

IN BRIEF:

Topics in Pediatric Orthopedics

Supracondylar Humeral Fractures: Diagnosis and Management

Overview

Supracondylar humeral fractures account for 60 percent of fractures near the elbow among children.¹ These fractures are most often seen in children during the first decade and typically affect the nondominant arm. They are considered serious injuries because of the risk of neurovascular injury or malunion.

Causes of Supracondylar Humeral Fractures

Most of these fractures occur when a child falls with a hand outstretched and the elbow extended. That type of fall places considerable force on the anatomically weak olecranon fossa, where the supracondylar region can be as thin as 1 mm.²

Evaluating Supracondylar Humeral Fractures and Associated Injuries

Children who have supracondylar fractures typically report pain in the elbow and are reluctant to move it. During the physical exam, examine the entire child and check for any signs of deformity in the other limbs. Remove splints or bandages and palpate each extremity. Check pulses and look for slow capillary refill. Check for pain upon passive finger extension.

- **Nerve damage** occurs in 10 to 15 percent of cases.³ Test for nerve damage by asking the patient to perform the thumbs-up sign (radial nerve); do the A-OK sign (median nerve); and spread or cross fingers (ulnar nerve). A flat, pinching motion instead of a round A-OK can be a sign of nerve injury. Test sensation in the first dorsal web space (radial nerve), the little finger (ulnar nerve) and the volar aspect of the index finger (median nerve).
- **Vascular impairment**, including tethering or spasm of the brachial artery, is more common than true vascular injury. Approximately 13 to 20 percent of patients with a displaced fracture will present with a diminished or absent pulse.⁴ Vascular compromise is first addressed with fracture reduction, not an arteriogram.⁵ There is also a risk of compartment syndrome.

Imaging

Radiographs are sufficient. Request orthogonal views—AP and lateral—of the elbow. Because additional distal injuries may be present, obtain AP and lateral views of the forearm/wrist, too. If a fracture is not well-visualized, consider obtaining oblique views.

Fracture Classification - The Gartland Classification⁶

Type I - Nondisplaced fracture

Radiograph findings may be minimal and the fracture line may not be visible. Tenderness on exam, along with a positive fat pad sign on the X-ray, is a strong indicator of a fracture.

Treatment: If there is truly no displacement, immobilize at a 90-degree angle with a posterior long-arm splint. The patient should see a pediatric orthopedic surgeon within 3 to 5 days.

Type II - Hinged fracture (displaced with one intact cortex)

There is some controversy in the management of these fractures, although there is an increasing trend toward treating Type II fractures with closed reduction and percutaneous pinning.

Treatment: Immobilize in a long-arm splint. A pediatric orthopedic surgeon should see the patient within 1 to 3 days. Surgery may be required.

Type III - Displaced fracture

Evaluate immediately for signs of neurovascular injury and/or compartment syndrome. Most displaced fractures can be treated with closed reduction and pinning. If the hand appears poorly perfused (cool, pale, poor capillary refill), notify an orthopedist immediately.

Treatment: Splint the elbow as it lies with 20 to 30 degrees of flexion. Do not wrap tightly. Perform a good neurovascular exam. Refer the patient to a pediatric orthopedist the same day.



Jennifer Laine, M.D., pediatric orthopedic surgeon, has a particular interest in limb deformity, developmental dysplasia of the hip, Legg-Calvé-Perthes disease and foot/ankle surgery. Laine has contributed to orthopedic textbooks and authored journal articles. Her professional affiliations include candidate membership in the American Academy of Orthopaedic Surgeons and the Pediatric Orthopaedic Society of North America. She is a member of the Ruth Jackson Orthopaedic Society.

Key Insights

- Supracondylar humerus fractures account for approximately 60 percent of the fractures near the elbow among children.¹
- Nerve damage and vascular impairment are relatively common with this type of injury. A good neurovascular exam is essential.
- Radiographs are sufficient.
- Request a pediatric orthopedic consult:
 - If a displaced fracture, same day. Splint in 20-30 degrees of flexion.
 - If a slightly displaced fracture, within 1 to 3 days. May need surgery.
 - If a nondisplaced fracture, within one week. Splint in 90 degrees of flexion.

¹ Maylahn D and Fahey J. Fractures of the elbow in children. *J Am Med Assoc* 1958; 166(3): 220-8.

² Dameron TB. Transverse fractures of distal humerus in children. *Instr Course Lect* 1981; 30: 224-35.

³ "Fractures about the elbow" in Tachdjian's *Pediatric Orthopaedics* 4th ed.; Herring JA ed. Philadelphia: Saunders; 2008: 2451-2535.

⁴ Copley LA, Dormans JP, Davidson RS. Vascular injuries and their sequelae in pediatric supracondylar humeral fractures. *J Pediatr Orthop* 1996; 16: 99-103.

Dormans JP, Squillante R, Sharf, H. Acute neurovascular complications with supracondylar humerus fractures in children. *J Hand Surg* 1995; 20A: 1-4.

⁵ Shaw BA, et al. Management of vascular injuries in displaced supracondylar humerus fractures without arteriography. *J Orthop Trauma* 1990; 4: 25-9.

⁶ Gartland JJ. Management of supracondylar fractures of the humerus in children. *Surg Gynecol Obstet* 1959; 109: 145-54

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To make a referral, call
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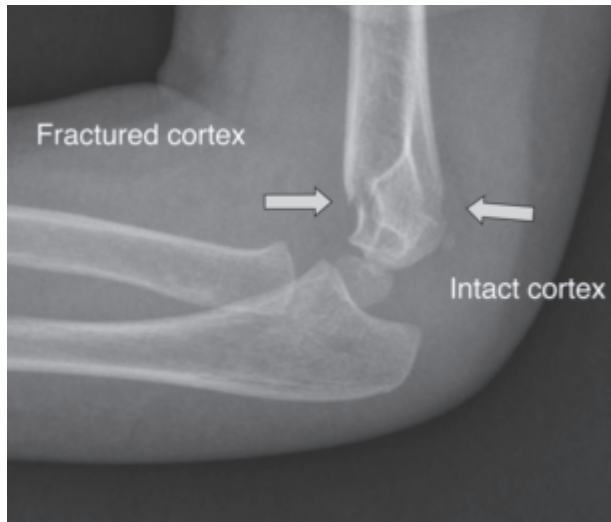
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About *In Brief*

In Brief has been developed by pediatric orthopedic specialists at Gillette Children's Specialty Healthcare as a resource for primary care providers. If you have comments or questions, please contact Jason Kelecic, D.P.T., program manager, Center for Pediatric Orthopedics, at jkelecic@gillettechildrens.com.

Supracondylar Humeral Fractures Common in Children



Type II Supracondylar Humeral Fracture
Note the intact cortex on the posterior surface of the distal humerus. The anterior surface shows only slight disruption.



Type III Supracondylar Humeral Fracture
An anterior spike, like the one pictured here, may cause tenting of the brachial artery. Nerve injury is also common.