ORIGINAL ARTICLE

Radial Length and Radial Angle in Closed Reduction Plaster Cast Immobilization Versus External Fixation in Comminuted Intra Articular Fracure of Distal Radius

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ABSTRACT

Objectives: To compare mean difference in radial length and radial angle in closed reduction and plaster cast immobilization versus external fixation in comminuted intra articular fractures of distal radius and to determine union rate without significant collapse of the fracture.

Study Design: Randomized clinical trial

Place and duration of study: Department of Orthopedics, Jinnah Postgraduate Medical Centre, Karachi, from April 2009 to October 2009.

Patients and Methods: Patients of either sex with comminuted intra articular distal radius fracture were included in this study, those with co-morbidities were excluded. They were randomly divided into two groups, one treated by surgery using external fixation and the other by POP cast for distal radius fractures. Radial length and radial angle was measured pre and post procedure. Data of radial length, angle and union rate were recorded on proforma. Clinical and radiological follow up was done on monthly interval for 3 months. Mean differences were determined using Student's t test in SPSS Version 12.

Results: 40 patients were in both groups. In external fixator group average post operative radial length was 11 mm and radial angle was 12.52 degrees, where as in POP cast group average radial length was 9mm and radial angle was 11.58 degrees. The difference in post procedure radial length in both groups was significant (p value <0.001). The difference of radial angles was not significant (p value 0.286). All patients in both groups achieved satisfactory union.

Conclusion: The results show that external fixator is a handy tool and is easy to apply, and a better method for achieving radial length, angulations and union in distal radius intra articular fractures.

Key words: External fixator, intra articular fracture, POP cast

INTRODUCTION

The incidence of distal radius intra articular fractures has rapidly increased and is fast becoming one of the common fractures[1]. Treating the fracture to attain a desirable outcome is of utmost importance.

Different treatment methods have been established for management of distal radius fractures. The choice of treatment depends on the type of fracture i.e. open or closed, simple or comminuted, stable or unstable[2,3]. Whatever the technique, the primary aim is to attain anatomical reduction with overall aim to restore near normal function. Use of external fixator for distal radius fracture stabilization, which began over fifty years ago in the United States, has proven to be beneficial in terms of anatomical and clinical results in 80-90 percent of patients [4]. Observing the paucity of research on this treatment modality in Pakistan, we analyzed the anatomical outcomes of this treatment.

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PATIENTS AND METHODS

40 patients from 15-65 years of either sex presenting with comminuted intra articular fractures were included. Co-morbids such as severe osteoporosis, ischemic heart disease, cerebrovascular accident, poly trauma, diabetes, taking steroid or any other immune suppressive therapy were reasons for exclusion. All patients presented in Accident and Emergency Department. The patients were randomly selected alternatively on their reporting day. They were given option either for A or B group. Those who got convinced and agreed for external fixator were

enlisted as Group A and other managed with cast as group B. Pros and cons of the study were explained and informed consent was taken. Ethical approval was taken from the ethical review committee. The entire procedure of the two groups was done by researcher himself having more than 4 years experience with the help of other investigators. Patients who were operated were admitted in ward. They received preoperative antibiotic prophylaxis, one hour before surgery. Patients were operated under general anesthesia in supine position, using image intensifier standard protocol described in Rockwood and Green's text book of Fractures in Adults[5]. 2 Schanz pins passed each in proximal fragment of radius and 2nd metacarpal, in dorso lateral safe zone. Position of pins and fracture reduction checked under image intensifier. Wounds were dressed and post operative antibiotics given for 5 days. Patients treated with plaster cast were managed by closed reduction and manipulation of fracture under wrist hematoma block with standard protocol described in Rockwood and Green's text book of Fractures in Adults[5]. These patients were treated in Accident and Emergency department and were discharged after the procedure with instructions regarding complications, physiotherapy and regular follow up in OPD. In operated Patients physiotherapy was started on 1st post operative day and were discharged on 2nd post operative day with advice for regular follow up in OPD. Both groups were followed up in OPD fortnightly clinically and radiologically and finding recorded in proforma.

Radial length and radial inclination were measured and recorded on each visit along with signs of union and collapse on radiographs. Findings were compared in two sets of patients.

Data Analysis Procedure

Statistical package for social science (SPSS-12.0) was used for data analysis. Ratio (M: F) was computed to present gender distribution. All continuous response variables like patient's age, radial length and radial angle, duration of fracture was presented by Mean ± S.D. Student's t-test was applied to compare mean age and mean radial length, radial angle and duration of sustaining fracture between two groups. Proportions of gender and degree of angulation between two groups was compared by using Chi square test. P-value s: 0.05 was considered statistically significant.

RESULTS

There were total 40 patients 20 in each group. 19 injuries were due to fall and 21 due to road traffic accident. 82.5% were males and 17.5% females. The average age was between 25 to 45 years. 42% of the patients were brought within one to two hours of injury. The cause of injury according to gender was RTA 60.6%, fall 39.4% in males.85.7% of the women were injured due to fall while slip on wet floor and only 14.3% due to RTA. 54.5% of the patients in whom we applied the external fixator were males and 45.5% were females. In case of POP cast 45.5% were males and 54.5% were females.

Table 1: Difference in Radial length and radial angle in intervention groups

Outcome	GROUP	N	Mean	Std. Deviation	Std. Error Mean
Difference in Radial Length	Extfix	20	3.3550	1.1821	.2643
	Popcast	20	1.8500	.9929	.2220
Difference in Radial Angle	Extfix	20	12.5250	2.5963	.5806
	Popcast	20	11.5850	2.8878	.6457

The mean age of the external fixator group was 31.45 years and that of POP cast group was 41.3 years. 69.7% of the males were brought to the emergency between 1 to 1.5 hours after injury out of which 45.5% were brought within the first hour after injury. Whereas 71.5% females were brought to the emergency within 1 to 1.5 hours after injury out of which 42.9% were brought after 1.5 hours after injury. The average radial length pre reduction varied from 13 to 17mm and pre reduction radial angle varied from 32 degrees to 36 degrees. In external fixator group average post op

radial length was 11 mm and radial angle was 12.52 degrees, where as in POP cast group average radial length was 9 mm and radial angle was 11.58 degrees. The difference in post procedure radial length in both groups was significant (p value <0.001). The difference of radial angles was not significant (p value 0.286). All patients in each group achieved satisfactory union.

DISCUSSION

Most of the fracture cases in the young encountered by our study were caused by road traffic accidents; this was also observed by the first national injury survey of Pakistan[6]. RTA has been reported as a major problem leading to injuries and death.

Distal radius fracture is one of the most common injuries, as time went by more and more classifications emerged with that came the emergence of newer and more effective modes of treatment that include both reduction and maintaining these reduction by plaster cast, external fixation, percutaneous pinning at same time, or K-wire fixation and bone grafting[2,3] . All these modalities are aimed to achieve optimum radial length and preservation of radial angle by using conventional X-rays pre and post operatively.

Using these two endpoints various studies concluded that the anatomical reduction of the fractures was achieved better in patients where external fixators were used[7,8,9]. Our study too confirmed that finding with significant statistical difference as results of our study were also comparable to Haddad M[10] and Edwards[11].

We lagged behind to achieve the desired angles due to lack of definite experience which has been achieved by other institutions who reported hundred percent results[12]. However, the post reduction results achieved in patients with plaster of Paris cast were not entirely discouraging. Most of the patients were those who could not comply with instruction to change to complete cast in due time as they continued in same first back slab till 15-20 days despite it became loose after subsidence of swelling and fracture collapsed. With improvement of technique of reduction and manipulation; and application of a good cast well molded, cast change in 10-15 days, the results can be further improved. Whereas this problem of collapse is less evident in external fixator group, this was the common reason of superior anatomical results indicated by Joosten, Akmaz [12,13] and also seen in our study, both in maintaining the reduced fracture position and in final anatomy[14,15] also evident in studies by Kreder[16], Kapoor [17] and Horesh[18], except Harley [19] and Young[20].

Our study achieved results comparable to other studies in maintaining radial length, radial angle and union in patients with use of external fixation in distal radius when compared to POP cast treatment, when all parameters observed pre operatively.

CONCLUSION

The results show that external fixator is a handy tool and is easy to apply, and a better method for achieving radial length, angulation and union in distal radius intra articular fractures.

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