(International Print/Online Journal)

SJIF IMPACT FACTOR: 5.565
PUBMED-National Library of Medicine ID-101739732

ISSN (Print): 2209-2870
ISSN (Online): 2209-2862

International Journal of Medical Science and Current Research (IJMSCR)
Available online at: www.ijmscr.com
Volume 5, Issue 5 , Page No: 301-319
September-October 2022

IJMSCR

A Prospective Observational Study of Comparison of Outcome of Intraarticular Distal End Radius Fracture Treated With External Fixator with K Wire And Locking Distal End Radius Plate

Dr. K R Salgotra[1] , Dr. Juilee Mhatre[2], Dr. Sanjeev K Singh[3], Dr. Vishnu Nair[4], Dr. Manan Shah[5], Dr. Atul Singh[6]

[1]Professor and Head of Unit , [2,4,5,6]Senior Resident,
Department of Orthopaedics, MGM Medical College, Kamothe, Navi-Mumbai- 410209, Maharashtra, India

***Corresponding Author:**
Dr. Sanjeev K Singh
Department of Orthopaedics, MGM Medical college, Kamothe, Navi-Mumbai- 410209, Maharashtra, India

Type of Publication: Original Research Paper
Conflicts of Interest: Nil

Abstract

Background : The aim of the present study is to compare the functional and radiological outcome of intraarticular distal end radius fracture treated with locking compression plate and that with an external fixator with K wire.

Materials and Method : This randomised trial was conducted between July 2018 and November 2020 at a Tertiary care centre in Navi Mumbai on 50 patients who sustained Distal end radius fracture, and were divided randomly into two groups wherein Group A consisted of patients managed with locking compression plate and Group B managed with external fixator with K wire. The Final outcome was calculated using Functional Mayo score. The score at 6 weeks was 80.60 and 73.00 for volar plating and external fixator respectively, at 12 weeks the scores were observed as 89.40 and 81.20 for volar plating and external fixator with K wire respectively, and final score as 96.40 and 86.80 for Volar plating and external fixator with K wire respectively.

Conclusion : In our study we concluded that there was no significant difference in terms of radiological outcomes in either the volar plating group or the external fixator with k wire group. However there was significant difference seen in the functional outcome in the volar plating group as compared to the external fixator group with k wire. Therefore, volar plating is recommended for a better functional outcome.

Keywords: NIL

Introduction

The fracture of distal end of radius presents a great challenge to Orthopaedic surgeons. They are the most frequent fractures encountered by orthopaedic surgeons accounting for almost 17.5% of all the fractures in adults [(1)]. Fracture of distal end radius is seen in the young population as well as in geriatric age group.

The majority (57% to 66%) of fractures are extra-articular (AO type A) Of the remainder between 9% and 16% are reported as partial articular (AO type B) and 25% to 35% as complete articular fractures (type C)[(2)].

The treatment of fractures of the distal radius is in a state of flux, because the results of conservative treatment have so far been unsatisfactory in 20%-30% of cases. Instability resulting from dorsal compression, damaged ligaments (60%) and the presence of débris in the area of the metaphysis means that, while reduction is easy, retention is

frequently difficult to achieve [3].It is well established that unreduced significant articular incongruency will result in early degenerative osteoarthritis [4].

Several methods for treating intra articular DER fractures have been tried in an attempt to maintain the articular surface. Numerous workers have used conservative management with plasters for treatment of intra articular distal end radius fractures, but the outcomes were not satisfactory.

Presently owing to the high incidence of this fracture combined with increased life expectancy and the resulting higher number of elderly population living active and independent life, procedures which provide better functional outcomes like external fixation, CRIF with k wires as well as ORIF are being considered.

Amongst the many surgical methods, the most frequently done are closed reduction internal fixation with an external fixator and open reduction internal fixation with volar locking plate.

However, inspite of the advancements in the surgical treatment of distal end radius fractures, there still exists controversy regarding the best treatment, which gives better functional and radiological outcomes.

The purpose of this study is to compare the functional and radiologcal outcome in an intra articular distal end radius fracture, when treated with a volar locking plate and with an external fixator with k wire.

Aims And Objectives

Aims

To compare the functional and radiological outcome of intraarticular distal end radius fracture treated with locking compression plate and that with an external fixator with k wire.

Objectives

1. To evaluate the functional and radiological outcome of intraarticular distal end radius fracture with open reduction internal fixation with locking compression plate with help of Mayo wrist score and x-rays.
2. To evaluate functional and radiological outcome of intraarticular distal end radius fracture with an external fixator with k wire with the help of Mayo wrist score and x-rays.

Anatomy Of The Wrist Joint [5]

Articular Surfaces

The radiocarpal joint is a synovial, biaxial and ellipsoid joint formed by articulation of the distal end of the radius and the articular disc of the triangular fibrocartilage with the scaphoid, lunate and triquetrum. The radial articular surface and distal discal surface form an almost elliptical, concave surface with a transverse long axis. The proximal articular surfaces of the scaphoid, lunate and triquetrum and their interosseous ligaments form a smooth convex surface that is received into the proximal concavity.

Volume 5, Issue 5; September-October 2022; Page No 301-319

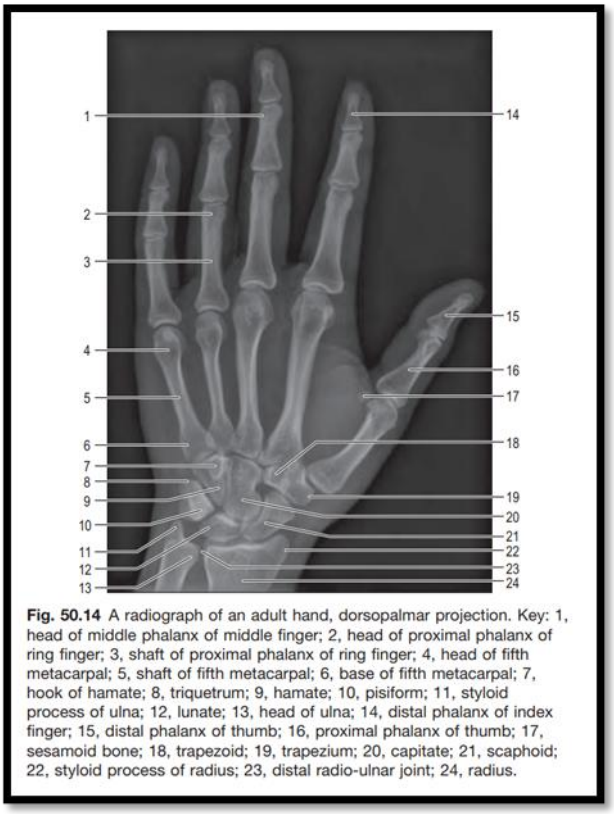


Fig. 50.14 A radiograph of an adult hand, dorsopalmar projection. Key: 1, head of middle phalanx of middle finger; 2, head of proximal phalanx of ring finger; 3, shaft of proximal phalanx of ring finger; 4, head of fifth metacarpal; 5, shaft of fifth metacarpal; 6, base of fifth metacarpal; 7, hook of hamate; 8, triquetrum; 9, hamate; 10, pisiform; 11, styloid process of ulna; 12, lunate; 13, head of ulna; 14, distal phalanx of index finger; 15, distal phalanx of thumb; 16, proximal phalanx of thumb; 17, sesamoid bone; 18, trapezoid; 19, trapezium; 20, capitate; 21, scaphoid; 22, styloid process of radius; 23, distal radio-ulnar joint; 24, radius.

Wrist Ligaments

1.The Triangular Fibrocartilage Complex

The triangular fibrocartilage complex (TFCC) is a ligamentous and cartilaginous structure that suspends the distal radius and ulnar carpus from the distal ulna. It stabilizes the ulnocarpal and radioulnar joints, transmits and distributes load from the carpus to the ulna, and facilitates complex movements at the wrist. By definition, it is made up of the triangular fibrocartilage proper (the articular disc), meniscus homologue (the ulnocarpal meniscus), ulnar collateral ligament, dorsal and palmar radio-ulnar ligaments, floor of extensor carpi ulnaris subsheath, and the ulnolunate and ulnotriquetral ligaments.

2.Extrinsic Ligament

The extrinsic ligaments connect the carpus with the forearm bones. They tend to be longer than the intrinsic ligaments and are approximately one-third as strong.

The extrinsic palmar carpal ligaments are the radioscaphocapitate ligament, the long radiolunate ligament, the radioscapholunate ligament, the short radiolunate ligament, the ulnolunate ligament, the ulnotriquetral ligament.

The extrinsic dorsal carpal ligament is the dorsal radiolunotriquetral ligament.

The intrinsic ligaments consist of proximal row interosseous ligaments, the distal row interosseous ligaments, the palmar midcarpal ligaments, the dorsal midcarpal ligaments.

Volume 5, Issue 5; September-October 2022; Page No 301-319

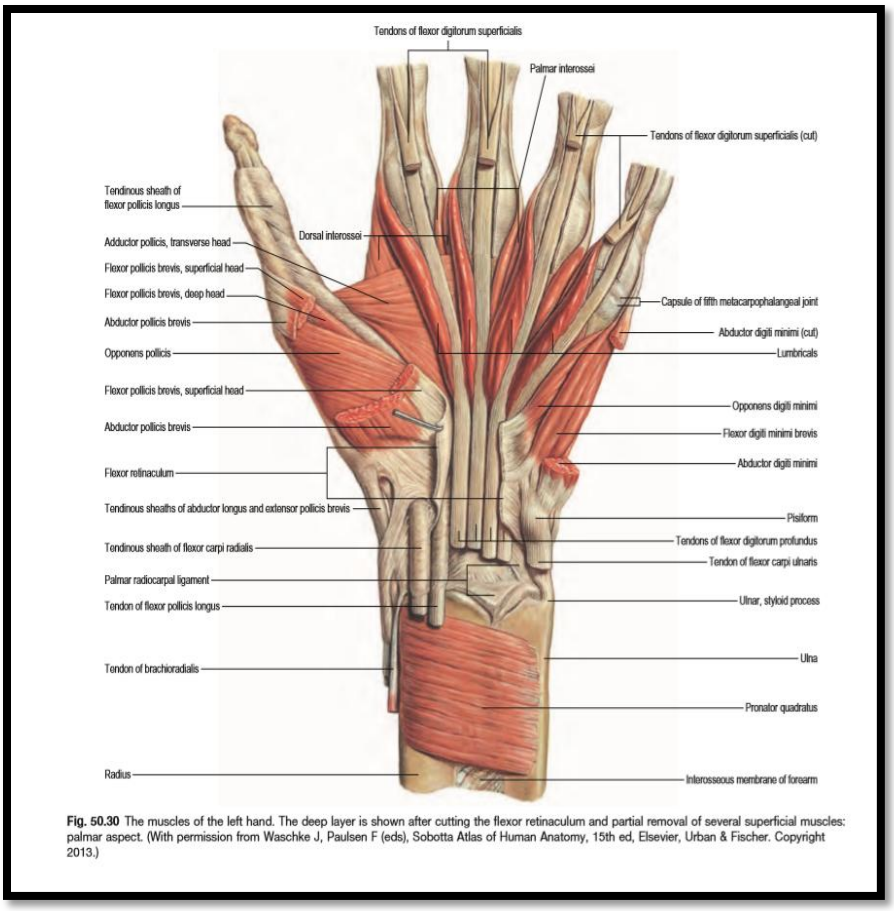


Fig. 50.30 The muscles of the left hand. The deep layer is shown after cutting the flexor retinaculum and partial removal of several superficial muscles: palmar aspect. (With permission from Waschke J, Paulsen F (eds), Sobotta Atlas of Human Anatomy, 15th ed, Elsevier, Urban & Fischer. Copyright 2013.)

Movements Of The Wrist Joint [6]

Flexion: Flexors carpi radialis and ulnaris and palmaris longus produce flexion, assisted by flexors digitorum superficialis and profundus, and flexor pollicis longus.

Extension: Extensors carpi radialis longus, brevis and ulnaris, assisted by extensors digitorum, digiti minimi, indicis and pollicis longus, produce extension.

Adduction (ulnar deviation): Flexor and extensor carpi ulnaris produce adduction.

Abduction (radial deviation): Flexor carpi radialis, extensors carpi radialis longus and brevis, with abductor pollicis longus and extensor pollicis brevis, produce abduction

Radiological Anatomy Of Wrist [7]

The standard series of posteroanterior (PA), lateral and oblique Xray views is useful to visualise a suspected fracture of the distal radius.

A number of radiologic measurements quantifying the orientation of the distal radius are in common use.

Dorsal/palmar tilt: On a true lateral view a line is drawn connecting the most distal points of the volar and dorsal lips of the radius. The dorsal or palmar tilt is the angle created with a line drawn along the longitudinal axis of the radius.

Normal range: 0^0 - 28^0

Radial length: This is measured on the PA radiograph. It is the distance in millimeters between a line drawn perpendicular to the long axis of the radius and tangential to the most distal point of the ulnar head and a line drawn perpendicular to the long axis of the radius and at the level of the tip of the radial styloid. Normal range: 10 – 13mm.

Radial inclination: On the PA view the radius inclines toward the ulna. This is measured by the angle between a line drawn from the tip of the radial styloid to the medial corner of the from the tip of the radial styloid to the medial corner of the articular

Volume 5, Issue 5; September-October 2022; Page No 301-319

surface of the radius and a line drawn perpendicular to the long axis of the radius.Normal range: 21^0 - 25^0

Ulnar variance: This is a measure of radial shortening. Ulnar variance is the vertical distance between a line parallel to the medial corner of the articular surface of the radius and a line parallel to the most distal point of the articular surface of the ulnar head, both of which are perpendicular to the long axis of the radius.

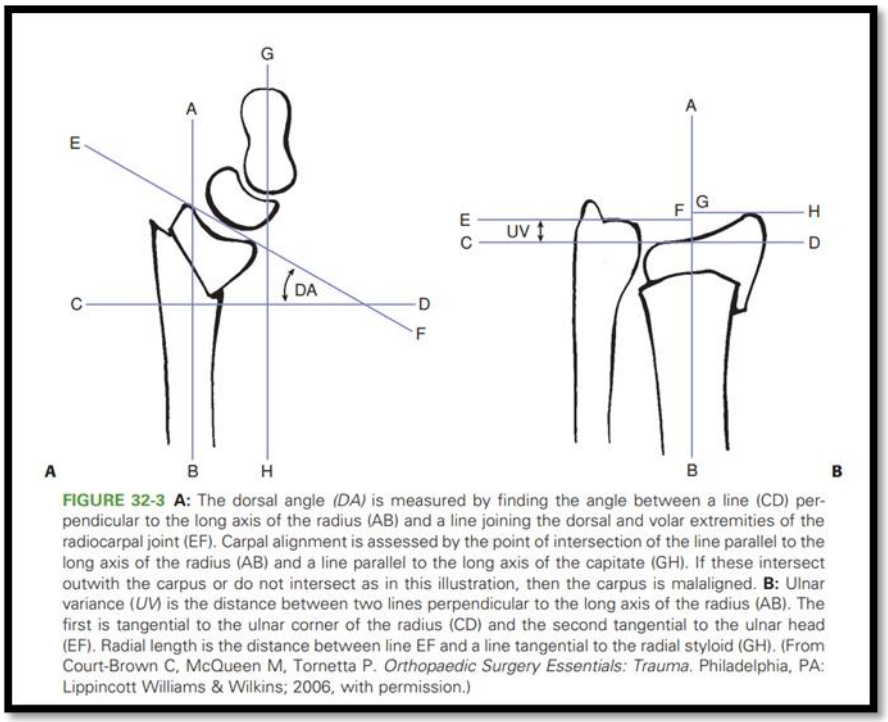


FIGURE 32-3 **A:** The dorsal angle *(DA)* is measured by finding the angle between a line (CD) perpendicular to the long axis of the radius (AB) and a line joining the dorsal and volar extremities of the radiocarpal joint (EF). Carpal alignment is assessed by the point of intersection of the line parallel to the long axis of the radius (AB) and a line parallel to the long axis of the capitate (GH). If these intersect outwith the carpus or do not intersect as in this illustration, then the carpus is malaligned. **B:** Ulnar variance (*UV*) is the distance between two lines perpendicular to the long axis of the radius (AB). The first is tangential to the ulnar corner of the radius (CD) and the second tangential to the ulnar head (EF). Radial length is the distance between line EF and a line tangential to the radial styloid (GH). (From Court-Brown C, McQueen M, Tornetta P. *Orthopaedic Surgery Essentials: Trauma*. Philadelphia, PA: Lippincott Williams & Wilkins; 2006, with permission.)

Materials And Methods

50 patients who sustained distal end radius fracture were admitted and operated in MGM Hospital and medical college. Two groups of 25 each were formed. Group A included those who were operated with locking compression plating and group B included those treated with an external fixator with k wire. Patients were taken for the study after obtaining their consent. Post operatively the patients were evaluated for a duration of 24 weeks using the Mayo functional scoring for wrist and x-rays.

Inclusion Criteria

1. Patient diagnosed with closed intraarticular distal end radius fracture treated surgically with locking compression plate or an external fixator.
2. Age >18 yrs.
3. Both male and female.

Exclusion Criteria

1. Skeletally immature individuals.
2. Open fractures of distal end radius.
3. Distal end radius fractures treated conservatively.
4. Patient not consenting

Pre operative and post operative xrays of intraarticular distal end radius fracture treated with locking plate

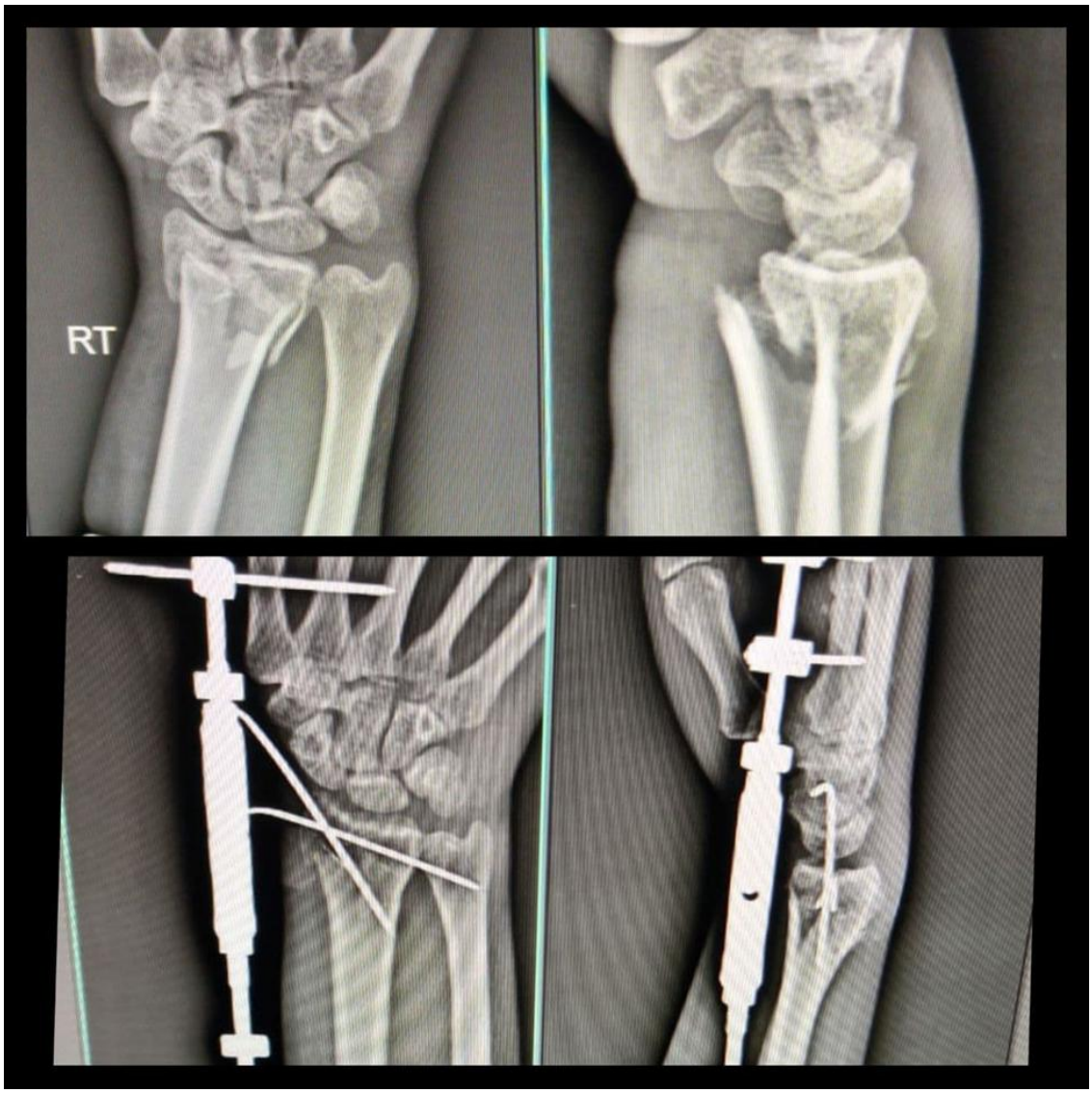
Volume 5, Issue 5; September-October 2022; Page No 301-319

Volume 5, Issue 5; September-October 2022; Page No 301-319

Funtional outcome of intraarticular distal end radius treated with locking plate

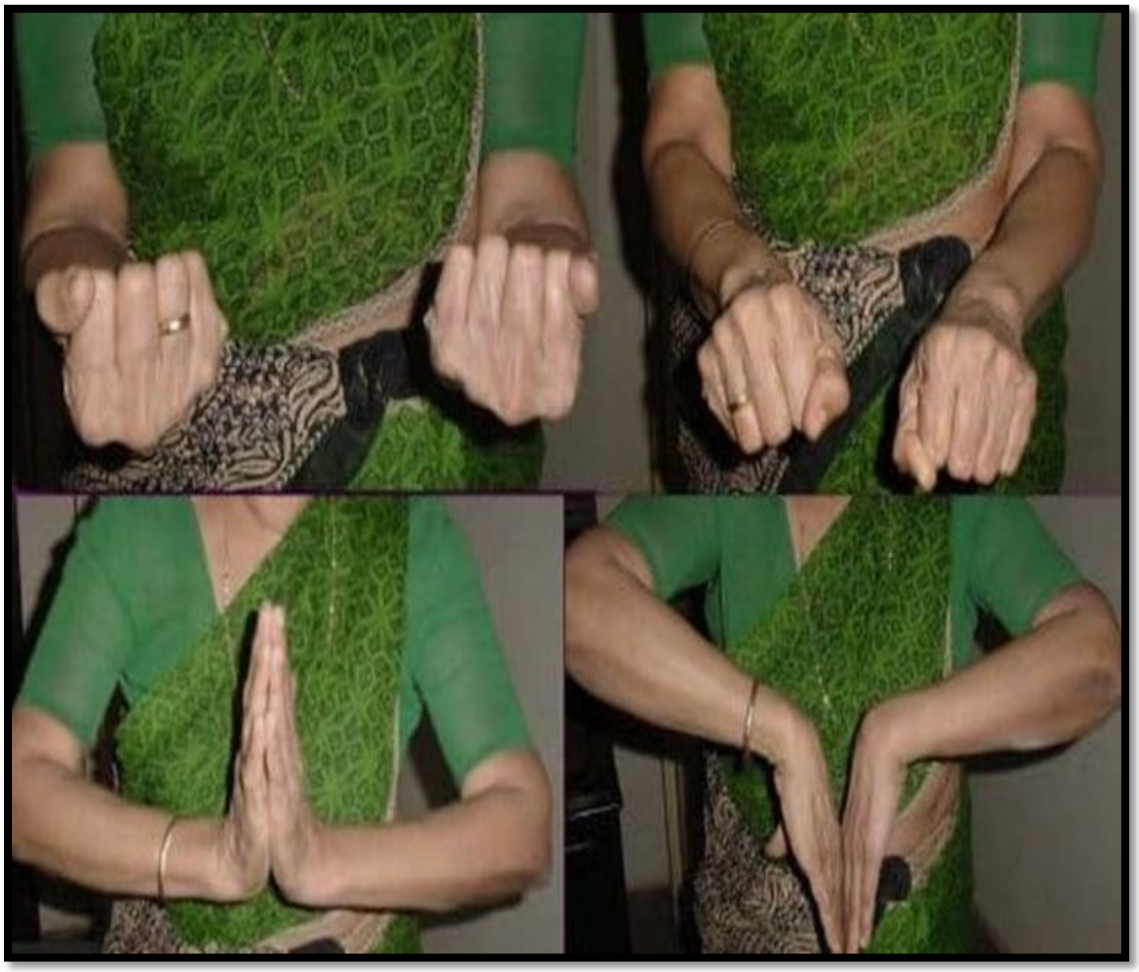
Volume 5, Issue 5; September-October 2022; Page No 301-319

Pre operative and post operative xrays of intraarticular distal end radius fracture treated with external fixator with k-wire



Volume 5, Issue 5; September-October 2022; Page No 301-319

Funtional outcome of intraarticular distal end radius treated with external fixator with k-wire.

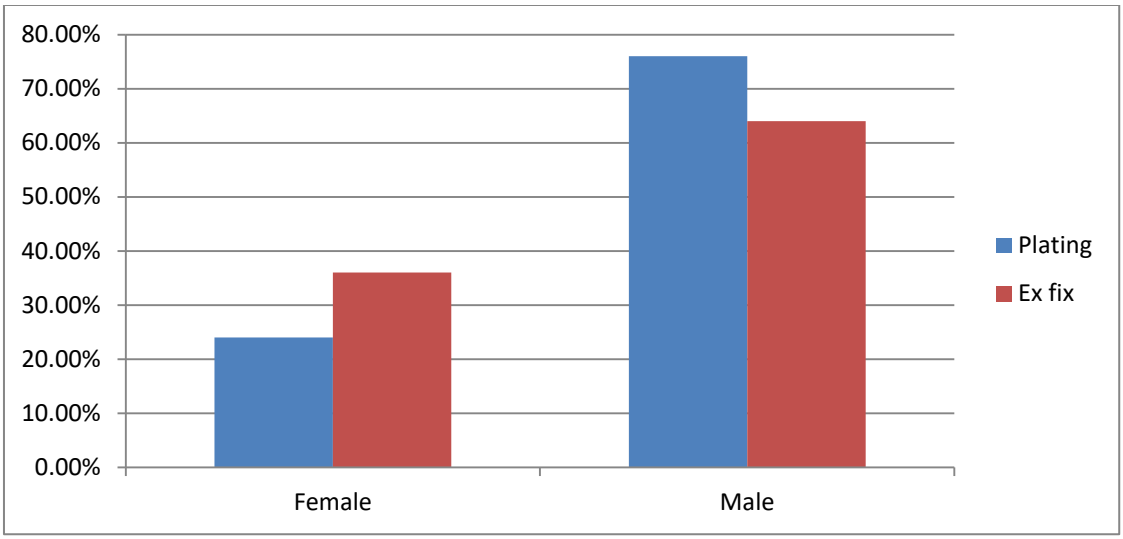


Observations And Results

1.Sex

	Plating		Ex fix	
	Count	%	Count	%
Female	6	24.0%	9	36.0%
Male	19	76.0%	16	64.0%

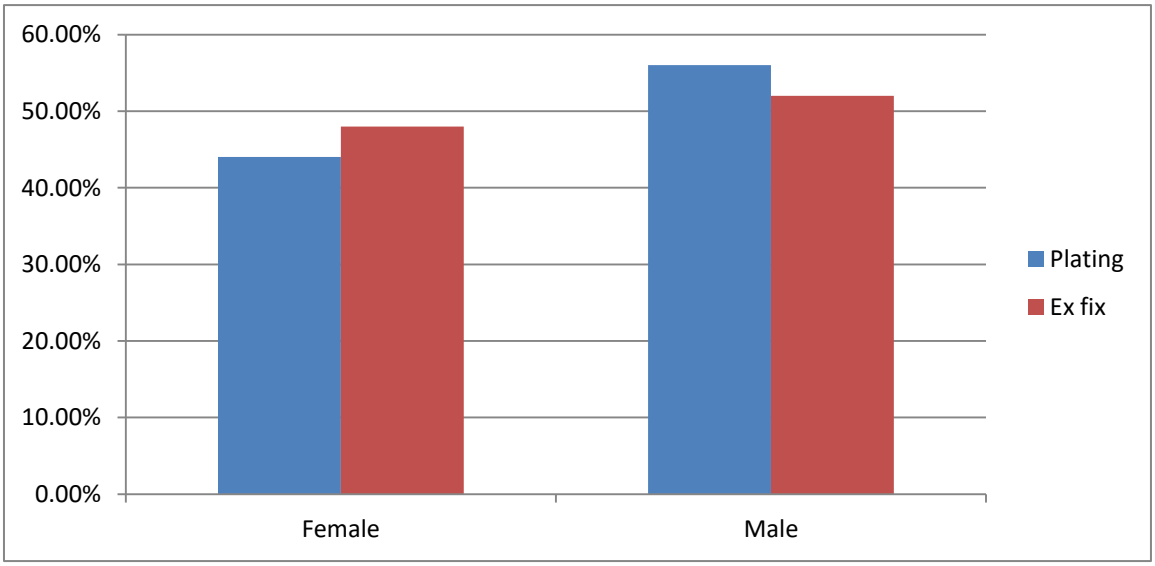
Volume 5, Issue 5; September-October 2022; Page No 301-319



In our study, patients 70% were male and 30% were female. The plating group consisted of 24%(n=6) females and 76%(n=19) males, whereas the exfix group consisted of 36%(n=9) females and 64%(n=16) males.

2.Side

	Plating		Ex fix	
	Count	%	Count	%
Left	11	44.0%	12	48.0%
Right	14	56.0%	13	52.0%

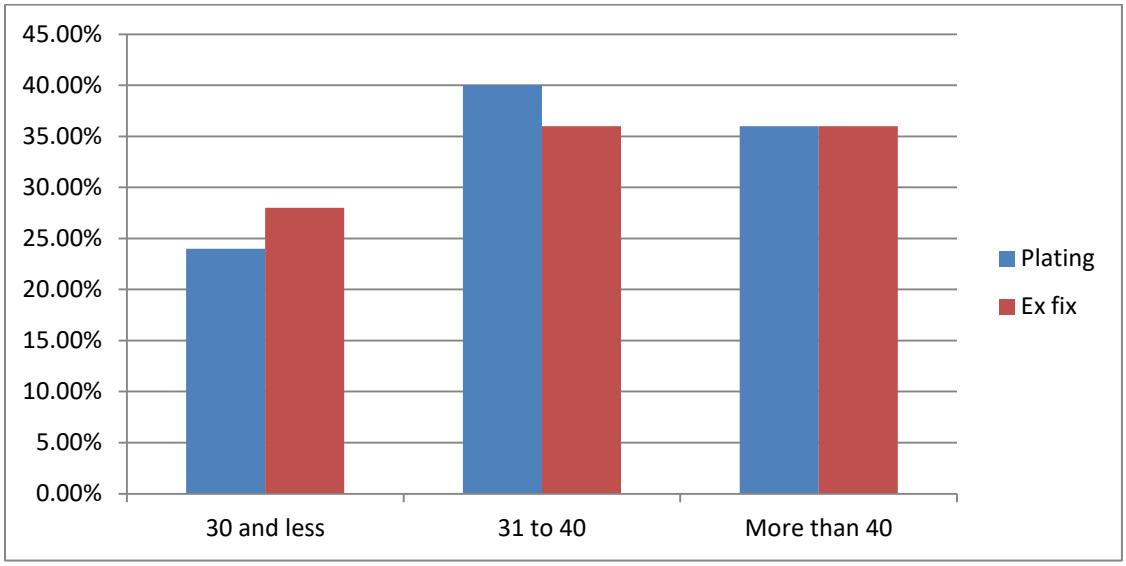


Out of the total 50 patients, 46% patients sustained an intra articular distal end radius fracture on the left side and 54% had a fracture on the right side. Of the 25 patients operated with plating 44% (n=11) had a left sided fracture and 56%(n=14) had a right sided fracture. Those operated with an exfix 48% (n=12) sustained a fracture on left side and 52%(n=13) on the right side.

Volume 5, Issue 5; September-October 2022; Page No 301-319

3.Age Group

	Plating		Ex fix	
	Count	%	Count	%
30 and less	6	24.0%	7	28.0%
31 to 40	10	40.0%	9	36.0%
More than 40	9	36.0%	9	36.0%



In the study, in the plating group 24%(n=6) patients were less than 30 years old, 40%(n=10) belonged to the age group between 31 to 40 years and 36%(n=9) were above 40 years old. The exfix group comprised of 28%(n=7) below 30 years, 36%(n=9) between 31 to 40 years and 36%(n=9) above 40 years.

Test of Normality:

Kolmogorov-Smirnov:

	Groups			
		Statistic	df	Sig.
FMS 6w	Plating	.198	25	.013
	Ex fix	.184	25	.029
FMS 12w	Plating	.295	25	.000
	Ex fix	.170	25	.061
FMS 24w	Plating	.311	25	.000
	Ex fix	.183	25	.031

Volume 5, Issue 5; September-October 2022; Page No 301-319

VOLAR TILT (Degree)	Plating	.209	25	.006
	Ex fix	.372	25	.000
RADIAL INCLINATION (Degree)	Plating	.258	25	.000
	Ex fix	.262	25	.000

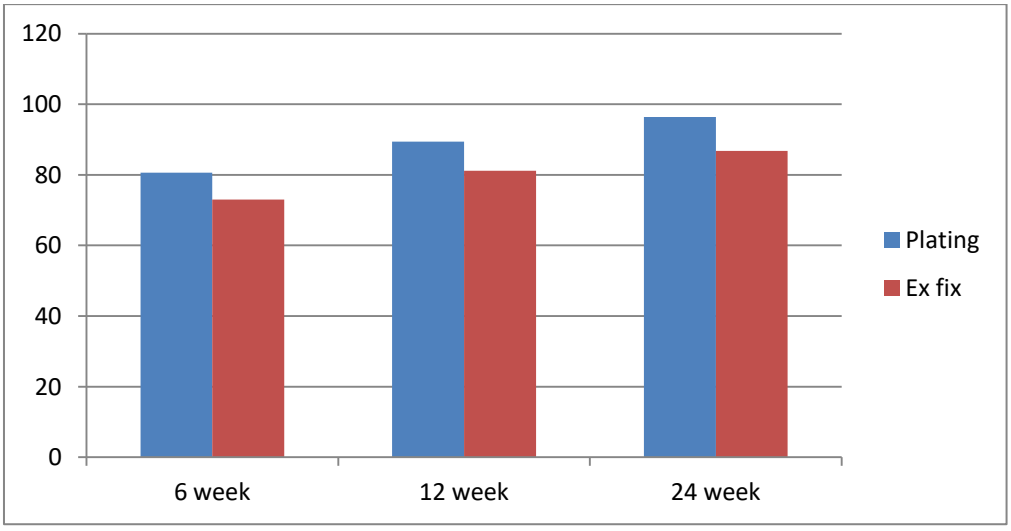
Interpretation:

p-value less than that of 0.05 indicates that the data is not distributed normally. Therefore, we will use Mann-Whitney U test to compare the significance of difference between the average score between two groups Plating and Ex fix.

4. Functional Mayo Scoring Comparison

Descriptive Statistics:

	Groups			
	Plating		Ex fix	
	Mean	SD	Mean	SD
FMS 6w	80.60	10.74	73.00	9.46
FMS 12w	89.40	8.93	81.20	6.81
FMS 24w	96.40	5.31	86.80	7.89



Volume 5, Issue 5; September-October 2022; Page No 301-319

Mann-Whitney U test results:

	6 week	12 week	24 week
Mann-Whitney U	166.000	149.500	106.500
Wilcoxon W	491.000	474.500	431.500
Z	-2.882	-3.223	-4.124
p-value	.004	.001	.000

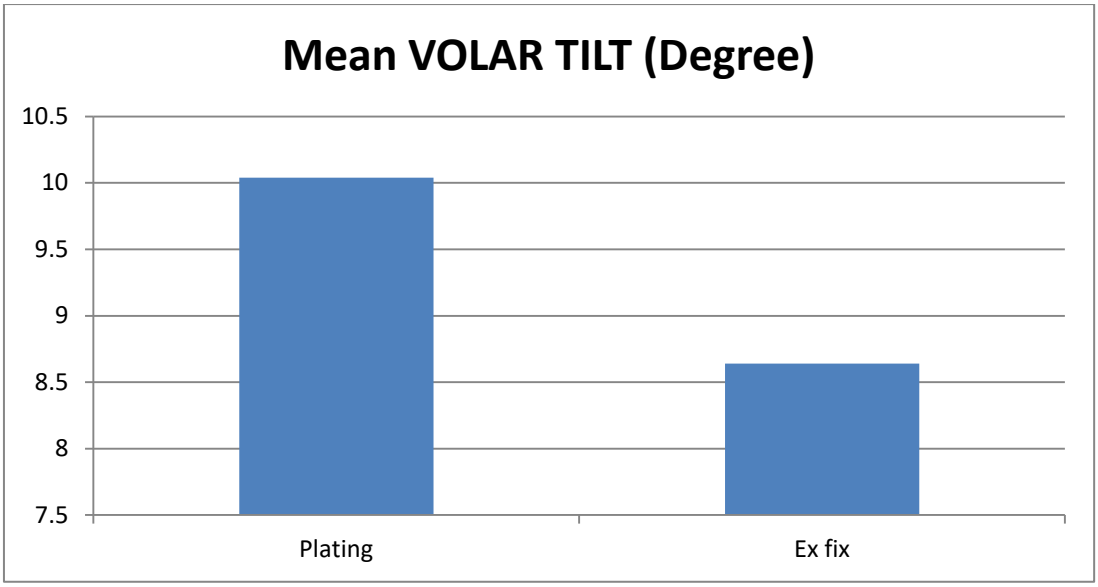
Interpretation:

Since p-value for the Mann-Whitney U test is less than that of 0.05 at 6 Week, 12 week and 24 week indicates that the average score of FMS is significantly more in Plating than that of Ex fix.

5. Radiological Outcome

A. VOLAR TILT (Degree)

Plating		Ex fix	
Mean	SD	Mean	SD
10.04	1.31	8.64	4.52



Mann-Whitney U test results:

	Value
Mann-Whitney U	296.000
Wilcoxon W	621.000
Z	-.333
p-value	.739

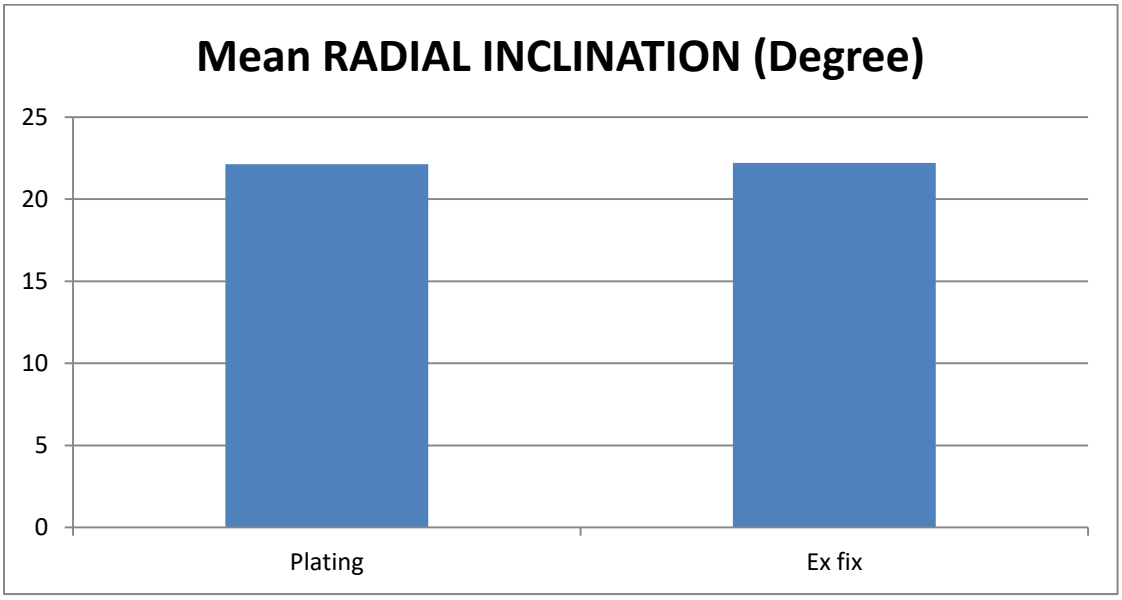
Volume 5, Issue 5; September-October 2022; Page No 301-319

Interpretation:

Since p-value for the Mann-Whitney U test is greater than that of 0.05 for **VOLAR TILT (Degree)** indicates that the average score of **VOLAR TILT (Degree)** is not significantly different for Plating and Ex fix.

B. RADIAL INCLINATION (Degree)

Plating		Ex fix	
Mean	SD	Mean	SD
22.12	.97	22.20	.87



Mann-Whitney U test results:

	Value
Mann-Whitney U	303.500
Wilcoxon W	628.500
Z	-.187
p-value	.852

Interpretation:

Since p-value for the Mann-Whitney U test is greater than that of 0.05 for **RADIAL INCLINATION (Degree)** indicates that the average score of **RADIAL INCLINATION (Degree)** is not significantly different for Plating and Ex fix.

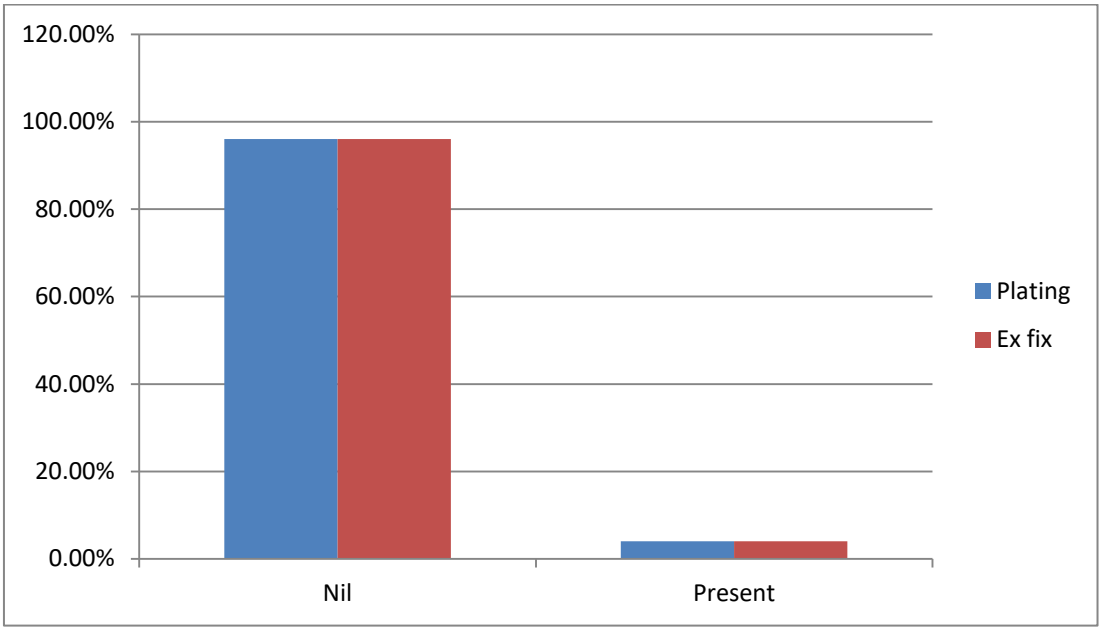
6. Arthritic Changes

	Plating	Ex fix

Volume 5, Issue 5; September-October 2022; Page No 301-319

	Count	%	Count	%
Nil	24	96.0%	24	96.0%
Present	1	4.0%	1	4.0%

In the study, arthritic changes were seen in only 4%(n=1) in both the groups during the follow up period.



7. Loss of Angulation

	Plating		Ex fix	
	Count	%	Count	%
Nil	25	100.0%	25	100.0%

Of the 50 patients, loss of angulation was not seen in any of the patients postoperatively until the last follow-up.

8. Complications

	Groups			
	Plating		Ex fix	
	Count	%	Count	%
CRPS	1	4.0%	3	12.0%
Infection, Pain, Stiffness	0	0.0%	1	4.0%
Inflammation at incision site	1	4.0%	0	0.0%
Pain	0	0.0%	1	4.0%
Pin tract infection	0	0.0%	2	8.0%
Stiffness	1	4.0%	3	12.0%
Stiffness, Infection	1	4.0%	0	0.0%

Volume 5, Issue 5; September-October 2022; Page No 301-319

Nil	21	84.0%	15	60.0%

Three patients (12%) treated with exfix developed CRPS (Complex regional pain syndrome), only one patient (4%) in the plating developed CRPS. Two patients (8%) had pin tract infection in the exfix group which were managed by daily dressings. Stiffness was seen in 12% patients in exfix group and 4% of patients in the plating group and had to undergo aggressive physiotherapy for the same.

Discussion

Distal end radius fracture is commonly seen in young as well as in geriatric age group. Proper reduction and alignment is necessary for a good functional outcome post operatively, especially in intra articular fractures. In our study we had 50 patients of distal end radius fracture, 25 of them were operated with volar locking plate and the rest 25 with external fixator with k wire. Our study was aimed at comparing the functional and radiological outcome of both the group postoperatively. Patients were evaluated postoperatively with Mayo scoring and regular x-rays. These results were compared with other studies by Hammer et. al. [8] , Safdari et al [9] , Williksen et al [10] and Alberto Agustín Jorge-Mora et al [11] for all the criterias in the study.

1.Sample Size:

Study	Sample size	Volar plating	External fixator
Hammer et al	166	84 (50.6%)	82 (49.4%)
Safdari et al	80	37 (46.2%)	43 (53.7%)
Williksen et al	111	52 (46.8%)	59 (53.2%)
Alberto Agustín Jorge-Mora et al	80	40 (50%)	40 (50%)
Our Study	50	25 (50%)	25 (50%)

In the study by Hammer et. al. 50.6% (n=84) of the total 166 patients underwent volar plating for intra articular distal end radius fracture and 49.4% (n=82) were treated with an external fixator. Another study by Safdari et. al. 46.2% (n=37) were treated with volar plating and 53.7% (n=43) were treated with an external fixator. Williksen et. al. included 46.8% (n=52) volar plating group and 53.2% (n=59) in the external fixator group. Alberto Agustin Jorge-Mora et. al. had 50% (n=40) in each group.

In our study we included 50% (n=25) in each group.

2. Sex Distribution:

Study	Volar plating	External fixator
Hammer et al	**70% female**	**67% female**
Safdari et al	**35% female**	**55% females**
Our Study	**24% females**	**36% females**

In the study by Hammer et.al. there were 70%females in the volar plating group as compared to 67% females in the exfix group. Safdari et.al. included 35% females in the volar plating group and 55% females in the exfix group.

In our study there were 24% patients in the volar plating group and 36% females in the external fixator group.

Volume 5, Issue 5; September-October 2022; Page No 301-319

3. Age Distribution:

Study	Average Age (in years)- Volar plating	Average Age (in years)- External fixator
Hammer et. al.	56	54
Alberto Agustín Jorge-Mora et al	52	45
Our Study	40.6	41.04

The average age of patients in Hammer et. al. in the volar plating group was 56 years and in the external fixator group was 54 years. In the study by Alberto Agustín Jorge-Mora et al the average age group for volar plating was 52 years and 45 years in the external fixator group.

In our study, the average age for patients in the volar plating group was 40.6 years, in the external fixator group it was 41.04 years.

4. Functional Mayo Scoring:

Study	Final Mayo score (volar plating)	Final Mayo score (external fixator)	Statistical difference (p value)
Safdari et al	Not described	Not described	<0.05
Williksen et al	92	76	<0.05
Our Study	96.40	86.80	<0.05

In all the studies, which included Safdari et. al., Williksen et. al. as well as our study the final mayo scoring for the volar plating group was significantly higher than that for the external fixator group.

Thus functional outcome was better in volar plating in all the studies, including our studies.

5. Radiological outcome:

Study	Volar tilt (p value)	Radial inclination (p value)
Hammer et. al.	0.119	0.002
Williksen et al	0.7	0.3

Volume 5, Issue 5; September-October 2022; Page No 301-319

Our study	0.739	0.852

No statistical difference was seen in the volar tilt and radial inclination in both the groups in all the studies which included Hammer et. al., Williksen et. al as well as our study.

Complications:

Main complication seen was stiffness (12% in exfix and 4% in plating group), which hampered the functional outcome, it was managed by regular physiotherapy. Complex regional pain syndrome (CRPS) was seen in 3 (12%) patients in the external fixator group and in 1 (4%) patient in the plating group. Pin tract infections were seen in the external fixator group in 3 (12%) patients, it was managed by daily dressings and antibiotics.

In a study by Alberto Agustín Jorge-Mora et al in the plating Group there was one case of Complex Regional Pain Syndrome I, there was an infection (treated with antibiotics) and there were needed 4 extractions of the volar-locking plate, 1 due to pain and 3 because of discomfort. Complications in the external fixator Group were four cases of CRPS, one patient with a painful scar, one lesion of the cutaneous branch of the radial nerve.

In a study by Hammer et. al. the external fixator group showed a higher prevalence of complex regional pain syndrome and the plating group had a higher frequency of suboptimal placement of implants.

Conclusion

In our study we concluded that there was no significant difference in terms of radiological outcomes in either the volar plating group or the external fixator with k wire group. However there was significant difference seen in the functional outcome in the volar plating group as compared to the external fixator group with k wire. Therefore, volar plating is recommended for a better functional outcome.

References

1. Court-Brown CM, Caesar B. Epidemiology of adult fractures: A review. Injury. 2006 Aug;37(8):691-7.
2. Margaret M.,Rockwood and Green's Fractures in Adults; McQueen, C. M. Court-Brown, Heckman J. D., Ricci, W. M., Tornetta P., Heckman J., eighth edition, 2015,1059
3. Oestern HJ. Distale Radius fraktur [Distal radius fracture]. Orthopade. 1988 Feb;17(1):52-63.
4. Axelrod TS, McMurtry RY. Open reduction and internal fixation of comminuted, intraarticular fractures of the distal radius. J Hand Surg Am. 1990 Jan;15(1):1-11.
5. Standring S, 2016, Gray's anatomy: The anatomical basis of clinical practice, 41st edn . Edinburgh, Churchill Livingstone2018, pg 872-874
6. Standring S, 2016, Gray's anatomy: The anatomical basis of clinical practice, 41st edn . Edinburgh, Churchill Livingstone2018, pg 874-875.
7. Margaret M., Rockwood and Green's fractures in adults; McQueen, C. M. Court-Brown, Heckman J. D., Ricci, W. M., Tornetta P., Heckman J., eighth edition, 2015.pg 1062-1063.
8. Hammer OL, Clementsen S, Hast J, Šaltytė Benth J, Madsen JE, Randsborg PH. Volar Locking Plates Versus Augmented External Fixation of Intra-Articular Distal Radial Fractures: Functional Results from a Randomized Controlled Trial. J Bone Joint Surg Am. 2019 Feb 20;101(4):311-321.
9. Safdari M, Koohestani MM. Comparing the effect of volar plate fixators and external fixators on outcome of patients with intra-articular distal radius fractures: A clinical trial. Electron Physician. 2015 Jun 5;7(2):1085-91.
10. Williksen JH, Frihagen F, Hellund JC, Kvernmo HD, Husby T. Volar locking plates versus external fixation and adjuvant pin fixation in unstable distal radius fractures: a randomized, controlled study. J Hand Surg Am. 2013 Aug;38(8):1469-76.
11. Jorge-Mora AA, Cecilia-López D, Rodríguez-Vega V, Suárez-Arias L, Andrés-Esteban E,

Volume 5, Issue 5; September-October 2022; Page No 301-319

Porras-Moreno MÁ, Resines-Erasun C. Comparison between external fixators and fixed-angle volar-locking plates in the treatment of distal radius fractures. J Hand Microsurg. 2012 Dec;4(2):50-4.

Appendices : Mayo Wrist Scoring System

	Point
Pain	
No pain	25
Mild occasional	20
Moderate	15
Severe	0
Work status	
Regular job	25
Restricted job	20
Able to work but unemployed	15
Unable to work due to pain	0
Range of motion	25
>120°	25
100 to 119°	20
90 to 99°	15
60 to 89°	10
30 to 59°	5
0 to 29°	0
Grip strength (% of normal)	
90 to 100	25
75 to 89	15
50 to 74	10
25 to 49	5
0 to 24	0

* Total point scores: excellent (91 to 100), good (80 to 90), fair (65 to 79), and poor (<64).

Volume 5, Issue 5; September-October 2022; Page No 301-319