Treatment of Flexion-Type Supracondylar Humerus Fractures in Pediatric Patients

Sudarshan J. Mohan, BS[1]; Danielle A. Hogarth, BS[1]; Niyathi Prasad, BS[2]; Casey M. Codd, BA[1]; Paul D. Sponseller, MD, MBA[2]; Christine A. Ho, MD[3]; Joshua M. Abzug, MD[1]

Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, Maryland[1]; Department of Orthopaedics, Johns Hopkins University, Baltimore, MD[2]; Texas Scottish Rite Hospital for Children, Dallas, TX[3]

INTRODUCTION

- Supracondylar humerus fractures are the most common elbow fractures in children
  - Flexion-type fractures account for only 2-3%
- There is a limited number of studies pertaining to flexion type supracondylar humerus fractures

- **Purpose:** To investigate the various treatment aspects of flexion type supracondylar humerus fractures in the pediatric population

METHODS

- **Study Design:** Retrospective review of the operative treatment of flexion type supracondylar humerus fractures

- **Sample:** Patients treated at three institutions over a 25-year period

- **Data:** Patient demographics, mechanisms of injury, diagnostic modalities, time to surgery, pin size and configuration, time to fracture union, and complications were recorded

- **Statistics:** Simple statistics were performed

Figure 1. Sample of images from a patient with a flexion-type supracondylar humerus fracture **(A)** Preoperative Baumann Angle **(B)** Preoperative Humeral Line **(C)** Postoperative Baumann Angle **(D)** Postoperative Humeral Line

RESULTS

- A total of 66 patients were identified
  - **Average Age:** 7.88 years (Range: 1-14 years)
- Of the 66 patients, 95% (N=63) sustained the injury from a fall
- **Time to Surgery:** less than 24 hours for 97% (N=64)
- **Treatment:**
  - **CRPP:** 79% (N=52) of patients
  - **ORIF:** 21% (N= 14) of patients
- **Baumann's Angle:** following operative intervention, ranged from 61 to 77 degrees (mean: 69.64; SD: 5.39)
- **Anterior Humeral Line:**
  - **Middle Third of the Capitellum**: 31% (N=4)
  - **Posterior Third of the Capitellum:** 69% (N=9)
- **Pin Size:**
  - **0.045 mm:** 0.9% (N =2), **0.054 mm:** 0.5% (N =1), **0.062 mm:** 49% (N =98), **5/64:** 42% (N=84), **1.8 mm:** 0.9% (N=2), **2 mm:** 5% (N= 11), **3/32:** 2% (N=4)
- **Pin Configuration:**
  - **Lateral Only:** 74% (N=49)
    - 1 pin: (2%, N=1)
    - 2 pins: (16%, N= 8)
    - 3 pins: (53%, N= 26)
    - 4 pins: (27%, N=13)
    - 5 pins: (2%, N= 1)
  - **Crossed Pin Configuration:** 26% (N=17)
    - 1 pin (0%, N= 0)
    - 2 pins (6%, N=1)
    - 3 pins (53%, N= 9)
    - 4 pins (35%, N= 6)
    - 5 pins (6%, N= 1)
- **Time to Fracture Union:**
  - **2 weeks:** 2% (N=1), **3 weeks:** 30% (N=20), **4 weeks:** 42% (N= 28), **5 weeks:** 20% (N= 13), **6 weeks:** 5% (N= 3), **Lost to Follow-Up:** 2% (N= 1)
- **Complications:**
  - **Overall Complication Rate**: 20% (13/66)
  - **Most Common Complications:** Nerve palsy 38% (N= 5) and decreased range of motion 30% (N=4)

CONCLUSIONS

- Flexion type supracondylar humerus fractures have a high rate of needing an open reduction as well as a high rate of incomplete reduction
- There is also a high complication rate associated with flexion type supracondylar humerus fractures in the pediatric population
- Further studies are needed to determine the optimal treatment of these infrequent fractures