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# The Outcome of Surgical Management for Unstable Fracture of the Distal Radius by Volar Locking Plating System

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**Abstract- Objective:** In this study our main goal is to evaluate the outcome of surgical management for unstable fracture of the distal radius by volar locking plating system.

**Method:** This observational prospective study was carried out at Chittagong Medical College Hospital and private hospitals in Chittagong from May 2015 to November 2020. Where a total of 30 Patients with unstable distal radial fracture attending at the emergency and outpatient department of Chittagong Medical College Hospital and Private Hospitals in Chittagong were included in this study.

**Results:** During the study, most of cases were left side were affected, 56.7% and 3.3% had fracture SOF. 73.3% patients stayed in hospital for 3-4 days followed by 16.7% had stayed in hospital 5-6 days, 10% had stayed in hospital 7-8 days. 23.3% cases were excellent followed by 60% cases were good, 10% cases were fair, 6.7% cases were poor.

**Keywords:** unstable fracture of the distal radius, volar locking plating system, distal fracture femur.

**GJMR-H Classification:** NLMC Code: WE 168, WE 185



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# The Outcome of Surgical Management for Unstable Fracture of the Distal Radius by Volar Locking Plating System

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**Results:** During the study, most of cases were left side were affected, 56.7% and 3.3% had fracture SOF. 73.3% patients stayed in hospital for 3-4 days followed by 16.7% had stayed in hospital 5-6 days, 10% had stayed in hospital 7-8 days. 23.3% cases were excellent followed by 60% cases were good, 10% cases were fair, 6.7% cases were poor. After surgery 13.3% patients had wrist stiffness followed by 10% had persistent wrist pain and reduced grip strength, 3.3% had surgical site infection and late collapse.

**Conclusion:** Management of distal radius fracture for adult patients with volar locking plating system results in satisfactory outcomes in most of the cases with minimum complications.

**Keywords:** unstable fracture of the distal radius, volar locking plating system, distal fracture femur.

## I. INTRODUCTION

Fractures of the distal radius are the most common fractures accounting about one sixth of the total skeletal injuries<sup>1</sup>. As high as 40% to 49% are considered to be unstable that requires surgical fixation.<sup>2</sup>

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Most functional tool for the physical activity of human being is "the hand". Improper treatment of unstable distal radial fracture, may compromise hand function.<sup>3</sup>

Management of the distal radius fractures are dictated by the pattern of the fractures, degree of displacement of the bone fragments, involvement of the fracture with the joints, associated soft tissue injuries, and the patients pre- injury activity level and physical demands.<sup>4</sup>

Unstable distal radius fracture requires surgical fixation of the broken bone because closed reduction (non-surgical manipulation and casting) often is insufficient to maintain fracture reduction and promote bone healing. Operative management of the distal radius fracture has been studied extensively and has evolved over past decade. The best treatment of unstable distal radial fracture is not well established. So, the treatment of unstable distal radial fractures continues to improve as better method of fixation and soft tissue management are more to be developed.<sup>5</sup>

With the locking system, distal screws are locked to the plate, which stabilizes the screws against lateral movement (toggle effect). This provides augmentation to the strength of fixation by producing "single bone-plate-screws construct" which producing a scaffold in the mostly cancellous distal radial metaphysis & also under distal radial articular surface.

This new technique of fixation is now sporadically being practiced in Bangladesh: For "A good Functional hand", the use of "Volar locking plating system" may be considered as a better tool in the treatment for unstable distal radial fractures in our country.

## II. OBJECTIVE

- To evaluate the outcome of surgical management for unstable fracture of the distal radius by volar locking plating system.

## III. METHODOLOGY

**Type of study:** This is an observational prospective clinical study.

**Place and period of study:** This study was conducted at Chittagong Medical College Hospital and private hospitals in Chittagong from May 2015 to November 2020.

**Study population:** Patients with unstable distal radial fracture attending at the emergency and outpatient department of Chittagong Medical College Hospital and Private Hospitals in Chittagong.

**Inclusion criteria**

- Unstable fracture of distal radius.
- Closed or open with soft tissue injury (Gustillo I & II)
- Age-any adult patient.(18-70 years)

**Exclusion criteria**

- Open fracture (Gustillo type III)
- Stable fracture.

- Undisplaced fracture.
- Acute medical illness.
- Poly trauma patient.
- Patients with mental or psychic issues.

**Sample selection**

A total of 30 Patient attended at Emergency Department and OutpatientDepartment of Chittagong Medical College hospital & PrivateHospital in Chittagong were selected considering the inclusion criteria.

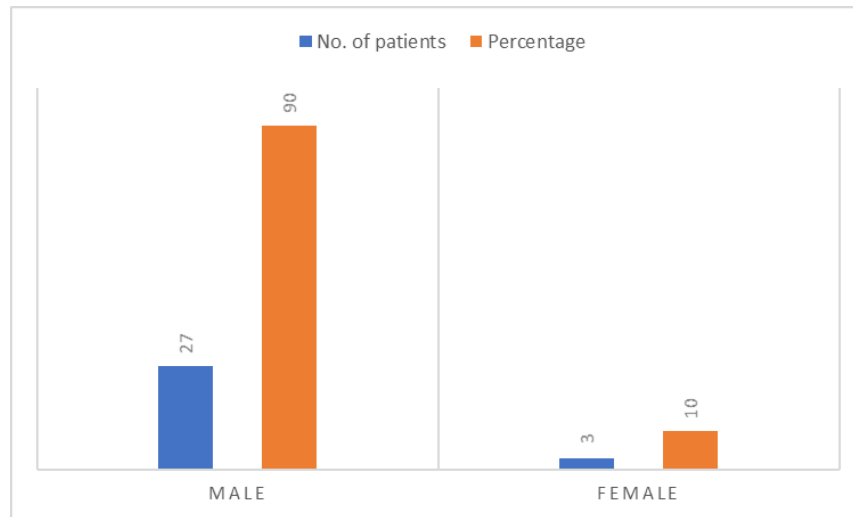
## IV. RESULTS

In table-1 shows age distribution of the patients where most of the patients belong to 31-45 years age group, 56.7%. The following table is given below in detail:

**Table – 1:** Distribution of patients in different age group

Age group	No. of patients	Percentage
18-30	9	30
31-45	17	56.7
46-70	4	13.3
Total	30	100

In figure-1 shows gender distribution of the patients where 90% patients were male and 10% patients were female. The following figure is given below in detail:



**Figure-1:** Gender distribution of the patients.

In table-2 shows distribution of the patients according to side affected where most of cases were left side were affected, 56.7%. The following table is given below in detail:

**Table-2:** Distribution of sides affected

Side Affected	No. of patients	Percentage
Right	13	43.3
Left	17	56.7
Total	30	100

In table-3 shows time intervals between injury and management of the patients where most of the cases were treated between 1-3 days of interval. The following table is given below in detail:

*Table-3:* Time intervals between injury and management

Time Interval	No. of Patients	Percentage
1-3	11	36.7
4-7	08	26.7
8-14	09	30.0
14-20	02	6.6
Total	30	100

In table-4 shows distribution of associated injuries where 3.3% had fracture SOF. The following table is given below in detail:

*Table-4:* Distribution of associated injuries

Associated injuries	No. of patients	Percentage
Fracture SOF	1	3.3
Fracture trochanter of femur	0	0
Fracture NOF	0	0
Chest Injury	0	0

In table-5 shows duration of hospital stay where 73.3% patients stayed in hospital for 3-4 days followed by 16.7% had stayed in hospital 5-6 days, 10% had stayed in hospital 7-8 days. The following table is given below in detail:

*Table – 5:* Duration of hospital stay from admission and discharge

Hospital stay (day)	No. of patients	Percentage
1-2	0	0.0
3-4	22	73.3
5-6	05	16.7
7-8	03	10.0
Total	30	100

In table-6 shows Distribution of outcome of physiotherapy. 23.3% cases were excellent followed by 60% cases were good, 10% cases were fair, 6.7% cases were poor. The following table is given below in detail:

*Table – 6:* Distribution of outcome of physiotherapy

Result	No. of Patients	Percentage
Excellent	7	23.3
Good	18	60.0
Fair	3	10.0
Poor	2	6.7
Total	30	100

In table-7 shows distribution of incidence of complications where 13.3% patients had wrist stiffness followed by 10% had persistent wrist pain and reduced grip strength, 3.3% had surgical site infection and late collapse. The following table is given below in detail:

*Table -7:* Distribution of incidence of complications

Complications	No. of Patients (total=15)	Percentage
Persistent wrist pain	3	10.0
Wrist stiffness	4	13.3
Finger stiffness	0	0.0
Reduced grip strength	3	10.0
Reduced pinch power	0	0.0
Surgical site infection	1	3.3
Late collapse	1	3.3

## V. DISCUSSION

There were some complications in this study. Two case developed tourniquet palsy in immediate postoperative period but fully improved within few days. Once case had feature of late collapse though fixed properly earlier. Wrist stiffness was in 4 cases which improved but not significantly after physiotherapy. Persistent wrist pain developed in one case. Step off > 2mm seen in one case.

Correction and maintenance of anatomical landmark (radial length, radial angle, and dorsal angle) are the most important factors to regain hand and wrist function. Anatomical and functional outcome in this was good to excellent in most of the cases.

The volar locking plating system as a method of fixing distal radius fracture has been shown one of the effective methods in relation with anatomical and functional outcome of the wrist joint. An advantage of the volar plating technique is the comfort that it provides to patients in initiating early finger and wrist motion.<sup>6</sup>

The locking screws in the volar locking plating system offer an additional advantage over previous implants.<sup>7</sup> With previous volar plate designs involving non-locking screws, screw purchase in the metaphysis of the distal part of the radius often was poor because of the limited amount of cortical bone in this location. With the new design, the distal screws are locked to the plate, which stabilizes the screws against lateral movement (toggle) and resists loosening.<sup>4</sup> This provides additional strength to the fixation by constructing a scaffold under the distal radial articular surface and producing 'bone-plate-screws construct'.<sup>8</sup>

Plate-related complications did not occur in this series. The pronator quadratus provided muscular coverage of the plate and shielded the flexor tendons from the plating system.

In this study average follow-up period was 6 months. The mean Gartland and Werley score improves significantly from 4 points at 6 months to 2 points at two years.<sup>9</sup>

Male attended more for 'Volar Locking Plating System' expecting good functional hand for the cost of procedure.

## VI. CONCLUSION

Management of distal radius fracture for adult patients with volar locking plating system results in satisfactory outcomes in most of the cases with minimum complications.

## REFERENCES RÉFÉRENCES REFERENCIAS

1. Coony WP, linscheild RL and Dobyys JH. External pin fixation for unstable colles' fractures'. JBJS 1953, vol 35: 641-648.
2. Willis AA, Mutsumi K, Zobitz K, Coony WP. Internal fixation for dorsally displaced of the distal part of the radius. JBJS 2006, vol 88A, no-12; 2411-17.
3. Andrew H, Crenshaw J.' Fracture of shoulder girdle, arm and forearm In Campbell's Operative Orthopaedic surgery, edited by terrycanle, Memphis, Tennessee 9th ed; 2281-362.
4. Scot ML, Cory ON, Jonathan DB, Glen AT, Yong K, fredSH., 'Biomechanical evaluation of volar locking plate for distal radius' Hand 2008, March, 3(1); 57-60.
5. Willis AA, Matsumi K, Zobitz K, Coony WP. 'Internal fixation of dorsally displaced fractures of the distal part of the radius. 'JBJS 2006, vol 88A, no-12; 2411-17.
6. Rikli DA, Regazzoni. Fractures of the distal end of the radius treated by internal fixation and early function. J Bone Jt Surg Br 1996; 78: 588-92.
7. Ring D, Jupiter JB, Brennwald J, Buchler U, Hastings H II. Prospective multicenter trial of a plate for dorsal fixation of distal radius fractures. J Hand Surg 1997; 22A: 777-84.
8. Trease C, McIlff T, Toby EB. Locking versus nonlocking T-plates for dorsal and volar fixation of dorsally comminuted distal radius fractures: a biomechanical study. J Hand Surg 2005; 30: 756-63.
9. Egol KA, Kubiak EN, Fulkerson E, Kummer FJ, Koval KJ. Biomechanics of locked plates and screws. J Orthop Trauma 2004; 18: 488-93.