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Study of outcomes of supracondylar *Humerus* fracture with ipsilateral lower end radius fracture in children

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Abstract

Supracondylar humerus fracture with forearm fractures are rare with reported incidence ranging from 3% to 13%. We have treated ten patients with ipsilateral supracondylar humerus fracture with distal radius fracture. One had a Gustillo-Anderson Grade 2 open supracondylar humerus fracture. All displaced fractures were treated with K-wire fixation by closed method except the open fracture which warranted wound debridement and subsequent open reduction. A follow up of at least 6 months is available for all our patients.

All fractures showed signs of union by 6 weeks when K-wires were removed. At 6 months, 9 patients had excellent outcome while one patient with recovering radial nerve palsy had fair outcome. No cases of non-union or loss of reduction were seen in the post-operative period. Pin tract site infection was seen in one patient with open fracture which resolved after K-wire removal and antibiotic coverage.

This study recommends a screening radiographs of forearm and wrist in patients with supracondylar humerus fractures to rule out any associated forearm/wrist injury. We also recommend closed reduction and K-wire fixation of the displaced supracondylar humerus as well as distal radius fractures.

Keywords: supracondylar, forearm fractures, radiographs, debridement

Introduction

Supracondylar humerus fracture and distal radius fracture are common as an isolated fracture but combined supracondylar fracture with distal radius fracture is an uncommon injury. Both have a similar mechanism of injury, most commonly involving hyper-extension injury of upper limb. One article hypothesized that children who sustain a supracondylar fracture have a greater range of elbow hyperextension than those associated with a fracture of the distal radius [1]. Hyperextension injury involves hyper-extension at wrist and elbow leading to fractures at scaphoid and other carpal bones, radius, ulna, elbow and humerus especially distal humerus. There have been few articles mentioning ipsilateral supracondylar and forearm fracture. The incidence varies from 3 to 13% as cited in various articles [2, 3, 5, 6]. One article has reported 9 cases of isolated distal radius fracture out of 31 cases with ipsilateral supra-condylar humerus and forearm fracture studied retrospectively over a period of 5 years [2]. Other article reported 4 distal radius fracture out of 8 (11.1%) patients with ipsilateral forearm with supracondylar humerus fracture [3]. Another article reported 22 patients with ipsilateral supracondylar and forearm fracture with 6 patients having radius fracture [5]. Apart from above mentioned data, few sporadic cases are reported having the above mentioned type of injury [4, 6, 7]. Most of the cases reported have been treated with K-wire fixation for both radius and supracondylar humerus if the fracture is displaced (gartland type II and Type III) [8-11].

We have reported 10 cases with ipsilateral supracondylar humerus fracture with distal radius fracture over a period of 2 years between April 2015 and March 2017 treated at B.J. medical college and civil hospital Ahmedabad and the functional outcome assessed for these injuries.

2. Patients and Method

Between April 2015 and March 2017, we came across 10 cases with ipsilateral supracondylar humerus and distal radius fracture, all between age group of 5-12 years. All of the patients presented within 24 hours of injury. Inclusion criteria- consisted of patients having supracondylar humerus fractures with distal radius fractures and patients between 4-12 years of age. Also fractures that presented with 3 days of injury were only included in the study. One patient had grade 2 open (Gustillo-Anderson classification) supracondylar humerus fracture with 2 cm

lacerated wound over lateral aspect of distal humerus. The same patient had a 1 cm puncture wound over the volar aspect of distal radius with wrist drop. Ultrasound examination did not show any nerve discontinuity. Of the ten patients, seven had history of fall on outstretched hand, two had history of road traffic accident (hit by two wheeler) and one with grade 2 open fracture had history of fall from tree. No co-morbidities were found in all these patients and all patients were operated in emergency department within 6 hours of arrival at hospital. We used closed reduction and K-wire fixation for

supracondylar humerus fracture from lateral side. Medial wire was used only if two lateral pins were insufficient in providing stability at fracture site. Closed reduction was achieved by milking manoeuvre as described by Peter, Scott and Stevens⁸. Only the patient with the open fracture underwent thorough wound wash and debridement and open reduction with K-wire fixation. All the displaced distal radius fracture underwent closed reduction and K-wire fixation using 2 crossed wires^[3, 5, 9] [Figures 1, 2].



Fig 1: (Original) shows immediate post-traumatic plain radiograph of the elbow and the wrist joint- showing displaced supra-condylar humerus and distal radius fractures.



Fig 2: (Original) shows immediate post-operative elbow and wrist joint plain radiographs of the same patient.

Post operatively the limb was immobilised in above elbow cast with forearm in supination except in the open fracture where elbow spanning external fixator was applied. Only one dose of broad spectrum intravenous antibiotic (cephalosporin) calculated on weight basis was given in the patients having the closed fractures requiring pinning. The child with the open fracture received intravenous antibiotic consisting of gram

positive and gram negative coverage (cephalosporin and aminoglycoside) for two days postoperatively with daily dressing to look for any sign of infection. Immediate post-operative radiographs were taken and then repeat radiographs at 4 weeks, 6 weeks and 8 weeks and 12 weeks and then once in 6 months [Figures 3, 4].



Fig 3: (Original) shows Post-operative plain radiographs of the elbow and wrist joint at 6 weeks of the same patient.



Fig 4: (Original) shows Post-operative plain radiographs of the elbow and wrist joint at 3 months of the same patient.

3. Results

We have at least a 6 month follow-up of all patients. All patients were assessed by Flynn's criteria

modified by Templeton and Graham (Table 1) at 6 months follow up^[10,11].

Table 1: Flynn Et.al Criteria modified by Templeton and Graham. Function is compared with uninjured limb.

	Loss of elbow flexion/extension	Loss of forearm pronation/supination	Loss of wrist flexion/extension	Change in carrying angle
Excellent	0-5	0-15	0-15	0-5
Good	6-10	16-30	16-30	6-10
Fair	11-15	31-45	31-45	11-15
Poor	>15	>45	>45	>15

Of 10 patients, nine patients had excellent functional outcome at 6 months with one having fair outcome due to presence of

wrist drop which has partially recovered (Table 2).

Table 2: Original - Tabulated data of patient outcome.

Sr. No.	Age (yrs)	Sex	Injury	Classification	Neuro-vascular status	Union Time(week)	Functional outcome at 6 months
1	7	M	Fall while playing	Gartland Type II	Nil	6	Excellent
2	8	M	Fall while laying	Gartland type I	Nil	6	Excellent
3	8	F	Road traffic accident	Gartland type III	Nil	6	Excellent
4	9	M	Fall from stairs	Gartland Type III	Nil	6	Excellent
5	12	F	Fall from tree	Grade 2 open /Gartland type III	Wrist drop	6	Fair
6	9	M	Road traffic accident	Gartland type III	Nil	6	Excellent
7	8	M	Fall while playing	Gartland type I	Nil	6	Excellent
8	7	M	Fall on outstretched hand	Gartland type III	Nil	6	Excellent
9	10	M	Fall on outstretched hand	Gartland type III	Nil	6	Excellent
10	6	M	Fall on outstretched hand	Gartland type I	Nil	6	Excellent

The same patient had superficial pin tract infection which healed after removal of pins at 5 weeks and antibiotic coverage. The other nine patients had no pin tract infection. All fractures showed signs of union by 6 weeks as seen on follow up radiographs following which the wires of both humerus and radius were removed. No fracture went into non-union. No incidence of loss of reduction was seen. No vascular injury was seen in any of the cases.

4. Discussion

The reported incidence of ipsilateral supracondylar humerus fracture with forearm fracture varies from 3% to 13%^[2, 3, 5, 6]. The mechanism of injury appears to be a fall on the outstretched hand with the wrist dorsiflexed, the forearm pronated and the elbow extended^[11]. In our cases, all supracondylar humerus fracture were of extension type with the displaced fractures having a posteromedial displacement (Gartland type 3). All radius fracture were of extension type with dorsal displacement and dorsal angulation. Supracondylar

fractures deserves priority because of the much greater incidence of associated complications. Once it is stabilised the management of the forearm fracture, open injuries, vascular impairment and nerve palsies is made easier^[11]. Our study recommends screening radiographs of the forearm and wrist in all patients with supracondylar humerus fractures to rule out any associated forearm or wrist injury. We recommend closed reduction and K-wire fixation for both supracondylar humerus (type III) and distal radius fracture. We had only one fair result at 6 month follow up due to recovering radial nerve palsy restricting active wrist dorsiflexion up to 45 degree. In all our patients the supracondylar humerus fracture was operated first followed by distal radius fracture as recommended by Templeton and Graham^[11].

5. Conclusion

This study recommends screening radiographs of the forearm and wrist in all patients with supracondylar humerus fractures to rule out any associated forearm or wrist injury. We also

recommend closed reduction and K-wire fixation of the displaced supracondylar humerus as well as distal radius fracture.

6. References

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