

# Trauma Rounds

Case Reports from the Mass General Hospital and Brigham & Women's Hospital

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## Pediatric Supracondylar Fractures



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Pediatric supracondylar fractures are the most common elbow fractures in children. Approximately 7-10% of supracondylar fractures and up to 50% of severely displaced Type III supracondylar fractures present with a neurologic injury: radial nerve (41.2%); median nerve (36%); ulnar nerve (22.8%). Vascular injury is seen in 1% of displaced supracondylar fractures. Nondisplaced fractures/minimally displaced Type II fractures can be safely managed with 3 weeks of immobilization. The standard of care for displaced fractures is reduction/pin fixation for 3-4 weeks, then early mobilization.

### Problematic Fractures: Tips for Identification

The majority (90-95%) of displaced supracondylar fractures can be managed with closed reduction and pinning with excellent outcomes. However, a subset of fractures need open reduction and are at risk for neurovascular sequelae. A problematic fracture should be suspected whenever there is less than a fully intact neurovascular exam or severe fracture displacement.

An adequate neurovascular exam can be difficult in a child but should always be documented, or – should an adequate exam not be possible - whatever can be obtained should be documented. Capillary refill should be immediate; sluggish refill should raise concern for vascular injury or entrapment. Similarly, nerve deficits or paresthesias signify nerve stretch or entrapment. These fractures need urgent treatment.

Radiographically, the direction of the proximal metaphyseal spike predicts the likely neurovascular injury: anterior (direct posterior extension type)-median nerve/brachial artery, medial (posterolateral extension type or flexion type)-ulnar nerve, lateral (posteromedial extension type)-radial nerve. Figure 1 shows a severely displaced extension type which had entrapped median nerve and brachial artery.

### How to Open Reduce & Fix Pediatric Supracondylar Fractures

Once a fracture has been identified as possibly problematic and has unsatisfactory closed reduction, it is important to have ap-

propriate setup with a hand table, sterile tourniquet, C-arm and hand instrument set. A vascular surgeon should be available if needed.

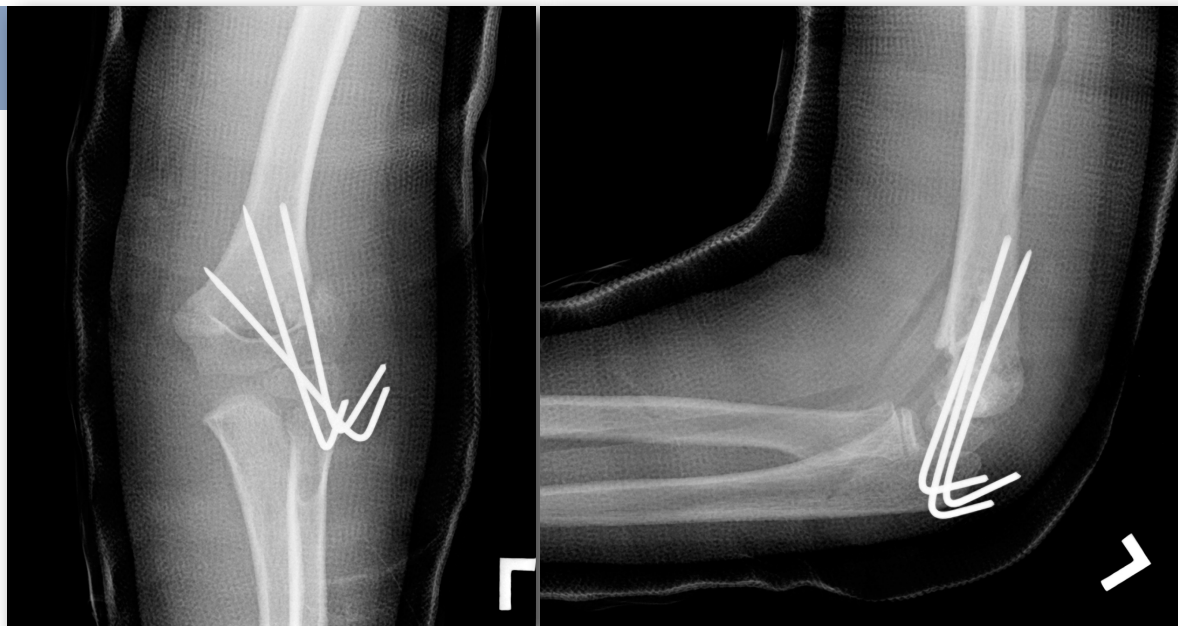
When opening pediatric fractures, it is best to always open over the tear in the periosteum. For supracondylar fractures, a 3-5 cm anterior incision in the elbow crease usually allows easy exposure of the fracture and the neurovascular structures. These are often tented over the proximal fracture fragment. Once any entrapped muscle and/or nerves/vessels are cleared, the fracture can be open reduced and pinned in the usual fashion. The nerves



Figure 1: Elbow x-ray demonstrating severely displaced supracondylar fracture.

and vessels can then be assessed with the tourniquet down. It often takes warming and dripping vasodilative agents on the brachial artery for 10-15 minutes to relieve vasospasm. If pulsatile flow returns - which is common - standard closure and bivalved casting can proceed. If flow does not return or an arterial injury is visible, a vascular surgery assessment for need of brachial artery repair must occur.

Figure 2: Postoperative AP and Lateral x-rays of pin configurations.



After either closed or open reduction and pinning of a supracondylar fracture (Figure 2), children should be comfortable with little narcotic requirement and no negative change to their preoperative neurologic exam. Significant pain and increasing pain medicine requirements are the best indicators in children of evolving compartment syndrome or missed arterial injury or entrapped nerve. Entrapment should particularly be suspected if pain increases and nerve function is decreased after closed reduction and pinning. These issues require emergent surgical exploration.

### Conclusions

The majority of displaced supracondylar fractures can be managed with closed reduction and pin fixation in a regularly scheduled OR time. However, displaced fractures with preoperative neurovascular deficits should raise concern for neurovascular entrapment and injury. Indications for open reduction of closed pediatric supracondylar fractures include inadequate hand perfusion after pinning, inability to obtain an adequate reduction, and evidence of iatrogenic neurovascular injury postoperatively. When open reduction is performed, an anterior antecubital crease incision affords access to the torn periosteum as well as the neurovascular structures.

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### New England Regional Fracture Summit, Stowe, VT

The popular AO Fracture Summit will be held **January 13 – 16, 2012** in Stowe, VT. The course is chaired by Drs Mark Vrahas, Jesse Jupiter and Raymond White, and features several BWH and MGH Orthopaedic Faculty. This year's special guest is Dr Joseph Schatzker.

The course uses an informal, discussion-based, highly interactive format. The chief aim is to educate community orthopaedic surgeons who are actively involved in the treatment of patients with fractures. Participants are invited to bring their own cases for discussion.

**Registration is still open!**

For more information: [www.aona.org](http://www.aona.org)