

A Study to Evaluate Different Profiles of Distal Radius Fracture (DRF) Patients at Tertiary Hospitals in Junagadh District, Gujarat**Himanshu Ladani¹, Divyaraj Ravalji², Ankit Umretiya³, Kapil J. Govani⁴, Pratik R. Gohil⁵**¹Associate Professor, Orthopaedics Department, GMERS Medical College, Junagadh²Senior resident, Orthopaedics Department, GMERS Medical College, Junagadh³Senior resident, Orthopaedics Department, GMERS Medical College, Junagadh⁴Associate Professor, Community Medicine Department, GMERS Medical College, Junagadh⁵Assistant professor, Orthopaedics Department, GMERS Medical College, Junagadh

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Abstract:**Background:** Distal radius fractures are among the commonest upper extremity fracture.**Aims & Objectives:** (1) To assess the socio-demographic & health profile of the patients. (2) To assess the aetiology, types of fracture and post-operative findings.**Methods and Material:** The study participants were confirmed DRF patients admitted at orthopaedics department of civil hospital- Junagadh and few private tertiary hospitals. A cross-sectional study was conducted during the period from July to December 2023. As per the predefined inclusion & exclusion criteria, a total 117 patients were taken for the study. Informed consent of participants was taken. Specially designed performa was prepared for the data collection.**Results:** Mean age of distal radius fractures patients was 46.4±12.2. Majority (60.7%) patients were males. Among the half of the patients, reasons for the DRF was road traffic accident. In Frykman DRF classification, majority (33%) of the patients were belonged to type-3. AO classification shows majority of DRF were type-B (52%). Post-operative mean radial shortening (in mm) was 0.5±0.2.**Conclusions:** A very few of the patients had radial shortening ≥ 2 mm, which was good post-operative outcome. Types of DRF, choice of surgical procedures with operative skills are some of the key factors for better post-operative outcome.**Keywords:** Distal Radius Fracture, DRF Classification, Post-Operative Outcome.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

The hand/upper extremity plays a vital role in our interaction with the environment and allows us to physically interact with objects around us. Distal radius fractures (DRF) are the most common type of all extremity fractures. [1] High-energy DRF are more frequent in younger people and usually requires reduction. Restoration of wrist joint function and preserving the radiocarpal and radioulnar joint mechanics at the maximum level are the main focus of reduction techniques. [2] Many complications might be there in DRF like articular mal-alignment, loss of reduction, and inadequate fixation in post-traumatic osteoarthritis, shortening at the fracture site, and impaired wrist and hand function. [3,4]

One of the major task in DRF is to decide the line of treatment, whether it is non-operative or operative management. [4,5] Distal radius practice guidelines of American Academy of orthopaedic

surgeons recommended surgical treatment rather than plaster cast fixation for better outcome if fractures with post-reduction radial shortening >3 mm, dorsal tilt >10 degrees, or intra-articular displacement or step-off >2 mm. Best practice for the management of DRF by British Orthopaedic association and British Society for Surgery of the Hand recommends that surgical intervention is indicated if a 4-5mm positive ulnar variance is present for patients between 38 to 58 years of age. [6] Percutaneous pinning with kirschner wire (K-wire), volar locking plate (VLP) and external fixation (EF) are among the fixation techniques used in the clinical practice for the treatment of distal radial fractures. [5,7] Closed reduction techniques EF and K-wire have the advantages of being less invasive with easy application and minimal costs. Even though there are various reports claiming the superiority of one method over

another, the decision on the treatment procedure is multifactorial. [8] The patient's age, occupation, expertise of the procedure to the surgeon, the comorbidities such as tendon, muscles and nerve injuries should be taken into account, as well as the fracture configuration while choosing the line of treatment in DRF. [9,10]

Many other studies also performed to evaluate clinical, functional, and radiological results in DRF patients to determine which modality provides better outcome and satisfactory restoration of the wrist function. [8] We also do a cross-sectional study on DRF patients with following objectives. (1) To assess the socio-demographic & health profile of the patients. (2) To assess the aetiology, types of fracture and post-operative findings.

Methods and Materials

The study was cross-sectional study. The study was conducted during the period from July to December 2023. Total 117 patients of DRF were selected for the study. The indoor patients took from the orthopaedics department of GMERS civil hospital- Junagadh and a few private hospitals in Junagadh district, Gujarat. After the briefing of study content, informed consent was taken from the patients/caretakers. Permission from the institutional ethical committee was also taken. All willing patients were included. All the patients with critical illness were excluded from the study. Surgery of all the patients was done under regional anaesthesia. The fracture was reduced using the classic technique, palmar flexion and ulnar deviation or longitudinal traction when required. External Fixator and K wire augmentation was used. Special care to protect the superficial radial nerve was taken at the time of procedure. Postoperative follow-up was done. Pretested performa was used for data collection purpose. Which mainly focused on basic socio-demographic profile of patients, different etiological factors for DRF, type of DRF and post-operative findings? Microsoft MS excel used for the data entry. Data analysis done by using MS excel and other statistical software. Appropriate statistical tests were applied e.g. proportion, mean, SD (standard deviation), chi-square and P value.

Results

Majority (71, 60.7%) were males patients followed by (46, 39.3%) females out of total 117 patients.

Table-1 shows gender wise comparison of different parameters. E.g. socio-demographic profile, DRF aetiology and few other parameters. Mean age of DRF patients was 46.4 ± 12.2 . Majority of the patients (45, 38.5%) were belonged to 45-65 years age group followed by ≥ 65 years of age group (38, 32.5%). Majority (89.7%) were married. No significant difference was noted for the religion group among patients (P: 0.1). Only few of the patients (11%) were illiterate. Gender wise significant difference was noted regarding educational status (P: 0.004). Majority (69.6%) of females were belonged to middle S-E class whereas majority (47.9%) of males were belonged to lower S-E class (P<0.002). For the nutritional status, we applied body mass index (BMI) criteria. Majority of the males (50.7%) were having normal BMI followed by underweight (38%). Majority of the females (39%) were obese. Significant differences were noted for BMI status among males & females (P: 0.001). Table-1 shows different reasons for DRF. Among the half of the patients, reasons for the DRF was RTA (Road Traffic Accident). Majority DRF among the males (44, 62%) were due to RTA followed by industrial accidents (11, 15.5%). Majority DRF among the females (19, 41%) were due to falling outstretched arm followed by RTA (15, 32.6%). Gender wise significant difference was noted for the reasons of DRF (P: 0.001). Majority of the males (70%) and the females (67%) were having DRF on the right hand. Majority of the patients (73, 62.4%) were having DRF on their dominant hand (P: 0.8).

Table-2 shows the some of the classification of DRF e.g. Frykman type and AO type classification. In Frykman type, majority (39, 33%) of the patients were belonged to type-3 followed by type-4 (22, 18%). AO type shows majority of DRF were type B (61, 52%) followed by type A (32, 27%). In the study, post-operative findings were shown in table-3. We include three parameters for assessing post-operative complications if any. These are radial inclination, palmar (volar) tilt and radial shortening. Majority (72, 61.5%) of the patients had radial inclination in 20-25 degree followed by 15-20 degree (21, 18%). Majority (76, 65%) of the patients had palmar (volar) tilt in 8-12 degree followed by ≥ 12 degree (20, 17%). Very few (3, 2.6%) of the patients had radial shortening ≥ 2 mm (Table-3).

Table 1: Gender wise Socio-demographic & other profile of the DRF patients (N= 117).

Particulars	Total (N=117)	%	Male (N=71)	%	Female (N=46)	%	P value (Gender based)	Chi-square
Age							0.4	3.2
≤ 25 yr.	10	8.5	6	8.5	4	8.7		
25-45 yr.	24	20.5	11	15.5	13	28.3		
45-65 yr.	45	38.5	28	39.4	17	37.0		
≥ 65 yr.	38	32.5	26	36.6	12	26.1		

Marital status							0.44	0.6
Married	105	89.7	62	87.3	43	93.5		
Unmarried	12	10.3	9	12.7	3	6.5		
Religion							0.1	4.5
Hindu	54	46.2	38	53.5	16	34.8		
Muslim	57	48.7	29	40.8	28	60.9		
Others	6	5.1	4	5.6	2	4.3		
Education							0.04	10
Illiterate	13	11.1	5	7.0	8	17.4		
Primary	21	17.9	10	14.1	11	23.9		
Higher Secondary	34	29.1	26	36.6	8	17.4		
Graduate	41	35.0	27	38.0	14	30.4		
Post Graduate	8	6.8	3	4.2	5	10.9		
S-E Classification							0.02	7.8
Upper	9	7.7	6	8.5	3	6.5		
Middle	63	53.8	31	43.7	32	69.6		
Lower	45	38.5	34	47.9	11	23.9		
BMI status							0.001	13.3
Underweight	42	35.9	27	38.0	15	32.6		
Normal	49	41.9	36	50.7	13	28.3		
Obese	26	22.2	8	11.3	18	39.1		
DRF Causes							0.001	17.3
RTA	59	50.4	44	62.0	15	32.6		
Falling outstretched arm	26	22.2	7	9.9	19	41.3		
Industrial accident	17	14.5	11	15.5	6	13.0		
Sports	8	6.8	5	7.0	3	6.5		
Adventures activity	7	6.0	4	5.6	3	6.5		
DRF Fracture Hand							0.5	0.6
Right	82	70.1	48	67.6	34	73.9		
Left	35	29.9	23	32.4	12	26.1		
Dominant Hand							0.8	0.07
Yes	73	62.4	45	63.4	28	60.9		
No	44	37.6	26	36.6	18	39.1		

(BMI= Body mass index, DRF= Distal Radial Fracture, P<0.05= Significant)

Table 2: Different types of Distal Radial Fracture Classifications (N=117).

DRF Classification	Type	No.	%
Frykman Type (2,4,6,8= with ulnar fracture) (1,3,5,7= without ulnar fracture)	1	16	13.7
	2	11	9.4
	3	39	33.3
	4	22	18.8
	5	13	11.1
	6	7	6.0
	7	6	5.1
	8	3	2.6
AO Type (A= Extra articular, B= Partially articular, C= Complete articular)	A	32	27.4
	B	61	52.1
	C	24	20.5

DRF= Distal Radial Fracture

Table 3: Post-operative clinical parameters among the patients (N=117).

Post-operative findings		Range	No.	%	
Radial (In Degree)	Inclination	10-15	7	6.0	
		15-20	21	17.9	
		20-25	72	61.5	
		≥ 25	17	14.5	
Palmar (In Degree)	(Volar)	Tilt	0-4	6	5.1
			4-8	15	12.8

		8-12	76	65.0
		≥ 12	20	17.1
Radial (In mm)	Shortening	0-1	91	77.8
		1-2	23	19.7
		≥ 2	3	2.6

Discussion

Distal radius fractures are the most common type of all extremity fractures. DRF are among the most common injuries seen in adult orthopaedic practices and these account for nearly one-sixth of fractures treated in emergency departments. [10] In the current study, out of total 117 DRF patients, majority of the patients (38.5%) were belonged to 45-65 years age group with mean age of 46.4 ± 12.2 . In young people DRF are often caused by high-energy trauma that involves various combinations of bending, compression and impaction.

Some other studies shows the fractures occur primarily in young adults and people over age 65, and can vary considerably between the two groups. [11] Table-1 shows different reasons for DRF. Major (50%) reasons for the DRF was RTA (Road Traffic Accident). Significant gender difference was noted for the reasons of DRF (P: 0.001). Most of the other studies show the similar result for the DRF, like fall on an outstretched hand with the wrist in extension. [5]

There are a number of ways to classify DRF. Classification systems are developed to describe patterns of injury which guide to differentiate between conditions which have different outcomes or which need different treatments. Most of the wrist fracture classification systems have failed to achieve any of these goals. Common types of DRF classification are Melone classification, Frykman classification, Universal classification, AO/OTA classification and Fernandez classification.

Out of which we took Frykman and AO types of classification to differentiate types of DRF (Table-2). It is generally accepted that fractures with >2 mm step-off in the radiocarpal joint and >10 degrees dorsal tilt should be treated surgically. [3,5] We include three parameters for assessing the functionality and post-operative complications if any. These are radial shortening, palmar (volar) tilt and radial inclination. Routine radiographs were taken at the post-operative three weeks and six weeks. Radial inclination, volar tilt, radial length and ulnar variance were assessed on the follow-up visits. Table-3 shows post-operative findings based on three parameters. A very less (2.6%) of the patients had radial shortening ≥ 2 mm, which was the good post-operative sign.

Conclusion & Recommendation

Mean age of DRF patients was 46.4 ± 12.2 . Significant difference was noted for BMI status

among males & females (P: 0.001). In the current study, AO type DRF classification shows majority belonged to type B (partially articular). At one extreme, a stable displaced extra-articular fracture has brilliant post-operative outcome.

On the other hand, an unstable, displaced intra-articular fracture is hard to treat and also has a poor prognosis. External Fixator and K wire augmentation was used as standard surgical procedure. Post-operative findings shows mean radial inclination range (in degree) was 21.3 ± 6.1 .

Mean palmar (volar) tilt range (in degree) was 10.2 ± 2.4 . Post-operative mean radial shortening (in mm) was 0.5 ± 0.2 . Only few of the patients had radial shortening ≥ 2 mm, which was good post-operative outcome. Types of DRF, choice of surgical procedures along with operative skills are some of the key factors for better post-operative outcome.

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