



## Predictors of Late Collapse of Distal End Radius Fractures after Fixation

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### Abstract

Distal radius fractures are commonly seen in elderly population and account for most common injuries encountered in orthopaedic practice. It is common in elderly population that post traumatically patient develop fracture instability, osteoarthritis, grip strength loss, loss of wrist motion, malunion. In this present study, we look for various factors like age, sex, comminution, DRUJ disruption, ulnar styloid fracture in loss of reduction in distal end radius fractures after the fixation. Total of 80 patients participated in the study out of which 32 patients are males and 48 where females, their age ranged from 28 to 82 years with mean age of 56.8 years. patients with age more than 50 years had loss of reduction in 38 patients and 08 among patients age less than 50 years. in distal end radius fractures associated with comminution 80% had loss of reduction, 62.5% had loss of reduction in DRUJ disruption, 4.7% patients had in ulna styloid fractures. In various type of fixations, loss of reduction varied with type of fixation. Loss of reduction in comminuted fractures is more with percutaneous pinning, next external fixation, least being plating. In case of DRUJ disruption, loss of reduction is more in external fixator, plating very as least in pinning. There is no association with ulna styloid fractures in loss of reduction of distal end radius fractures.

**Keywords:** Distal End Radius Fractures; Druj Injury; Comminution; Ulna Styloid Fracture; External Fixation; Plating; Percutaneous Pinning.

### Introduction

Distal radius fractures are commonly seen in elderly population and account for most common injuries encountered in orthopaedic practice [1,2]. They make up 8% - 15% of all bony injuries [1,2]. There are various modalities present in management of distal end radius fractures i.e closed reduction and cast application, percutaneous pinning, external fixation, open reduction and internal fixation with volar plating. It is common in elderly population that post traumatically patient develop fracture instability, osteoarthritis, grip strength loss, loss of wrist motion, malunion. Fractures with

dorsal comminution, dorsal angulation greater than 20° or intra-articular involvement to have a significant chance of displacement after reduction was advocated by Cooney et al [3]. In this present study, we look for various factors like age, sex, comminution, DRUJ disruption, ulnar styloid fracture in loss of reduction in distal end radius fractures after the fixation.



### Materials and Methods

Of the patients attended orthopaedic outpatient department out of 102 patients, 20 patients were managed conservatively and 2 patients did not participate in the present study. Total of 80 patients participated in the study out of which 32 patients are males and 48 where females; their age ranged from 28 to 82 years with mean age of 56.8 years. The patients who came with distal end radius fractures radiographs were taken before closed reduction and application of slab and postoperative x-ray was taken after day one and 4 weeks of surgery operated by various modalities (percutaneous

pinning, external fixation, volar plating). All the radiographs are studied for dorsal angulation, radial angle, radial height and all fractures were reduced according to acceptable anatomic criteria: radial tilt  $>10^\circ$ , ulnar variance 0 mm, palmar tilt  $>0^\circ$ , no intraarticular displacement more than 2mm [4]. The variables used in this study are age, sex, comminution, radial styloid fracture, ulnar styloid fracture. The results were compared statistically by Mann-Whitney test.

### Results

Of 80 cases of distal end radius fractures, the mean age of the patients was 56.8 years. 34 patients were males and 46 patients were females, there is not much significance on predisposition of sex in the loss of reduction. 21 cases are presented with

comminution, 42 cases with ulnar styloid fracture, 16 cases associated with DRUJ injury. Out of it 17 (80.5%) patients with comminution, 10 (62.5%) patients with DRUJ injury, 2 (4.7%) patients presented with ulna styloid fracture had loss of reduction. patients with age more than 50 years had loss of reduction in 38 patients and among 08 patients with less than 50 years. In external fixation patients loss of reduction was seen in 06 (66.6%) patients with comminution, 03 (85%) patients with DRUJ disruption, 01 (20%) patient with ulna styloid fracture. Where as in percutaneous pinning 06 (75%) patients had loss of reduction with comminution, 05 (62.5%) with DRUJ disruption, (50%) with ulna styloid fracture. In case of plating 01 (5%) had loss of

Table 1: shows of male, female percentage of distal end radius fractures

	Males	Females
Number of patients	34	46
Percentage	42.5%	57.5%



Fig. 1: shows pie chart of male, female ratio



Fig. 2: loss of reduction by age group

Table 2: shows loss of reduction in various age group individuals.

Age	Loss of reduction
>50 years	38 patients
<50 years	08 patients

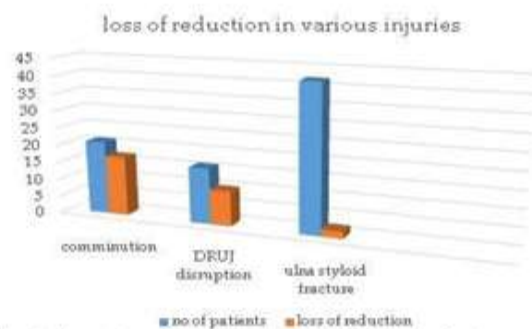


Fig. 3: shows loss of reduction in distal end radius fractures due to various associated injuries.

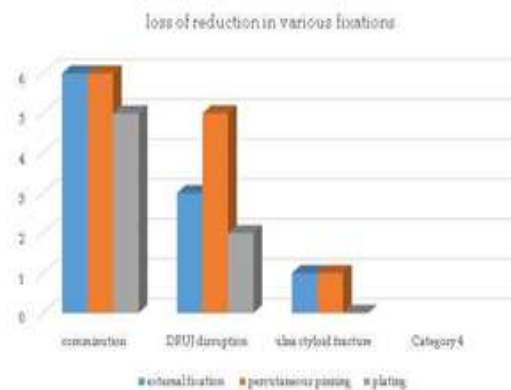


Fig. 4: shows the bar diagram of various fixations and loss of reduction due to different injuries



**Table 3:** shows loss of reduction in associated injuries in patients along with various factors involved in loss of reduction.

	No. patients	Loss of reduction	Loss of radial tilt	Loss of radial height	Loss of dorsal tilt
Comminution	21	17 (80.9%)	05	09	03
Druj Disruption	16	10(62.5%)	06	08	06
Ulna Styloid Fracture	42	02 (4.7%)	01	01	00

**Table 4:** shows various types of fixations and loss of reduction associated to various injuries

	External fixation	Loss of reduction	Percutaneous pinning	Loss of reduction	Plating	Loss of reduction
Comminution	09	06(66.6%)	07	06(85%)	05	01 (20%)
DRUJ disruption	04	03 (75%)	08	05 (62.5%)	04	02 (50%)
Ulna styloid fracture	20	01 (5%)	12	01 (8.3%)	10	00 (0%)

reduction with comminution, 02 (8.3%) patients with DRUJ disruption, none with ulna styloid fracture.

Discussion: the various modalities of treatment for the distal end radius fractures are aimed at reducing the deformity and achieving better anatomical results. In our present study, we considered various factors in loss of reduction i.e age, comminution, injury of DRUJ, ulna styloid fractures.

Our study results show that there is correlation between the comminution of fracture in loss of reduction and it is seen more in the patients aged more than 50 years. Comminution of fracture fragments and resulted in the dislodgement of fragments leading to loss of reduction.

Disruption of distal radio ulnar joint have a strong correlation between loss of reduction, Ligamentous structures around the DRUJ are strong stabilizers of the wrist joint, so any disruption of this mechanism may lead to instability. Patients without DRUJ disruption has minimal displacement of reduction when compared to patients with DRUJ involvement. Other authors also report that distal radius fractures with DRUJ involvement have a worse prognosis than those fractures without DRUJ instability [5]. Patient age is another predictor of late instability, as there were increased number of patients with late fracture collapse who were over 70 years old [4,6]. Osteoporosis leading to bone comminution is the main factor of this collapse [4]. Due to aging, the cortical segments of bone become porotic, and this trabecular bone plays part in load transmission [4,9]. Our results show a weak correlation between ulnar styloid fractures and loss of reduction. Several studies have found no correlation between ulnar styloid fractures and the end result [4,10].

May et al [6] have shown that 11% to 19% of patients with distal radius fractures suffered from problems of the DRUJ following these injuries [4,6]. Other authors also report that distal radius fractures with DRUJ involvement have a worse prognosis than those fractures without DRUJ instability [4,6].

Kristin et al found that risk for displacement with an unacceptable radiographic result was found to increase with increasing age and decrease with decreasing age [11]. Yoon et al [12] showed that AO type C3 distal radial fractures, which have intraarticular comminution, had poorer clinical and radiographic outcomes than AO type C2 fractures, despite open reduction and palmar locking plate fixation. In our study we found that distal end radius fractures associated with comminution, loss of reduction was seen more, in pinning with external fixation next and plating the least. Various as in case of DRUJ disruption loss of reduction is more in external fixation and plating with least in pinning. Where as in ulnar styloid fractures there was not much loss of reduction with any of the fixations.

### Conclusion

The distal end radius fractures are the most common fractures presented to the orthopaedic opd. There are various modalities present in fixation but reductions are lost over a period of time after fixation due to various factors like age, comminution, DRUJ, ulna styloid fracture associated in distal end radius fractures. So, while fixation the surgeon has to keep in mind all the factors to get a proper anatomical reduction and also maintaining the reduction. We came to conclusion that age, comminution, DRUJ disruption, influence in loss of reduction and ulnar styloid fractures did not have much effect in loss of reduction. Plating has least loss of reduction in comminuted fractures. In DRUJ disruption percutaneous pinning has better maintenance of reduction.



## References

1. Pogue DJ, Vegas SF, Patterson RM, Peterson PD, Jenkins DK, Sweo TD, et al. Effects of distal radius malunion on wrist joint mechanics. *J Hand Surg Am.* 1990;15:721-7.
2. Meena S, Sharma P, Sambharia AK, Dawar A. Fractures of Distal Radius: An Overview. *Journal of Family Medicine and Primary Care.* 2014;3(4):325-332. doi:10.4103/2249-4863.148101.
3. Cooney W3, Dobyns JH, Linscheid RL. Complications of Colles' fractures. *J Bone Joint Surg Am.* 1980 Jun;62(4):613-9.
4. Myderrizi N. Factors Predicting Late Collapse of Distal Radius Fractures. *Malaysian Orthopaedic Journal.* 2011;5(3):3-7. doi:10.5704/MOJ.1111.006.
5. Nesbitt, Kristin S. Assessment of instability factors in adult distal radius fractures. *J Hand Surg Am.* 2004 Nov;29(6):1128-38.
6. May MM, Lawton JN, Blazar PE. Ulnar styloid fractures associated with distal radius fractures; incidence and implications for distal radioulnar joint instability. *J Hand Surg [Am].* 2002;27(6):965-71.
7. Young B.T., Rayan G.M. Outcome following nonoperative treatment of displaced distal radius fractures in low-demand patients older than 60 years. *Journal of Hand Surgery,* 2000;25(1):19-28.
8. Trumble T.E., Schmitt S.R., Vedder N.B. Factors affecting functional outcome of displaced intra-articular distal radius fractures. *Journal of Hand Surgery,* 1994;19(2):325-340.
9. Yan S, Michael A.K, Liebschner, Gemunu H. Gunaratne. A Study of Age-Related Architectural Changes that Are Most Damaging to Bones. *Biophysical J* 2004;87:3642-7.
10. Lindau T, Aspenberg P. The radioulnar joint in distal radial fractures. A review. *Acta Orthop Scand* 2002;73(5):579-88.
11. Nesbitt K.S., Failla J.M., Les C. Assessment of instability factors in adult distal radius fractures. *Journal of Hand Surgery,* 2004;29(6):1128-38.
12. Yoon J.O., You S.I., Kim J.K. Intra-articular comminution worsens outcomes of distal radial fractures treated by open reduction and palmar locking plate fixation. *Journal of Hand Surgery (European Volume)* 2017;42(3):260-65.