

ORIGINAL RESEARCH

A study on clinical profile of patients with fracture of forearm attending tertiary care hospital

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ABSTRACT

Automobile and motorcycle accidents result in some type of direct blow to the forearm, other causes includes fights in which one of the adversaries struck on the forearm with a stick. Gun shot wounds can also cause fractures of both bones of forearm. On admission of the patient, a careful history was taken from the patient 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 the injured forearm revealed swelling, deformity and loss of function. Nerve injury was looked for and noted. Fracture both bones in left forearm is 60% with 95 % Confidence Interval is 42.32-75.41%, which is border line significant. Majority of the fractures were seen in the middle third of both bones. 7 (23.33%) had proximal third fractures, 16 (53.33%) patients had middle third fractures and 7 (23.33%) patients had lower third fractures both bones forearm.

Key words: Fracture of forearm, clinical profile, the radius and ulna

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INTRODUCTION

The mechanism of injury that causes fractures of radius and ulna are myriad. By far, the most common is high-speed vehicular trauma.

DIRECT VIOLENCE

Automobile and motorcycle accidents result in some type of direct blow to the forearm, other causes includes fights in which one of the adversaries struck on the forearm with a stick. Gun shot wounds can also cause fractures of both bones of forearm.

INDIRECT VIOLENCE

Fall on an outstretched hand results in most of these fractures, most forearm shaft fracture resulting from fall occur in athletes and in fall from heights.

DISPLACEMENT

The muscle groups acting across the forearm because complex deformity forces when fractures are present. The radius and ulna are connected to each other by three muscles viz. The supinator, pronator teres and

pronator quadratus, and interosseous membrane apart from the ligaments of superior and inferior radioulnar joints, when there is a fracture, these muscles tend to approximate the radius and ulna by decreasing the interosseous space.¹

In fracture of the upper radius, below the insertion of supinator and above the insertion of pronator teres, two strong muscles (biceps and supinator) exert an unopposed force that supinates the proximal radial fragment and the distal fragment gets pronated because of pronator teres and quadratus.²

In fracture of the radius located distal to the pronator teres, the combined forces of biceps and supinator is somewhat neutralized with proximal fragment by the pronator teres and the proximal fragment assumes mid prone position.

In fracture of distal third radius, the distal fragment is pronated because of pronator quadratus. Hence, in closed treatment of fracture both bones forearm, immobilization in desired position is mandatory.³

For upper third of fractures of radius, the forearm is to be immobilized in supination. For middle third mid

pronation and for distal third pronation of forearm, these immobilization position help in satisfactory union and good functional results.

Normal pronation and supination. Bone healing of both radius and ulna is slow because of small contact surfaces at the fracture site and is the reason why stable fixation of fragments is very important. Intramedullary nailing straightens the radius with loss of curvatures leading to cross union.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.⁵ Ascertain 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. 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°.

Since the normal range of pronation is by the radius crossing over the ulna and compressing the deep flexor muscle between the two bones, anything encroaching upon their space such as fibrous tissue, callus, edema or hemorrhage will alter to compressibility of the flexor muscles and limit pronation.⁷ It is therefore expected that in all the fractures of mid third radius/ulna some loss of pronation will occur and will last for a considerable time after union has occurred. Assessment of other factor limiting rotation is therefore based on measurement of supination rather than pronation.⁸

METHODOLOGY

The present study includes treatment of 30 cases of fracture both bones of forearm by open reduction and internal fixation with 3.5mm LC-DCP.

RESULTS

Table 1: Age distribution with sex

Age in years	Male	Female	All cases
16-20	5 (20.0%)	-	5 (16.7%)
21-30	9 (36.0%)	1 (20.0%)	10 (33.3%)
31-40	7 (28.0%)	1 (20.0%)	8 (26.7%)
41-50	2 (8.0%)	2 (40.0%)	4 (13.3%)
>50	2 (8.0%)	1 (20.0%)	3 (10.0%)
Total	25 (100.0%)	5 (100.0%)	30 (100.0%)
Mean ± SD	30.44±9.73	41.40±13.26	32.27±10.93

The age of these patients ranged from 16-60 years with fracture being most common in 2nd and 3rd decade and an average age of 32.26 years.

INCLUSION CRITERIA

- Patients with both fresh and old diaphysal fractures of both bones of forearm.
- Patients above the age 16years.

EXCLUSION CRITERIA

- Compound fractures, segmental fractures of forearm.
- Pathological fractures, infected fractures, non-union, malunion, delayed union.
- Monteggia and Galeazzi fractures.

On admission of the patient, a careful history was taken from the patient 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 the injured forearm revealed swelling, deformity and loss of function. 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 fingertips.

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 cuff and collar sling.

The patient was taken for surgery after routine investigations and after obtaining fitness for surgery. The investigations are as follows: Routine blood, Blood urea, Serum creatinine, FBS, PPBS, Urine routine, HIV, HBsAg, VDRL, Chest X-ray and ECG.

Proximal radius was approached by Dorsal Thompson incision and Volar Henry approach was used for middle and distal radius. A narrow 3.5mm LC-DCP was used and a minimum of 6 cortices were engaged with screw fixation in each fragment.

Out of 30 patients, 25 patients (83%) were males and 5 patients (17%) were females, showing male predominance.

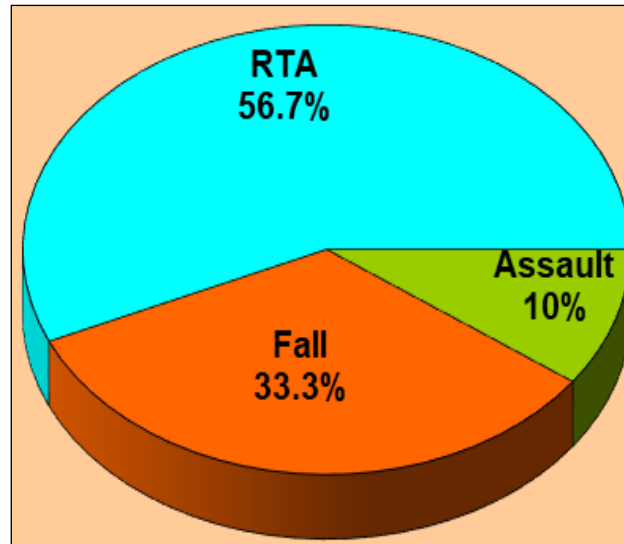


Fig 1: Mode of Injury

17(56.7%) patients had injuries from Road traffic accidents, 10(33.3%) from fall and 3(10%) from assault.

Table 2: Side of Injury

Side of Injury	Number(n=30)	%	95% CI ⁴⁷
Left	18	60.0	42.32-75.41
Right	12	40.00	24.59-57.68

Fracture both bones in left forearm is 60% with 95% Confidence Interval is 42.32-75.41%, which is border line significant.

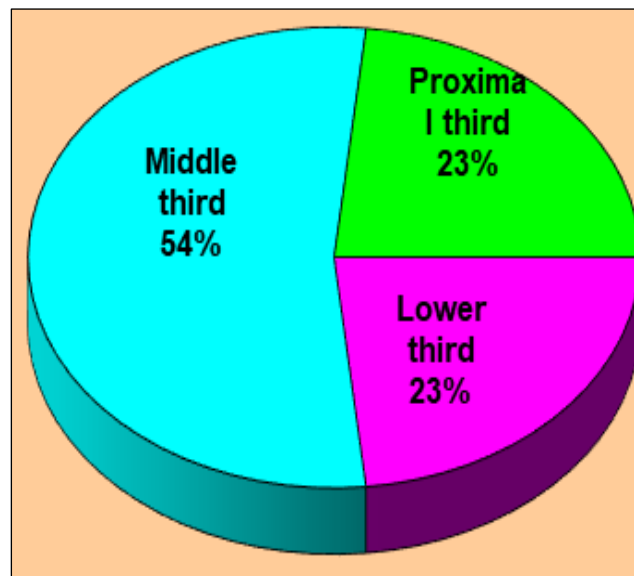


Fig 2: Fracture site

Majority of the fractures were seen in the middle third of both bones. 7 (23.33%) had proximal third fractures, 16 (53.33%) patients had middle third fractures and 7 (23.33%) patients had lower third fractures both bones forearm.

Table 3: Type of fracture

	Radius	Ulna	%
Comminuted	10	12	36.7
Transverse/Short oblique	20	18	63.3

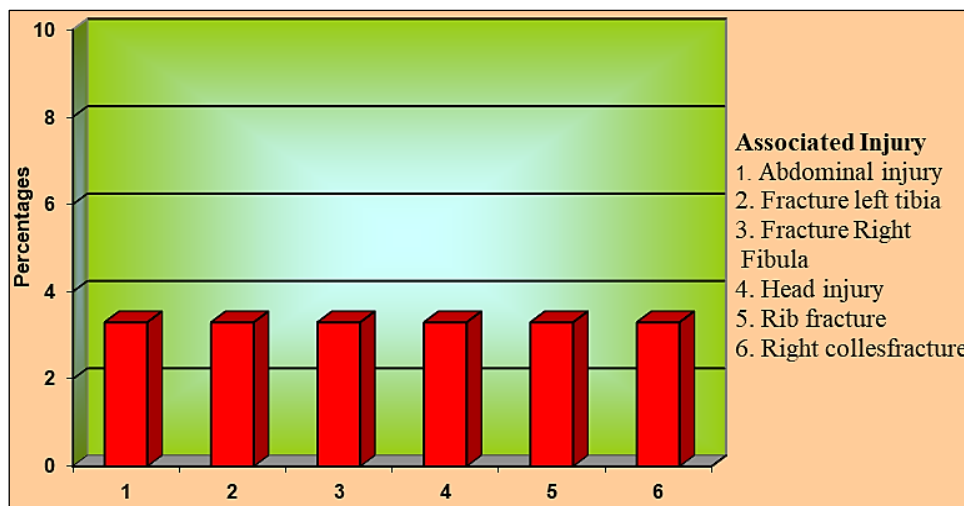


Fig 3: Associated injury

DISCUSSION

In our study fracture bothbones of forearm was common Between age group of 20-40 years with an average of 32.26 years (16-60 year).

Our findings are comparable to the study made by Michael W, Chapman *et al.*, in 1989, series showed average of 33 years (13-79 years).⁹

In 1964, H.Nevile Burwell and A.D. Charnley found the average age was44.8 years.¹⁰

In 1972, Herbert S. Dodge and Gerald W. Cady found 24 years as the average age in their series.¹¹

Berton R. Moed, (1986) found the average age was 22 years.²⁷In 2000, Aljo a Matejic *et al.*, found average age was 43 years.¹²

Our series had male predominant with 83% male patients and 17% female patients, which were comparable to previous studies.

Herbert Dodge in his study, noted about 89% males and 11% females.¹³

Michael Chapman noted about 78% males and 22% females.¹⁴

William in his series had 67% males and 33% of females.¹⁵Frankie-Leung series showed 82.6% males and 17.4% females.¹⁶

In our study 56.7% of patients had road traffic accidents, 33.3% had a fall and 10% had direct blow (assault). Our studies are comparable to previous studies.

Moed BR *et al.*, 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.¹⁷

Thomas Grace *et al.*, 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.¹⁸

We have accounted for 40% incidence of fracture bothbones in right extremity, which is also comparable to previous studies.

Burwell HN and Charnley AD reported about 50% incidence of fracture both bones in right forearm.¹⁰

Chapman MW reported about 5.5% incidence of fractures of both bones in right extremity.¹⁴

CONCLUSION

- Fracture of the bothbones forearm is common in male in-between 20-40 years.
- Majority of the fractures were due to Road traffic accident and transverse/ short oblique fractures in the middle third of the bothbones of forearm were more common due to low velocity injuries.

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