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Supracondylar fracture humerus in children, comparison study between conservative and surgical treatment

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Abstract
In this prospective study. Sixty eight patients with supracondylar fracture of humerus were included. The diagnosis was achieved by clinical and radiological examination, detail history and thorough physical examination was performed to assess the patient generally and locally. We treated the cases by different ways according to type of fracture(Wilkin's classification) as out or in patients by conservative or surgical treatment using different approaches ,then follow up the patient to identify which manner gives an excellent results by clinical assessment of carrying angle and range of motion and radiological assessment of crescent sign and Bauman's angle. We found that male more than female and urban patients more than rural one, the dominant hand fractured less than non dominant, the surgery give more complications than conservative treatment. There is no difference between early versus delayed treatment of fractures. We found types 1,11 treated successfully by conservative treatment while type 111 with surgery give more complications, we were using either posterior or lateral approach the late one gives less complications.

Keywords: supracondylar, fracture, complication

1. Introduction

In supracondylar fracture, the humerus breaks just above the condyles .It is10%of all pediatric fractures ,these are among the commonest fractures in children the distal fragment may be displaced either posteriorly (extension) or anteriorly (flexion) Posterior one which is the commonest type 95% of cases suggest hyperextension injury usually due to fall on out stretched hand .The distal segment is push back- ward and because of forearm is usually in pronation twisted inward .The jagged end of proximal fragment pokes into soft tissues anteriorly some time injuring the brachial artery or median nerve. While anterior displacement is rare .It is due to direct violence(fall on the point of the elbow)with elbow joint in flexion.The posterior type is classified according to severity and the degree of displacement (Wilkin, 1984) into:

Type I: undisplaced fracture. (picture no.1)

Picture 1

Type II: An angulated fracture with the posterior cortex still in continuity.
Type IIA; less sever and merely angulated. (Picture no.2)
Type IIB; being more sever and both angulated and malrotated. (Picture no. 3)

Picture 2 Picture 3

Type III: Completely displaced fracture.(picture no. 4)

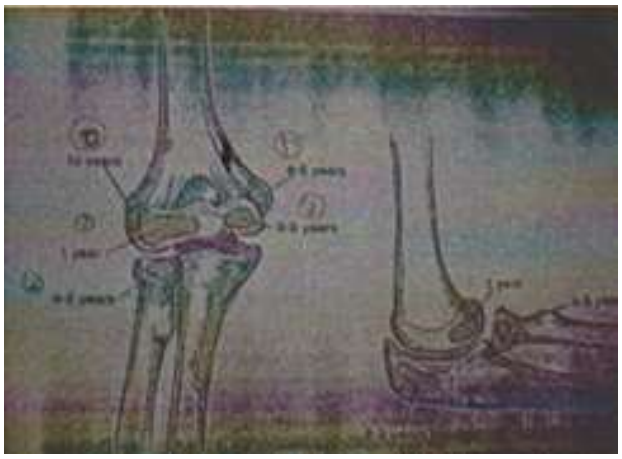
Picture 4

Surgical anatomy

The lower end of the humerus possesses the medial and lateral epicondyles for the attachment of muscles and ligament, the rounded capitulum for articulation with the head of the radius, and pulley shaped trochlea for articulation with the trochlear notch of the ulna? . above the capitulum is the radial fossa, which receives the head of the radius when the elbow is flexed. Above the trochlea anteriorly is the coronoid fossa which during the same movement receives the coronoid process of the ulna. Above the trochlea posteriorly is the olecranon fossa, which receives the olecranon process of the ulna when the elbow joint is extended. These fossi make the lower end of metaphysis of humerus weaker in comparison with above and below humeral metaphysis , this anatomical pattern make this bony and soft tissue articulation acting as lever in extension position of elbow where coronoid process is act as fulcrum and the hand and forearm is a long arm of lever , and olecranon is short arm of lever which push the olecranon fossa during hyperextension of elbow leading to fracture of the weakest region of lower humerus metaphysis and according to the mechanism of injury (falling on out stretched hand) makes the distal segment displaced posteriorly by coronoid process pressure.

Radiological anatomy

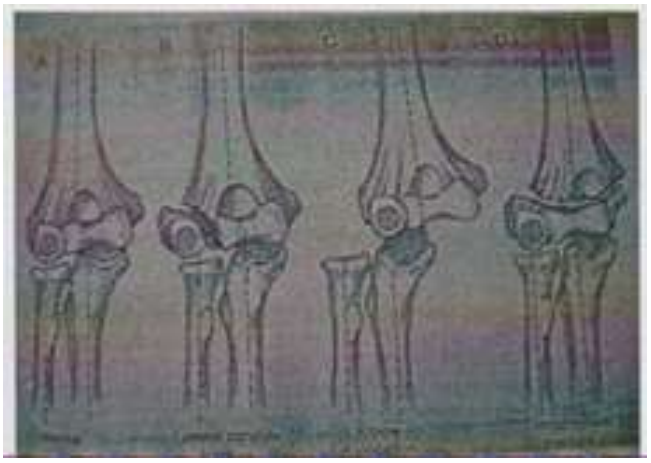
The secondary centre of ossification of the bones about the elbow appear in a relatively predictable order, with girl reaching skeletal maturity approximately 2 years before boys 3). The capitulum appears ist, usually by 1 years of ages epiphysis of the radial head and the medial epicondylar apiphysis appear at about age 5yrs, followed by trochlea and olecranon epiphysis at age 8 or 9 yrs lateral condylar usually appear last ossifying at about age 10 yrs.as in (picture no. 5)



Picture 5

The following anatomic relation ships should be assessed in all radiographs of 2 children elbow as part of trauma evaluation

1. The proximal radius should point to the capitellum in all views.(picture no.6)
2. Long axis of ulna should line up with or be slightly medial to the long axis of the humerus on true A.P. view.
3. Anterior humeral line bisects the capitellum on the lateral view. (Picture no. 6)



Picture 6

4- humeral – capitellum angle. (Baumann's angle) should be within the range of(64 – 81) degree of valgus according to Apley system and 9°- 26° according to Campbell's operative orthopedic .

It is seen most commonly by lateral view; as following

1/ Undisplaced fracture show fat pad sign should raise suspicion, it is triangle lucency in front of the distal humerus because pushing of it forward by haematoma. În common posteriorly displaced fracture, the fracture line runs obliquely downward and forward and distal fragment is tilted backward and or shifted backwards, in anteriorly displaced fracture the crack runs downwards and backward and the fragment is tilted forward, and anteroposterior view is often difficult to obtain without causing pain and may need to be postponed until the child has been anaesthetized it may show that the distal segment is shifted or tilted sideways and rotated (usually medially)'.

2/ Measurement of Baumanns angle is useful in assessing the degree of medial angulation before and after reduction.

3/ Crescent sign, described by Marion it's overlapping of the ossification centers of lateral condyle and the olecranon on the lateral view , implies tilt either medially or laterally(4) .

There is common formula is that a change of 5 degree in the Baumanns angle correspond to a 2 degree change in the clinical carrying angle (angle subtended between long axis of humerus and ulnar bone in supination position), Williamson found that an average of 72 degree (64 to 81 degree) could be considered a normal Baumanns angle and that as long as the angle did not exceed 81 degree."

4\ Oppenheim believe humeral-ulnar-wrist angle is most consistent and accurate method of proximating the true carrying angle which is 5-7° of physiological valgus ,any thing more than this is an accentuation of the normal

5 \ Obrien study reported that the metaphyseal-diaphyseal angle was more accurate 7 than the Baumanns angle , which is 90 any thing more or less consider as abnormal.

6/ Sherma describe measurement of medial epicondylar epiphyseal angle to determine the accuracy of reduction of supracondylar fracture , this angle is created by intersection of a line drawing down the humeral axis and a line drawn along the medial epicondylar epiphyseal plate (fig. no.4). Coronal tilting secondary to lateral displacement, or medial

impaction at the fracture site by a mechanism that is not completely understood ,varus tilting is reduced by pronation of forearm that close the fracture laterally .

Treatment

1 \ conservative treatment

The Restoration of sagital alignment is verified on the lateral radiography by the passage of anterior humeral line through capitalum .Coronal plan displacement is restored when Baumman's angle is restored ,limited degree of rotational malalignment (less than 20% is well compensated by shoulder movement) and often result in few clinical problem .In contrast to varus malalignment doesn't significantly remodel. Buaumman's angle less than 9 or difference greater than 10 compared with the contralateral side usually should not be accepted ,carrying angle of arm relative to the other arm may also serve as guide. the definitive treatment recommended here is based on the guide lines suggested by (O'Hara, et al. 2000)'.

Type I (Undisplaced fracture): The elbow is immobilized at 90° and neutral rotation in a light splint or cast and the arm is supported by sling ,it is essential to obtain an X-ray 5-7 days, later to check that there has been no displacement .The splint is retained for 3wks and supervised movement is then allowed'.

Type II A (mild Posteriorly angulated fracture): In this cases swelling is usually not sever and the risk of vascular injury is low if the posterior cortices are in continuity, the fracture can be reduced under general anesthesia by the following stepwise maneuver:

1. Traction for 2-3 minutes in length of arm with counter-traction above the elbow
2. Correction of any sideways tilt or shift and rotation (in comparison with other arm)
3. Gradual flexion of the elbow to 120 and pronation of forearm ,while maintaining traction and exerting finger pressure behind the distal fragment to correct posterior tilt, then feel the pulse and check the capillary return ,if distal circulation is suspect immediately relax the amount of elbow flexion until it improves. X-ray is taken to confirm reduction ,checking carefully to see that there is no varus or valgus angulation and no rotational deformity, anteroposterior view is confusing and unreliable with the elbow flexed but the important feature can be inferred by noting Baumanns angle following reduction the arm is held in collar and cuff or cast splint in pronation for medially displaced fractures and in supination for lateral displaced fracture. The circulation should be checked repeatedly during the 1st 24hr .an X-ray is obtained after 3-5 days to confirm that the fracture has not slipped. The splint is retained for 3wks after which movement are begun. If acutely flexed position can not be maintained without disturbing the circulation, or if the reduction is unstable, the fracture should be fixed with percutaneous K.wire (Take care not to skewer the ulnar nerve)'.

Type IIB, III (Angulated and malrotated or posteriorly displaced.)

These are usually associated with severe swelling are difficult to reduce and are often unstable more over there is considerable risk of neurovascular injury or circulatory compromised due to swelling. The fracture should be reduce under general anesthesia as soon as possible, by stepwise maneuver which described above and then held with percutaneous crossed K- wire. This obviates the necessity to hold the elbow acutely flexed . Smooth wire should be used (This lessens the risk of epiphyseal injury) and great care should be taken not to injure the ulnar and radial nerve post operative management is the same as for type IIA '.

Continuous fraction: Traction through a screw in the olecranon, With arm held over head, can be used 1. if fracture is severely displaced and cannot be reduced by manipulation. 2. if the elbow flexed 100,the pulse is obliterated and image intensification is not available to allow pinning and straighten of elbow. 3. sever open injury or multiple injury of the limb once the swelling subsided further attempt can be made at closed reduction ,alternatively child may be treated by skin traction with elbow almost straight and the arm in small Thomas splint or Dunlop traction".

2\Open reduction: indications

(1) Fracture which is simply can not be reduced closely (2) An open fracture.

(3) Fracture associated with vascular injury.

Various approaches have been described for open reduction, generally reduction is facilitated by an approach from side opposite the direction of displacement of distal segment to preserve the remaining periosteum, however, the anterior approach is preferable if the surgeon is concerned about interposition of the neurovascular structures The fracture is exposed (preferably through two incision, one on each side of elbow'. The haematoma is evacuated and the fracture is reduced and held by two crossed K-wire which is more rigid than two lateral pins, . The use of lateral pins alone is an equally effective, but safer way to treat type II and TypeIII fracture and strongly advised against the placement of a medial pin while the elbow is hyperflexed ,collectively these result suggest that the use of medial pin is not necessary and certainly should not be placed with the elbow flexed more than 90.) Comparison of immediate versus delayed (at least more than 8 hrs after fracture). The reduction and pinning of type III fracture has shown no difference in rates of failed close reduction!?) or out come between groups leading to conclude that treatment of these fracture can be safely delayed (s). possible complications of open reduction includes :

* Infection. * Vascular injury. * Nerve injury. * Myositis ossificans. * Excessive callus formation. * Stiffness. * Decrease range of motion.

The delayed in performing of open reduction is mandatory to decrease swelling but not later than 5days after injury ,since possibility of myositis ossificans apparently increases after that time. Campbell prefer lateral approach other have used post. Medial, anterolateral, antecubital approach (s).Open reduction and internal fixation of severely displaced fracture that could not be reduced closely or had significant vascular embarrassment. They also recommend fasciatomy at the same time.

Complications

1\Early complication

A/neurological compromise the usually neuropraxia) is reported to occur in 2% to3% of patient with supracondylar fracture. Any of peripheral nerve, median, anterior interosseous, radial, ulnar nerve may be damaged . Exploration is indicated when nerve entrapment occurs at the time of reduction. The specific nerve that is injured may depend on the direction of the initial displacement of the fracture 35-45% of neurologic injuries involve the radial

nerve, and they are most common when the distal fragment is displaced posteromedially. 32-40%of neurologic injuries involve the median nerve or anterior interosseous nerve and those injuries are most common with posterolateral displaced fracture.' complete return of nerve function is usually although this may require several months . some author recommend surgical exploration of nerve , If the function has not returned within 6 to 8wks of reduction .Continued nerve pulsies after fracture may indicate nerve entrapment in the fracture callus. 10)

B\brachial artery injury : It occur in as many as 10% of patient with supracondylar fracture often the problem is corrected once the fracture is reduced and circulation returns to normal. Most authors recommend close observation of vascular status after reduction .if circulation does not return to normal (with elbow flexed to less than45 degree within about 5 minute ,consultation with vascular surgeon is recommended and surgical exploration of the brachial artery may be necessary ,beside the clinical indication of refill and pulse ,Doppler measurement or pulse oximitor have been recommended for evaluating circulation after reduction . An arteriogram usually is not recommended unless entrapment or severing of the artery is suspected!.

C\compartment syndrome: It is un common but serious complication of supracondylar fracture present by un due pain and palpable firmness in the forearm. 15) It s caused by hypoxic damage caused by interruption of circulation to the muscle any evidence of compartment Syndrome required vascular consultation, compartment pressure measurement ,and possibly fasciotomy , the morbidity caused by fasciotomy is minimal while that caused by an untreated compartment syndrome is much greater , general indication for fasciotomy are!"):* clinical sign such as demonstrable motor or sensory loss . * compartment pressure above 35 mm Hg(slit and wick catheter technique) or above 40 mm Hg(needle technique) or differential pressure < 30mmHg which is equal to diastolic pressure minus absolute compartmental pressure.") * Interrupted arterial circulation to the extremity for more than 4hrs

2\Late complications: Alcubitus varus

Its generally accepted that cubitus varus occur secondary to mal reduction „and not growth disturbance. (1) Cubitus varus may occasionally impact function and the cosmetic appearance is often disturbing to patient and family (). Persistent posterior angulation can lead to hyperextension and some loss of flexion. Although malunion rarely affects function and often remodels, some children are bothered by the cosmetic appearance or loss of motion. Many osteotomies and fixations techniques have been described to correct deformity fallowing malunion of the supracondylar fracture. Several causes for cubitus Varus have been suggested. Medial displacement and rotation of distal fragment have been blamed most often , but Smith proved in his experimental studies that varus tilting of the distal fragment was the most important cause of change in carrying angle") growth disturbance in the distal humerus, especially over growth of the lateral condyle can occur. Kassen notes that a rare cause of progressive cubitus var. deformity after supracondylar fracture is osteonecrosis and delayed growth of trochlea with relative over growth of the normal lateral side of distal humeral epiphysis. (5) Beal's notes that the normal carrying angle from birth to age of 4yrs is15,and it increase to 17.8degree in adult for this reason an increase of valgus is not as cosmetically noticeable as a complete reversal to a varus position > rotational malalignment may occur but is not a significant deformity .malrotation of the distal humerus is compensated for to a large degree by the shoulder joint. As a result the rotational component in cubitus Varus deformity is of little consequence and all that is necessary for correction of the cubitus Varus deformity 3 basic types of osteotomies have been describe:

1\medial opening wedge osteotomy with bone graft 2\ oblique osteotomy with derotation and internal Fixation or llizarov external fixation (8) 3\ lateral close wedge osteotomy

1. Medial operative. Wedge. Osteotomy

* It gain length,
* Instability,
* Lengthening lead to ulnar nerve injury unless it is transposed anteriorly.

2-oblique osteotomy : correct two plane deformity with one osteotomy Sugioka described a three dimensional osteotomy for correction of cubitus Varus (5) Deformity in which medial and posterior tilt and rotation of the distal segment can be corrected if necessary with internal fixation or Ilizarov ext. fixator () an excellent anatomic and functional out come resulted. Two wire were placed in the mid shaft of the humerus, perpendicular to the shaft and at 60 to each other. These wires were attached to a complete ring and tensioned. Two wires were then placed in the condylar region of the humerus, distal to the proposed osteotomy site, 10 short of perpendicular to obtain over correction these wires were at a 30 angle to one another and were attached to a half ring, and tensioned, lateral incision was done between two rings and distal humerus was exposed, a numerus cf small holes were drilled in the distal humerus a long an oblique osteotomy line running from proximal posterior to distal anterior. An osteotom was then used to complete the short oblique osteotomy, then Ilizarove rings were manipulated under fluoroscopic quidance, external rotation and vulgus angulation of distal fragment. Range of motion exercise were started (day after surgery). two weeks after surgery the patient demonstrate flexion from 50 to 120°, 70° of supination and 90 of pronation, the patient remain in Ilizarov external fixation 32 days. 3- lateral closing wedge osteotomy: It's easiest, safest, and inherently the most stable osteotomy. The methods of fixation that include the use of two screw and wire attached between them,plate fixation, compression fixation, crossed k. wire and staples. Some have used no fixation. Complications of surgery: are * Lossening, * pin tract infection, * osteomyelitis * skin slough * nerve palsy* aneurysm of brachial artery. Bl Cubitus valgus: It is rare complication of this fracture and may be complicated by ulnar nerve neuritis. Clelbow stiffness D | Myositis ossificans (traumatic); The extension in particularly may take months to return it must not be hurried, passive movement which include carrying heavy weight. or forced movement is prohibited this with only make the matters worse and may contribute to development of myositis ossificans which is extremely rare. The predisposing factors are: (*)Previous injury to brachialis muscle and other soft tissues stretching (*)Hematoma formation, so any passive forceful movement will lead to more muscle stretching and injury and hematoma formation which is trigger for myossitis ossificans.“

Aim of study

1. To compare between the results of different methods of treatment and different surgical approaches.
2. To identify the common type of supracondylar fracture and its complications in my locality

Patients and method:- This prospective study was carried out in Al-Basra general hospital in the department of orthopedic surgery from September 2005 to September 2006. Sixty eight patients with supracondylar fractures of humerus were included, the diagnosis was achieved by clinical and radiological examination detail history was taken regarding; age, sex, address, the side of the fracture whether dominant hand involved or not, cause of fracture time of presentation whether early(within8 hours) or late (8 hours or more). thorough physical examination was performed to assess the patient generally and locally, looking for any associated injuries. After stabilization of the patient general condition , X-ray study was requested , Wilkin's classification (4) was used to classifying fracture among our patients and accordingly we divide our cases into: Type I,II,III In type I which presented with less swelling treated as out-patient by immobilization with back-slab from upper third humerus to metacarpophalangeal knuckle with elbow flexion 90 degree until edema subside then converted to complete plaster of Paris and followed for three weeks after discarding of gypsona, Physiotherapy was encouraged. Those patients with type II or III who were presented with mild swelling were admitted to the hospital and closed reduction under general anesthesia was performed for all of them, post-reduction assessment of carrying angle was done and 2 immobilization by above elbow back slab, in addition to X-ray which was taken to assess the perfection of reduction at the next morning looking for crescent sign and measurement of Bauman's angle. While those with type II,III and had sever swelling at presentation the treatment selected according to associated ischemia , if no sign of ischemia reduction postponed until edema subside using Danlop traction for 5-7 days. If there is signs of ischemia; immediate trial of closed reduction and rechecking of vascularity of the limb , if no improvement following reduction , vascular consultation is mandatory. In those cases of severe type of fracture in whom conservative treatment was failed , open reduction and fixation by two K-wire become crucial ,Tornequet was used and different approaches were tried hopping to assess the advantages & disadvantages of each one. We were used mainly posterior approach with crossed two K-wires , lateral approach with lateral two k-wire, posterior approach with olecranon Steinman pin fixation ,the posterior approach either tongue or splitting both were used. every 14 days checking of plaster of Paris and physical examination including Xray was done . The period of follow up extended for 6-8 weeks, k-wire were removed at 6 weeks postoperatively, physiotherapy started after 8 weeks. we were recorded complications which had happened in each case as in(table number 1.).

In follow up we were depended on four parameters

1) Clinical carrying Angle 2) clinical range of movement 3) Radiological measurement of Bauman's angle 4) Crescent sign.

Results

Type of fracture	No. of patients	Time of presentation	conservative	Surgery					complications						
				ptckw	psckw	pslkw	lalkw	psosp	Early				late		
									bac	cs	ni	inf	mu	mo	stf
I	8	Early 6	6			-									
		Late 2	2												
II	14	Early 10	10		-										2*
		Late 4	3	1					1*						1* 1**
III	46	Early 36	12	5	11	1	5	2	1*		2**	1**	3* 2**		13** 2*
		Late 10	2	3	1		4		1*		1**		1*		3**

Table (1)show types of fractures,its treatment and its complications.*=conservative treatment, **=surgery , ptckw=posterior tongue cross k-wire, psckw= posterior splitting cross k-wire,pslkw=posterior splitting lateral k wire,psosp=posterior splitting olecranon stieman pin ,bac=brachial artery compromise , cs=compartment syndrome,ni=nerve injury,mo=myositis ossificans ,stiff=stiffness

17

Discussion

Supracondylar fracture was noticed mainly in this study in age group 5 years and more.(78%).and the male (65%) more than female (35%).and this may reflecting increase activity of male with increase their ages and may be due to misdiagnosis of fracture in early life because inability to discover ossific centre by plain X-ray in early life (less than 5 years).and this agree with results of Alburger's(14). we were seen that urban areas give higher percentage of suprcondylar fracture than the rural areas and that reflecting the difficulties of transmission of patients from rural areas and the location of the hospital in the city centre reflecting the type of populations drained to it and by the depending of people in the district on bone setters for management of fracture . we found that the dominant hand is lower than that of non- dominant one and that reflecting the experience uses

of dominant hand in protection measures during falling and overuse of dominant hand (exercises) stimulate of muscular bulk and lead to increase stress on bone resulting in stimulation of osteocyte to convert into osteoblast and increase bone formation. and this supported by Skerry TM. which called " Wolf law "(10). we have obtained that there is no reasonable difference between early and late presentation in supracondylar fracture and this supported by LyengarSR who indicate that many supracondylar fractures of humerus can treated safely in delayed maner with axcellent clinical result and without unduly prolonging the hospital stay(6). ,the late of open reduction is mandatory to decrease the swelling but not later then 5 days after injury since the possibility of myositis ossificans apparently increase after that time and that supported by Lal GM(15). The conservative treatment show encouraging results in type I and II fracture with less complications than those occurring with type III fracture treated by the same method.. Mild limitation of elbow extension occur in 3out of 21 cases (14%) which ended with full recovery by physiotherapy in comparison to 6out of 14 (42%) associated with type III fracture . on the other hand complications occur more following surgery in type III fracture 22(69%),so conservative treatment was superior in my study, this against result of Ohcw, who conclude that selective open reduction for displaced supracondylar fracture of distal humerus produced as good result as closed reduction(11). That stiffness was increased following surgery due to sever soft tissue damage associated with this fracture and surgery add more damage to the soft tissues resulting in more adhesion and fibrosis and joint stiffnes. The malunion occur more with those treated by conservative treatment rather than with surgery, 6 cases of malunited fracture 4 cases out of 14 (28%) resulted from conservative treatment and 2 out of 32 cases (6%) from surgical treatment, these malunited deformities treated by osteotomy at the end of bone growth which are at 16 years for male and 14 years for female by French osteotmy. Tourniquet nerve palsy happened in 3 (5%) of cases and all of them radial nerve pulsy which ended with full recovery within 6 weeks ,ulnar nerve injury avoided by identification and protection of the nerve while introducing the medial K-wire this supported by Culp(5) If nerve function not return ,surgical exploration is indicated and this supported by Culp who reported 18 neural injury in children with supracondylar fracture, 9 of which resolved spontaneously in average of 2-5 months after injury ,the remaining of lesions were explored at an average Of 7.5 months after injury „neurolysis was performed on 8 and one completely lacerated nerve required grafting. Culp concluded that observation should an initial approach, but if clinical and electromyography evidence of neural function is not present at five months after injury, exploration and neurolyasis are indicated. If nerve is incontinuity the prognosis after neurolysis is excellent. In this study we found 3 cases were presented with brachial artery compromise with sever swelling and negative peripheral pulse, refilling test was positive. we were treated these cases by close reduction and traction (Dunlop traction) with elevation until swelling subside and pulse appear then converting treatment to definitive treatment and this process gave an excellent result this supported by Shaw (5) who reported rapid reduction with K-wire fixation without arteriogram in 17 children with sign of vascular impairment after supracondylar humeral fracture, 3 patients in whom satisfactory blood supply to the hand was not present after reduction ,brachial artery exploration was performed ,Shaw do not believe arteriography is indicated before reduction of fracture and also supported by Rang who does not perform open reduction even if distal pulse if absent after reduction , he reported that pulse usually return within week or two after reduction(5).

Conclusion

1- Supracondylar fracture type I and II are preferable treated conservatively and gave an excellent result while type III preferable treated operatively because of increase possibility of malunion as a result of unavailability of image intensifier or portable x-ray device which make that job easy in our Department.2- No difference in result between early versus delay representation of supracondylar fracture.3- The male to female ratio was 2:1 specially in ages 5 years and more from urban regions. 4- Non dominant hand was exposed more to fracture than dominant hand. 5-conservative treatment associated with higher percentage of malunion of lower humerous while surgical treatment associated with higher percentage of stiff elbow. 6- The lateral approach of lower humerous was shown to give less complications 11% in comparison to posterior approaches which gave 58 % complications. The posterior approaches complications were divided to posterior splitting 50% and posterior tongue 75%.

Recommendations

1- For those patients with severe displaced supracondylar fracture (Wilkin III) There is no urgency in performing a trial of close reduction with high failure rate and then perform open reduction which can be postponed up to five days. 2- The close reduction with or without percutaneous K-wires fixation is the treatment of choice. Good equipment like image intensifier is recommend to aid Z the surgeon in achieving good reduction. 3- We advise a long run study to compare between posterior and lateral approaches in order to highlight the advantages and disadvantages of each and select the most beneficial one.

References

1. Injury of shoulder and upper arm and elbow Alan Graham Apley, Apley system of orthop and fracture 8th edition Arnold. 2001; 24:596-598.
2. The upper limb, Richards. Snell, M.D.ph D. clinical anatomy for medical student 2nd edition, little Brown and company Boston, 1981, ch 9,p430.
3. Michael G. Vitale MD, MPH David L, Skaggs MD. Elbow: Pediatric aspects Home study Syllabus .American Academy of orthop surgeon, orthopedic knowledge update 7" (dition by Kenneth J.Koval, MD, 2002, ch 29 p299-302.
4. Norman Y, James R, Kasser MD, MD supracondylar fractures of the humerus in children .J Am Acad orthop surg. 1997; 5(1)19-26.
5. Terry Canal S. Fracture and dislocation in children ,Campbells operative orthop ,9th edition Mosby. 1978; ch50:2407-2420.
6. John M,F lynn MD, Peter M, Laura powers MD.the operative management of paediatric fractures of theupper extremity. the JBJS-org vol 84-a no11 november - 02.
7. Lyengar SR,Hoffinger SA,Townsend DR.early versus delayed reduction and pinning of type 111 displaced supracondylar fractures of the humerus in children :a comperare study.J orthop Traum 1999,jan ;13(1):51-

5.www pubmed.gov.
8. Helen M. Horstman, MD. And Ralph Cavalier, MD, Treatment of Cubitus Varus with Osteotomy and Ilizarov External Fixation, American journal of orthope!: May 2000 volume xxlx No. 5.P. 389 -390.

9. Robert B, Duthie Roger M. Atkin, metabolic ,hormonal and bone marrow diseases 9th edition ,Bath press ,Avon 1996,ch5 p321.
10. Skerry TM, Chayen J, Lanyon Le. Early strain related changes in nzyme activity in osteocyte following bone loading in vivo ,Journal of bone and mineral earch. 1989; 4:783-788.
11. Ohcw, Park bc, Kim pt, Park IH, Ihn Jc. completly displaced supru! humerus fractures in children :result of openreduction versus closed reduction Jordan sci 2003;8(2):137-41. www pubmed.gov.
12. Ozkoc G, Goneu, Kayaalp Peker TT. Displaced supracondylar humerlictures in children: open reduction versus close reduction and pinning. www pubmed.gov.
13. Yusof A, Razak, Mdisplaced supracondylar facture of humerus in tren comperative study of the result of closed and open reduction. Med .J.Malysia 1009: 53:52-8. www pubmed.gov.
14. Alburger PD, Betz RR. Supracondylar fracture of the humerus in c n .J pediatric orthop. 12:16:1992.
15. Lal GM,Bhans.delayed open reduction for supracondylar fractures ordrumerus,int orthop 15;189,1991.