



COMPERATIVE STUDY BETWEEN VOLAR LOCKING PLATE AND EXTERNAL FIXATOR IN DISTAL END OF RADIUS FRACTURE

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ABSTRACT

Objective: to compare the function out come of distal radius fracture in external fixator and voalr locking plate.

Material and method: 25 pateint treated with volar locking plate and 26 were treated with external fixator.both the group were followed up for a period of 1 year. Radiologically evaluation done using sarmiento modification of lindstrom criteria and functional out come as PRWE score.

Results: early mobilization and return to activity is an advantage in plating group but in long term almost equal function results external fixator group (84%) and plating group (92%) are seen.

KEYWORDS :

INTRODUCTION:

Distal end of radius fractures are more common due to high energy trauma in young individuals and because of osteoporosis in older population¹. There are several treatment modalities for this fractures like cast immobilization, percutaneous k wires and external fixation or volar locking plating. Surgical fixation enables patients to resume daily activity earlier and more independently. Thus, there has been a trend toward more aggressive fracture fixation in patients.

Closed or limited open reduction with percutaneous pinning and external fixation, which has traditionally been used in unstable intra-articular fractures, does not always lead to anatomic reductions and can result in residual instability with secondary displacement. Volar plates have gained popularity because of their low complication rates and high stability in osteoporotic bone without joint distraction^(2,3,4).

In this study we try to compare overall outcome in patients treated with external fixator and volar locking plate.

MATERIAL METHODS:

We included 51 patients of having distal end of radius fracture those came to our institute between year 2015 to 2018. Among them 26 were treated with percutaneous k wire fixation and external fixator, rest 25 were treated with open reduction and internal fixation with volar locking plate.

Inclusion criteria for study is more than 18 years of age without any other skeletal injury. Bilateral fracture and open fractures were excluded from the study.

All the procedures done under regional or general anaesthesia at the same institute.

External fixator group: 2.5 mm of two shanz screws were inserted in second metacarpal and 3.5 mm of two shanz screws were inserted into radial shaft proximal to fracture. Frame was constructed using connecting bars and clamps. Reduction was checked under c arm. One k wire from radial styloid and other k wire from lunate fossa of radius inserted in a cross fashion. Pin tract dressing and below elbow slab applied.

Volar plating group: Skin incision longitudinally over flexor carpi radialis. Tendon sheath opened and tendon retracted radially. Beneath if lies flexor polllis longus which is retracted ulnarly to expose pronator quadratus and elevated from radial border to expose distal end of radius. Fracture reduction done under image intensifier and internal fixation done using volar locking plate. Plaster slab was applied till suture removal.



Follow up:

Both group discharged on 4th day and active finger moments are allowed. Suture removal done after two weeks. Active assisted wrist mobilization started in palting group. External fixator was removed after 6 weeks followed by wrist mobilization exercise.

Further they were followed 1 month, 3 month, 6 month and 1 year clinically as well as radiologically.

Radiological criteria⁽¹⁾ for acceptable reduction is

1. Radial inclination of > 15degree.
2. Radial shortening of < 5 mm compared to the contralateral side.
3. Sagittal tilt between 15 degree dorsal and 20 degree volar tilt.
4. Intra-articular step-off of < 2 mm.

Evaluation of outcome:

Radiologically we use sarmiento modification of lindstrom criteria⁽⁵⁾.

| | Residual deformity | Loss of palmer tilt {degrees} | Residual shortening {mm} | Loss of radial deviation {degrees} |
|-----------|--------------------|-------------------------------|--------------------------|------------------------------------|
| Excellent | No or significant | 0° | <3mm | <50 |
| Good | Slight | 10 to 100 | 3 to 6 mm | 50 to 90 |
| Fair | Moderate | 110 to 140 | 7 to 11mm | 100 to 140 |
| Poor | severe | At least 150 | At least 12mm | > 140 |



Wrist range of motion was measured in flexion, extension, Pronation, Supination, ulnar deviation & radial deviation and was compared with uninjured limb. The overall function of the upper limb was assessed using the GARTLAND & WERLEY SCORE, & PATIENT RATED WRIST EVALUATION SCORE (PRWE).

External fixator group:



Plating group :



RESULTS:

The result of volar locking plate is summarized below.

| | Palmer flexion | Dorsi flexion | Prona tion | Supin ation | Radial deviation | Ulnar deviation |
|--|----------------|---------------|------------|-------------|------------------|-----------------|
| Plating group Average (Degrees) | 75 | 80 | 87 | 81 | 11 | 25 |
| External fixator group Average (degrees) | 74 | 78 | 75 | 80 | 14 | 30 |

Functional range of motion of injured wrist after final follow up is as below:

Radiological outcome:

| Loss of radial inclination (degrees) | No. of Patients[%] Volar plating | No of patients [%] External fixator |
|--------------------------------------|----------------------------------|-------------------------------------|
| <5 | 56% | 56 % |
| 5-9 | 32% | 40% |
| 10-14 | 12% | 4% |
| >14 | 0 | 0 |

| Radial shortening in mm | No of Patients volar plating | No of patients external fixator |
|-------------------------|------------------------------|---------------------------------|
| <03 | 72% | 81% |
| 03-06 | 28% | 15% |
| 07-11 | 0 | 4% |
| >11 | 0 | 0 |

| Loss of Palmer tilt [degrees] | No. of Patients volar plating | No of patients External fixator |
|-------------------------------|-------------------------------|---------------------------------|
| 0 | 24% | 28% |
| 1-10 | 40% | 40% |
| 11-14 | 36% | 20% |
| At least 15 | 0 | 12% |

Over all functional outcome according to garland and werney scoring system was:

| G&W Score | Number of patients Volar plating group | Number of patients External fixator group |
|---------------|--|---|
| Excellent 0-2 | 21(84%) | 20(77%) |
| Good 3-8 | 2(8%) | 2(7%) |
| Fair 9-20 | 2(8%) | 3(12%) |

| | | |
|----------|---|-------|
| Poor >20 | 0 | 1(4%) |
|----------|---|-------|

DISCUSSION:

We use A O classification for our study. Among the external fixator group 20 patients of type A and 6 patients were type C. In volar plating group 6 WERE type A , 11 were type B and 8 were type C.

No infection was found in any of our patients. Among external fixator group, 3 patients had residual dorsal tilt and 3 had grip weakness. Among plating group 2 patients had residual dorsal tilt and one patient had prominent ulnar styloid process.

After one year of followup, we found almost equal wrist range of motion in both groups. Radiologically we found almost equal results except for loss of palmer tilt in external fixator group. 3 patients had residual dorsal tilt because of comminution and collapse.

The advantages of open reduction and internal fixation include direct visualization and manipulation of the fracture fragments, stable rigid fixation, and the possibility of immediate postoperative motion. The subchondral placement of smooth pegs is useful to buttress small articular fragments and successfully control shortening and angular displacement, especially in osteoporotic bone.

Some studies suggested that CRPS I is more likely

to occur after EF than after other surgical procedures. In the current study, there was no significant difference in the occurrence of CRPS I between the VP and EF groups, which is consistent with other studies.²⁷ This suggests that the high incidence of CRPS I after EF in the literature may be related to the recruitment of subjects with more severe DRFs or excessive distraction during EF^(6,7,8).

In the present study, 92 % of volar plating patients and 84% of external fixator group patient had an excellent to good result. Gradl et al⁽¹⁰⁾ reported 100 and 97.5 % with good or excellent results in these two groups, respectively. Rozenal et al⁽⁹⁾ reported similar findings on external fixator and plating group, that both groups doing equally well by 6 months.

Recently randomized trials have reported rapid functional recovery after volar plating in the early period after surgery. However, at 1 year, there were no significant differences between the volar locking plate and external fixator groups based on objective and subjective functional assessments⁽¹³⁻¹⁷⁾.

In our study we found plating group having slightly superiority in terms of early mobilization and return to activity, however after 1 year there is no significant difference between these two groups.

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