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A comparative study of management of intraarticular fracture lower end of radius by conservative versus surgical method: A prospective study of 80 patients

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Abstract

Introduction: Distal radial fracture is one of the most common injuries to the musculoskeletal system, which are managed both conservatively & surgically. There are pitfalls, advantages & disadvantages in each method. This study was conducted in orthopaedic department of our medical college from September 2016- November 2018 to compare the results of conservative versus operative treatment of intraarticular distal end radius fractures.

Material and methods: Total of 80 patients, (53 males & 27 female) of 20-80 yrs of age were treated conservatively or surgically depending upon the displacement and comminution. Those with minimum comminution and displacements (40 patients) were managed conservatively and others with more displacements and comminution (40 number) were treated surgically using either pinning, plating or external fixation.

Results: Most commonly the mode of injury, wrist involvement & fracture type were RTA (45%), Right side (51.25%) & Frykman's III (41.7%) respectively. Excellent results were seen in 47.5% in surgical group & 30% in conservative group.

Conclusion: We conclude that surgical management is better than conservative in the treatment of comminuted & displaced intra articular fractures of distal end of radius. However, we cannot generalize one treatment method for all fracture patterns & it should be individualized to a particular fracture.

Keywords: intra articular distal end radius fracture, conservative treatment, external fixators

Introduction

Fractures of the distal radius remain the most common fractures approximately one-sixth of all fractures treated in emergency departments [1]. There are three main peaks of fracture distribution: the first peak is in children ages 5 to 14, the second is in males under age 50 & the third peak is in females over the age of 40 yrs. Majority are being treated conservatively by CR with local anaesthesia. However, other distal radial fractures require surgical management & many treatment methods are available.

The outcome of these fractures is not uniformly good regardless the treatment instituted. There is a strict relationship between the quality of anatomical reconstruction & the long-term functional outcome. No single treatment is the solution for all fracture in different patient. Treatment aims should be to reconstruct the anatomy as good as possible, to guarantee that there is no loss of reduction & to allow for a functional recovery after treatment as soon as possible [3].

This study was conducted in orthopaedic department of our medical college from to compare the results of conservative versus operative treatment of intraarticular distal end radius fractures.

Aims & objectives

1. To compare the clinical & functional outcome of intra-articular fractures of distal end of radius with conservative versus surgical management.
2. To infer the appropriate management by assessing the scope of conservative management in case of intra articular fractures of distal end of radius.

Materials & Methods

We studied prospectively 80 patients with Intra-articular distal radius fractures. 40 were treated conservatively and 40 with surgically. Out of those treated surgically, 10 were managed by Pinning, 10 with Ligamentotaxis with External fixator & 20 with Plating in the Department of Orthopaedics, of our institution during September 2016 to November 2018.

Inclusion criteria

1. Male & female of age 20 to 80 yrs with intra articular fracture of distal end of radius who has given consent for the procedure.
2. Patients who are medically fit for surgery when required.

Exclusion criteria

1. Patients who are medically unfit for surgery.
2. Patients not willing for surgery.

The patients were followed up for minimum of six months. The functional, radiographic & overall results were recorded

according to PRWE & Demerit point system Score.

- Functional grading was made depending on pain, mobility & work.
- Radiological grading was made based on varus or valgus deformity, shortening, signs of osteoarthritis & union of fracture.
- The outcome is compared with the result available from the latest literature.

At our Hospital, most of the Intra-Articular Distal radius fractures are managed conservatively because the patients are not willing for surgical management of fractures. Surgical methods adopted were Pinning, Ligamentotaxis with External fixator & Plating.

In present study, the treatment was decided based on amount of displacement and comminution. Fractures with minimal displacement and minimal comminution were treated conservatively on OPD basis. Whereas most fractures which were displaced & comminuted were admitted and treated surgically after standard preoperative investigations and evaluation for anaesthetic fitness.

Various Implants used

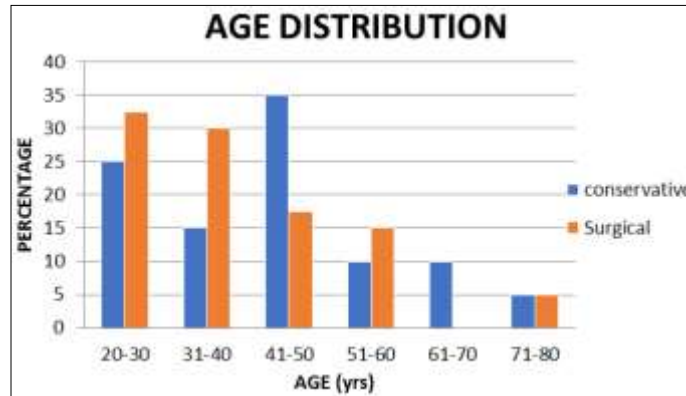
Pinning	External Fixation	Plating
K-wires - 1mm, 1.5mm & 2mm	Schanz's pins - 2.5, 3.5mm Clamps, Connecting rods	Ellis Plate Distal radial LCP

Surgical procedure

All procedures were performed under GA or Supraclavicular block with patient in supine position using standard surgical techniques for CRPCP, Ex Fix or ORIF with plating.

Post discharge follow-up at regular intervals for serial clinical & radiological evaluation was done on OPD basis.

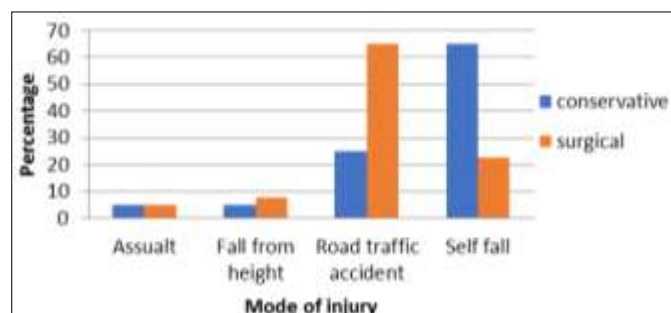
Results



Graph 1: Graph showing Age distribution of conservative X surgically treated patients

Gender distribution

Gender	Conservative management		Surgical management	
	No	%	No	%
Male	20	50.0	33	82.5
Female	20	50.0	7	17.5
Total	40	100.0	40	100.0



Graph 2: Distribution of mode of injury in two groups.

Table 4: Distribution of classification in two groups

Classification	Conservative management (n=20)		Surgical management (n=40)	
	No	%	No	%
Frykman's classification				
Type I	-	-	-	-
Type II	-	-	-	-
Type III	18	45.0	16	40.0
Type IV	4	10.0	1	2.5
Type V	-	-	-	-
Type VI	-	-	-	-
Type VII	6	15.0	12	30.0
Type VIII	12	30.0	11	27.5
A O classification				
B1.1	6	15.0	5	12.5
B1.2	6	15.0	1	2.5
B2.2	2	5.0	2	5.0
B3.1	4	10.0	3	7.5
B3.2	0	0.0	7	17.5
C1.2	2	5.0	0	0.0
C1.3	2	5.0	0	0.0
C2.2	6	15.0	9	22.5
C3.1	6	15.0	4	10.0
C3.2	4	10.0	8	20.0
C3.3	2	5.0	1	2.5

Distribution of Laterality in two groups

Side	Conservative management		Surgical management	
	No	%	No	%
Left	22	55	17	42.5
Right	18	45	23	57.5
Total	40	100	40	100

Distribution Management in two groups

Management	Conservative		Surgical	
	Number	Percentage	Number	Percentage
Conservative	40	100%	0	00%
External Fix	0	00	10	25%
K-wire	0	00	10	25%
Plating	0	00	20	50%
Total	40	100%	40	100%

Comparison of Time of union in two groups

Time of union	Conservative treatment		Surgical Treatment	
	Number	Percentage	Number	Percentage
6 weeks	18	45%	35	87.5%
3 months	20	50%	5	12.5%
6months	2	5%	0	0%
Total	40	100%	40	100%

Comparison of pain score in two different groups of managements

Pain Score	Conservative		Surgical	
	Number	Percentage	Number	Percentage
1-10	12	30	19	47.5
11-20	14	35	12	30
21-30	6	15	5	12.5
31-40	4	10	4	10
>40	4	10	0	00
Total	40	100	40	100
Mean± SD	20.30±12.19		15.17±8.89	

Comparison of Function Score in two groups

Function Score	Conservative		Surgical T/t	
	Number	Percentage	Number	percentage
1-10	4	10	7	17.5
11-20	10	25	18	45

21-30	6	15	11	27.5
31-40	8	20	1	2.5
>40	12	30	3	7.5
Total	40	100	40	100
Mean± SD	29.20± 15.67		19.12± 10.41	

Table showing comparison of movements:

Movements	Conservative T/t n-40		Surgical T/t n-40		p-value
	Number	Percentage	Number	Percentage	
Dorsiflexion					
1-10	4	10	0	00	0.002**
11-20	2	05	1	2.5	
21-30	2	05	2	05	
31-40	-	-	-	-	
>40	32	80	37	92.5	
Palmer flexion					
<50	14	35	8	20	0.334**
51-75	10	25	17	42.5	
>75	14	35	15	37.5	
Arc of Dorso-palmer flexion					
<100	8	20	4	10	0.588**
100-150	20	50	24	60	
>150	12	30	12	30	
Radial Deviation					
1-10	30	75	32	80	0.925**
11-20	8	20	8	20	
Ulnar Deviation					
1-10	8	20	5	12.5	0.610**
11-20	22	55	29	75.5	
21-30	8	20	5	12.5	
31-40	0	00	1	2.5	
Arc of Radio-ulnar Deviation					
<10	6	15	10	25	0.322**
11-50	34	85	38	95	
>50	0	00	0	00	
Pronation					
<50	6	15	10	25	0.757**
50-75	10	25	9	22.5	
>75	24	60	21	52.5	
Supination					
<50	4	10	3	7.5	1.00**
50-75	10	25	12	30	
>75	26	65	25	62.5	
Arc of Pronation- Supination					
<100	4	10	5	12.5	1.00**
101-150	14	35	13	32.5	
>150	22	55	22	55	

Comparison of Loss of Movements % in two groups

Loss of Movements %	Conservative management		Surgical management	
	No	%	No	%
1-10	4	10.0	3	7.5
11-20	12	30.0	10	25.0
21-30	0	0.0	11	27.5
31-40	12	30.0	4	10.0
41-50	8	20.0	8	20.0
>50	4	10.0	4	10.0
Total	40	100.0	40	100.0
Mean ± SD	35.20±24.47		29.50±16.37	

Mean loss of movement % is statistically less in patients with surgical management with P=0.288

Comparison of Radial Parameters & Complication in two groups

Complications	Conservative management (n=20)		Surgical management (n=40)		P value
	No	%	No	%	
Radial Inclination					
Lost	18	45.0	13	32.5	

Retained	22	55.0	27	67.5	0.344
Radial length					
Lost	18	45.0	14	35.0	0.453
Retained	22	55.0	26	65.0	
Intra articular Step					
Lost	28	70.0	24	60.0	0.553
Retained	12	30.0	16	40.0	
Mal Union					
Absent	28	70.0	36	90.0	0.050*
Present	12	30.0	4	10.0	

Comparison of Results in two groups

Results	Conservative management		Surgical management	
	No	%	No	%
Excellent	12	30.0	18	45.0
Good	6	15.0	13	32.5
Fair	14	35.0	8	20.0
Poor	8	20.0	1	2.5
Total	40	100.0	40	100.0
Inference	Distribution of outcome based on results is statistically significant for Fair/Poor in Conservative management with $p=0.046^*$			

Discussion

We studied prospectively 80 Patients, with Intra-articular distal radius fractures. 40 were treated with conservative management, 40 with surgical management. Out of 40 surgical 10 were managed by Pinning, 10 by Ligamentotaxis with External fixator & 20 with plating.

Age distribution

Mean age & most common age was less in surgical group. Most common age group as 41-50 (35.0%) with mean age being 43.50 years in conservative group. Years where as in surgical group most common age group was 20-30 years (32.5%) with mean age being 39.97 years, similar to Harish Kapoor *et al.* [8] study. The best outcome or results were seen among young individuals.

Sex distribution

In our series of 80 patients, there were 53 males (66.25%) & 27 female (33.75%) similar to Harish Kapoor *et al.* [8] study. Gender was confounding factor as in surgical group males were 33 (82.5%) & females were 7 (17.5%), where as in conservative group male & female were equal.

Mode of injury & Fracture pattern

RTA was most common mode of injury in study accounted for 45% of cases similar to study of Harish Kapoor *et al.* [8] But self-fall (65%) in conservative and RTA (65%) in surgical group was more common.

Frykman's type III was most common fracture in both the groups followed by type VIII. AO type C3.2, C3.3 & B2.2 were more common among RTA cases & among surgical group.

The excellent & good outcome in conservative group was seen only in stable, minimally comminuted & minimally displaced fracture pattern. Excellent & good outcome were seen in many of such fracture pattern among surgical group.

Laterality

Overall Right side was more commonly injured (51.25%). Right side was more affected among surgical group (57.5%) & left in conservative group (55%).

Time of Union

Is significantly less (6 weeks) associated with Surgical management (87.5%) similar to results of Toshiko Hiroshima

[10], whereas it was more (3 months) in conservative group (50%). 5% had union at 6 months in conservative & none in surgical. Delayed union was seen more among postmenopausal females & aged males.

The percentage of loss of movement did not correlate very well with time of union. Even the patients with Time of Union of 6 weeks had greater percentage of Loss of Movements & also patients with Time of Union of 3 months had good range of movements. Similarly pain & function score at 6 months follow up did not correlate with Time of Union.

Mean pain score was significantly less associated with surgical management with ($P=0.07$), values being 20.30 in conservative & 16.7 in surgical group. In the surgical group least being in Plating group (12) & more in K-wire group (23.1) [more than conservative group] similar to other studies Chin-En Chen *et al.* [9] & Carrozzella J. [4].

Mean function score is significantly less in patients with surgical management ($P = 0.004$), values being 29.2 for conservative group & 20.7 for surgical group. In the surgical group it was least in External fixator group (8.7) & more in K-wire group (35.4). Function score was poor among the patients who delayed physiotherapy.

Movements

Mean loss of movements was less in surgical group 29.5% than conservative group 35.2%. Among surgical group least was in plating (30%) & more in K-wire (35%).

Mean Dorsi-flexion in conservative was 55° & in surgical group 68° . Mean Palmar-flexion for conservative group was 61° & 69° for surgical group. Mean Arc of Dorso-palmar flexion for conservative group was 116° & 136° for surgical group.

Mean radial deviation was 9 conservative group and surgical group. Mean Ulnar deviation for conservative group was 16 and 18 for surgical group. Mean arc of Radio-Ulnar deviation for conservative group was 24 & 26 for surgical group.

Mean Pronation for conservative group was 71° & 68° for surgical group. Mean Supination for conservative group was 73° & 78° for surgical group. Mean arc of Pronation-supination for conservative group was 144° & 147° for surgical group.

All movements were similar to study of Harish Kapoor *et al.* [8] In surgical group, all movements were maximum in plating group & minimum in K-wire group.

Mal-union was seen in 30% cases of conservative group & 10%

in surgical group. In K-wire group 30% & none in plating. Malunion was seen in case of fractures with excess initial displacement, excess comminution treated conservative or with K-wire. Stiffness of wrist & fingers was seen in 10% in both the groups. Shoulder hand syndrome was seen in 10% in conservative group & none in surgical group. Osteodystrophy was seen in 5% in conservative group & none in surgical group. Intra-articular step was seen in 30% cases of conservative group & 41.7% in surgical group. In contrast to other studies Knirk-JL *et al.* [7] Harish Kapoor *et al.* [8] it was best corrected with plating & least with external fixator. The percentage of patients having step were 10%, 60% & 50% in plating, external fixator & K-wire groups respectively.

Radial inclination was lost in 45% cases of conservative group & 32.5% in surgical group. Radial inclination was best restored with plating (75%) in our study & least with K-wire (30%).

Radial length was lost in 45% cases of conservative group & 35% in surgical group. Radial length was best restored with plating (75%) in our study & least with K-wire (70%) in contrast to other studies Horesh *et al.* [6] & Harish Kapoor *et al.* [8] where it is best restored with external fixation.

Excellent results were seen in 30% of cases in conservative group & 47.5% in surgical group. Excellent & good results were seen in 90% in plating & 50% in K-wire among surgical group. Results are similar to other studies Knirk J L *et al.* [7] Kapoor H *et al.* [8] & Arora J *et al.* [5]

Conclusion

From the study, we conclude the following:

1. Conservative management is better in managing undisplaced, minimally comminuted fractures & fractures with minimal initial displacement.
2. For fractures with minimal comminution, K-wires appeared to be better suited & gave better results if used with plaster.
3. For highly comminuted fractures where no reconstruction was possible without sufficient purchase for screws, External fixator was found to be a better option.
4. For Barton fractures & comminuted fractures where articular reconstruction was still possible, Plating gave better results.

Therefore, we cannot generalize one treatment method for all fracture patterns & treatment should be individualized to a particular fracture.

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