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A Study on the Clinical Profile of Patients with Forearm Bone Fractures Admitted at Tertiary Care Hospital

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ABSTRACT
In adults, usually the forearm fracture fragments are displaced. The patient complains of pain, deformity and loss of function of the forearm and hand. Some degree of swelling is always present. Abnormal mobility and crepitus are present. The physical examination should include neurological evaluation of the motor and sensory functions of radial median and ulnar nerves. This was a prospective time bound study with a sample size of 20 patients, which include treatment of 10 cases of fracture both bones forearm by open reduction and internal fixation with 3.5 mm DCP (Group-A) and 10 cases with 3.5 mm LC-DCP (Group-B). In group A left side was predominant with 90%, and in group B both the sides were equally distributed. In both the groups A and B, Type A 3 (Simple both bones fracture) was the most common type of injury with 70-60% respectively.

INTRODUCTION

The forearm represents the critical anatomic unit of upper limb, permitting the effector organ of the upper limb the hand, to perform multiaxial daily activities of living[1]. The forearm fractures are one of the most common injuries seen in day to day practice. They are increasing faster than the predicted rate due to increase in population, increase in number of vehicles, increase in violence, rapid industrialization and various sports activities[1].

The forearm bones, radius and Ulna take part in the formation of five joints, which are ulnohumeral, radiohumeral, proximal radioulnar, distal radioulnar and the radiocarpal articulations. Ulna is straight bone, but the radius is much more complex. The ulna is a fixed strut around which the radius rotates in pronation and supination. Unlike in other bone the distracting forces act only along the longitudinal axis of bones but also along the horizontal plane, in a plane perpendicular to the long axis. So, while achieving reduction, both these points should be kept in mind and lateral bow of the radius should be maintained[2]. In adults, usually the fragments are displaced. The patient complains of pain, deformity and loss of function of the forearm and hand. Some degree of swelling is always present. Abnormal mobility and crepitus are present. The physical examination should include neurological evaluation of the motor and sensory functions of radial median and ulnar nerves. The vascularity should be checked and compartment syndrome should be ruled out[3].

The x-ray of the forearm including elbow and wrist are taken at least in two views antero-posterior and lateral. It is important to know the level of fracture, the configuration, degree of angulation, communication and displacements. The proximal and distal radioulnar joints are evaluated. Associated injuries to these joints are important to be diagnosed, because it impacts heavily on prognosis and treatment[4]. The rotational alignment of the forearm is difficult to determine in the ordinary anterior posterior and lateral x-ray. The “Bicipital tuberosity view” recommended by Evans is helpful. Because the surgeon has no hold on the proximal fragment the distal radial fragment has to be brought into correct relationship with the proximal fragment. Ascertaining the rotation of the proximal fragment from the Evans tuberosity view before reduction, gives some idea of how much pronation or supination has to be done[5]. The tuberosity view is made with x-ray tube-tilted 20° towards the olecranon, with the subcutaneous border of ulna flat on the cassette. The x-ray can be composed with serial diagrams showing the prominence in supination. As an alternative, a film of the opposite elbow can be taken at a given degree of rotation for comparison[6]. In this method full supination is referred to as 180° and mid position 90° and full pronation as 0°.

MATERIALS AND METHODS

This was a prospective time bound study with sample size of 20 patients. Which include treatment of 10 cases of fracture both bones forearm by open reduction and internal fixation with 3.5 mm DCP (Group-A) and 10 cases with 3.5 mm LC-DCP (Group-B).

Inclusion Criteria:

- Patients with closed and type one open diaphyseal fractures of both bones of forearm
- Patients fit for surgery
- Age above 18 years
- Patients willing for surgery

Exclusion Criteria:

- Open fractures other than type I
- Children below 18 years of age
- Patients medically unfit for surgery
- Patients not willing for surgery

The results are evaluated using “Anderson’s criteria” for functional evaluation of forearm bones fracture. On admission of the patient, a careful history was elicited from the patient and/or attendants to reveal the mechanism of injury and the severity of trauma. The patients were then assessed clinically to evaluate their general condition and the local injury. In general condition of the patient the vital signs were recorded. Methodical examination was done to rule out fractures at other sites. Local examination of injured forearm revealed swelling, deformity and loss of function. Any nerve injury was looked for and noted. Palpation revealed, abnormal mobility, crepitus and shortening of the forearm, distal vascularity was assessed by radial artery pulsations, capillary filling, pallor and paraesthesia at finger tips.

Radiographs of the radius and ulna i.e, anteroposterior and lateral views, were obtained. The elbow and wrist joints were included in each view. The limb was then immobilized in above elbow Plaster of Paris slab with sling. The patient was taken for surgery after routine investigations and after obtaining fitness towards surgery. The investigations are as follows: Hb%, Urine for sugar, FBS, Blood urea, Serum creatinine, ECG and chest x-ray. Proximal radius was approached by Dorsal Thompson’s approach and middle and distal radius were approached through Volar Henry’s approach. Ulna was approached through subcutaneous incision. Alternate cases were selected and fixed with narrow 3.5 mm DCP and LCDCP respectively and a minimum of 5 cortices were engaged with screw fixation in each fragment.

RESULTS AND DISCUSSIONS

In Group A, majority of the cases (30%) were in 30-50 year age group with an average of 36.3 years,

ranging from 18-59 years and in group B, majority of the cases (50%) were in 30-40 year age group with an average of 36.2 years ranging from 22-60 years.

In both the groups there was equal distribution of Males accounting for 70% and Females 30%.

In group A left side was predominant with 90% and in group B both the sides were equally distributed.

In both the groups A and B, RTA (Road traffic Accident) was the most common mechanism of injury with 90-70% respectively (Table1-3).

In both the groups A and B, Type A3 (Simple both bones fracture) was the most common type of injury with 70-60% respectively.

In group A 30% of the cases had associated injuries and in group B it was 20% (Table 4-6).

Our findings are comparable to the study made by Charnley in 1964 witnessed 50% of patients between second and third decade and with an average of 44.8 years[7]. Herbert S. Dodge and Gerald found 24 years as the average age[8]. Berton found the average age was 22 years[9]. Chapman *et al*.[10] showed average age of 33 years (13-79). In 1992, Schemitsch, found 24 years as average (16-83)[11]. In 2003, Frankie Leung and Shew Ping chow accounted an average of 36 years (11-90 years)[12]. In the present study, fracture was common in fourth and fifth decade in Group A with an average age of 36.3 years (18-59 years). In group B it was common in fourth decade with an average of 36.2 years (22-60 years).

In most of the series, males are affected more. In the series of Burwell *et al*.[7] 69.33% were males and 30.67% were females.Herbert Dodge in his study, noted about 89% males and 11% females[9]. Michael Chapman noted about 78% males and 22% females[10]. William in his series had 67% males and 33% of females[13]. Frankie-Leung series showed 82.6% males and 17.4% females[12]. In the present study, there was equal distribution of Males accounting for 70% and Females 30% in both the groups A and Moed *et al*.[8] accounted 50% of his cases to RTA, 20% due to industrial accidents, 14% due to fall, 12% due to direct blow and 4% due to gunshot injuries[9].

Thomas Grace *et al*.[14] noted about 29% (45%) patients with automobile/motorcycle accident 14 (22%) in fall 2 (3%) had gunshot wounds and remainder had other miscellaneous types of injuries. Smith noted about 45% of his cases, which were due to RTA, 36% were due to fall and 19% were due to industrial accidents[15]. In the present study, RTA was the most common mechanism in both group A and group B constituting 90-70% respectively. Burwell and Charnley AD reported about 50% incidence of fracture both bones in right forearm[7].

Chapman MW reported about 55% incidence of fractures of both bones in right extremity[10]. This may be because, in case of assaults the person tries to protect himself/herself with the left upper limb and also in case of falls the person may land on the left hand first as he/she would be holding something in the right hand or would use the right hand to hold something. We accounted left sided fracture in about 90% of cases in group A and 50% cases in group B. But it is always difficult to determine the exact sequence of events in RTA or fall. However, the results of present study are comparable with the previous studies.

Table 1: Age group

	Group A		Group B	
Age group (years)	No. of cases	Percentage	No. of cases	Percentage
18-20	2	20	0	0
21-30	1	10	2	20
31-40	3	30	5	50
41-50	3	30	2	20
51-60	1	10	1	10
Total	10	100	10	100

Table 2: Sex

	Group A		Group B	
Sex	No. of cases	Percentage	No. of cases	Percentage
Male	7	70	7	70
Female	3	30	3	30
Total	10	100	10	100

Table 3: Side affected

	Group A		Group B	
Side	No. of cases	Percentage	No. of cases	Percentage
Right	1	10	5	50
Left	9	90	5	50
Total	10	10	10	100

Table 4: Mechanism of injury

	Group A		Group B	
Mechanism	No. of cases	Percentage	No. of cases	Percentage
RTA	9	90	7	70
Fall	1	10	2	20
Direct	0	00	1	10
Total	10	100	10	100

Table 5: Type of fracture-AO classification

	Group A		Group B	
Type	No. of cases	Percentage	No. of cases	Percentage
A3	7	70	6	60
B3	3	30	4	40
C3	0	00	0	00
Total	10	100	10	100

Table 6: Associated injuries

	Group A		Group B	
Injury	No of cases	Percentage	No of cases	Percentage
Head injury	1	10	1	10
Upper limb	1	10	1	10
Lower limb	1	10	0	00
Total	3	30	2	20

CONCLUSION

- Forearm fractures are commonly occur due to increasing road traffic accidents in young adults
- High incidence of fractures is seen in males, due to manual working and outdoor activities

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