

Lateral Condyle Fracture - Pediatric

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Introduction

- Fractures involving the lateral condyle of the humerus
- Epidemiology
 - incidence
 - 17% of all distal humerus fractures in the pediatric population
 - demographics
 - typically occurs in patients aged 5-10 years old
 - location
 - most commonly are [Salter-Harris IV fracture patterns](#) of the lateral condyle
- Pathophysiology
 - mechanism of injury
 - [pull-off theory](#)
 - avulsion fracture of the lateral condyle that results from the pull of the common extensor musculature
 - [push-off theory](#)
 - fall onto an outstretched hand causes impaction of the radial head into the lateral condyle causing fracture
- Prognosis
 - outcomes have historically been worse than supracondylar fractures
 - [articular nature, missed diagnosis, and higher risk of malunion/nonunion](#)



Classification


Milch Classification		
Type I	Fracture line is lateral to trochlear groove	
Type II	Fracture line into trochlear groove	

Fracture Displacement Classification		
Type 1	<2mm, indicating intact cartilaginous hinge	
Type 2	2-4mm, displaced joint surface	
Type 3	>4mm, joint displaced and rotated	

Presentation

- History
 - fall onto an outstretched hand
- Symptoms
 - lateral elbow pain
 - mild swelling
- Physical exam
 - inspection
 - exam may lack the obvious deformity often seen with supracondylar fractures
 - swelling and tenderness are usually limited to the lateral side
 - motion
 - may have increased pain with resisted wrist extension/flexion
 - may feel crepitus at the fracture site

Imaging

- Radiographs
 - recommended views
 - AP, lateral, and oblique views of elbow
 - **internal oblique view** most accurately shows maximum displacement and fracture pattern 
 - optional views
 - contralateral elbow for comparison when ossification is not yet complete
 - routine elbow stress views are not recommended due to risk of fracture displacement
 - findings
 - fracture fragment most often lies posterolateral which is best seen on internal oblique views
- CT scan
 - indication
 - improved ability to assess the fracture pattern in all planes
 - findings
 - CT has limited ability to evaluate the integrity of articular cartilage
 - may require sedation to perform the test
- MRI
 - indication
 - provides the ability to assess the cartilaginous integrity of the trochlea
 - findings
 - increased expense
 - may require sedation to perform the test

Differential

Pediatric Elbow Injury Frequency			
Fracture Type	% elbow injuries	Peak Age	Requires OR
Supracondylar fractures	41%	7	majority
Radial Head subluxation	28%	3	rare
Lateral condylar physeal fractures	11%	6	majority
Medial epicondylar apophyseal fracture	8%	11	minority
Radial Head and Neck fractures	5%	10	minority
Elbow dislocations	5%	13	rare
Medial condylar physeal fractures	1%	10	rare

Treatment

- Nonoperative
 - **long arm casting**
 - indications
 - only indicated if **< 2 mm of displacement**, which indicates the cartilaginous hinge is most likely intact
 - sub-acute presentation (>4 weeks)
 - technique
 - cast with elbow at 90 degrees and forearm supination
 - weekly follow up
 - radiographs out of cast may be useful
 - total length of casting is 3-7 weeks
- Operative
 - **CRPP**
 - indications
 - some authors suggest CRPP for all lateral condylar fractures with **< 2 mm of displacement**
 - ability to **maintain fracture fragment in a position to prevent late displacement**
 - technique
 - closed reduction performed by providing a varus elbow force and pushing the fragment anteromedial
 - divergent pin configuration most stable

- third pin may be used in transverse plan to prevent fragment derotation
 - arthrogram can confirm joint congruity
- **open reduction and fixation**
 - indications
 - if > 2mm of displacement
 - **any joint incongruity** ?
 - fracture non-union
 - technique
 - direct lateral approach
 - **avoid dissection of posterior aspect of lateral condyle (source of vascularization)** ?
 - percutaneous or subcutaneous pins may be used for fixation
 - single screw may also be used with non-unions +/- bone grafting

Complications

- **AVN**
 - posterior dissection can result in lateral condyle osteonecrosis
 - may also occur in the trochlea
- **Nonunion/malunion**
 - caused from delay in diagnosis and improper treatment
 - may result in **cubitus valgus and tardy ulnar nerve palsy** ? ? ?
- **Tardy ulnar nerve palsy**
 - slow, progressive paralysis of the ulnar nerve
 - caused by stretching of the nerve, as is seen with cubitus valgus
 - usually late finding, presenting many years after initial fracture
- **Lateral overgrowth/prominence (spurring)** ? ?
 - in up to 50% of cases regardless of treatment, families should be counseled in advance
 - lateral periosteal alignment will prevent this from occurring
 - presence of spurring is correlated with greater initial fracture displacement
- **Growth arrest** with or without angular deformity
- **Unsatisfactory appearance of surgical scar**
- **Late elbow presentation or deformity**
 - cubitus varus deformity is most common in nondisplaced and minimally displaced fractures
 - cubital valgus less common, but more likely with significant deformities that cause physeal arrest
 - controversy whether to treat subacute fractures (week 3-12) nonoperatively or surgically

- most deformities can be corrected after skeletal maturation with a supracondylar osteotomy