



EXTERNAL FIXATION VERSUS PLATING IN INTRA-ARTICULAR DISTAL END RADIUS FRACTURES

Dr. Pradeep Khinchi*

Postgraduate Resident, Department of Orthopaedics, SRGH, Jhalawar
*Corresponding Author

Dr. Qadir Anwar Tak

Postgraduate Resident, Department of Orthopaedics, SRGH, Jhalawar

Dr. Navin Kumar Ratawal

Postgraduate Resident, Department of Orthopaedics, SRGH, Jhalawar

DR. Purushottam Jhawar

Senior Professor, Additional Principal & Unit Head, Department of Orthopaedics, SRGH, Jhalawar

ABSTRACT

Background- The purpose of this study was to derive a better outcome as to which type of fixation is a better choice for the treatment of intra-articular distal end radius fracture. **Methods-** A prospective randomized controlled study was conducted with 50 patients and comparison was made between the plating and external fixator group using the modified clinical-scoring system of Green and O'Brien and demerit point system at each follow-up. **Results-** In the plating group 23 patient's fracture united in 6th week and 2 patient's fracture united at 8th week this result was similar to the external fixator group were 23 patient's fracture united in 6th week and 2 patient's fracture united at 8th week. 2 patient each developed wrist joint stiffness and delayed union in the plating group as compared to the external fixator group were 2 patient each developed wrist joint stiffness, delayed union and broken implant in situ and pin tract infection. **Conclusions-** During the initial follow ups the functional outcome of the plating group were better than the external fixator group but as the time passed at the final follow up plating was only marginally better than the external fixator group. It was seen that radiologically plating lead to a better correction of all the parameters as compared to external fixator group.

KEYWORDS : Volar locking plate, External fixation, Distal end radius fracture, Intra-articular

INTRODUCTION

Distal radius fractures are the most common fractures of the upper extremity in adults. Thousands of articles were published after Abraham Colles¹ described a very common fracture of the distal end radius in 1814 in Edinburgh Medical and Surgical journal, have not yet created a consensus as treatment programme. The fractures of the lower end of radius crush the mechanical foundation of man's most elegant tool the hand. No other fracture has a greater potential to devastate hand function.

A thorough understanding of the pathophysiology and treatment of distal radius is important as high energy trauma to distal radius in adults is becoming more common and long term functional results are unclear, these common injuries must be evaluated thoroughly and treated adequately. The cause of injury are fall on outstretched hand, work related accidents, car accidents, sports injuries.

Fractures of distal end of radius are one of the most common skeletal injuries encountered in orthopaedic departments. Management of Distal radius fractures has remained a controversial issue.² They are often treated with closed reduction and immobilisation but the difficulty here is the possibility that displacement may persist even in the least complex fractures. Other problem with this method is immobilisation of wrist and forearm for at least 6 weeks and the further time required to regain the functions of forearm wrist and hand by physiotherapy. During this entire time duration, patient's ability to carry out day to day activities are hampered. The need of the hour is treatment modality that restores and maintains anatomy and allows early functional mobility which allows patient to carry out his activities of day to day life with minimal discomfort.

Numerous other methods of treating injuries of this nature like closed percutaneous pinning, external fixation, buttress plating have enjoyed recognition from time to time, testifying the fact that there is no ideal modality of treatment. The anti-

glide effect of Buttress plates helps reduce and stabilise intra-articular fractures. However, the need for protection of fracture till it consolidates and the chances of loss of reduction on mobilisation are still areas of concern with Buttress plating.³

Treatment of comminuted, displaced intra-articular or potentially unstable fractures of the distal radius with open reduction and internal fixation with locking compressions plates (LCP) and screws has increasingly been found to be the better alternative.⁴

The functional outcome of treatment of fracture of the distal aspect of the radius is influenced by the anatomical reduction of the articular surface and the extraarticular alignment of the distal part of the radius. By directly restoring the anatomy, plating allows secure internal fixation with resultant early return of wrist function. Furthermore, the increase in the incidence of sympathetic dystrophy with immobilisation over long durations is circumvented by this novel method of fixation.⁵

The use of ext fix and pinning has demonstrated successful outcomes in multiple studies. Ext fix is versatile in managing both intra- and extra-articular fractures with acceptable functional results. Reasons for using ext fix include the improved reduction by ligamentotaxis and the ability to protect the reduction until healing occurs. The advantages of ext fix are the relative ease of application, minimal surgical exposure, and reduced surgical trauma.

MATERIAL AND METHOD

The prospective randomized controlled study was conducted on 50 patients with 25 patients in each group having Intra-articular fracture of distal end radius. These patients presented to the hospital and study was done after obtaining approval from hospital ethics committee. Inclusion criteria being skeletally mature patient (more than 20 years), all displaced intra articular fractures of distal end of radius,

injury less than 2 weeks old and compound grade 1 fracture. Patients who didn't meet inclusion criteria were excluded.

Written informed consent for participation was taken from all the patients. Complete history was taken and physical examination was done. They were assessed for vascular and neurological status. Antero-posterior and lateral radiographs were done of injured as well as uninjured wrist. All the intra-articular fracture of distal end radius cases were admitted and immobilized with Plaster of Paris slab. Limb was kept elevated. The OTA/AO (Orthopaedic Trauma Association / Arbeitsgemeinschaft für Osteosynthesefragen (Association of Orthopaedics)) classification was used to classify distal end radius fractures. All unacceptably reduced fractures were selected for surgical fixation. These patients were randomized by random number generator, which assigned external fixator or volar locked plating to each operative patient. Regional or general anaesthesia was given. No tourniquet was applied for external fixator application and for volar plating tourniquet was used. Affected hand and forearm was scrubbed, painted and draped as standard method. Intravenous(IV) antibiotics were administered 30 minutes before the start of the procedure.

Statistical analysis Interpretation and analysis of obtained data was done using appropriate statistics. Data was entered and analyzed on Microsoft Excel and SPSS version 19.

RESULTS

Table 1. Socio-demographic Profile

Variable	Plate	External fixation	p-value
Age	34.12±6.12 yrs	33.05±5.36 yrs	>0.05
Male : Female	19:6	18:7	>0.05

Table 2. Final Result At 3rd Month And 6th Month (Green O'brien Scoring System)

Outcome	Plate		External fixation	
	3rd month	6th month	3rd month	6th month
Poor	4	0	9	0
Good	15	4	16	6
Fair	6	9	0	5
Excellent	0	12	0	14
Total	25	25	25	25

Table 3. End Result Point Range At 3rd Month And 6th Month (Demerit Point System).

Outcome	Plate		External fixation	
	3rd month	6th month	3rd month	6th month
Poor	0	0	6	0
Good	3	3	9	7
Fair	16	7	6	8
Excellent	6	15	4	10
Total	25	25	25	25

Table 4. Radiological Assessment: Pre-operative, Immediate Post-operative And At 6th Month (mean± SD)

Assess Time	Treatment modality	Palmar tilt (degree)	Radial inclination (degree)	Radial length (mm)	Radial shift (mm)	Ulnar variance (mm)	Articular incongruity (mm)
Pre-operative	Plate	5.14+ 5.22	17.13+ 4.18	7.29+ 2.31	15.35 +1.87	0.55+ 1.56	2.14+ 1.01
	External Fix	2.59+ 5.20	15.05+ 3.15	6.35+ 2.14	18.01 +2.15	0.80+ 2.01	2.16+ 1.12
Post-operative (immediate)	Plate	10.10+ 4.35	22.89+ 4.05	11.01+ 2.15	13.13 +1.01	-2.06 +1.75	0.81+ 0.72
	External Fix	7.87+ .27	22.30+ 3.14	10.85+ 3.14	15.15 +2.05	-0.81 +1.71	0.83+ 0.70
	P value	0.047	0.629	0.892	0.021	0.115	1.00

Post-operative (6 months)	Plate	10.08+ 4.87	22.00+ 4.18	11.01+ 2.15	13.51 +1.01	-2.05 +1.75	0.06+ 0.20
	External Fix	7.01+ .15	22.15+ 3.36	10.14+ 3.18	14.14 +2.18	-0.80 +1.71	0.00+ 0.00
	P value	0.047	0.629	0.892	0.211	0.115	0.334

DISCUSSION

Intra-articular fractures of the distal radius represent high energy, complex, unstable injuries and the optimal treatment remains controversial. With the aim of articular restoration and early finger and wrist mobilization, the present study was conducted to compare volar locking plating system and external fixator application and evaluate the clinic-radiological and functional outcomes of the two procedures.

According to the Green O'Brien scoring system findings are suggestive that in the initial follow ups (2 weeks and 3 months) the functional outcome of the plating group were better than the external fixator group but as the time passed at the last follow up there was not much significant difference between the results of plating and external fixator. The end result in the Demerit point system was found to be similar to the study done by Pradhan et al⁶ where they concluded that, at 3 month follow up the plating group showed better functional outcome but as the time passed at the 6 month follow up the results of plating was only marginally better than the external fixator group.

In the study done by Gereli et al⁷ radiographically it was seen that palmar plating was associated with better correction of palmar tilt. This may be explained by the fact that distraction primarily occurs via palmar structures and that palmar locking plate provides a better support to the fracture. Traction alone in external fixation cannot correct palmar angulations due to the fact that ligamentotaxis primarily functions through strong palmar links.

Aro et al⁸ and Fernandez et al⁹ in their study showed that restoration of the radial length is the most important factor in achieving a good end result.

Kapoor et al¹⁰ reported that open reduction and internal fixation provides the best anatomical restoration with patients less likely to develop arthritis in future.

CONCLUSION

During the initial follow ups the functional outcome of the plating group were better than the external fixator group but as the time passed at the final follow up plating was only marginally better than the external fixator group. It was seen that radiologically plating lead to a better correction of all the parameters as compared to external fixator group.

REFERENCES

1. Chung KC, Spilson SV. The Frequency and Epidemiology of Hand and Forearm Fractures in the United States. *J Hand Surg (Am)*. 2001;26:908-15.
2. Nijs S, O'Broos PL. Fractures of the Distal Radius: A Contemporary Approach. *Acta Chir Belg*. 2004;104:401-12.
3. Knirk JL, Jupiter JB. Intra-articular Fractures of the Distal End of Radius in Young Adults. *JBJS (Am)*. 1986;68(5):647-59.
4. Mehta JA, Bain GI, Heptinstall RJ. Anatomical Reduction of Intra-articular Fractures of the Distal Radius: An Arthroscopically-Assisted Approach. *JBJS (Br)*. 2000;82-B:79-86.
5. Komurcu M, Kamaci L, Ozdemir MT, Atesalp AS, Basbozkurt M. Treatment of AO type C2-C3 Fractures of the Distal End of the Radius with External Fixation of Distal Radius. *Acta Orthop Traumatol Turc*. 2005;39(1):39-4
6. Pradhan U, Agrawal A, Prasad P, Chauhan V, Maheshwari R, Juyal A. Clinic-radiological and functional outcome after surgical fixation of intraarticular fractures of distal end of radius by external fixator versus locked volar plate: a prospective randomised study. *IOSR Journal of Dental and Medical Sciences*. 2013;6(3):20-26.
7. Gereli A, Nalbantoğlu U, Kocaoğlu B, Türkmen M. Comparison of Palmar Locking Plate and K-wire Augmented External Fixation for Intra-articular and Comminuted Distal Radius Fractures. *JBJS (Am)*. 2010;92:96-106.
8. Aro TH, Koivunen T. Minor axial shortening of the radius affects outcome of Colles' fracture treatment. *J Hand Surg*. 1991;16A:392-8.
9. Fernandez LD, Geissler BW. Treatment of displaced articular fractures of the radius. 1991;16A:375-84.
10. Kapoor H, Agarwal A, Dhoon BK. Displaced intra articular fractures of distal radius :A comparative evaluation of results following closed reduction external fixators and ORIF Injury 2000 ;31(2) :75- 79.