SUPRACONDYLAR HUMERUS FRACTURE (SCH FX)

ALGORITHM. Supracondylar Humerus Fracture

**Inclusion Criteria:**
- Patients with Supracondylar humerus fracture (SCH FX)

**Exclusion Criteria:**
- N/A

1. **Supracondylar humerus fracture diagnosed on x-ray (3 View elbow)**
   - Immobilize in long arm splint
   - Ice and elevate for pain control
   - Assess neurovascular status

2. **Displaced?**
   - Yes → **Open fracture?**
     - Yes → Refer to Open Fracture Policy
     - No → **Posterior Cortex intact?**
       - Yes → **Anteriorly displaced?**
         - Yes → Flexion type
           - Contact orthopedics
           - Surgery within 18 hours
           - Admit pre-operatively
         - No → Type II
           - **Discuss surgical plan with orthopedics**
           - Discharge home with OR instructions
           - Urgent room ticket given if scheduled in UR next day
           - Pain control
           - Oxycodone
           - Tylenol
           - Ibuprofen
       - No → Type II
         - **Discharge home with OR instructions**
         - Urgent room ticket given if scheduled in UR next day
         - Pain control
         - Oxycodone
         - Tylenol
         - Ibuprofen

3. **Type I**
   - **1st ortho visit**
     - 5-7 days
     - X-rays in splint/cast
   - **2nd ortho visit**
     - Immobilize for 3 weeks
     - X-rays out of cast
     - Gradually resume activities

4. **Type II**
   - **1st post-operative visit**
     - 5-7 days post-op
     - X-rays in splint
     - Consider overlap to long arm cast
   - **2nd ortho visit**
     - 3-4 weeks post-op
     - Remove splint/cast
     - Pull pins
     - X-ray
     - Gradually resume activities

5. **Type III**
   - **1st post-operative visit**
     - 5-7 days post-op
     - X-rays in splint
     - Consider overlap to long arm cast
   - **2nd ortho visit**
     - 3-4 weeks post-op
     - Remove splint/cast
     - Pull pins
     - X-ray
     - Gradually resume activities

6. **Open fracture?**
   - Yes → Refer to Open Fracture Policy
   - No → Pathway Completed

7. **Has range of motion returned to normal?**
   - Yes → Pathway Completed
   - No → Pathway Completed

8. **Nerve Palsy?**
   - Yes → Pathway Completed
   - No → Pathway Completed

9. **Pathway Completed**
   - 3rd ortho visit
     - 6 weeks after cast removed

**Notes:**
- *In a displaced fracture, the anterior humeral line will not intersect the capitellum*
Algorithm: Vascular Injury

Supracondylar Humerus Fracture Pulseless (undopplerable)

Consult Orthopedics
Consider gentle traction and elbow flexion
(In Emergency Department)

Yes, well perfused — No, poorly perfused

Well Perfused?

Closed reduction

Reduction acceptable?

Yes, acceptable

Reevaluate vascular exam

Well perfused with pulse

Inpatient observation for at least 12 hours

Well perfused, pulseless

Inpatient observation for at least 24-48 hours

24-48 hours

Well perfused, No compartment syndrome?

Yes

Discharge from inpatient unit

Poorly perfused, pulseless

Open reduction.

Anschutz: Call plastic surgery on call to notify of potential need for consult.
Colorado Springs/NOC: Call orthopedics on call at Anschutz to discuss emergent transfer.

Open vascular exploration and repair needed, consider compartment release

No, poorly perfused or developing compartment syndrome

Anschutz: Call orthopedics on call at Anschutz to discuss emergent transfer.

Inpatient observation for at least 24-48 hours

No, not acceptable
TABLE OF CONTENTS

Algorithm: Supracondylar Humerus Fracture
Algorithm: Vascular Injury
Target Population
Background | Definitions- N/A
Initial Evaluation, Clinical Management, and Imaging
Therapeutics
Monitoring
Parent | Caregiver Education
Post-Operative Discharge Criteria
Follow-up
Appendix A: Orthopedic Urgent Room Ticket
Appendix B: Supracondylar Humerus Information Sheet
Appendix C: PCP Quick Reference Guide
References
Clinical Improvement Team

TARGET POPULATION

Inclusion Criteria
- Patients with supracondylar humerus fracture (SCH FX)

Exclusion Criteria
Not Applicable

INITIAL EVALUATION, CLINICAL MANAGEMENT AND IMAGING

Clinical assessment
- Soft tissue swelling
- Ecchymosis
- Skin puckering
  - Sign of considerable soft-tissue damage
  - Results from proximal segment piercing brachialis muscle and engaging deep dermis
- Bleeding/wounds
  - Open fracture (refer to open fracture policy for antibiotic recommendations)

Assess for vascular injury and Neurological deficits
- Refer to Vascular Injury Pathway
- Vascular compromise occurs in approximately 6 to 20% of children with type III supracondylar humerus fracture (SCH fx)² ⁵ ⁶
- Neurologic injury occurs in 10-20% of patients
Median nerve/anterior interosseous nerve most commonly injured\textsuperscript{2,4,6}

**Radiographs**
- Obtain true anterior/posterior (A/P) and lateral elbow radiographs if not available\textsuperscript{1}

**Assess for other injuries**
- Ipsilateral forearm fractures increase risk for development of compartment syndrome\textsuperscript{6}

**Assess pain**
- Use pain assessment strategies that are appropriate to the age/development level of the patient
- Refer to [Pain Assessment and Management Policy](#)

**Determine need for surgical fixation**
- See [Algorithm](#)
- Goal for time to OR is less than 18 hours
- Open fracture or poorly perfused hand after reduction are indications for emergent surgery\textsuperscript{3}

**THERAPEUTICS**
- Pain control – oral, IV, or intranasal medication
- Apply long arm posterior splint
- Ice and elevation for swelling and pain control

**MONITORING**
- Neurovascular status
  - Continuous pulse oximetry allows the nurse to objectively measure perfusion\textsuperscript{1}
- Pain control

**PARENT | CAREGIVER EDUCATION**
- How to evaluate neurovascular status
- Pain control measures
- Return precautions
- Splint/cast care
- NPO and pre-op check-in instructions – [Urgent Room Ticket](#) (Anschutz campus only)
- Provide family/caregiver education handout

**In Care of Kids Handouts:**
- Casts, Splints and Braces for Immobilization ([English](#) and [Spanish](#))

**POST-OPERATIVE DISCHARGE CRITERIA**
- Acceptable bone alignment
- Pain control acceptable
  - Admit to observation unit if control of pain or swelling is an issue (All Type III fractures to be admitted to observation post-operatively for monitoring)
FOLLOW-UP

- Follow-up in 5-7 days for Type III with orthopedic care team for x-rays (2 view elbow) in splint/cast, clinical assessment, neurovascular evaluation and cast placement if not casted in OR
- Follow-up in 3-4 weeks for Type II with orthopedic care team for splint/cast removal and pin removal. X-rays (2 view elbow) and pin site evaluation after removal.
- Further follow-up determined by provider
- Recommendations for follow-up in 6 weeks only if range of motion has not returned to normal or if nerve palsy present

RELATED DOCUMENTS

- ED/UC Suspected Extremity Fracture Clinical Pathway
- Opioid Prescribing Practices Clinical Pathway
APPENDIX A: ORTHOPEDIC URGENT ROOM TICKET (ANSHUTZ CAMPUS ONLY)

- Tickets given to any patient scheduled for next day outpatient surgery
- Exclusions: First case, give instructions to come in at the appropriate time.
- Should be given out at any CHCO ED or Urgent Care
- Patient and family should be given tentative OR and Check in time, and instructed to call numbers on the card to confirm their time the day of surgery.
APPENDIX B: SUPRACONDYLAR HUMERUS INFORMATION SHEET

Orthopedic Institute – Pediatric Orthopedic Trauma Program

SUPRACONDYLAR HUMERUS FRACTURE

What is a supracondylar fracture?
- Supracondylar fractures are the most common fracture of the elbow in children.
- These fractures are the result of trauma to the elbow, most often from a fall from height (monkey bars are a common culprit), or other sports or leisure activities.

How are supracondylar fractures treated?
- These fractures are treated differently depending on the severity.
- The most stable fractures can be treated with a cast or splint.
- More complicated and unstable fractures may need surgery. Surgery usually includes putting temporary pins in the bone in order to hold the fracture in place.

What should we do about pain?
- Pain with these injuries usually happens with swelling. Please keep your child’s elbow elevated above their heart and place ice on the area.
- You may utilize Tylenol and ibuprofen for pain.
- Your doctor may also prescribe a narcotic pain medication for severe pain.

How long will my child be in a cast and when will I follow up?
- Each child’s fracture is different; however, the total immobilization time is typically around 3-4 weeks.
- Stable fractures will require follow-up in 3-4 weeks for repeat x-rays to make sure your child is well enough healed to come out of their cast.
- For more severe fractures, one extra visit may be required. You will need to follow-up in one week after surgery to get x-rays in the splint or cast to make sure the fracture has not moved.
- Complications or slower healing may require more time in a splint or cast.

How do the pins come out?
- The pins used to hold the fracture in place come out through the skin.
- These are taken out in clinic typically after 3-4 weeks and do not require surgery or sedation.
- There may be minor discomfort associated with pin removal. Please feel free to give your child some pain medication before coming to clinic to get the pins out.

What problems could my child have after this injury?
- Please monitor your child for increased pain not controlled with oral medications, or any decrease in feeling in the fingers or hand. Please let your provider know of any concerns immediately.
- Most children will not have full motion or strength of the cast arm for up to 6 weeks after cast removal. This usually comes back with time and does not require occupational therapy.

Please call the orthopedic trauma nurse line at 720-777-0115 with any questions or concerns.
Evaluation of Elbow Injury:

Elbow Injury

X-ray, 3 view elbow

Supracondylar humerus fracture diagnosed on X-Ray

Immobilize in long arm splint at 45-90 degrees. (See splinting guidance next page)

Assess Neurovascular status

Call orthopedics for recommendations. One Call (720)777-3999

Fracture Type with Treatment Recommendations:

- **Displaced?**
  - Yes
    - Anterior displaced?
      - Yes
        - Flexion type
          - Contact orthopedics
          - Surgery within 18 hours
          - Admit pre-operatively
      - No
        - Type III
          - Contact orthopedics
          - Surgery within 18 hours
          - Admit pre-operatively
    - No
      - Type II
        - Discharge surgical plan with orthopedics
        - Discharge home with OR instructions
        - Urgent orthoticket given if scheduled in OR next day
        - Pain control
          - Oxycodone
          - Tylenol
          - Naproxen
      - Type I
        - Discharge home
        - Instructions to follow-up within 5-7 days
        - Pain control
          - Tylenol
          - Naproxen

- **No**
  - Anterior displaced?
    - Yes
      - Posterior cortex intact?
        - Yes
          - Type II
          - Discharge surgical plan with orthopedics
          - Discharge home with OR instructions
          - Urgent orthoticket given if scheduled in OR next day
          - Pain control
            - Oxycodone
            - Tylenol
            - Naproxen
      - No
        - Posterior cortex intact?
          - Yes
            - Type I
              - Discharge home
              - Instructions to follow-up within 5-7 days
              - Pain control
                - Tylenol
                - Naproxen
          - No
            - Type II
              - Discharge surgical plan with orthopedics
              - Discharge home with OR instructions
              - Urgent orthoticket given if scheduled in OR next day
              - Pain control
                - Oxycodone
                - Tylenol
                - Naproxen
SPLINTING PRINCIPLES

Long Arm Posterior Splint

- Extends from the axilla over the posterior elbow to the distal palmar crease
- Position of Function: 90 degree flexed elbow
- Forearm is neutral and the wrist is slightly extended

Application

- Measure dry splint next to the area being splinted or on the contralateral extremity
  - Add 1 to 2 cm at each end to allow for shrinkage that occurs during wetting, molding, and drying
- If cotton padding available, apply to extremity adding additional layers to bony prominences
- Wet splint and wring out excess moisture
- Place splint on ulnar aspect of arm and mold to the contours of the arm
  - Use palm to mold to avoid pressure point dimples
  - Take caution to avoid creases and wrinkles in the splinting material
- Splint secured with ACE wrap, wrapping distal to proximal
- Recheck neurovascular status post application
REFERENCES


CLINICAL PATHWAY

CLINICAL IMPROVEMENT TEAM MEMBERS
Jason Stoneback, MD | Orthopedic Institute
Maggie Leyendecker, RN, BSN, ONC | Orthopedic Institute
Tim Givens, MD | Emergency Department
Courtney Braund, MD | Emergency Department
Emily Greenwald, MD | Emergency Department
Kirk Bouzarelos, MD, FAAP | Pediatrics 5280
Joni MacKenzie, CPS, PNP | Emergency Department
Andrew Miller, EMT | Emergency Department
Elise Rolison, RRT-NPS | Clinical Effectiveness

APPROVED BY
Clinical Pathways and Measures Committee – October 24, 2017
Trauma Committee – October 17, 2017
Pharmacy & Therapeutics Committee – N/A

<table>
<thead>
<tr>
<th>MANUAL/DEPARTMENT</th>
<th>Clinical Pathways/Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORIGINATION DATE</td>
<td>January 4, 2011</td>
</tr>
<tr>
<td>LAST DATE OF REVIEW OR REVISION</td>
<td>March 15, 2019 (Colorado Springs alignment)</td>
</tr>
<tr>
<td>COLORADO SPRINGS REVIEW BY</td>
<td>Michael DiStefano, MD Chief Medical Officer, Colorado Springs</td>
</tr>
<tr>
<td>APPROVED BY</td>
<td>Lalit Bajaj, MD, MPH Medical Director, Clinical Effectiveness</td>
</tr>
</tbody>
</table>

REVIEW/REVISION SCHEDULE
Scheduled for full review on October 24, 2021

Clinical pathways are intended for informational purposes only. They are current at the date of publication and are reviewed on a regular basis to align with the best available evidence. Some information and links may not be available to external viewers. External viewers are encouraged to consult other available sources if needed to confirm and supplement the content presented in the clinical pathways. Clinical pathways are not intended to take the place of a physician’s or other health care provider’s advice, and is not intended to diagnose, treat, cure or prevent any disease or other medical condition. The information should not be used in place of a visit, call, consultation or advice of a physician or other health care provider. Furthermore, the information is provided for use solely at your own risk. CHCO accepts no liability for the content, or for the consequences of any actions taken on the basis of the information provided. The information provided to you and the actions taken thereof are provided on an “as is” basis without any warranty of any kind, express or implied, from CHCO. CHCO declares no affiliation, sponsorship, nor any partnerships with any listed organization, or its respective directors, officers, employees, agents, contractors, affiliates, and representatives.
Discrimination is Against the Law. Children's Hospital Colorado complies with applicable Federal civil rights laws and does not discriminate on the basis of race, color, national origin, age, disability, or sex. Children's Hospital Colorado does not exclude people or treat them differently because of race, color, national origin, age, disability, or sex. Children's Hospital Colorado provides free aids and services to people with disabilities to communicate effectively with us, such as: Qualified sign language interpreters, written information in other formats (large print, audio, accessible electronic formats, other formats). Children's Hospital Colorado provides free language services to people whose primary language is not English, such as: Qualified interpreters; information written in other languages.

If you need these services, contact the Medical Interpreters Department at 720.777.9800.

If you believe that Children's Hospital Colorado has failed to provide these services or discriminated in another way on the basis of race, color, national origin, age, disability, or sex, you can file a grievance with: Corporate Compliance Officer, 13123 E 16th Avenue, B450, Aurora, Colorado 80045, Phone: 720.777.1234, Fax: 720.777.7257, corporate.compliance@childrenscolarado.org. You can file a grievance in person or by mail, fax, or email. If you need help filling a grievance, the Corporate Compliance Officer is available to help you.

You can also file a civil rights complaint with the U.S. Department of Health and Human Services, Office for Civil Rights, electronically through the Office for Civil Rights Complaint Portal, available at coral.hhs.gov/ocr/portal/lobbyist, or by mail or phone at: U.S. Department of Health and Human Services 200 Independence Avenue, SW Room 509F, HH Building Washington, D.C. 20201 1-800-368-1019, 800-537-7369 (TDD) Complaint forms are available at www.hhs.gov/ocr/offices/file/index.html.

Children's Hospital Colorado complies with applicable Federal civil rights laws and does not discriminate on the basis of race, color, national origin, age, disability, or sex.

ATENCIÓN: si habla español, tiene a su disposición servicios gratuitos de asistencia lingüística. Llame al 1-720-777-9600.


注意：如果您使用繁體中文，您可以免費獲得語言援助服務。請致電1-720-777-9600。

ВНИМАНИЕ: Если вы говорите на русском языке, то вам доступны бесплатные услуги перевода. Звоните 1-720-777-9800.


ATTENTION : Si vous parlez français, des services d'aide linguistique vous sont proposés gratuitement. Appellez le 1-720-777-9800.


注意事項：日本語を話される場合、無料の言語支援をご利用いただけます。1-720-777-9800 まで、お電話にてご連絡ください。