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Research Article

To compare the functional outcome of distal radius fractures treated with closed reduction and cast application versus volar plating

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Abstract

Background: Fractures of distal radius account for 20% of all fractures treated in emergency department. These fractures result from low energy injuries in elderly population and high energy injuries in young adults. Most of these fractures are relatively uncomplicated and are effectively treated by closed reduction and casting. However, fractures that are unstable intra-articular can jeopardize the integrity of the articular congruence and kinematics of articulations resulting in high prevalence of complications. So to overcome these above complications, there is a shifting trend towards surgical management.

Aim: To compare the functional outcome of distal end radius fractures treated with closed reduction and cast application versus volar plating in our institution.

Methods: A randomized prospective interventional study was done in our institution in which all the patients of distal end of radius fractures were included as per inclusion and exclusion criteria. 30 patients were included in the study and followed up to 6 months. They were distributed equally into two groups i.e. 15 patients were treated surgically and the rest 15 conservatively. As all the patients were having similar characteristics, therefore no difference was noted among the groups w.r.t. demographic information. Patients were recommended for follow up at 6 days, 6 weeks, 3months and 6 months interval and routine x-rays were taken and dash scoring done to assess the functional recovery.

Results: 30 patients were included in this study and followed up to 6 months. The Affected limb DASH score at 6 months was compared in operative and no operative patients. In current study, Good score of Affected hand post-reduction dash score at 3 months was significantly more among Operative management. Fair score was significantly more among Conservative management. Excellent score at 6 months was significantly more among Operative management.

Conclusion: It can be concluded that surgical intervention for fracture distal end radius reduces chances of wrist joint stiffness and loss of reduction which gave good functional results as compared to conservative intervention. Hence, in our opinion surgical intervention for treatment of fracture distal end radius is a good method with excellent outcome.

Keywords: fracture, unstable, radius, surgical, outcome

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(13.3%) and 51 years- 60 years (6.7%) as per given Fig. 1&2 and Table 2 and 3.

As per Frykman's classification, Type 1 occurred among 13.3%, Type 2 among 13.3%, Type 3 among 33.3%, Type 4 among 10.0%, Type 5 among 10.0%, Type 6 among 6.7%, Type 7 among 3.3% and Type 8 among 10.0% (Fig. 3 and 4) and (Table 4 and 5).

Operative management was done among 15 (50.0%) and Conservative among 15 (50.0%) patients.

The comparison between Operative and Conservative management using chi-square test there was a significant difference in affected hand

Table 1. Distribution of study population according to Age

Age groups	Frequency	Percent (%)
21 years-30 years	9	30.00%
31 years-40 years	10	33.30%
41 years-50 years	4	13.30%
51 years-60 years	2	6.70%
Above 60 years	5	16.70%

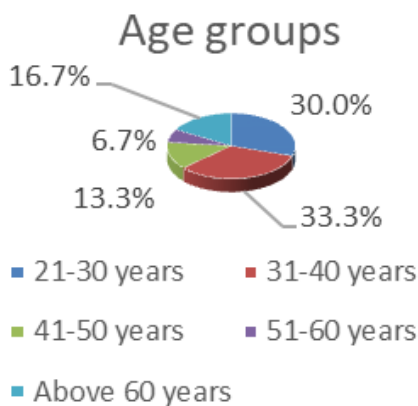


Fig. 1. Age groups above 60 years

Table 2. Distribution of study population according to Gender

Gender	Frequency	Percent (%)
Male	14	46.70%
Female	16	53.30%
Total	30	100.00%

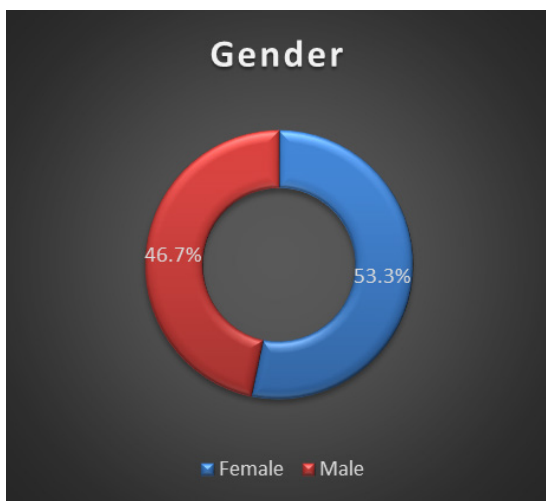


Fig. 2. The study population had 46.7% males and 53.3% females

Table 3. Distribution of study population according to Site of Injury

Site of Injury	Frequency	Percent
Left wrist	13	43.30%
Right Wrist	17	56.70%

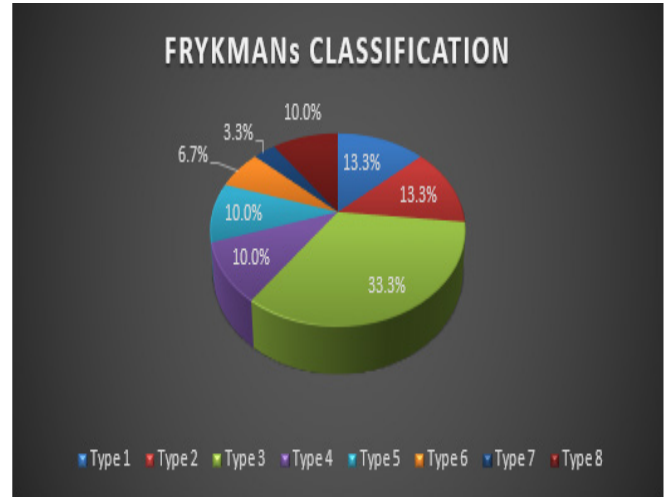


Fig. 3. FRYKMANs classification from type 1 to type 8

Table 4. Distribution of study population according to Frykman's Classification

Frykman's Classification Type	Frequency	Percent (%)
Type 1	4	13.3%
Type 2	4	13.3%
Type 3	10	33.3%
Type 4	3	10.0%
Type 5	3	10.0%
Type 6	2	6.7%
Type 7	1	3.3%
Type 8	3	10.0%

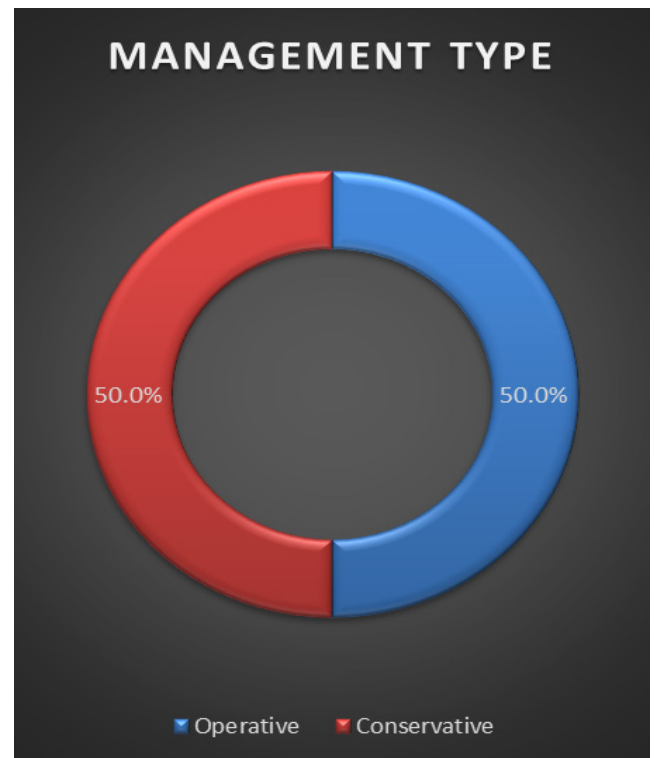


Fig. 4. Conservative and Operative management

Table 5. Distribution of study population according to Frequency

Management Type	Frequency	Percent(%)
Operative	15	50.0%
Conservative	15	50.0%

post-reduction dash score at 6 days between Operative and Conservative management. Fair score was significantly more among Conservative management (Fig. 5 and Table 6).

The comparison of affected hand post reduction DASH score at 6 weeks between operative and conservative management using chi-square test which showed no significant difference (Fig. 6 and Table 7).

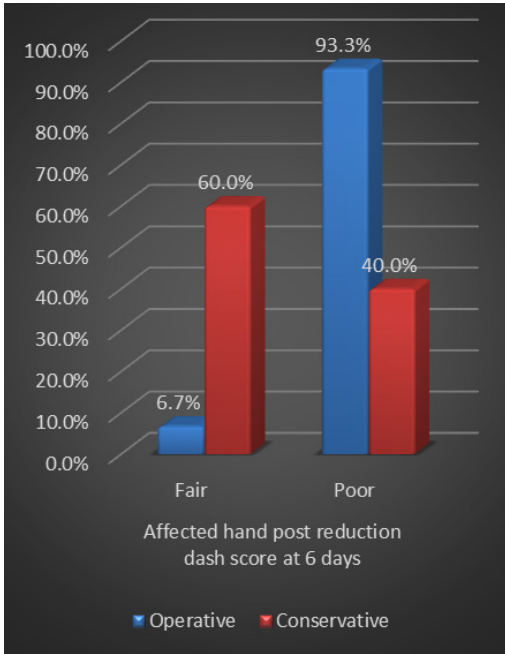


Fig. 5. Operative and conservative management

Table 6. Distribution of study population according to affected hand post-reduction dash score at 6 days

Affected hand post-reduction dash score at 6 days	Management Type	
	Operative	Conservative
Fair	1 6.70%	9 60.00%
Poor	14 93.30%	6 40.00%

Chi-square value = 9.600, p-value = 0.002*

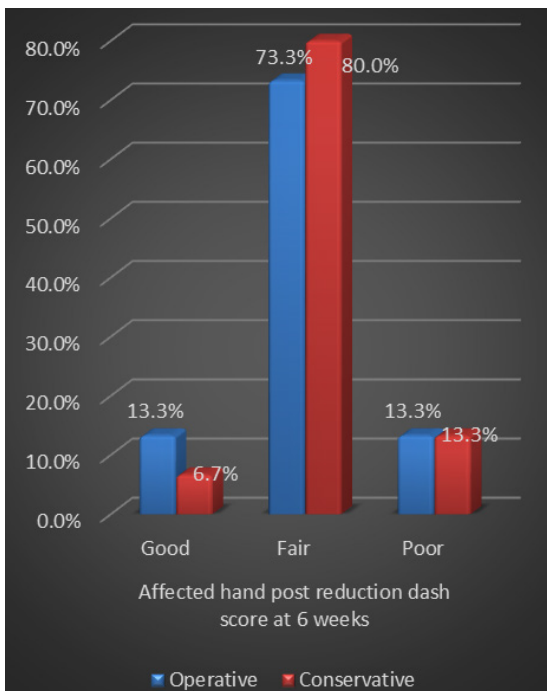


Fig. 6. Management operative and conservative of 6 months

The comparison between Operative and Conservative management using chi-square test that Good score of affected hand post-reduction dash score at 3months was significantly more among operative management. Fair score was significantly more among Conservative management (Fig. 7 and Table 8 & 9).

The comparison of Affected hand post reduction DASH score at 6 months between Operative and Conservative management using chi-square test showed that excellent score at 6 months was significantly more among operative management (Fig. 8).

The Affected limb pre-reduction DASH score was compared as per FRYKMANs CLASSIFICATION TYPE using the chi-square test showed no significant association between affected limb pre-reduction DASH score and FRYKMANs CLASSIFICATION TYPE (Table 10).

Table 7. Distribution of study population according to affected hand post reduction DASH score at 6 weeks

Affected hand post reduction DASH score at 6 weeks	Management Type	
	Operative	Conservative
Good	2 13.3%	1 6.7%
Fair	11 73.3%	12 80.0%
Poor	2 13.3%	2 13.3%

Chi-square value = 0.377, p-value = 0.828

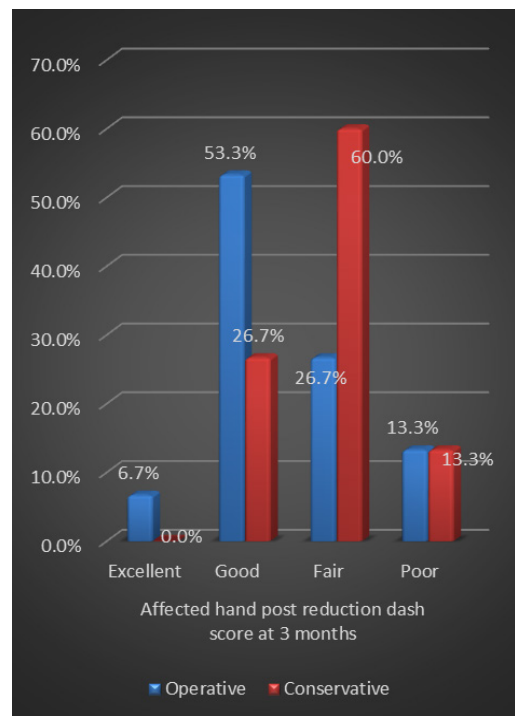


Fig. 7. Management operative and conservative of 3 months

Table 8. Distribution of study population according to affected hand post reduction DASH score at 3 months.

Affected hand post reduction DASH score at 3 months	Management Type	
	Operative	Conservative
Excellent	1 6.70%	0 0.00%
Good	8 53.30%	4 26.70%
Fair	4 26.70%	9 60.00%
Poor	2 13.30%	2 13.30%

Chi-square value = 7.768, p-value = 0.045*

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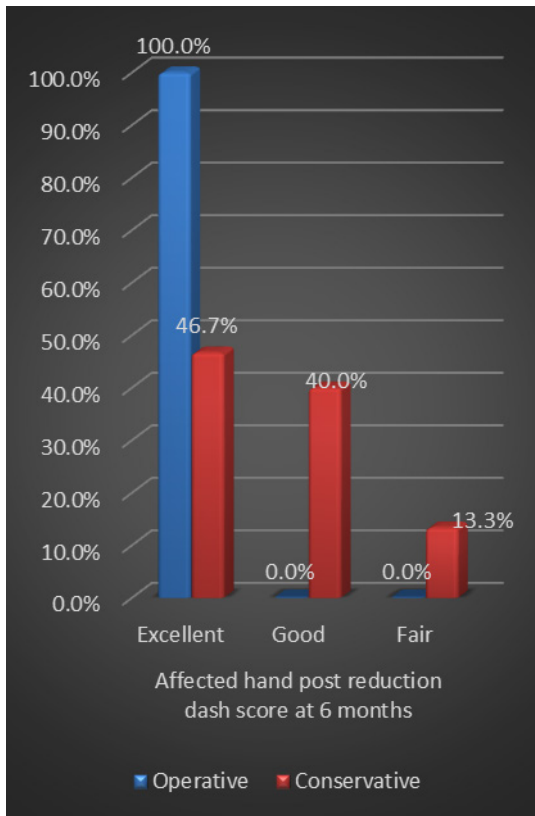


Fig. 8. Management operative and conservative of 6 months

Table 9. Distribution of study population according to affected hand post reduction DASH score at 6 months

Affected hand post reduction DASH score at 6 months	Management Type	
	Operative	Conservative
Excellent	15 100.00%	7 46.70%
Good	0 0.00%	6 40.00%
Fair	0 0.00%	2 13.30%

Chi-square value = 10.909, p-value = 0.004*

Table 10. Distribution of study population according to Affected limb pre reduction DASH score

FRYKMANS CLASSIFICATION TYPE	Affected limb pre reduction DASH score	
	Fair	Poor
Type 1	2 50.00%	2 50.00%
Type 2	3 100.00%	0 0.00%
Type 3	4 36.40%	7 63.60%
Type 4	0 0.00%	3 100.00%
Type 5	0 0.00%	3 100.00%
Type 6	1 50.00%	1 50.00%
Type 7	0 0.00%	1 100.00%
Type 8	0 0.00%	3 100.00%

χ² value = 11.795, p-value = 0.107

The Affected limb DASH score at 6 days was compared as per Frykmans Classification Type using the chi-square test showed no significant association between affected limb DASH score at 6 days and Frykmans Classification Type (Table 11).

The Affected limb DASH score at 6 weeks was compared as per Frykmans Classification Type using the chi-square test showed no significant association between affected limb DASH score at 6 weeks and Frykmans Classification Type (Table 12).

Table 11. Distribution of study population according to

FRYKMANS CLASSIFICATION TYPE	Affected hand post reduction dash score at six days		
	Fair	Good	Poor
Type 1	3 75.00%	0 0.00%	1 25.00%
Type 2	3 100.00%	0 0.00%	0 0.00%
Type 3	9 81.80%	1 9.10%	1 9.10%
Type 4	2 66.70%	1 33.30%	0 0.00%
Type 5	2 66.70%	1 33.30%	0 0.00%
Type 6	2 100.00%	0 0.00%	0 0.00%
Type 7	1 100.00%	0 0.00%	0 0.00%
Type 8	1 33.30%	0 0.00%	2 66.70%

χ² value = 14.411, p-value = 0.420

Table 12. Distribution of study population according to affected hand post reduction dash score at six weeks

Frykmans Classification Type	Affected hand post reduction dash score at six weeks			
	Excellent	Fair	Good	Poor
Type 1	0 0.00%	2 50.00%	1 25.00%	1 25.00%
Type 2	0 0.00%	2 66.70%	1 33.30%	0 0.00%
Type 3	0 0.00%	6 54.50%	4 36.40%	1 9.10%
Type 4	1 33.30%	1 33.30%	1 33.30%	0 0.00%
Type 5	0 0.00%	0 0.00%	3 100.00%	0 0.00%
Type 6	0 0.00%	2 100.00%	0 0.00%	0 0.00%
Type 7	0 0.00%	0 0.00%	1 100.00%	0 0.00%
Type 8	0 0.00%	0 0.00%	1 33.30%	2 66.70%

χ² value = 27.640, p-value = 0.151

Table 13. Distribution of study population according to affected hand post reduction dash score at 3 months

FRYKMANS CLASSIFICATION TYPE	Affected hand post reduction dash score at 3 months			
	Excellent	Fair	Good	Poor
Type 1	0 0.00%	1 25.00%	2 50.00%	1 25.00%
Type 2	0 0.00%	2 66.70%	1 33.30%	0 0.00%
Type 3	1 9.10%	2 18.20%	7 63.60%	1 9.10%
Type 4	1 33.30%	0 0.00%	2 66.70%	0 0.00%

Type 5	1	0	2	0
	33.30%	0.00%	66.70%	0.00%
Type 6	1	0	1	0
	50.00%	0.00%	50.00%	0.00%
Type 7	1	0	0	0
	100.00%	0.00%	0.00%	0.00%
Type 8	0	0	2	1
	0.00%	0.00%	66.70%	33.30%
χ^2 value = 20.125, p-value = 0.513				

Table 14. Distribution of study population according to affected hand post reduction dash score at 6 months

FRYKMANs CLASSIFICATION TYPE	Affected hand post reduction dash score at 6 months		
	Excellent	Fair	Good
Type 1	1	1	2
	25.00%	25.00%	50.00%
Type 2	1	0	2
	33.30%	0.00%	66.70%
Type 3	8	1	2
	72.70%	9.10%	18.20%
Type 4	3	0	0
	100.00%	0.00%	0.00%
Type 5	3	0	0
	100.00%	0.00%	0.00%
Type 6	2	0	0
	100.00%	0.00%	0.00%
Type 7	1	0	0
	100.00%	0.00%	0.00%
Type 8	3	0	0
	100.00%	0.00%	0.00%
χ^2 value = 13.691, p-value = 0.473			

The Affected limb DASH score at 3 months was compared as per FRYKMANs CLASSIFICATION TYPE using the chi-square test showed no significant association between affected limb DASH score at 3 months and FRYKMANs CLASSIFICATION TYPE (Table 13).

The Affected limb DASH score at 6 months was compared as per FRYKMANs CLASSIFICATION TYPE using the chi-square test showed no significant association between affected limb DASH score at 6 months and FRYKMANs CLASSIFICATION TYPE (Table 14).

DISCUSSION

Distal radius fractures are common and mismanaged injuries. Several studies have been directed towards clarifying which surgical treatment method would be best for fracture of the distal extremity of the radius. Recently documented the increasing popularity of open reduction and internal fixation, especially since the introduction of locked volar plates [5]. The majority of the studies have used subjective tools for measuring quality of life, such as the Gartland and Werley calculation and the DASH calculation while others have given greater emphasis to the radiographic parameters obtained after surgical reduction of fractures of the distal extremity of the radius [6, 7]. In present study, majority of the study population belonged to 31 years-40 years (33.3%), 21 years-30 years (30.0%), Above 60 years (16.7%), 41 years-50 years

(13.3%) and 51 years-60 years (6.7%). Similar to our study. In the study by Kevin and Chung et al, the average age of the patients was 48.9 years with minimum age 18 years and maximum years 83 years [8]. Arora. Stated that the average age of the patients was 57 years (17 years-79 years) [9]. In the study by Kilic A the average age of the patients was 45 years (18 years-77 years) [10]. In our study, the study population had 46.7% males and 53.3% females. Chavhan AN et al. stated that most (71.4%) of the patients were females as compared with males (28.6%) [11]. the study done by Hanae Minegishi included mostly females (80%) and males were 20% [12]. Fok WM, reported that there were 57.7% male and 42.3% were female while Tank Gyaneshwarstudy had 65% females and 35% males [10, 13]. In current study, Majority of the study population had injury on the right wrist (56.7%) followed by left wrist (43.3%). Khan. Found that Left side was involved in 37% and the right side was involved in 63% [14]. We observed that as per Frykmans Classification, Type 1 occurred among 13.3%, Type 2 among 13.3%, Type 3 among 33.3%, Type 4 among 10.0%, Type 5 among 10.0%, Type 6 among 6.7%, Type 7 among 3.3% and Type 8 among 10.0%. Testa found that in the surgical group, type A fracture was among 20.5%, type B fracture among 38.46% and an intra articular fracture among 41% and in the conservative group, type A fracture among 36% B fractures among 40% and C fractures among 23% [15]. The DASH questionnaire has been widely used to analyze problems related to the arm, shoulder, and hand from the patient's perspective. The questionnaire evaluates the degree of difficulty in performing physical activities, the severity of symptoms along with the impact of the health problem on the patient's daily functioning [16].

In current study, Good score of affected hand post-reduction dash score at 3 months was significantly more among Operative management. Fair score was significantly more among Conservative management. Excellent score at 6 months was significantly more among Operative management. In line with our study, Ochen [14]. Analyzing data from all age-groups, has also reported significantly better DASH scores in patients undergoing operative management of distal radius fractures as compared to those undergoing non-operative treatment (Mean difference-5.22).

CONCLUSION

The present study was done to compare the functional outcome of distal radius fractures treated with closed reduction and cast application versus volar plating. Majority of the study population belonged to 31 years-40 years (33.3%), 21 years-30 years (30.0%), Above 60 years (16.7%), 41 years-50 years (13.3%) and 51 years- 60 years (6.7%). The study population had 46.7% males and 53.3% females.

Majority of the study population had injury on the right wrist (56.7%) followed by left wrist (43.3%). As per Frykmans Classification, Type 1 occurred among 13.3%, Type 2 among 13.3%, Type 3 among 33.3%, Type 4 among 10.0%, Type 5 among 10.0%, Type 6 among 6.7%, Type 7 among 3.3% and Type 8 among 10.0%. Operative management was done among 15 (50.0%) and conservative among 15 (50.0%) patients.

Good score of affected hand post-reduction dash score at 3 months was significantly more among Operative management. Fair score was significantly more among Conservative management. Excellent score at 6 months was significantly more among Operative management.

It remains clear by this study that using ORIF with a plate and screw is the best treatment for distal radius fractures.

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