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FRACTURES, ELBOW

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INTRODUCTION

Supracondylar fractures/SHF/ are the most cammon pediatric elbow fracture and carry significant potential for neurovascular compromise. These fractures of the distal humerus are frequently problematic in terms of diagnosis, treatment, and complication. Proper care reguires appropriate assessment and prompt orthopedic care for those patients where fractures pose the greatest risk for long-term complications. **The Gartland classification** is a system of categorizing supracondylar humerus fractures, clinically useful as it predicts the likelihood of associated neurovascular surgery, such as anterior interosseous nerve neuropraxia or brachial artery disruption:

- ***Type I; Non displased,(35,4%),***
- ***Type II; Angulated with contact posterior cortex,(21,9%),***
- ***Type III; Complete displacement, but have periosted (medial/lateral) contact(24,6%) and***
- ***Type IV; Periostal disruption with instability in both flexion and extension(10%).***

This distribution is important with aspect diagnostic method and methody treatment, that assessment final results healing.

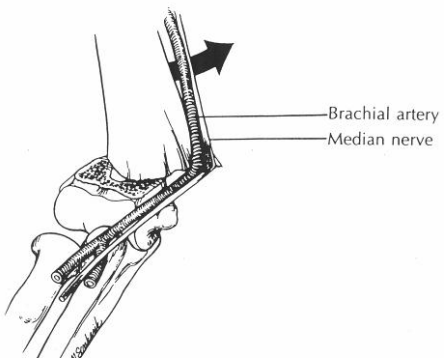
BACKGROUND

Elbow, fractures are encountered commonly in the ED/Emergency Department/. Injuri patterns for children and adults are quite different. Supracondylar fractures account for up to 65%/percent/ of pediatric elbow fractures, 3% of all fractures and 15% of all pediatric fractures. They occur most frequently in children between two and seven year of age. Supracondylar fractures result from a fall on an oustretched arm un up to 70percent of patient. The nondominant extremity is most commonly affected. Children under three years of age typically sustain a supracondylare after a fall from a height of less then 3 feet(eg, fall from a bed or couch). Most fractures in older children result from higher falls from playground equipment (eg, monkey bars, swings or other high energy mechanism). Extension injuries account for 95% of SHF. Emergency physicians must recognize whether fractures reguire admission, immediate orthopedic evaluation, or less urgent referal. Under general anesthesia, about 28,8% of fractures were surgically treated (Gartland II et III). However, the treatment is often delayed in areas where healthcare resources are scarce. Delayed treatment was not associated with an sucriased rate of perioperative complications.

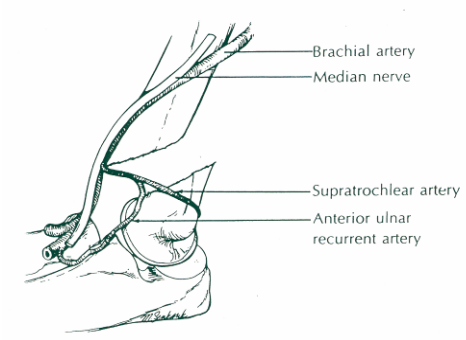
Pathophysiology: Direct trauma, or a fall onto an outstretched hand is responsible for most elbow fractures. Triceps muscle insertion on the olecranon often causes its displacement following fracture. Elbow joints are composed of 3 distinct articulations: radiocapitellar, ulnotrochlear, and proximal radioulnar, all contained in 1 synovial-lined capsule. This capsule typically encases hemarthrosis following injury.

The brachial artery is the most commonly injured artery. This is especially common in supracondylar fractures.

The median nerve is the most commonly injured nerve. This injury often is due to displaced supracondylar humerus fracture.



(a)



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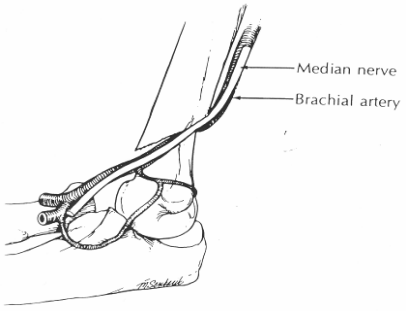
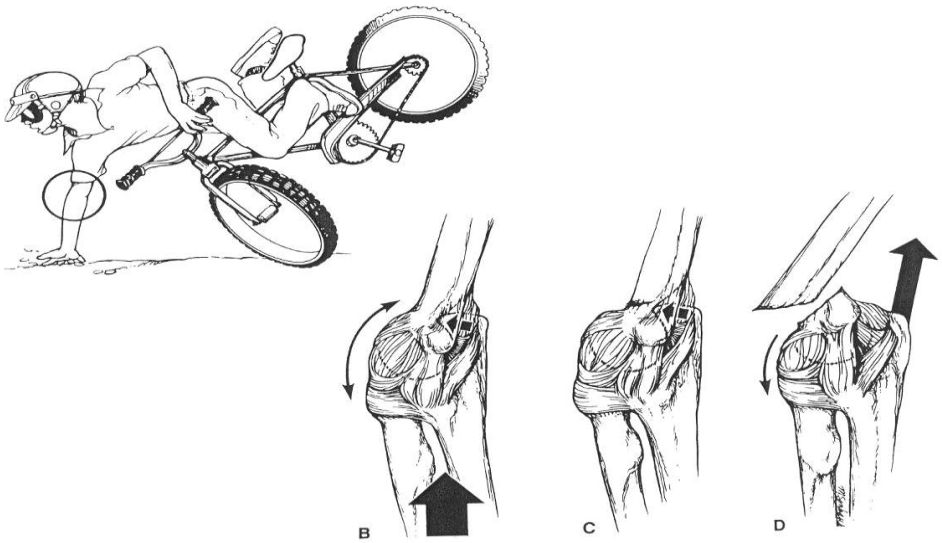
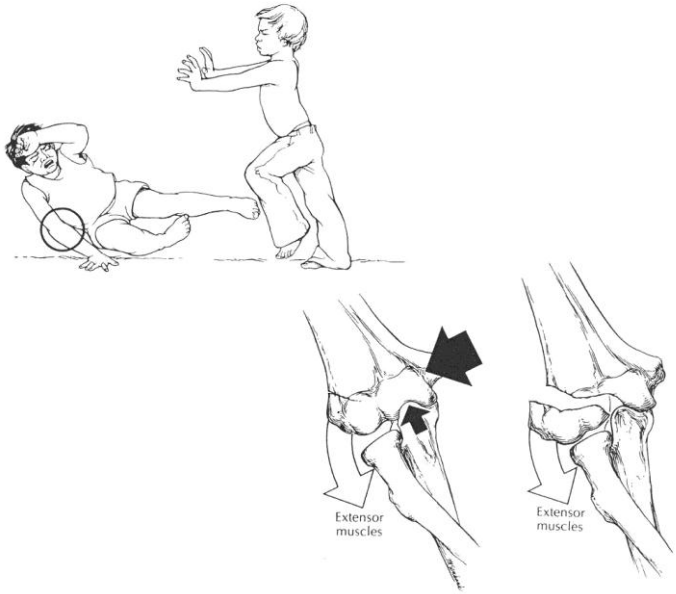


(c)

Pic.: Neurovascular Relations (1)



Pic.: Hyperextensions Forces – machanism of injury.(1)



Pic.: The most common mechanism of injury is believed to occur when the elbow is forced into varus. (1)

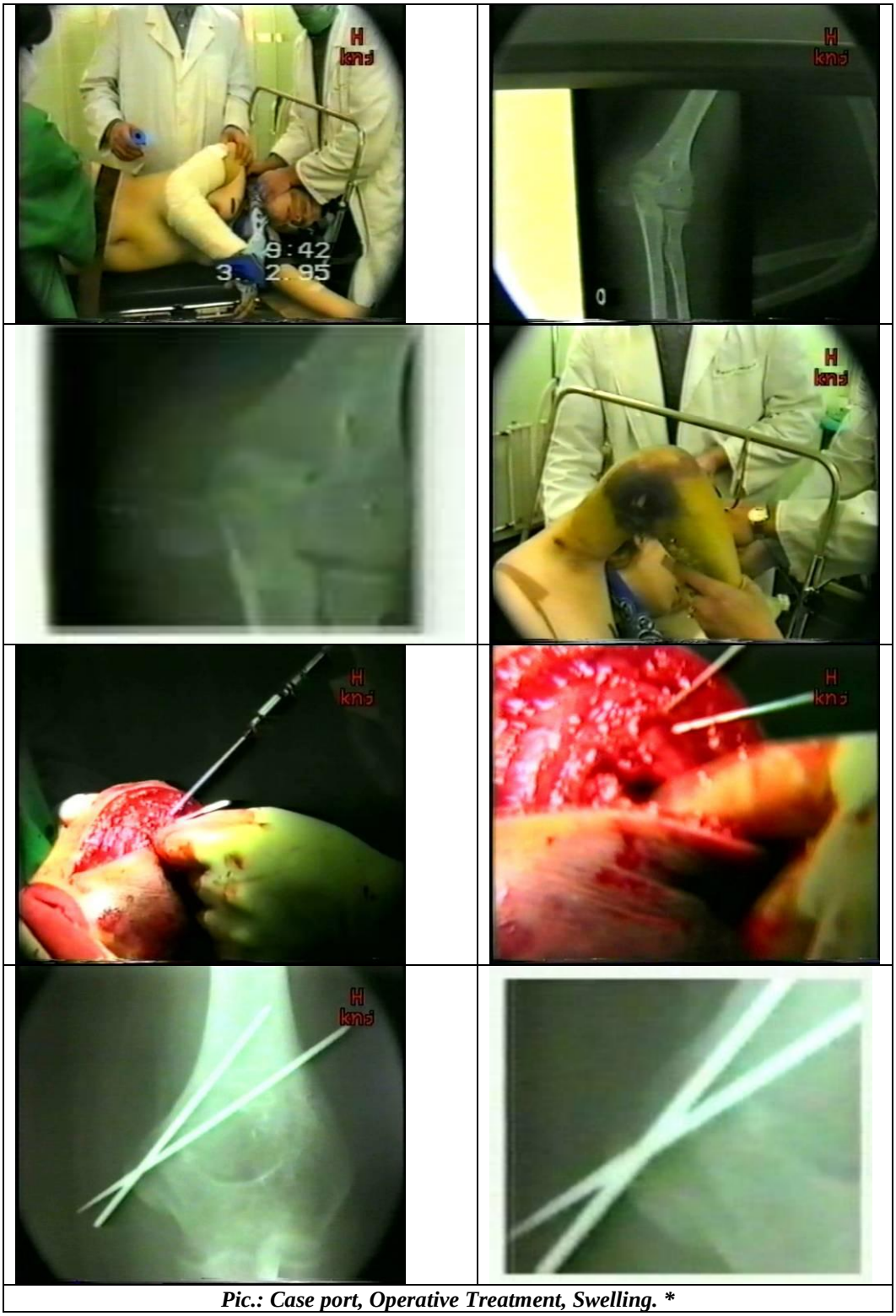
Age

- Fracture patterns vary markedly among different age groups.
- Supracondylar humerus fractures are most common in children aged 4-10 years because of this age group's relative strength of surrounding ligaments in comparison to bone.
- Injuries to proximal radius often manifest as radial neck fractures in children, and radial head fractures in adults.
- Intraarticular condyle fractures are seen in children and adults.History:

Patients may experience the following:

- Pain
- Swelling
- Decreased range of motion.

*Pic.: Conservative Treatment, Swelling, follow up. **



Pic.: Case port, Operative Treatment, Swelling. *

** Buturović. S.: Comparison result's treatments fractures DH in children's againt's indication for conservative or operative treatment's, doct. Job, Sarajevo. 2006.,4-2 ;4-3.*

- Patient is unable to fully extend elbow, and pain is present with pronation, supination of the forearm.
- Edema and ecchymosis near the elbow be evident.
- Perform carefful schulder and wrist examinations with all elbow injures.
- Radial head fracture es characterized by point tenderness at the radial head (located along lateral aspect of elbow), and pain with pronation/supination.

Supracondylar fracture

- Perform and document a careful vascular examination, as the brachial artery may be disrupted.

- Perform and document a careful neurologic examination as nerves (most commonly the median nerve, or one of its branches the anterior interosseus nerve), may be injured.

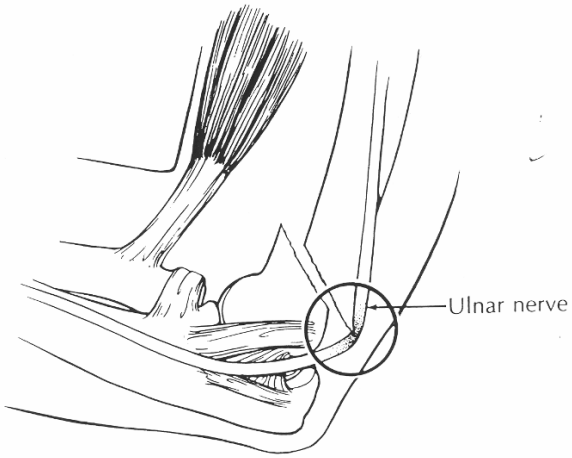
Olecranon fracture

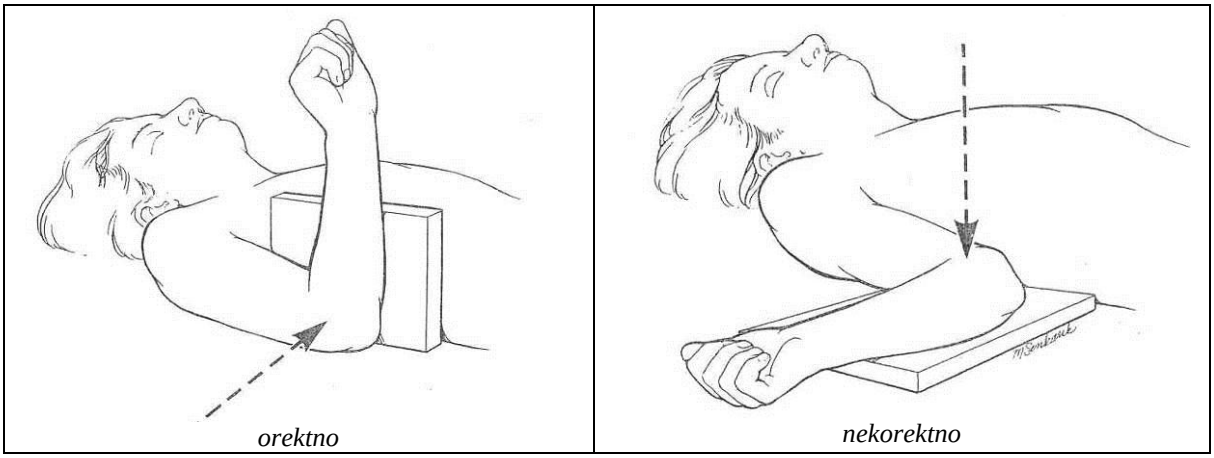
- Patient demonstrates an inability to extend elbow actively, along with point tenderness at the olecranon.
- Perform and document a careful neurologic exam., as nerves (most commonly the ulnar nerve) may be injured.

Sl. 1.4.;Ulnar Nerve Injury. The distal spike of the proximal fragment can easily injury the ulnar nerve. (1), 747.

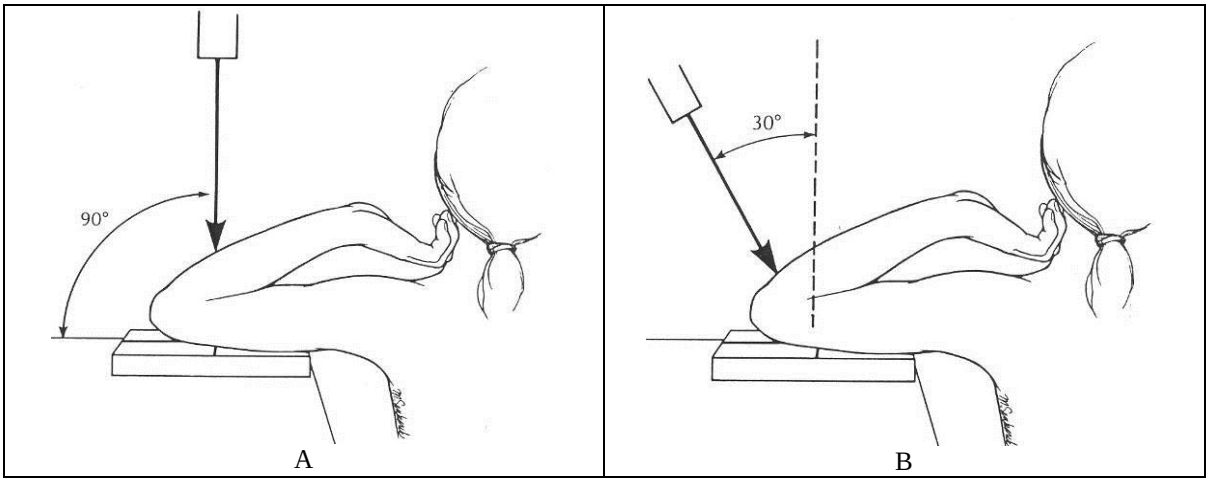
Imaging Studies

- Anteroposterior (AP), lateral, and oblique IX- rays of the elbow adequately visiolise most elbow fractures.

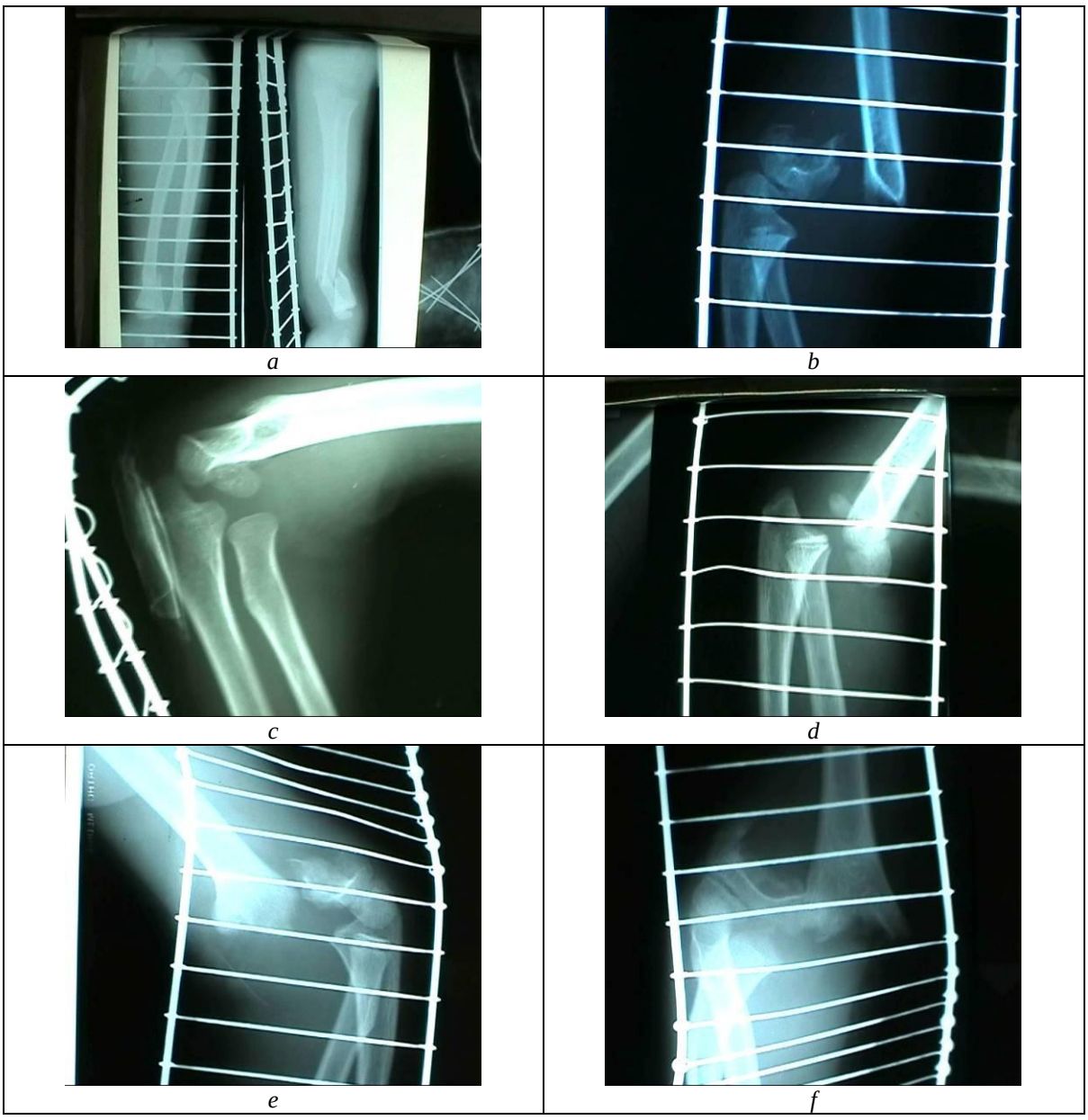


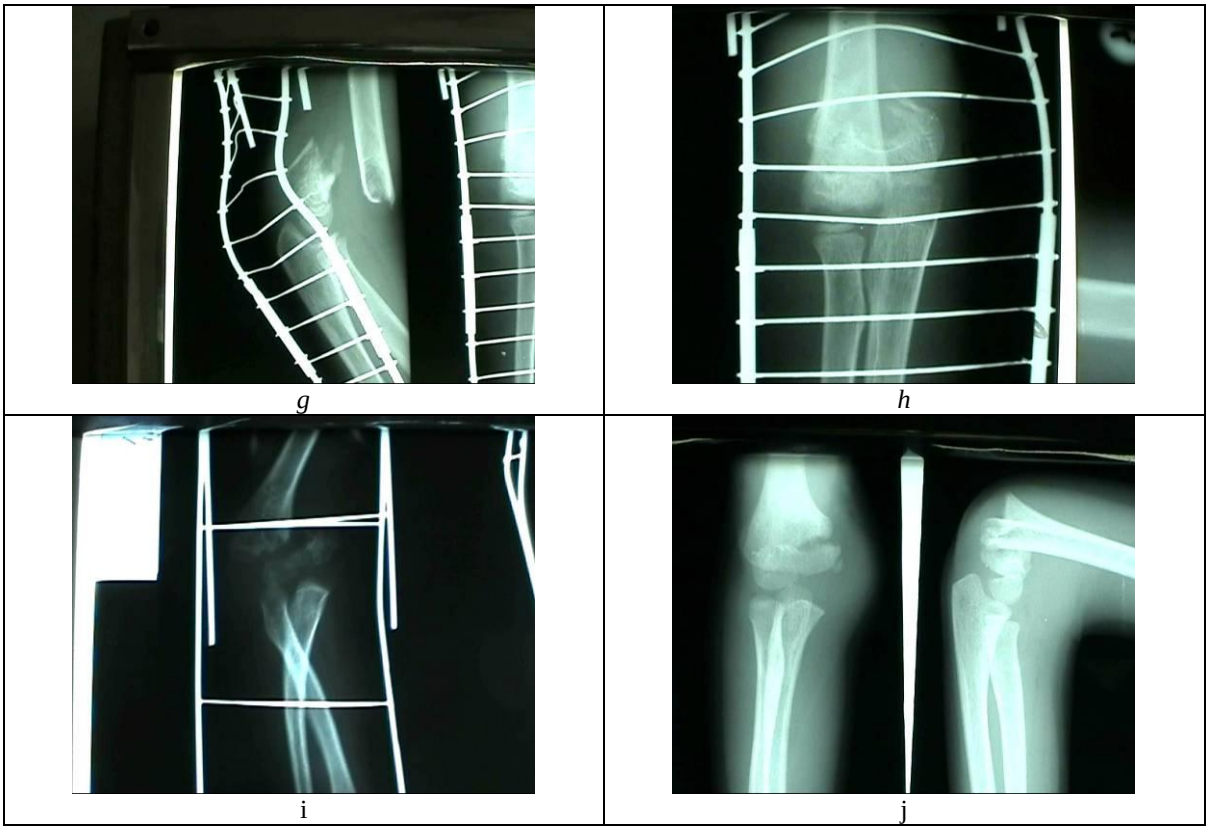


Pic.: Radiographic Positioning. The correct method of taking a lateral view is with the upper extremity direct anteriorly rather than externally rotated. (1); 684.



Pic.: Jones axial x-ray view of the elbow. (1) ; 664.





Pic.: Rtg- photo of documentation Orthopedic clinic, UMC-a , Sarajevo.*(1-19, 1-20)

Base treatment decisions upon angulation and displacement seen in AP and lateral views.

Today known possible approaches in the treatment of supracondylar fractures of the humerus are;

- skelet traction,
- closed repositioning and plaster immobilisation,
- ***percutaneous pinning after closed/open repostion and***
- open reposition with internal fixation.

Modern surgical techniques (e.g., closed reduction with percutaneous pinning) have reduced this frequency of angular deformities from 58% to aproximately 3%. Closed reduction with percutaneous pin fixation is believed to represent a safe reliable and efficient method of managing displaced supracondylar fractures.

According to **Flynn's* criteria**, results were good or excellent in 93,7% patients. The cubitus varus in the most frequent long-term complication (16,7%),

Flann's criteria takes into account two/2/ criteria:

- cosmetic factor/ measuring bearing, „Bauman's angle“ and

- functional factor(flexion-extension)

Procedures

Supracondylar fracture

- In general, an orthopedic consultant best handles decisions regarding reduction of significantly angulated an displaced fractures.
- If neurovascular structures are compromised, the emergency physician may need to apply forearm traction to reestablish distal pulses.
- If pulse is not restored with traction, emergent operative intervention for brachial artery exploration, or fasciotomy is indicated.

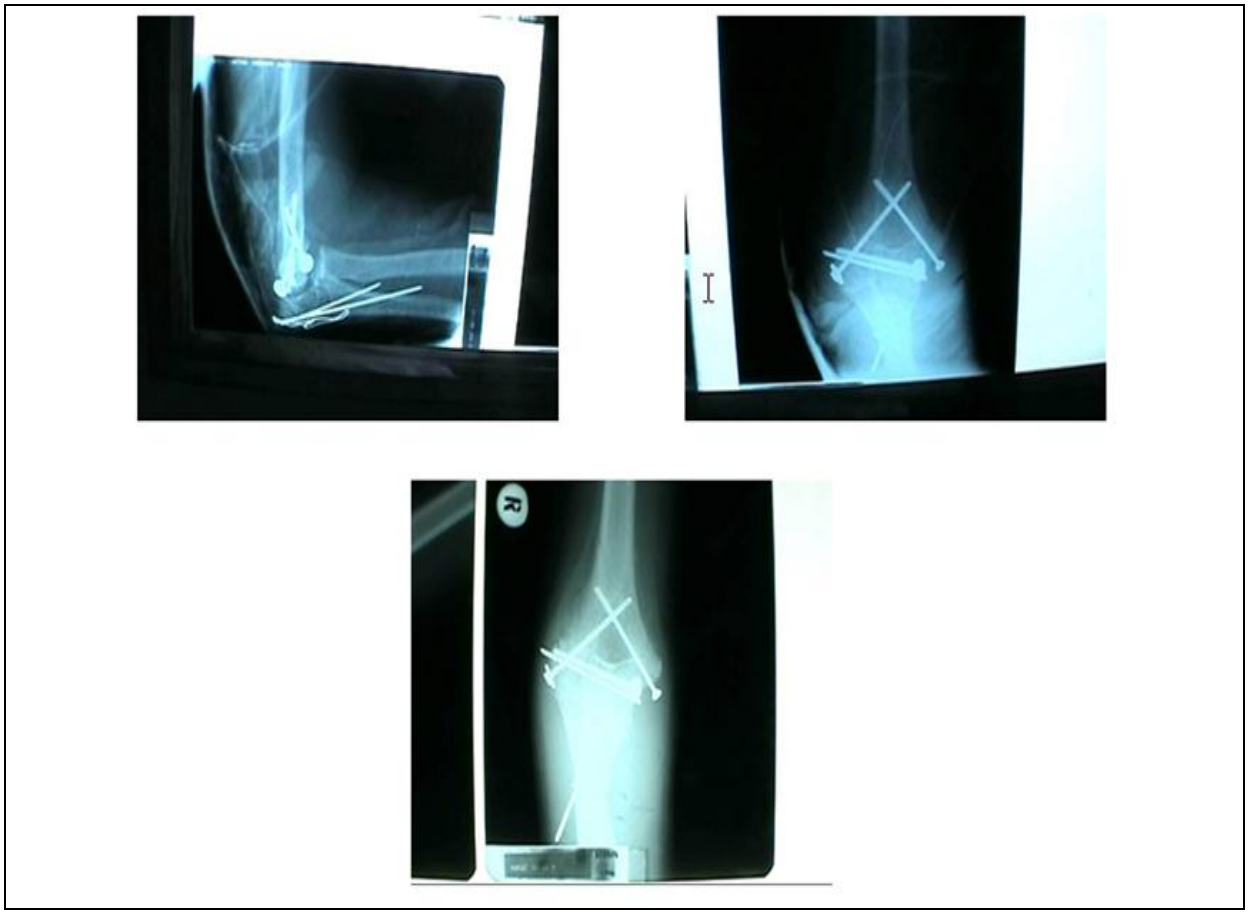
Emergency Department Care

Supracondylar fracture

- Adult patients usually require surgical intervention.
- In children, nondisplaced, nonangulated fractures can be splinted (elbow in 90 st. of flexion); angulated fractures require reduction and splinting, and displaced fractures require reduction and percutaneous pinning on an urgent bassis within 12-24 hours.







*Pic.: Some of radiographic from Orthopedic cilinic UMC-a Sarajevo **

Olecranon fracture

Loss of active extension, or intraarticular displacement of greater than 1mm are indications for surgical treatment.

Radial head fracture

- Occult or small radial head fractures are treated symptomatically with early range of motion exercises.
- For displaced, or comminuted fractures mechanically blocking joint motion, surgical intervention may be necessary. Refer these patients to an orthopedic surgen.
- Radial neck fracture: Angulation greater than 15st. often reguires closed reduction.
- Condylar fractuire: Displaced fractures of the trochlea or capitellium require surgical intervention.

Complication

Complications of a displaced SHF can be dramatically reduced by early surgical fixation.The percentage of complications in the treatment of supracondylar fractures is about 14,2%.

Supracondylar humerus fracture

Early complications include

- Volkmann ischemia can occur in 0,1% to 0,3% of cases: This is a form of compartment syndrome that can lead to muscle ishemia and permanent muscle contracture, particularly occuring in children. Simptoms suggestive of this complication include pain with passive extension of fingers, refusal to open hand, and forearm tenderness.
- About 10-20% of displased SHF present alterations in vascular status.
- Median nerve injury(6,5% to 19%) et increase with tip III /Garthland's classifications) to 49%: Displaced supracondylar humerus fractures may lead to median et ulnaris nerve dysfunction. Rarely does this result in complete nerve transection, and full return of function is common.
- Pin track infections: In the literature has reported pin tract infections in the rang of 1% to 25%. Most infections are superficial,
- Stiffnes (40%),
- Displacement fragmentorum (33%).

Long-term complications include

- Myossitis ossificans(15%)
- Malunion: Angulated or displaced fractures that remain unreduced lead to functional and cosmetic deformities. The incidence of ***cubitus varus*** in inreduced treated extension type II fractures was reported to be as high as 26,1%/Miraleda et al/, The best way to avoid cubitus varus seems to be to acheve and maintain anatomical reductione of the fracture with special attention to replicating contralateral rotation of the humerus. The distal

humerus physis, in contrast to the proximal humeral physis, contribues only to 15 to 20% of overal longitudinal growth of the humerus. This is predisposed to the development of angular deformities. The incidence of ***cubitus valgus*** is 9%.

- Bad bone grow together (2-7%)

Pic.:Fractura DH male sanata, S-deformity,(5-8).*

Prognosis

Supracondylar humerus fracture

- Children: Undisplaced fractures and properly managed displaced, angulated fractures result in no long-term functional deficits.
- Adults: Usually range of motion decreases somewhat but without functional deficit.

REFERENCES

1. Rockwood, Ch.A., Jr., M. D. and Wilkins, K.E., M. D. and Beaty. J. H., M.D.: Fractures in Childdren (Volume 3) Lippincott-Raven, Philadelphia-New York : 1996; (655-752).
2. Edward Y., Madhav K.: Distal Humerus Fractures, Department of Orthopedic Surgery, University of Michigen, 2003. g.
3. Cekanauskas E, Degliute R, Kalesinskas RJ., Treatment of supracondylar humerus fractures in children, according to Gartland classification, Medicina (Kaunas), 2003; 39(4): 379-83., Lituanya.
4. De Buys Roessingh AS, Reinberg O.: Open or closed pinning for distal humerus fractures in children? Swiss Surg., 2003; 9(2): 76-81.
5. Diri B, Tomak Y, Karaismailoglu TN.: The treatment of displaced supracondylar fractures of the humerus in children (an evaluation of three different treatment methods), Ulus Travma Derg., 2003 Jan; 9(1): 62-9. Turkish.
6. Powell RS, Bowe JA., Ipsilateral supracondylar humerus fracture and Monteggia lesion: a case report, J Orthop Trauma, 2002 Nov-Dec; 16(10): 737-40.
7. Scola E, Jezussek D, Kerling HP, Yedibela S., Dislocated supracondylar humerus fracture in the child. Surgical technique and outcome with dorsal approach, Unfallchirurg, 2002 Feb; 105(2): 95-8. German.
8. Kumar R, Trikha V, Malhotra R.: A study of vascular injuries in pediatric supracondylar humeral fractures, J Orthop Surg (Hong Kong), 2001 Dec; 9(2): 37-40.
9. Gordon JE, Patton CM, Luhmann SJ, Bassett GS, Schoenecker PL., Fracture stability after pinning of displaced supracondylar distal humerus fractures in children, J Pediatr Orthop, 2001 May-Jun; 21(3): 313-8.
10. Koudstaal MJ, De Ridder VA, De Lange S, Ulrich C., Pediatric supracondylar humerus fractures: the anterior approach, J Orthop Trauma, 2002 Jul; 16(6): 409-12.
11. Von Laer L, Gunter SM, Knopf S, Weinberg AM., Supracondylar humerus fracture in childhood--an efficacy study. Results of a multicenter study by the Pediatric Traumatology Section of the German Society of Trauma Surgery--II: Costs and effectiveness of the treatment, Unfallchirurg, 2002 Mar; 105(3): 217-23. German.
12. Houshian S, Mehdi B, Larsen MS., The epidemiology of elbow fracture in children: analysis of 355 fractures, with special reference to supracondylar humerus fractures, J Orthop Sci., 2001; 6(4): 312-5.
13. Cheng JC, Lam TP, Maffulli N., Epidemiological features of supracondylar fractures of the humerus in Chinese children, J Pediatr. Orthop B., 2001 Jan; 10(1): 63-7.
14. Srivastava S., The results of open reduction and pin fixation in displaced supracondylar fractures of the humerus in children, Med J Malaysia, 2000 Sep; 55 Suppl C: 44-8.
15. Kumar R, Malhotra R., Medial approach for operative treatment of the widely displaced supracondylar fractures of the humerus in children, J Orthop Surg (Hong Kong), 2000 Dec; 8(2): 13-18.
16. Sobotta, J.; Atlas of human anatomy, Vol, 1. Head, neck, upper limbs, skin, Printed in Germany by R. Oldenbourg, Munich, 1989; (238-240).
17. Scola E, Jezussek D, Kerling HP, Yedibela S.: Dislocated supracondylar humerus fracture in the child, Surgical technique and outcome with dorsal approach: Unfallchirurg, 2002. feb; 105(2): 95-8., Klinikum Neumarkt.
18. Cramer KE, Devito DP, Green NE.: Comparison of closed reduction and percutaneous pinning versus open reduction and percutaneous pinning in displaced supracondylar fractures of the humerus in children.: J. Orthop Trauma, 1992; 6(4): 407-12., Nashville, Tennessee.
19. A.S. de Buys Roessingh, O. Reinberg: Open or Closed Pinning for Distal Humerus Fractures in Children ?, Department of Pediatric Surgery, Lausanne., 2003, feb.

20. Shahab-ud-Din, Israr Ahmed.: Percutaneous Crossed Pin Fixation of Supracondylar Humeral Fracture in Children, Department of Orthopaedic, Hayatabad Medical Complex, Peshawar, Original Article, 2003; 17(2): 184-188.
21. Lewis, H.; Morrison, C.; Kennedy, P., Herbert, K.: Arterial Reconstruction Using the Basilic Vein from the Zone of Injury in Pediatric Supracondylar Humeral Fractures., American Society of Plastic Surgeons., 2003.
22. Philip Fleuriau-Chateau MD, William McIntyre MD, Mervyn Letts MD: An analysis of open reduction of irreducible supracondylar fractures of the humerus in children., Can. J. Surg., 1998; 41: 112-118.
23. Banović D. i saradnici: Traumatologija koštano - zglobnog sistema, Zavod za udžbenike i nastavna sredstva, Beograd, 1998.
24. Holt JB, Glass NA, Shah AS. Understanding the Epidemiology of Pediatric Supracondylar Humeral Fractures in the United States:Identifying Opportunities for Intervention. J Pediatric Orthop, 2018; 38: e 245.
25. Delniotis I,Ktenidis K. The pulseless supracondylar humeral fracture: Our experience and a 1-year follow-up. J Traume Acute Car Surg, 2018; 85: 711.
26. Gary S, Willer A, Larson AN, et al. Clinical characteristics severe supracondylar humerus fractures in children:J Pediatr Orthop, 2014; 34: 34.
27. Lewine E, Kim JM, Miller PE, et al. Closed Versus Open Supracondylar Fractures of the Humerus in Children: A Comparison of Clinical and radiographic Presentation and Result. J Pediatr Orthop, 2018; 38: 77.
28. Loison CL, Simillis C, Hutchinson JR. A systematic review of early versus delayed treatment for supracondylar humeral fractures in children. Injury, 2009; 40: 245-248.