To Assess the Functional Outcome of Various Modalities of Treatment of Intra-Articular Fractures of Distal Radius in Adults

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ABSTRACT: Introduction: Most frequent orthopaedic injuries are distal radius fractures which appear in one out of every six cases of fractures in emergency rooms. Approximately 20% of fractures are distal radius fractures. These fractures lead to extreme damage and disruption in upper extremity function, and they are commonly caused by either high or intermediate amounts of energy. Orthopaedic literature provides a series of surgical options available to address this trauma. Thus, this research was performed to determine the best treatment options for DRF.
Aim and Objectivses: To assess patterns of intra-articular fractures of distal end of radius and to study the functional outcomes of different modalities of treatment for intra-articular fracture of distal end of radius in adults.
Materials and Methods: A prospective study was done on 120 patients admitted with intra-articular fractures of distal end of radius in the Department of Orthopaedics, Vinayaka Missions Medical College and Hospital, Salem. Patients more than eighteen years old, Volar Barton, Dorsal Barton, Chauffers; Frykmann Type III, IV, V, VI, VII, and VIII fractures, less than 5 cm of intra-articular fracture from the joint line and those with Closed fractures were included in the study.
Results: Most number of patients (25.83 %) were in 51-60 years' age group. The higher no. of male patients was observed in this study (70.83%). Very lower no. of complication patients was observed in all surgical procedure. The p-value is 0.034 < 0.05 statistically significant was observed. The higher no. of working status patients was observed in all surgical procedure
Conclusion: In terms of specific radiological parameters like volar tilt, radial inclination, and intraarticular step off, the volar locking plate significantly outperforms the external fixator, dorsal plating, and K-wire fixation among the four surgical methods of treatment (volar plate, external fixation, dorsal plating, and K-wire).

Keywords: *Intra-articular fractures of distal end of radius,volar plate, external fixation, dorsal plating, and K-wire.*

INTRODUCTION

Most frequent orthopaedic injuries are distal radius fractures which appear in one out of every six cases of fractures in emergency rooms. Approximately 20% of fractures are distal radius fractures. These fractures lead to extreme damage and disruption in upper extremity function, and they are commonly caused by either high or intermediate amounts of energy. Orthopaedic literature provides a series of surgical options available to address this trauma. American Academy of Orthopaedic Surgeons at this point is unable to recommend one single possible course of management, whether conservative or surgical and in the latter situation, they are unable to

indicate which surgical course is superior. The patient's age, health and lifestyle, comorbidities, ability to comply with orthopaedician's orders and demands, type of job, hand dominance, Fracture pattern, Reduction and Alignment, Soft tissue condition, all of these conditions and more all play an essential role in the management. The critical step in achieving a completely normal wrist joint following fracture of the distal radius is early mobilization and anatomical reconstruction. Poor reduction of the fracture might ultimately result in impaired function and arthritis. Various thoroughly document surgical treatments for DRF include external fixators and pinning and casting percutaneously. The most famous option is Open Reduction Internal Fixation utilizing volar locking plate technology. In a recent randomized study, ORIF-treated people recovered function twice as fast as EF-treated persons, with no functional advantage observed at the 2-year follow-up. The only concern about the eponymous unstable distal radius fracture is that the anatomic reduction should not be forfeited to avoid the loss of reduction. The unstable extra-articular and a few intra-articular distal radius fractures were typically handled with an external skeletal support for an extended period of time, with or without K wires. This strategy was founded on the notion of "Ligamentotaxis," which relies on soft structures around the joints to push the bones. DRF occurs in individuals who are middle-aged labour force and the old as well. This has an exceptional impact on the utilization of the healthcare system. Thus, this research was performed to determine the best treatment options for DRF.

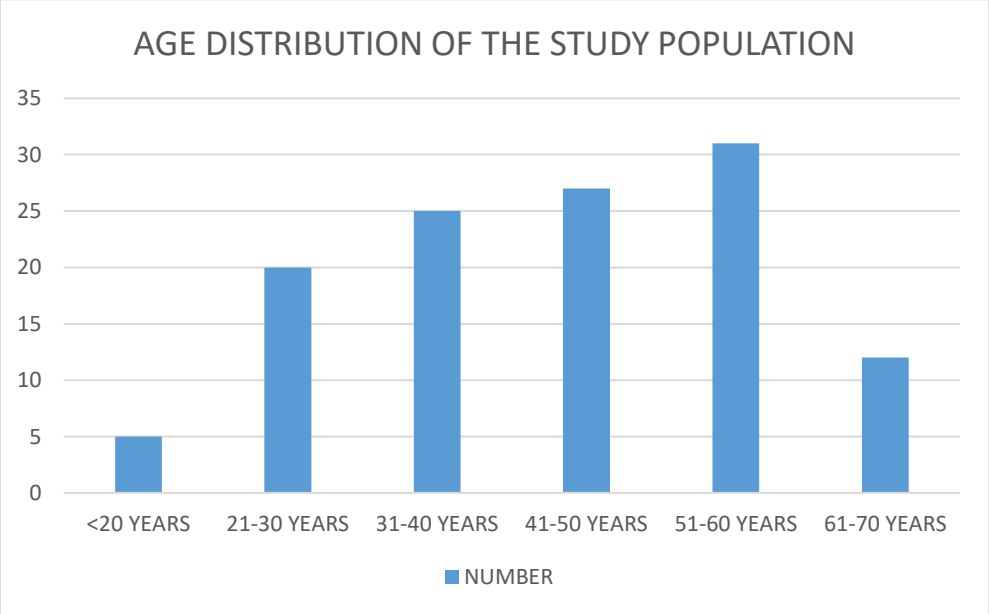
AIM AND OBJECTIVSES:

To assess patterns of intra-articular fractures of distal end of radius and to study the functional outcomes of different modalities of treatment for intra-articular fracture of distal end of radius in adults.

MATERIALS AND METHODS:

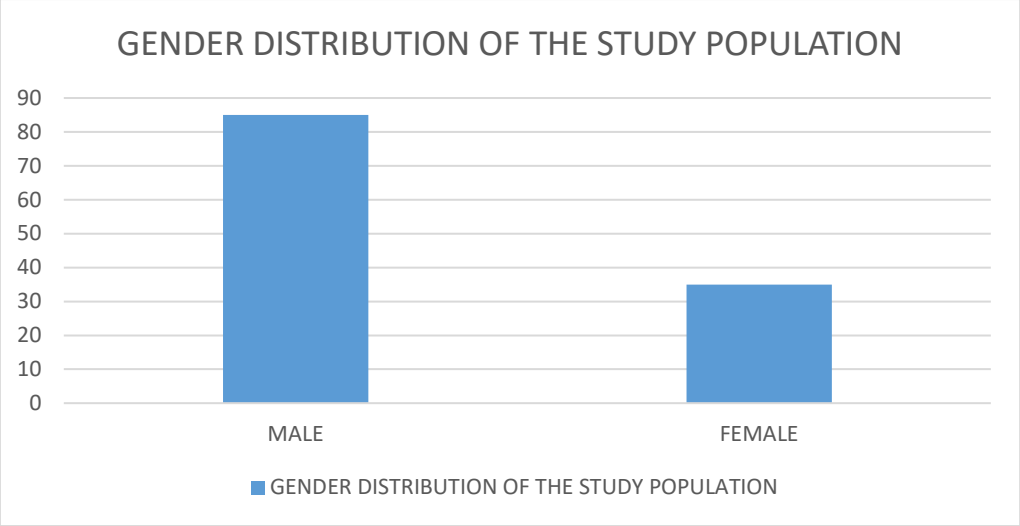
A prospective study was done on 120 patients admitted with intra-articular fractures of distal end of radius in the Department of Orthopaedics, Vinayaka Missions Medical College and Hospital, Salem.Patients more than eighteen years old, Volar Barton, Dorsal Barton, Chauffers; Frykmann Type III, IV, V, VI, VII, and VIII fractures, less than 5 cm of intra-articular fracture from the joint line and those with Closed fractures were included in the study.Patients of age less than eighteen years old, Carpal bone arthritis; all open fractures; fractures neglected for more than four weeks, Serious co-morbid conditions and those with the history of previous wrist pathology or fracture of distal radius, ulna and carpal bones were excluded from the study.

GRAPH 1: AGE DISTRIBUTION OF THE STUDY POPULATION



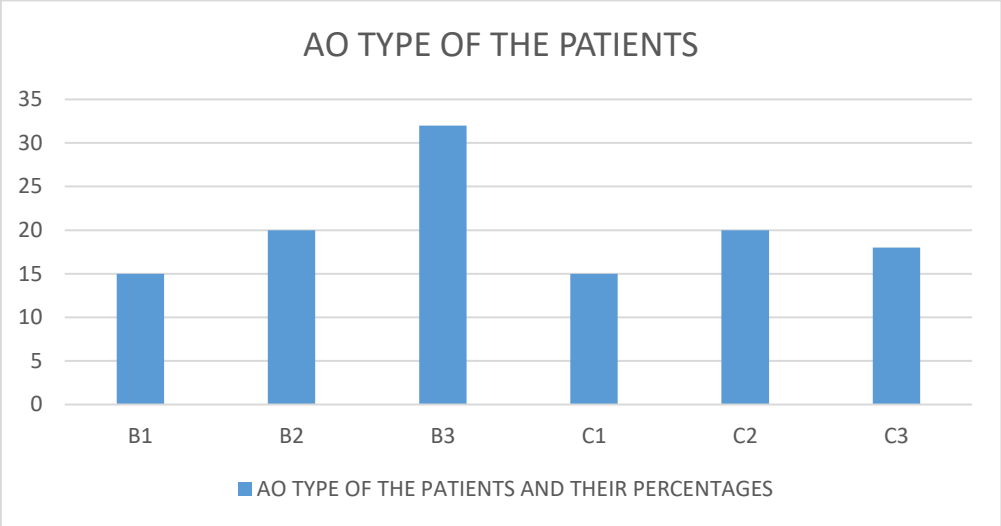
Most number of patients (25.83 %) were in 51-60 years age group, followed by 41-50 years, Only small fraction of patients had below 20 years, mean age =43.44±13.28 y/o.

GRAPH 2: GENDER DISTRIBUTION OF THE STUDY POPULATION



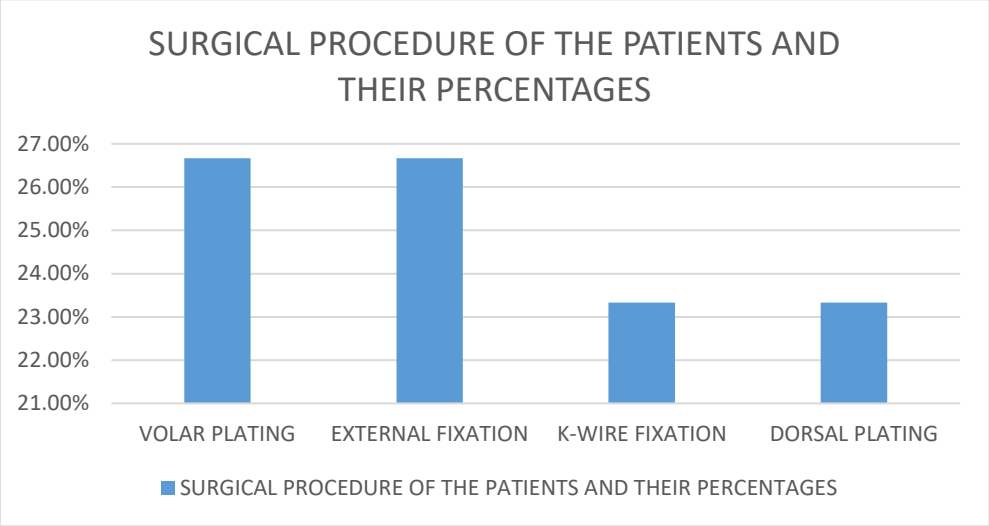
The higher no. of male patients was observed in this study (70.83%).

GRAPH 3: AO TYPE OF THE PATIENTS

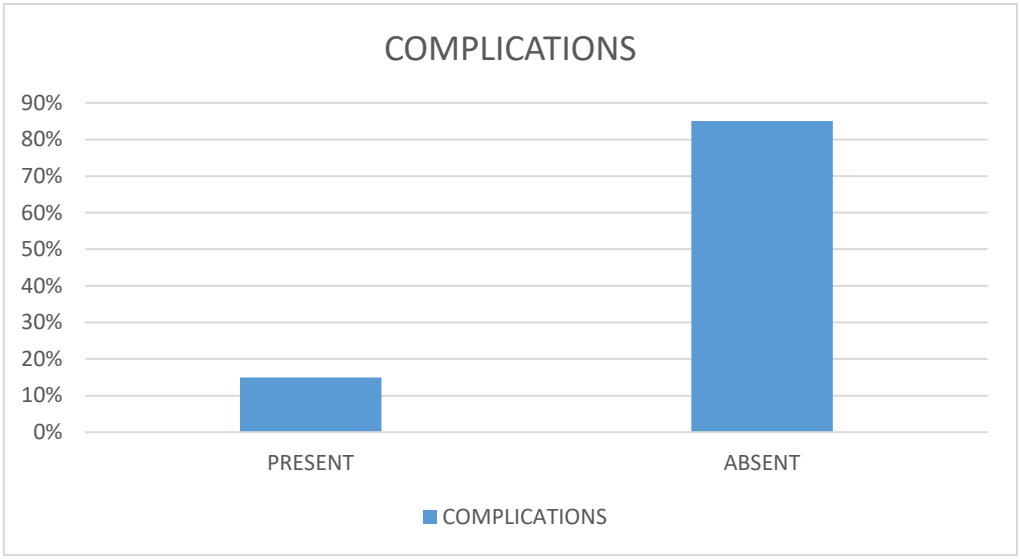


The higher no. of volar plating procedure (26.67%) was observed.

GRAPH 4: SURGICAL PROCEDURE OF THE PATIENTS AND THEIR PERCENTAGES

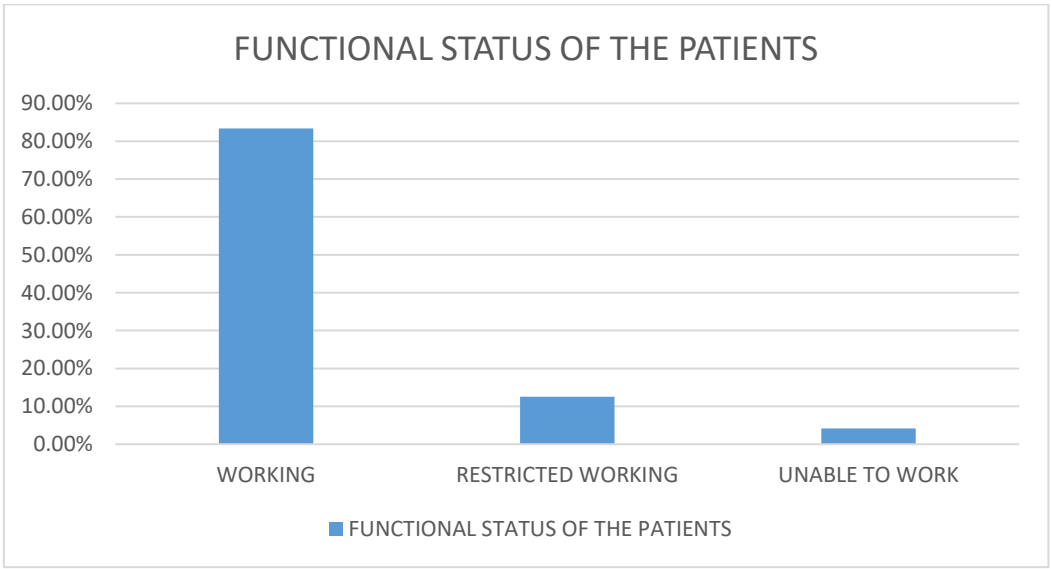


GRAPH 5: COMPLICATIONS OF THE PATIENTS AND THEIR PERCENTAGES



Very lower no. patients having mild (22.5%) and moderate (12.5%) pain was observed

GRAPH 6: FUNCTIONAL STATUS OF THE PATIENTS AND THEIR PERCENTAGES



The higher no. of working status was observed (83.33%)

Table 1: Comparison between the Type of Injury and Surgical Procedure of the Patients

TYPE OF INJURY	VOLAR PLATING		EXTERNAL FIXATION		K-WIRE FIXATION		DORSAL PLATING	
	NUMBER	%	NUMBER	%	NUMBER	%	NUMBER	%
B1	8	25%	4	12.5%	3	10.71%	5	17.85%
B2	6	18.75%	6	18.75%	5	17.86%	6	21.42%
B3	8	25%	5	15.63%	5	17.86%	6	21.42%
C1	4	12.5%	5	15.63%	4	14.29%	4	14.28%
C2	3	9.38%	7	21.88%	5	17.86%	4	14.28%
C3	3		3	15.63%	6	21.43%	3	10.71%
P-VALUE		0.478						

Very lower no. of complication patients was observed in all surgical procedure. The p-value is 0.034 < 0.05 statistically significant was observed.

TABLE 2: Comparison between the Complications and Surgical Procedure of the Patients

TYPE OF INJURY	VOLAR PLATING		EXTERNAL FIXATION		K-WIRE FIXATION		DORSAL PLATING	
	NUMBER	%	NUMBER	%	NUMBER	%	NUMBER	%
PRESENT	2	6.25%	8	25%	8	28.57%	4	14.29%
ABSENT	30	63.83%	24	75%	20	52.63%	24	85.71%
P-VALUE		0.034						

Very few no. of moderate pain patients was observed in all surgical procedure. The p-value is 0.035 < 0.05 statistically significant was observed.

Table 3: Comparison between Pain and Surgical Procedure of the Patients

PAIN	VOLAR PLATING		EXTERNAL FIXATION		K-WIRE FIXATION		DORSAL PLATING	
	NUMBER	%	NUMBER	%	NUMBER	%	NUMBER	%
MILD	5	15.63%	11	34.29%	11	39.29%	6	21.43%
MODERATE	2	6.25%	5	15.63%	3	10.71%	3	10.71%
NIL	25	78.13%	16	50%	14	50%	19	67.86%
P-VALUE		0.035						

The higher no. of working status patients was observed in all surgical procedure. Similarly, very few nos. of non-working status patientswas observed. The p-value is 0.264 > 0.05 statistically not significant was observed.

Table 4: Comparison between Pain and Surgical Procedure of the Patients

GRIP STRENGTH	VOLAR PLATING		EXTERNAL FIXATION		K-WIRE FIXATION		DORSAL PLATING	
	NUMBER	%	NUMBER	%	NUMBER	%	NUMBER	%
EXCELLENT	25	78.13%	26	81.25%	18	64.29%	20	71.43%
GOOD	4	12.5%	4	12.5%	5	17.86%	2	7.14%
FAIR	3	9.38%	2	50%	5	17.86%	4	14.28%
P-VALUE		0.035						

DISCUSSION

One of the most prevalent types of fractures that are treated in accident patients is a distal radius fracture. There is a trimodal distribution, with males under the age of 50 and females older than 40 years old. The age range is

from 5 to 14. There are a number of characteristics that have been identified as risk factors for this injury. These include decreased bone mineral density, female gender, ethnicity, inheritance, and early menopause beginning. The patient- related characteristics, the velocity of the injury, the fracture pattern, and the treatment that was administered are some of the elements that determine a good long-term outcome. However, the surgeon is unable to make any changes to the first three criteria. As a result, the outcome may not be favourable and consistent in each and every case following treatment. A satisfactory radiological outcome, the prevention of loss of reduction, and functional rehabilitation of the patient should all be achieved by treatment. The treatment should help to restore normal or near normal anatomy of the wrist. Several studies have been conducted to investigate the association between the functional outcome and the anatomical reconstruction outcome.

The treatment of distal radial fracture has been subject to numerous revisions and has been the subject of additional debates. There is a broad variety of techniques available, including closed reduction with casting, percutaneous pinning, intrafocal pinning, external fixation with ligamentotaxis, minimal open to open reduction, and internal fixation using a variety of contemporary devices. Many researchers continue to believe that external fixation is one of the most effective methods that are now accessible. In our study functional and anatomical results of 120 patients treated with Closed reduction and k wire fixation, closed reduction and joint spanning external fixation, Open reduction and internal fixation by volar locking compression plating and Open reduction and internal fixation by dorsal locking compression plating were analysed. In this group, the average age was 43.44±13.28 years. The age group of 51–60 years old had the highest number of patients (25.83%), followed by the age group of 41–50 years old (22.50%). 70.83% were males and 29.17% were females in this study. Mode of injury, 52.5% were self-fall and 47.5% were RTA. Side of injury, 45.83% were right sided injury and 54.17% were left sided injury.AO type classification of the patients, there were higher no. of B3 type patients was observed (26.67%) and very lower no. of B1& C1 type patients (12.50%) were noted. Surgical procedure of the patients in this study was 26.67% had volar plating, 26.67% had external fixation, 23.33% of patients had k-wire fixation and 23.33% of patients had dorsal plating. 15% of patients having complications and 85% have no complications. In pain perception mild pain in 22.5% and moderate pain in 12.5% of patients. On functional outcome 83.33% of patients were working, 12.50% were restricted working, and 4.17% were unable to work. Out of 120 patients, 25 patients have stiffness and 95 patients have no stiffness. The age group of 51–60 years old accounted for the largest number of patients in volar plating (37.5%), followed by 41–50 years old (31.25%). The age group of 51-60 years' old accounted for the highest number of patients (34.38%) in the external fixation procedure. Ages 31 to 40 had the highest number of patients (32.14%) undergoing K-wire fixation. In dorsal plating, 21.43% of participants were between the ages of 21–30 and 61–70, and 25% were between the ages of 31–40 and 41–50. In volar plating, the higher no. of excellent functional grading was observed (65.63%) and higher no. of good functional grading was observed in external fixation (46.88%), dorsal plating (35.71%) and K-wire fixation (78. 57%).The percentage of volar plating (78.13%), external fixation (81.25%), k-wire fixation (64.29%), and dorsal plating (75%), in terms of anatomical grading, where no major deformity is reported. 81.25% of external fixation, 64.29% of k-wire fixation, 71.43% of dorsal plating, and 78.13% of volar plating all had outstanding grip strength. On comparison of pain, volar plating has higher number of no pain. Volar plating procedure patients have less complications, higher number of no stiffness, excellent functional status, excellent grip strength and no significant deformity.

CONCLUSION

After a year of follow-up, 120 patients with intra-articular distal radius fractures showed no discernible changes in their functional result in terms of pain, range of motion, grip strength, or ability to resume work. This was decided after the results of several fixation techniques were assessed. In terms of specific radiological parameters like volar tilt, radial inclination, and intraarticular step off, the volar locking plate significantly outperforms the external fixator, dorsal plating, and K-wire fixation among the four surgical methods of treatment (volar plate, external fixation, dorsal plating, and K-wire). Furthermore, it is effective in guaranteeing patient satisfaction with a minimal number of minor issues and a timely return to work.

CONFLICT OF INTEREST: NIL

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