher exact tests, as appropriate.

Results: A total of 6151 postoperative x-rays were obtained in 2929 patients (mean 2.1±0.9 per patient). Specifically, 1523 (52.0%) patients had imaging taken at a visit prior to the date of pin removal, 2814 (96.1%) on the date of pin removal, and 1416 (48.3%) after the date of pin removal. Eighteen patients experienced 28 changes in clinical management based on postoperative films:

15/2929 (0.5%) on early imaging prior to pin removal, 11 (0.4%) at the time of pin removal, and 2 (0.1%) after pin removal. Compared to those that did not experience a management change based on x-ray, patients with an altered clinical course more frequently had an ipsilateral proximal/diaphyseal forearm fracture (11.5% vs. 0.5%, $p<0.001$); preoperative deficit of the ulnar (3.8%), posterior interosseous (5.0%), or complete median nerve (2.2% vs. 0.5%, $p=0.04$); and more mean total pins placed (3.0 ± 0.3 vs. 2.6 ± 0.6 , $p<0.001$). Similar results were found when evaluating risk factors for imaging-based management changes at specific time periods (before, during, and after pin removal).

Conclusion: Plain radiography is obtained frequently after pinning of pediatric supracondylar humerus fractures. This results in management changes 0.5% of the time or less, calling into question the utility of postoperative x-rays when weighed against time, cost,

and radiation risk. Patients that experienced imaging-based management changes were more likely to have an ipsilateral forearm fracture, uncommon nerve palsy, or received more pins, suggesting a more complex initial injury in these children.

Significance: This large, multicenter study found the rate of management changes based on postoperative x-rays to be 0.5% or less in children with supracondylar humerus fractures. Such alterations were more likely to occur in patients with complex injuries. For uncomplicated fractures, surgeons should consider the implications of postoperative x-rays on cost, radiation, and resource utilization.

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