KEY PROCEDURES

CLOSED REDUCTION AND PERCUTANEOUS PINNING OF PEDIATRIC SUPRACONDYLAR HUMERAL FRACTURES

Carley Vuillermin, MBBS, MPH, FRACS*, Collin May, MD, MPH*, James Kasser, MD

Published outcomes of this procedure can be found at: *J Bone Joint Surg Am.* 2007 Apr;89(4):706-12.

COPYRIGHT © 2018 BY THE
JOURNAL OF BONE AND JOINT
SURGERY, INCORPORATED

Click the arrow above or go to surgicaltechniques.jbjs.org to view the video article described in this summary.

Abstract

Supracondylar humeral fractures are the most common elbow fractures in children requiring operative intervention. They are classified according to the Gartland system as nondisplaced (type I), displaced with hinging and the posterior cortex intact (type II), and completely displaced (type III). The standard treatment for type-II and III fractures is closed reduction and percutaneous pinning. The timing of surgery depends on the severity of the fracture and the presence of any neurovascular injury. Preoperative assessment of the neurologic and vascular status is imperative, and can be challenging in a young child. The steps of the surgical procedure consist of the following.

1. Position the patient supine with the affected extremity on a fluoroscopy detector or hand-table.
2. Perform closed reduction.
 - Apply longitudinal traction with the elbow in 30° of flexion.
 - Correct medial or lateral translational displacement.
 - Correct varus or valgus malalignment.
 - Maintain traction and flex the elbow, placing pressure over the olecranon process to correct extension at the fracture site.
3. Assess reduction using anteroposterior, oblique, and lateral fluoroscopic views.
4. Place divergent pins from the lateral side, using 2 pins for type-II and 3 pins for type-III fractures.
5. Assess stability by moving the elbow through a range of motion under live fluoroscopy in the lateral projection. If the fracture is determined to be unstable with lateral-only pins, proceed with medial pin placement through a mini-open approach.
6. Cut the pins and bend them outside the skin. Then apply a long-arm bivalved cast.

The pins are removed between 3 and 4 weeks postoperatively, depending on patient age, and range of motion is initiated. Elbow stiffness is

*Carley Vuillermin, MBBS, MPH, FRACS, and Collin May, MD, MPH, contributed equally to the writing of this article.

Disclosure: The authors indicated that no external funding was received for any aspect of this work. The **Disclosure of Potential Conflicts of Interest** forms are provided with the online version of the article (<http://links.lww.com/JBSEST/A207>).

common for 4 to 6 weeks, but a return to a nearly full range of motion can be expected. Resumption of normal activities should be delayed until the fracture is fully healed and the range of motion is nearly normal.

Acknowledgment

NOTE: Children's Orthopaedic Surgery Foundation (COSF) retains the copyright to the radiographs, diagrams, and photographs contained within the videos.

Carley Vuillermin, MBBS, MPH, FRACS¹

James Kasser, MD¹

¹Boston Children's Hospital, Harvard Medical School, Boston, Massachusetts

E-mail address for C. Vuillermin: Carley.Vuillermin@childrens.harvard.edu

ORCID iD for C. Vuillermin: [0000-0001-7390-384X](https://orcid.org/0000-0001-7390-384X)

References

1. Kocher MS, Kasser JR, Waters PM, Bae D, Snyder BD, Hresko MT, Hedequist D, Karlin L, Kim YJ, Murray MM, Millis MB, Emans JB, Dichtel L, Matheney T, Lee BM. Lateral entry compared with medial and lateral entry pin fixation for completely displaced supracondylar humeral fractures in children. A randomized clinical trial. *J Bone Joint Surg Am.* 2007 Apr;89(4):706-12.
2. Skaggs DL, Hale JM, Bassett J, Kaminsky C, Kay RM, Tolo VT. Operative treatment of supracondylar fractures of the humerus in children. The consequences of pin placement. *J Bone Joint Surg Am.* 2001 May;83(5):735-40.
3. Larson L, Firoozbakhsh K, Passarelli R, Bosch P. Biomechanical analysis of pinning techniques for pediatric supracondylar humerus fractures. *J Pediatr Orthop.* 2006 Sep-Oct;26(5):573-8.
4. Omid R, Choi PD, Skaggs DL. Supracondylar humeral fractures in children. *J Bone Joint Surg Am.* 2008 May;90(5):1121-32.
5. Brauer CA, Lee BM, Bae DS, Waters PM, Kocher MS. A systematic review of medial and lateral entry pinning versus lateral entry pinning for supracondylar fractures of the humerus. *J Pediatr Orthop.* 2007 Mar;27(2):181-6.
6. Pirone AM, Graham HK, Krajbich JI. Management of displaced extension-type supracondylar fractures of the humerus in children. *J Bone Joint Surg Am.* 1988 Jun;70(5):641-50.