



**ORIGINAL RESEARCH PAPER**

**Orthopaedics**

**SHORT TERM COMPARATIVE STUDY OF VOLAR LOCKING PLATE VERSUS EXTERNAL FIXATOR IN THE TREATMENT OF DISTAL END RADIUS FRACTURES**

**KEY WORDS:**

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**INTRODUCTION**

Distal end radius fractures account for 17% of all emergency room treated fractures and 14% of all fractures in extremities.<sup>1</sup> A younger group that has relatively high energy trauma to the upper extremity and an elderly group that experiences both high energy and low energy injuries appear to make up the bimodal distribution of distal radius fractures.<sup>2</sup>

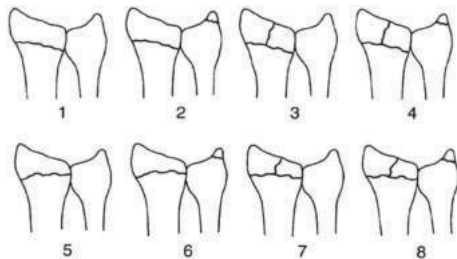
There are non-operative, internal and external fixation technique. The distal radio-ulnar joint was not associated with instability, and fractures were deemed stable if there was an adequate initial reduction, which was defined as residual dorsal angulation of less than 10° (from neutral), loss of height of less than 2 mm compared with the contralateral side, articular step-off of less than or equal to 1 mm, and no associated fracture. These fractures are amenable to nonoperative treatment with successful results.<sup>3,4</sup>

External fixation (EF) (with/without percutaneous Kirschner-wire)<sup>5,6</sup> is a useful technique to treat this type of trauma with little invasion for unstable forms of fractures that may be reduced to an appropriate position by persistent counter traction utilising the ligamentotaxis concept.<sup>7</sup>

Even with the use of EF, it can be extremely challenging to achieve and maintain an optimum reduction in some misplaced or comminuted distal radius fractures. The research is in agreement that these fractures need surgical fixing, such as intramedullary fixation<sup>8</sup> and internal fixation using several types of implants.<sup>9</sup> Internal fixation with volar locking plates (VPs) has grown in acceptance during the last few decades.<sup>10</sup>

**Classification Of Distal End Radius Fracture**

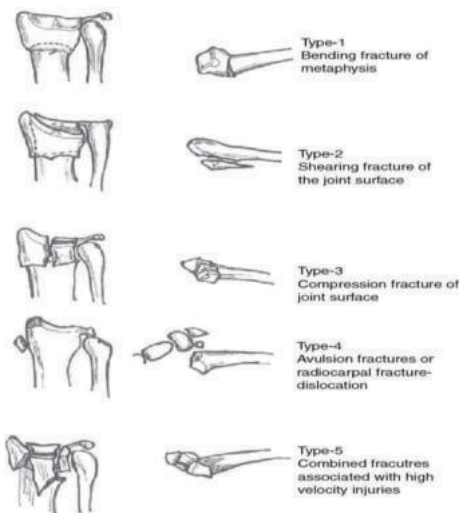
**FRYKMAN CLASSIFICATION**



TYPE	Ulnar Styloid Fracture Absent	Ulnar Styloid Fracture Present
Extraarticular	Type-1	Type-2
Intraarticular with Radiocarpal Joint	Type-3	Type-4
Intraarticular with Radioulnar Joint	Type-5	Type-6

**Fernandez Classification<sup>11</sup>**

- Type-I: Bending fracture - Extra articular, Metaphyseal
- Type-II: Shearing - Intraarticular fracture
- Type III: Compression - complex articular fracture
- Type IV: Avulsion fracture with radiocarpal dislocation
- Type V: High velocity injury



**AIM**

Aim of this study was to compare the clinical and functional results of 20 patient treated for unstable distal radius fractures with external fixation with/without supplemental "K" wire fixation and volar locked plating.

**MATERIALS AND METHOD**

From MARCH 2022 to JANUARY 2023, 20 patients had surgery as part of a comparison between volar locking compression plates and external fixation. 10 patients were treated with volar locking compression plates and 10 were treated with external fixators (with/without percutaneous Kirschner-wire). Patients underwent functional assessment using the DASH score method and wrist joint range of motion.

**Inclusion Criteria**

- Unstable Extra or Intra articular fractures of Distal Radius were included in this study.
- Patients presented with polytrauma.

**Exclusion Criteria**

- Patients with pathological fractures due to metastasis, tumours were excluded.
- Patients with compound fractures were also excluded from this study.

**Statistical Analysis**

The statistical analysis was done with the help of statistical software SPSS version 28.

Sampling Done – Random Sampling

Study Type – Prospective study

DASH Scoring Formula =  $\left( \frac{\text{sum of n responses}}{n} - 1 \right) * (25)$   
 where n represents the number of completed items.

DASH cannot be computed if greater than three items are missing.

**Dash Scoring**

Item	1	2	3	4	5
1. Pain when gripping or lifting objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
2. Pain when carrying or holding objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
3. Pain when lifting or pushing objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
4. Pain when pulling or tugging objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
5. Pain when twisting or turning objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
6. Pain when reaching for objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
7. Pain when grasping or holding objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
8. Pain when gripping or lifting objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
9. Pain when carrying or holding objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
10. Pain when lifting or pushing objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
11. Pain when pulling or tugging objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
12. Pain when twisting or turning objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
13. Pain when reaching for objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
14. Pain when grasping or holding objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
15. Pain when gripping or lifting objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
16. Pain when carrying or holding objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
17. Pain when lifting or pushing objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
18. Pain when pulling or tugging objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
19. Pain when twisting or turning objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
20. Pain when reaching for objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
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25. Pain when pulling or tugging objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
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32. Pain when pulling or tugging objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
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73. Pain when lifting or pushing objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
74. Pain when pulling or tugging objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
75. Pain when twisting or turning objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
76. Pain when reaching for objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
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81. Pain when pulling or tugging objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
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85. Pain when gripping or lifting objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
86. Pain when carrying or holding objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
87. Pain when lifting or pushing objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
88. Pain when pulling or tugging objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
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98. Pain when grasping or holding objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
99. Pain when gripping or lifting objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do
100. Pain when carrying or holding objects	No difficulty	Minimal difficulty	Moderate difficulty	Severe difficulty	Unable to do

**RESULTS**

**Age Incidence**

Age in years	No of patients	Percentage
10-20	1	5
21-30	6	30
31-40	3	15
41-50	4	20
51-60	6	30

**Sex Incidence**

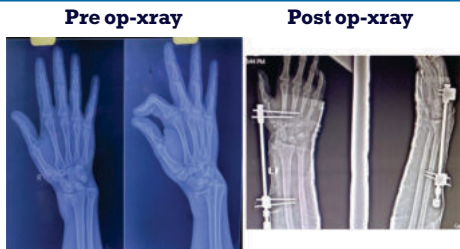
Sex	No of patients	Percentage
Male	14	70
Female	6	30

**Volar plating**

**Pre op-xray Intra op-xray**



**External fixator**



Details	External Fixation	Internal Fixation
Stiffness	Wrist stiffness in 2 cases	Wrist stiffness in 1 case
Non- Union	Nil	Nil
Infection	Pin tract infection in 1 case	Nil
Bone grafting	Not Required	Not Required
Post Traumatic Arthritis	Nil	Nil
Union duration	7-8 Weeks	7-8 Weeks
Dash Score	Fair Outcome	Better results

**Analysis**

7-8 weeks, there is evidence of good radiographic and clinical union, however there was only a minimal dorsal tilt in one case of the external fixator group.

Patients in the external fixator group initially had a reasonable range of motion. However, these individuals improved their range of motion after receiving intensive physiotherapy. However early improvement of ROM was seen in volar plating group.

Grip strength was better in volar plating group.

Pin tract infection in two of the cases of external fixator was recorded.

**DISCUSSION**

Goal of the Surgery for an unstable distal radius fracture is to achieve and maintain a tolerable reduction and enable function to be restored as early as possible. Unstable fractures have a higher chance of losing their reduction and developing malunion as a result.

Malunion can further lead to persistent discomfort, loss of range of motion, diminished stamina and grip strength, midcarpal instability, and post-traumatic arthritis resulting in a poor functional outcome.<sup>15</sup>

The parameters linked to a better result are reduction of post-operative fracture gap and step, as well as radial length restoration.<sup>16</sup>

Direct manipulation and observation of fracture pieces is one benefit of open reduction and internal fixation.<sup>17</sup>

In 88 patients, Egol, Walsh, Tejwani, and colleagues conducted a prospective randomised study. Although the wrist range of motion of patients who had volar plating showed statistically significant early improvement, this advantage gradually faded and, in absolute terms, the difference in range of motion was clinically insignificant. At one year, the two groups' radiological, clinical, and functional outcomes were comparable. They found that although neither therapy had a definite benefit, the external fixator group required fewer reoperations.<sup>19</sup>

Shukla<sup>20</sup> shown that External Fixator outperformed Volar Plating at the 1-year follow up result. However, the study's participants were mostly young.

Both Jeudy et al. and Roh et al. discovered that Volar Plating had a better functional recovery and radiological prognosis

without causing additional problems.<sup>21,22</sup>

## CONCLUSION

Result of our study showed that Volar Plating is more beneficial in the early postoperative period in terms of DASH scores, grip strength, flexion, extension, and supination, indicating that it is likely to promote a more rapid functional recovery, which may be advantageous for certain patients who want an accelerated return to function, like the young or the athletes.

After 7-8 weeks of intensive physical therapy in external fixator group ROM improved.

Good radiographic and clinical union seen in both the groups.

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