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A prospective study to analyze the outcome of surgical stabilization of fractures of lower end of radius with Ellis plate

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Abstract

Introduction: The most common cause of distal radius fracture is a fall on an outstretched hand. Osteoporosis can make a relatively trivial fall result in a broken wrist. Many distal radius fractures in people older than 60 years of age are caused by a fall from a standing position

Methodology: Total of 1336 bony injuries were reported to Hospital casualty and orthopedic opd during the study period. Out of which 382 are upper limb fractures. Total number of distal radius fractures are 60. After exclusion for detailed study 20 patients were selected

Results: Using the Demerit score system of Gartland and Werley, we had 12 (60%) excellent results, 5 (25%) good results, 3 (15%) fair results and on poor results

Conclusion: Thus open reduction and internal fixation by volar Ellis plating provides better functional results in fractures of distal end of radius. So this procedure can be used as alternative to other procedure in treating fractures of distal end radius

Keywords: Fracture, lower end of radius, Ellis plate

1. Introduction

Fractures of lower end of radius are the most common fractures of the upper extremity, constituting 17% of all fractures and 75% of all forearm fractures [1].

Due to population explosion, with an ageing society, & enormous increase of high speed motor vehicle accidents, the number of distal radial fractures can be expected to increase in the coming decades. Hence the distal radius fracture requires a new reassessment and a new concept for adequate and optimized timely treatment. On the other hand, the increased life expectancy and the related osteoporotic changes in the skeleton lead to an increase in late complications. The risk increases with a family history of osteoporosis or fractures besides smokers are at higher risk in relation to low bone mineral density. Distal radius fractures occur most often in older postmenopausal women, it is four times more common in women than in men, mostly aged 60-70 years [2, 3].

The most common cause of distal radius fracture is a fall on an outstretched hand. Osteoporosis can make a relatively trivial fall result in a broken wrist. Many distal radius fractures in people older than 60 years of age are caused by a fall from a standing position. A broken wrist can happen even in healthy bones, if the force of the trauma is severe enough. Whenever a person falls, instinctively it is the hand that comes for protection, hence it is the bones of wrist joint and upper limb bones in general that are prone to fracture [4].

One of the most common distal radius fractures is a Colles' fracture, in which the broken fragment of the radius tilts upward. This fractures was first described in 1814 by an Irish surgeon and anatomist, Abraham Colles' – hence the name "Colles' fracture" [5]. The treatment of fractures dates back to susrutha, an ancient Indian Surgeon who is credited with the treatment of fractures, some of which are still in vogue. Distal radius fractures damages the mechanical foundation of man's most elegant tool, the hand. No other fracture has a greater potential to devastate hand function.

Distal radial fractures are treated by wide arrays of technique such as closed manipulation, POP cast reduction and percutaneous pins, pin and plaster, ligamentotaxis, external fixation & internal fixation etc. internal fixation of metaphyseal bending fractures has become increasingly popular primarily due to (a) direct control and maintain physiologic palmar tilt, (b) prevent collapse with external fixation, and (c) avoid bridging the radiocarpal joint. The distal fragment typically has sufficient size and integrity to provide adequate purchase.

Open reduction and internal fixation of indicated to address the unstable distal radius fractures and those with articular incongruity that cannot be anatomically reduced and maintained through closed manipulation and ligamentotaxis and percutaneous pinning. Ellis plating is preferred, as the screws directly buttress against collapse and loss of palmar tilt. Volar buttress is used in younger individuals and locking compression plate in old and osteoporotic individuals⁶. With smaller and more distal fragments, a dorsal plate has to be positioned distally on the dorsum of the radius making extensor tendon injury more likely^[2]. Ellis volar fixed angle plates are an effective treatment for unstable extra articular distal radius fractures allowing early post-operative rehabilitation^[3]. In Ellis plate even if screws are not fixed to distal fragment it seeks some function. Under 100N axial load, the palmar compression Ellis plate restores stability comparable to that of a intact radius, and is superior to conventional palmar or dorsal T-plates^[4].

2. Methodology

The present study was conducted in the department of orthopedics and twenty patients with distal radius fractures treated by open reduction and internal fixation with Ellis plating were selected for a present study. Total of 1336 bony injuries were reported to Hospital casualty and orthopedic opd during the study period. Out of which 382 are upper limb fractures. Total number of distal radius fractures are 60. After exclusion for detailed study 20 patients were selected. Among 20 patients 11 are males and 9 are females. Of these 18 (90%) were between the age of 25 years and 60 years. mean age of our patients is 42 years. Most common mechanism of injury is road traffic accidents. In females common cause is domestic fall on an outstretched hand.

2.1 Inclusion Criteria

- Adults (aged between 25years and 70 years) both Male and Female with unstable, comminuted or intra articular and extra articular fractures of distal end radius.

2.2 Exclusion Criteria

- Patients aged below 25 years
- Patients medically unfit for surgery
- Compound fractures associated with vascular injuries
- Patients who are not willing for surgery.

On admission general condition of the patients were assessed and stabilized haemodynamically. All patients were evaluated clinically and radiologically. Xrays were taken in two planes, anteroposterior and lateral views including elbow and hand. After radiographs patient limb is temporarily immobilized in the form of above elbow POP slab and kept in elevation. Routine investigations were done for all patients. Patients were operated as early as possible once the general condition of the patients were stable and fitness obtained for surgery and anaesthesia. All the patients were operated in supine position

with side support table, under image intensifier and under tourniquet. Routine antibiotics and anti-inflammatory drugs were given. Check x-ray was taken on 2nd day after drain removal. Sterile dressings were done on 2nd, 5th and 8th post-operative day. Sutures were removed on 10th post-operative day and patient was discharged with below elbow pop slab. Patients were assessed clinically and radiographically at 8 weeks, 12 weeks, and 24 weeks to assess the fracture union and the progress of patients recovery were documented. After clinical and radiological union results are evaluated as per Demerit point system of Gartland and Werley.

3. Results

Table 1: Extra Articular and Intra Articular Fracture

Type	No. of Cases	Percentage
Extra articular Fractures	4	20
Intra articular Fractures	16	80

4 (20%) of the fractures were of Extra particular Type 16 (80%) were Intra articular fractures. Fig14

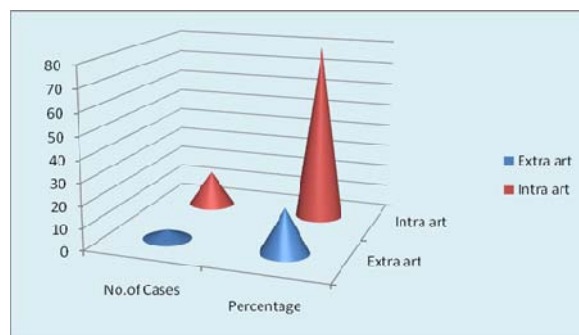


Fig 1: showing type of fracture

Table 2: Associated Injuries

Associated Injuries	No. of Cases
Ipsilateral fracture shaft of femur	1
Contusion head injury	1
Contralateral fracture both bones forearm	0
Total	2

2 (10%) patients had associated injuries.

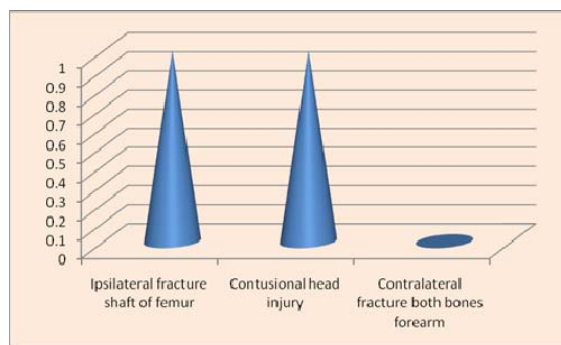


Fig 2: Associated Injuries

Table 3: Duration of operation from date of injury

Duration	No. of Cases	Percentage
1-5 days	20	100
6-10 days	0	0

Surgery was done between 1-5 days in 20 (100%) patients as an elective procedure.

Table 4: Duration of Fracture Union

Time of Union	No. of cases	Percentage
2-3 months	14	70
3-4 months	4	20
>3 months	2	10

In the present study 14 (70%) patients had union within 2-3 months and 04 (20%) patients had union in 3-4 months. There was 2 (10%) case of delayed union.

Table 5: Complications

Complications	No. of cases	Percentage
Extensor pollicis longus tendon irritation	1	5
Arthritis	1	5
Total	02	10

1 (5%) patient had extensor pollicis longus tendon irritation because of long volar to dorsal screw. 1 (5%) patient had developed arthritis of the wrist joint due to improper reduction and articular step.

None of the patients had median nerve complications. There were no intra operative complications.

The assessment of results were made using the demerit score system of Gartland and Werley based on objective and subjective criteria, residual deformity and complications.

Table 6: Outcome

Results	No. of Cases	Percentage
Excellent	12	60
Good	5	25
Fair	3	15
Poor	0	0

Using the Demerit score system of Gartland and Werley, we had 12 (60%) excellent results, 5 (25%) good results, 3 (15%) fair results and on poor results.



Prepare Xray- AP



Prepare Xray- lateral



Check Xrays -AP



Check Xrays-lateral



2 months follow-up

6 months follow-up

4. Discussion

The average time of clinical union was 11 weeks and the average time of radiological union was 14 weeks (ranging from 12 weeks to 24 weeks) in the present study which is slightly higher when compared to R.E. Anakwe *et al.*, (2010) [7] series it was 12 weeks. The complication rate is 10% out of which 1(5%) was due to extensor pollicis longus tendon irritation, 1(5%) developed arthritis of wrist joint. Ayhan Kilic *et al* (2009) [8], Kevin C. Chung *et al.*, (2006) [9], reported complication rate of 11.1% 9.1%. So the average complication rate is lesser when compared to above authors. None of the patients in this study had problems of malunion or implant loosening or re surgery.

Final outcome was excellent in 12 out of 20 patients 60%, good in 5 patients 25%, fair in 3 patients 15% and 0% poor result which is better out come as comparable to Ayha Kilic *et al.*, (2009) [8] where 44.4% excellent, 44.4% good, 11.2% fair respectively. In the series younger age groups patients had a better outcome.

A study was conducted by Dr. Syed Amir Jalil *et al* [10] on eleven patients of volar Barton's fracture with a mean follow up of 2 years. There were 8 males and 3 females. The mean age was 31 years (range from 20-56 years). The major cause of injury was Road traffic accident in 64% of patients. Eight patients were excellent, two were good and one was fair, according to Gartland and Werley scoring.

A study was conducted by Dr. Jorge L. Orbay *et al* [11] on 29 patients with 31 dorsally displaced, unstable distal radial fractures with a new fixed-angle internal fixation device. At a minimal follow-up time of 12 months. The overall outcome according to the Gartland and Werley scales showed 19 excellent and 12 good results.

A study was conducted by Dr. Ujjawal Pradhan, Dr. Atulagarwal *et al* [12] on 15 patients with intraarticular fractures of distal radius, with a mean follow up of 2 years. The evaluation was based on the criteria of Garland and Werley. Then had 60% of their patients rated excellent, 40% good results.

A study was conducted by John K. Bradway and William P Cooney [13] on 16 patients with comminuted intra articular fractures of distal radius, with a mean follow up of 5.7 years. The evaluation was based on the criteria of Garland and Werley and also by Green and O'Brien scoring system. They had 56% of their patients rated excellent, 25% good and 19% fair. They had no poor results.

5. Conclusion

Excellent to good results were seen in 85% of patients by using open reduction and internal fixation with volar Ellis plating is a good option for treating unstable intra articular and extra articular fractures of distal radius

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