

## A comparative study of outcome of distal radius fracture frykman type (IV-VIII) treated with distractor fixation versus volar plate

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### Abstract

**Background:** Comminuted Distal radius fracture is a common injury with a variety of operative and non-operative management options. There remains debate as to the optimal treatment for a given patient and fracture. Our aim was to compare the functional outcome of patients of distal radius fractures treated with a volar locking plate fixation or wrist spanning distractor.

**Method:** This prospective randomized study comprised 30 patients with displaced intra-articular (Frykman type IV-VIII) distal end radius fractures treated with distractor and 30 patients treated with volar locking plates. The patients were followed up at 2<sup>nd</sup> week, 1 month, 6 months and 1 year after surgery. The assessment of pain, range of motion, grip strength and activity was done at each follow-up visit and scored according to the Green and O'Brien scoring system.

**Results:** At the end of 1 year, in volar plate group out of 30 patients, excellent result was achieved in 04 patients (13%), good in 24 patients (80%), fair in 02 patients (7%). No poor outcome seen. In distractor fixation group, out of 30 patients, excellent result was achieved in 01 patients (3%), good in 15 patients (50%), fair in 12 patients (40%) and poor in 02 (07%) patients.

**Conclusion:** volar locked plating showed superiority over distractor fixation after 1 year of surgery.

**Keywords:** Volar locking plate, distractor, distal end radius fracture, frykman type IV

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### Introduction

The fracture of distal radius is a common injury in old patient with osteoporotic bone, but in present scenario the incidence of these injuries is also increasing in working adult [1,2]. The variety of treatment methods are available like cast, external fixator and ORIF with plating [3].

Many complications are seen in these fracture like Malunion and deformity of wrist despite so many available options. Choosing an optimal method of treatment

for a given patient and fracture type is a matter of debate [4,5].

Despite the popularity of volar locking plate fixation, there are few large cohort or long term follow up studies to justify this modality.

External fixation with Distractor is an excellent option for the treatment of comminuted fractures associated with bone loss [6]. However, pin tract infection and joint contractures are common complications of this techniques [7]. Internal fixation devices that have been used to treat

these fractures include the distal radius locking/ non locking plate. Distal radius Locking Compression Plate (DR-LCP) is a smaller application device and allowing both locking and compression screw fixation of the complex fracture [8].

In this study, we analyzed functional results of distal radius fracture treated with either distractor or volar locking plate.

**Materials and Methods**

This study was done prospectively in the Department of Orthopaedics and Trauma Centre, J. A. Group of Hospitals, Gwalior (M. P.) for a period of 2 years. Total of 60 intra articular distal radius fractures, out of which 30 cases were treated with volar plating and remaining with the distractor application.

Fractures were classified using Frykman classification and Randomization was done to allocate the patient to one of the two treatment groups.

Follow-Up: Patients were regularly followed after 2, 6 and 12 weeks, and every 4 weeks thereafter until radiographic healing and function are established.

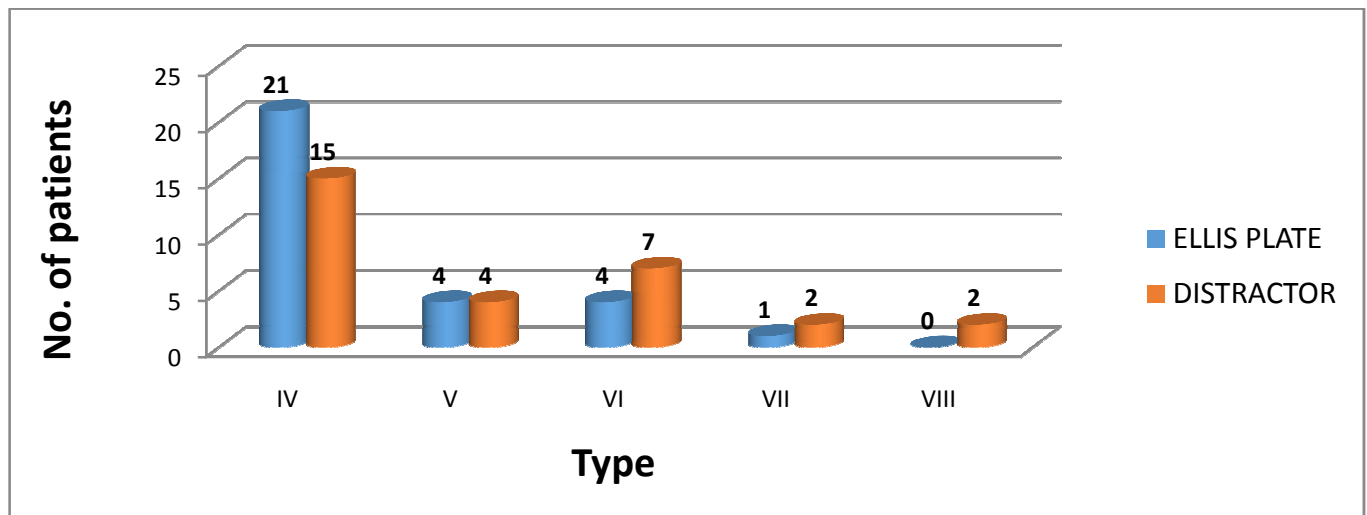
Functional outcome was assessed according to the Green and O'Brien scoring system. Pain, grip strength, wrist range of motion (ROM) and activity were noted at each visit. All the patients were followed up till the radiological union achieved.

**Results**

This prospective comparative study compared outcome following treatment of distal radius fracture by either volar locking plate or distractor. No. of patients allotted to both groups and their frykman classification was analyzed.

In this study the mean age of the patients was 38 years in distractor group and 31 years in volar locking group. There were 23 males (81%) and 07 females (19%) in volar locking plate and 14 male (47%) and 16 female (53%) in distractor fixation group.

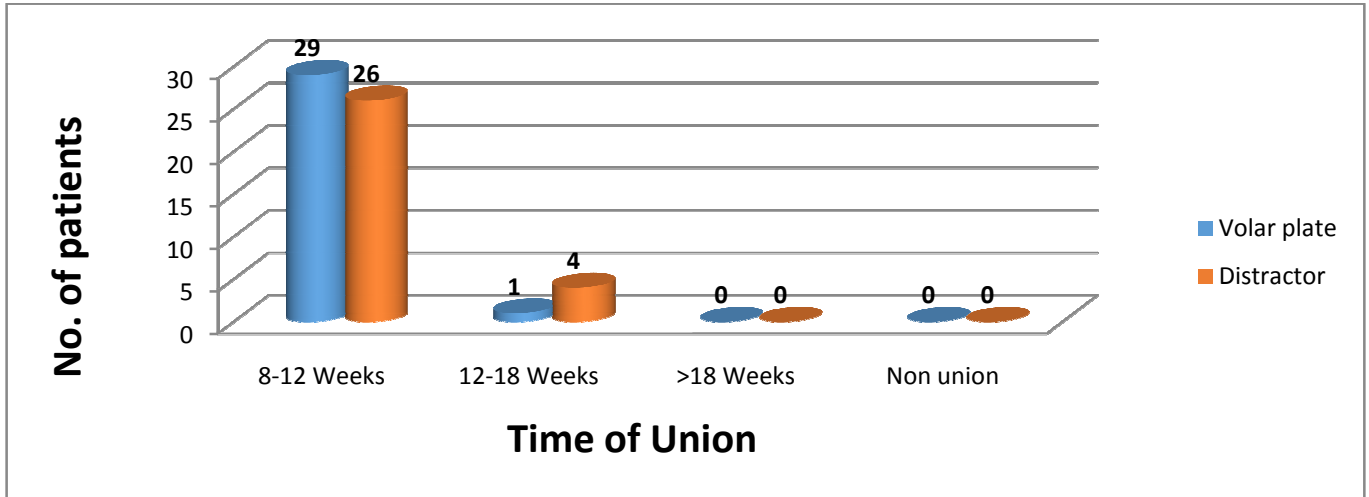
**Figure 1 : Frykman Type**



In our study, out of 30 patients of distal radius fractures treated by volar plate we had (Frykman) type IV- 21(70%),type V-04(13%), type VI-04(14%), type-VII-01(3%). In Distractor fixation group we had type IV-15(50%), type V-04(13%), type VI-07(23%),

type-VII-02(7%) type –VIII-02(07%).In both the groups Frykman type IV was the most common fracture pattern. In volar locking plate group average union time was 8.2 weeks, in distractor fixation group average union time was 10.2 week.

**Figure 2 : Time to union**



**Table 1 : Green and o'brien score in two techniques at 6 months and 1 year follow-up**

	Volar plate		
	6 month	1 years	P value
<b>Pain</b>	18.91 ± 4.6	22.36 ± 2.86	0.0009
<b>ROM</b>	18.36 ± 6.2	22.67 ± 5.4	0.0057
<b>Grip strength</b>	17.91 ± 5.3	18.78 ± 4.3	0.4878
<b>Activity</b>	22.36 ± 4.4	23.67 ± 3.2	0.1924
<b>Final score</b>	77.54 ± 17.7	87.48 ± 11.25	0.0119

	Distractor fixator		
	6 month	1 years	P value
<b>Pain</b>	18.36 ± 2.86	20.33 ± 3.5	0.0202
<b>ROM</b>	18.0 ± 4.77	18.89 ± 5.05	0.4856
<b>Grip strength</b>	18.91 ± 5.4	16.89 ± 4.4	0.1176
<b>Activity</b>	21.09 ± 2.6	21.44 ± 2.78	0.6164
<b>Final score</b>	76.36 ± 11.62	77.55 ± 11.327	0.6894

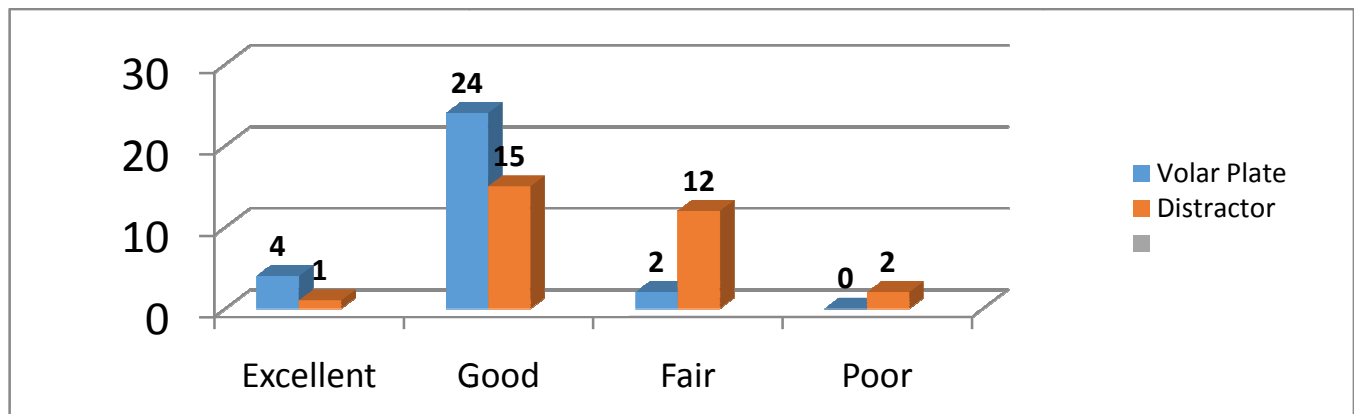
Green and O'Brien score had shown gradual improvement from 6 month to final

follow-up at 1 year postoperatively. Mean Green and O'Brien score was comparable between two groups.

Out of 30 patients of volar plate group, excellent result was achieved in 04 patients (13%), good in 24 (80%), fair in 02 patients

(7%). No poor outcome was observed. Out of 30 patients of distractor fixation group, excellent result was achieved in 01 patient (3%), good in 15 patients (50%), fair in 12 patients (40%) and poor in 02 (07%) patients.

**Figure 3 : Functional Outcome**



## Discussion

Distractor fixation is a commonly used technique for unstable distal radius fractures, its main benefit being its less invasive nature. The Distractor fixator cannot ensure perfect anatomical reduction in all cases because it has no direct control over the bone fragments and has to rely on indirect reduction through ligamentotaxis.

The advent of distal radius locking plates has provided several solutions to these problems. Direct visualization and manipulation of the fracture fragments appears to be the greatest advantage of open reduction and external fixation.

Pattanashetty OB et al in their clinical study done on patients with displaced, comminuted, intra-articular fractures of distal end of radius reported male predominance (M:F – 53%:47 %) [9]. In this study the mean age of the patients was 38 years in distractor group and 31 years in volar locking group. There were 23 males (81%) and 07 females

(19%) in volar locking plate and 14 male (47%) and 16 female (53%) in distractor fixation group. In a study in the Czech Republic, the average age is 59. By the 5th decade the representation of male is higher in all groups of fractures.

Gogna Pet et al reported 7 type A3, 8 type C2, and 18 type C3 fractures [10]. Rozentel TD in his study consisting of 15 men and 26 women with a mean age of 53 years (17–80years) reported 18 type A fractures (3A2, 15 A3), 4 type B fractures (all B2), and 19 type C fractures (14 C2, 5 C3) [11].

In our study of 60 patients of distal radius fractures Frykman type (IV-VIII), In volar plate group we had type IV- 21(70%), type V-04(13%), type VI-04(14%), type VII-01(3%). In Distractor fixation group we had type IV-15(50%), type V-04(13%), type VI-07(23%), type VII-02(7%) type VIII-02(07%). In our study Frykman type IV was most common fracture pattern.

Joideep Phadnis et al in his study observed that overall mean time to fracture union was 8.4 weeks (6- 28 weeks) [12]. Rozental TD et reported average time to union - 8 weeks (range, 7–10 wk) [11]. In our study, average time to union was 8.2 weeks ( Avg 8-14weeks) in both the groups. In volar locking plate group union time was 8.2 weeks (8-10 weeks) and in distractor fixation union time was 10.2 weeks(10 -14 weeks).

Shukla R et al, in his study of 110 patients (61 females and 49 males) with Cooney's type IV distal radius fractures comparing functional outcome of patients treated with external fixation versus volar locking plate found that there was no difference in pain, ROM and grip strength in two groups; however, there was a significant change in activity and final score at 1 year compared to 6 month follow-up [13]. One year after surgery, In volar plate group we observed, out of 30 patients excellent result was achieved in 04 patients (13%), good in 24 patients (80%), fair in 02 patients (7%).No

poor outcome seen according to the Green and O'Brien score.

In distractor fixation group we observed, out of 30 patients excellent result was achieved in 01 patients (3%), good in 15 patients (50%), fair in 12 patients (40%), poor in 02 (07%)patients.

We observed a significant reduction in pain, increased ROM, grip strength, activity and final score after 1-year follow-up compared to that at 6-month follow-up in both the groups. However, the outcome scores were comparable in both the groups at 6 months and 12 months follow-up.

### Conclusion

Comminuted Distal radius fracture (Frykman type IV – VIII) treated with either volar locking plate or distractor external fixator gives good functional results and functional outcome is better at 1 yr as compared to 6 months post op. However, there is no difference in the outcome scores among patients treated with either modality.

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