supracondylar humeral fractures

available online at
www.tharu.com
- extra-articular
- metaphysis
- 2nd commonest childhood # (16.6%)
- incidence rises in first 5 years
- peaks age 5-8, then falls
flexion

direct force
rare

extension posterior

supracondylar area weak 2° remodelling
elbow hyper-extends in young
f.o.o.s.h pronated hand
more common (95%)
Classification

Gartland 1
- undisplaced

Gartland 2
- displaced with intact posterior cortex
  - 2A = angulation only; 2B = angulation and rotation

Gartland 3
- displaced with no cortical contact
  - 3A = postero-medial; 3B postero-lateral
clinical assessment

- full history (be aware of child protection issues)
- “S”-shaped deformity in gartland 3 fractures
- establish and document NV status
- peripheral pulses and capillary refill
- forearm pain vs. elbow pain?
- beware compartment syndrome
- radial, median & ulnar nerves
- anterior interosseous nerve
  - lateral ½ FDP, FPL, pron quadrat
  - “OK” sign (Kiloh-Nevin)
  - normal = tip-to-tip pinch
  - abnormal = side-to-side pinch
x-rays

Normal ossification centres

C = capitellum  2 years
R = radial head  4 years
I = internal epicondyle  6 years
T = trochlea  8 years
O = olecranon  10 years
E = external epicondyle  12 years
x-rays

obtaining a true lateral

figure of 8 appearance

normal tear drop

shaft-condylar angle $\approx 40^\circ$
x-rays

baumann’s angle

between the longitudinal axis of the humerus and a line through the coronal axis of the capitellar physis

normal = 72° (64-81)

> 80° results in cubitus varus
x-rays

anterior humeral line

If a line is drawn along the anterior border of the distal humeral shaft, it should pass through the middle-third of the ossification centre of the capitellum.
x-rays

fat pad sign

haematoma displaces the normal fat pads:

anterior alone can occur without fracture

posterior always associated with fracture
treatment

gartland 1
- immobilise at 90° in a light-weight slab or cast for 3 weeks
- support in a broad-arm sling, allow finger movements
- need check x-ray at 1 week to exclude displacement

gartland 2
- MUA if: posterior angulation > 15°, medial/lateral tilt > 10°,
  >50% displacement or evidence of rotation
- K-wires if unstable (60% failure rate if no K-wires in 2B fractures)

gartland 3
- splint in 30° to 40° flexion and elevate
- MUA + K-wire fixation
role of traction

- skeletal or skin traction
- similar results to fixation
- longer hospital stay!
- can be used pre-operatively to allow soft tissue swelling to subside
manipulation

- axial traction with 20° flexion
- correct rotation or sideways tilt/shift
- flex to 120° to stretch triceps over fracture
- use finger pressure to correct posterior angulation
- check pulse and reduce flexion if needed
- above-elbow POP cast
k-wire techniques

**lateral**
- 40% less torque to displace
- improved if placed >10mm apart and diverging
- must enter medial cortex

**crossed**
- more stable
- risk of ulnar nerve injury (6%)
- must cross above fracture line
open surgery

- indications:
  - open fracture
  - failure of closed reduction
  - vascular compromise after reduction

- have a tourniquet in place
- avoid posterior approach as disrupts undamaged tissue, and difficult access to anterior structures
after care

- repeat x-ray after 1 week to assess for slip
- re-assess after 3-4 weeks (age 4) or 4-5 weeks (age 8), and place in sling if united
- mobilise elbow for 10 minutes, × 3-4 /day
- remove sling when pain free (consolidated)
- physiotherapy after 2 weeks mobilisation until ROM 25-120°
- no passive movements or carrying weights to achieve full extension as risks myositis ossificans
complications

vascular injury
- direct injury or compartment syndrome from oedema
- remove dressings and relieve flexion
- untreated can lead to Volkmann’s ischaemic contractures

nerve injury
- anterior interosseous nerve (median nerve) at high risk
- ulnar nerve by careless K-wire placement (resolves if pin removed)
- tardy ulnar nerve palsy from over correcting the normal cubitus valgus

malunion or malrotation
- cubitus varus leads to altered arc of movement without loss of function
- corrected by osteotomies for cosmesis or “throwing” athletes

stiffness
- common problem with extension often taking months to return
- passive movements to speed rehabilitation must be avoided as can trigger myositis ossificans
references


Crombie A, Duncan R, Closed reduction and percutaneous fixation of displaced paediatric supracondylar fractures of the elbow, Current Orthopaedics 2004, 18, 147-53


Pocketbook of Orthopaedics and Fractures, McRae R 2006, Chapter 20

http://nypemergency.org/imaging/elbow.html