



# POSNA

## The Core Curriculum

### Supracondylar fracture of the humerus

#### Objectives

1. Describe a useful classification system for supracondylar fractures of the humerus
2. Describe useful radiographic parameters for assessing quality of reduction of supracondylar fractures
3. Describe necessary components of the physical exam of a child with a displaced supracondylar fracture
4. Describe the reduction maneuver for a supracondylar fracture
5. Discuss methods of fixation for supracondylar fractures
6. Describe strategies to avoid complications for supracondylar fractures
7. Discuss indications for open reduction
8. Describe patterns of neurovascular injuries with supracondylar fractures
9. Describe the functional problems, if any, associated with cubitus varus

#### Discussion

There is no shortage of information available on supracondylar fractures, Wilkins includes 325 references following his text chapter on the subject in 1996. The task is to distill this information. Gartland's 1959 classification has continued to be widely used, with Type I being nondisplaced, Type II hinged, and Type III displaced. Sometimes Type III fractures are subdivided into posterolateral or posteromedial fractures. Type I fractures obviously are easy to treat, sometimes they are hard to recognize on initial radiographs, a recent paper underscored the value of the posterior fatpad in detection. Type II fractures can be recognized on the lateral view by a posterior tilt of the distal fragment (lack of normal anterior tilt), without displacement on the AP view. Type III fractures provide no challenge in diagnosis, are most often complicated. Posteromedial fractures are most likely to injure the radial nerve; posterolateral with brachial artery and/or median nerve; the distal spike of the proximal humeral fragment being the culprit. The need of a good preoperative neurovascular assessment is obvious, recognizing that it is not always easy. The anterior interosseous nerve, supplying the flexor pollicis longus, and the FDP to the index finger seems to be most sensitive to injury; often undiscovered as there is no sensory distribution of this nerve. Reduction is accomplished by first correcting medial or lateral displacement, then flexing and reducing the posterior angulation. It is important to ensure that rotation of the distal fragment matches the proximal, this is best done on the lateral view. Most authors use Bauman's angle to gauge the reduction on the AP view, some believe it is too subjective. Percutaneous pinning is now used for all closed reductions of Type III fractures and some Type II. Crossed pins of adequate diameter (usually 5/64") provide the most secure fixation; better if the pins do not cross at the fracture site. The lateral pin is placed first. Two lateral pins may be used; this voids the possibility of iatrogenic ulnar nerve injury, but the lateral pins are less stable. There are continuing reports of

iatrogenic ulnar nerve (usually) neuropraxia from medial pin placement. The ulnar nerve can lie over the medial epicondyle in flexion, or even anterior in some patients. For this reason, an increasing number of experienced surgeons use a small incision for the medial pin to ensure the ulnar nerve is protected. Type II injuries can be maintained in 120 degrees of flexion without pinning. A recent study on Doppler response of the radial artery to elbow flexion found that was point where the pulse became impaired, so there is some justification for pinning Type II as the elbow can then be extended to a safe position. With percutaneous pinnings, the rate of Volmann's ischemia of the forearm is virtually eliminated. Indications for open reduction include 1) an irreducible fracture, vascular compromise, or 2) an open fracture, in which case neurovascular injuries may be more severe. Olecranon traction is still a very acceptable option for the very swollen or comminuted fracture. Vascular compromise following reduction is another obvious indication, the vessel has been found in the fracture itself following reduction.

Other than neurovascular problems, the main complication of supracondylar fractures is cubitus varus, resulting from faulty reduction or loss of reduction. For many years, we have been taught that this was only a cosmetic problem, but recent studies have documented late onset ulnar nerve dysfunction, average onset about 15 years postfracture.

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