Scholars Academic Journal of Biosciences
Abbreviated Key Title: Sch Acad J Biosci
ISSN 2347-9515 (Print) | ISSN 2321-6883 (Online)
Journal homepage: https://saspublishers.com/sajb/

OPEN ACCESS

Orthopedic

A Descriptive Study on the Causes and Occurrences of Fracture Radius in the Distal Region For Patients Coming With Fracture Radius and the Treatment Given in Dr. Hardas Singh Orthopedic Hospital And Super Specialty Research Centre, Circular Road, Amritsar, Punjab

Dr. Pancham Prasad*, Dr. Parvinder Singh Sandhu

HOD Department of Orthopedic, Dr. Hardas Singh Orthopedic Hospital and Superspeciality Research Centre, Circular Road, Amritsar, Punjab, India

DOI: 10.36347/sajb.2020.v08i10.001 | **Received:** 23.09.2020 | **Accepted:** 02.10.2020 | **Published:** 06.10.2020

***Corresponding author:** Dr. Pancham Prasad

Abstract **Original Research Article**

Background: Fracture wrist in distal region is one of the most common fractures encountered in the orthopedics department. They can be anything from 8-17% of all skeletal injuries. Abraham Colles is credited with a description of the most famous fracture pattern affecting the distal end radius in year 1814 and is classically named after him. The fracture of Colles is clearly described as a metaphyseal injury to the cortico-cancellular junction (within 2−3 cm of the articular surface) of the distal radius with characteristic dorsal tilting, dorsal shifting, radial tilting, radial shifting, supination and impaction. Smith's fractures, also referred to as Colles' reverse fracture, have a palmar inclination of the distal piece. ***Methodology:*** Study was done prospectively from Jan 2019 – Feb 2020. On all patients meeting the inclusion criterion. Inclusion requirements were as follows: (1) patients who consented to be a part of the study, (2) patients presented within 3 weeks of injury, (3) patients with mature skeletons, and (4) patients who had no other related fractures in the upper ipsilateral limb. Exclusion criterion - Patients with comorbid conditions that preclude surgery or with local tissue conditions that make surgery inadvisable were removed from surgery. Data Processing and Analysis – Data was collected on standard template created on MS office Excel sheets. Data analysis was done on SPSS while using the standard measures of central tendency, various measures of association, and running the standard test for association like Chi square test. A p value of less than .05 was considered to be statistically significant. ***Result:*** In our study we found males participants to be the majority (male n=34, 61.5%) while most of them were following Hindu religion, were from Rural region and were BPL families. Majority the study participants had their right hand involved while most of the trauma types. We saw that most of the participants were offered below elbow pop cast (45.5% n=25) followed by Close reduction. In our study RTA with involvement of Motor vehicle (bikes/car) was the most common cause (n=44, 80%) ***Conclusion:*** The most common cause of road traffic accidents is in young adults, where osteoporosis is common in elderly people because of falling on extended hands. Our study shows that extremely comminuted distal radius intra-articular fractures are normal and result from high velocity accidents such as collisions with motor vehicles.

Keywords: fractures, orthopedics department, Colles, metaphyseal injury.

INTRODUCTION

Fracture wrist in distal region is one of the most common fractures encountered in the orthopedics department.

They can be anything from 8-17% of all skeletal injuries. Incidence of the fracture is estimated to be approximately close to 1:10 000 people [1, 2]. A clear approximation in Indian settings is still not vivid, for the developed world the figures stand close to 15%.

Data over last 50 years suggest steady rise in the number of cases in most countries including in India. The rapid expansion of knowledge on functional hand and wrist anatomy, the growing functional demands of senior citizens, and improved means for achieving and preserving anatomical reconstruction of these fractures have given rise to a renewed interest in treating these fractures in a more accurate manner [2, 3].

Abraham Colles is credited with a description of the most famous fracture pattern aff ecting the distal end radius in year 1814 and is classically named after him [4].

The fracture of Colles is clearly described as a metaphyseal injury to the cortico-cancellular junction (within 2−3 cm of the articular surface) of the distal radius with characteristic dorsal tilting, dorsal shifting, radial tilting, radial shifting, supination and impaction.

Smith's fractures, also referred to as Colles' reverse fracture, have a palmar inclination of the distal piece.

Barton's fracture is a displacement of the intra-articular coronal plane fracture-subluxation of the dorsal lip of the distal radius with displacement of the fragmented carpus.

Reverse Barton occurs with a palmar-flexion wrist and requires a volar tongue. Chauffer's fracture was identified as initially occurring due to the backfire of the car starter handles in older models. It requires an intra-articular fracture of a variable scale radial styloid [4, 5].

Intra-articular aspect of distal radius fractures typically implies high-energy trauma occurring commonly for young adults, while in old geriatric groups the common type is extra articular.

A fall on the outstretched hand with the wrist in dorsiflexion causes most of the fractures. The shape and magnitude of the fracture of the distal radius, as well as the concomitant damage to the disco-ligamentary structures of the wrist, also depend on the location of the wrist at the moment of the impact on the ground. The width of this angle determines the location of the fracture. Pronation, supination and abduction determine the direction of force and compression of carpus and the various appearance of ligament injuries [6].

Classifying the fracture radius of distal end had been a tough task with many proposals to classify it met with relative acceptance including those from Nissen – Lie, Gartland and Werely [6, 7]. Frykamn classification got widespread popularity followed by the AO classification which is the most inclusive having 27 categories [8]. The different categories are grouped in order to maximize the severity of osseous and articular lesions, making it useful for broad anatomical categorization of large numbers of trauma registry fractures, although there is inadequate emphasis for clinical decision-making use. However despite the lack of clinical decision making usability this classification is widely accepted and being used in India.

Information on the occurrence of various fracture forms is important because fractures decide the choice of treatment and can influence the functional end result in terms of articular involvement and degree of fracture displacement. In deciding the expense and resource allocation for these accidents, the same considerations will be important. Also the data regarding the treatment being offered is not available on public domain for Patients in PUNJAB.

Data regarding the type of patients coming to the emergency of Orthopedics with fracture radius involving the distal region is not published while evidence regarding the type of treatments being given is lacking.

This study was done with these intended objectives

1. To understand the socioeconomic status of the patients with fracture radius distal region coming in the Ortho department.
2. To understand the type of fracture being presented in such cases.
3. To document the treatments being given in such cases in our department.

This will help other sites in the state of PUNJAB to treat and plan along with preparation on the basis of data gathered. Also multiple facilities once start having data analysis of fracture radius can give a clear approximation regarding its incidence and reason behind it.

METHODOLOGY

IEC clearance: Study was proceeded after getting the due IEC clearance from the Institute.

Study Setting: Was conducted on patients coming with fracture radius of the distal region Department of Orthopedics in Dr. Hardas Singh orthopedic hospital.

Study Duration: Study was done prospectively from Jan 2019 – Feb 2020 on all patients meeting the inclusion criterion. A total of 52 patients were enrolled in the study after they gave consent to be a part of this study.

Inclusion Criterion: Inclusion requirements were as follows: (1) patients who consented to be a part of the study, (2) patients presented within 3 weeks of injury, (3) patients with mature skeletons, and (4) patients who had no other related fractures in the upper ipsilateral limb.

Exclusion Criterion: Patients with comorbid conditions that preclude surgery or with local tissue conditions that make surgery inadvisable were removed from surgery.

All patient records were checked and the injury date, injury mode, fracture type were registered, open or closed, intra-articular or extra-articular. Demographics for patients were also noted. Often noticed are related fractures to the ipsilateral upper limb and any other damage to the whole body. Patients were examined radiographically using posterior anterior and lateral wrist and forearm radiographs and other x-rays.

Categorization of the Fracture

After considering the various classifications AO classification was used to categories all the fracture cases of distal radius coming and meeting the inclusion criterion. Treatments were given according to the clinical feasibility and standard protocols mentioned in treatment manuals described in Solomon's and being practiced routinely in our hospital setting.

Data Processing and Analysis

Data was collected on standard template created on MS office Excel sheets. Data analysis was done on SPSS while using the standard measures of central tendency, various measures of association, and running the standard test for association like Chi square test. A p value of less than .05 was considered to be statistically significant.

RESULTS

In our study we found males participants to be the majority (male n=34, 61.5%) while most of them were following Hindu religion, were from Rural region and were BPL families (Table-1). Majority the study participants had their right hand involved while most of the trauma types were open (Table-2).

Table-1: The participants detail in terms of SES and other demographic traits

		Gender		Total
		Male	Female	
Age in years Mean Age 39.136 Std. Dev 20.54	**18-25**	8	7	15
		23.5%	33.3%	27.3%
	25-35	6	4	10
		17.6%	19.0%	18.2%
	35-55	14	8	22
		41.2%	38.1%	40.0%
	>55	6	2	8
		17.6%	9.5%	14.5%
Religion	**Hindu**	17	13	30
		50.0%	61.9%	54.5%
	Muslim	8	5	13
		23.5%	23.8%	23.6%
	Christian	4	2	6
		11.8%	9.5%	10.9%
	Others	5	1	6
		14.7%	4.8%	10.9%
SES	**APL**	13	9	22
		38.2%	42.9%	40.0%
	BPL	21	12	33
		61.8%	57.1%	60.0%
Residence	**Urban**	13	9	22
		38.2%	42.9%	40.0%
	Rural	21	12	33
		61.8%	57.1%	60.0%
Total		34	21	55
		100.0 %	100.0%	100.0%

P >.05
P>.05
P<.05
p>.05

Table-2: A description of the side involved and trauma type

		Gender		Total
		Male	Female	
Side Involved	**Right**	20	10	30
		58.8%	47.6%	54.5%
	Le†	14	11	25
		41.2%	52.4%	45.5%
Trauma type	**Closed**	15	10	25
		44.1%	47.6%	45.5%
	Open	19	11	30
		55.9%	52.4%	54.5%
Fracture Type	**Intra articular fracture**	6	5	11
		17.6%	23.8%	20.0%
	Displaced fracture	10	6	16
		29.4%	28.6%	29.1%
	Comminuted Fracture	14	7	21
		41.2%	33.3%	38.2%
	Distal end ulnar fracture	4	3	7
		11.8%	14.3%	12.7%
Total		34	21	55
		100.0%	100.0%	100.0%

P <.05
p>.05
p<.05

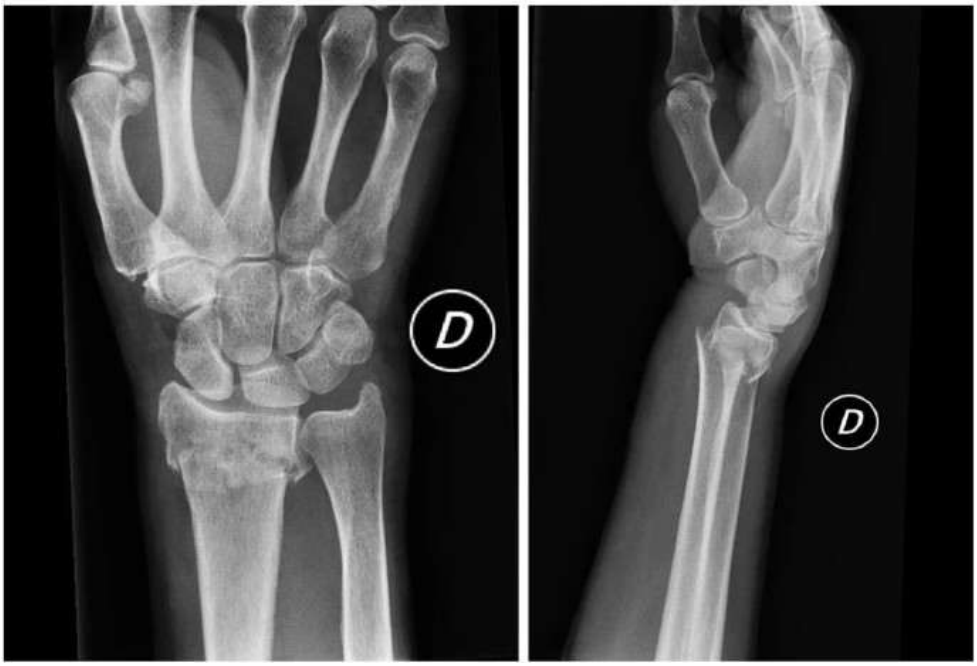
We also noted that most of the study participants had a statistically significant relationship with the side of fracture involved and their genders. While the trauma type was not related with statistical significance with gender. Fracture type like Intraarticular, Comminuted Fracture etc. were in their relationship with the gender having a statistically significant relationship. In our study we found AO type C fractures to be the common type and it was statistically significant in relationship to gender. We saw that most of the participants were offered Below elbow pop cast (45.5% n=25) followed by Close reduction. This had no statistical significance with the gender (Table-3). In our study RTA with involvement of Motor vehicle (bikes/car) was the most common cause (n=44, 80%).

Table-3: Treatment given and Fracture ABO type compared with gender

		Gender		Total
		Male	Female	
Fracture Type AO Classification	**Type A**	10	5	15
		29.4%	23.8%	27.3%
	Type B	7	3	10
		20.6%	14.3%	18.2%
	Type C	17	13	30
		50.0%	61.9%	54.5%
Treatment Given	**Below elbow pop cast**	17	8	25
		50.0%	38.1%	45.5%
	Close reduction and pop cast	7	8	15
		20.6%	38.1%	27.3%
	Close reduction And percutaneous s k wire	4	3	7
		11.8%	14.3%	12.7%
	External fixation	6	2	8
		17.6%	9.5%	14.5%
Total		34	21	55
		100.0%	100.0%	100.0%

P<.05
P>05

Fig. 1



Postero-anterior and lateral view radiographs showing extra-articular fractures of the distal radial epiphysis with dorsal displacement (type 2R3A2.2 according to the AO/OTA classification) A below elbow pop cast.

DISCUSSION

In recent years, current and historical clinical reports suggest an increase in the incidence of distal radius fractures in the paediatric, adult and elderly populations. This increase can possibly be due to a rise in sports-related activities for the paediatric population.

The growth in the elderly population and the rise in the number of active elderly people are primarily responsible for the increase in this age group. Intraarticular and Comminuted fractures are the commonest type owing to speeding motor bikes, high speed impact etc.

Classically both Frykman and Melone reported these type of injuries to be the common types. They both stressed the injury to be common in Young patients. Over the years this pattern has been similar and in our study too we found the mean age to be 39 years.

Similar findings have been reported by studies over the years across various locations including in India [10-13] In our study we had males more commonly affected while in other studies females were more commonly affected [11-13] however other evidence like from Brogen *et al*., have found that men and women had nearly equal incidence rates in the age group of 19-49 years, but women had almost double the prevalence in the 19-65 age group relative to men because of the occurrence of osteoporosis in women over 50 years of age [14].

In our study male were predominantly evident as in our society most males are riding the bikes and the patient coming to us were injured in majority on RTAs (80%). RTAs in fact are known to cause lots of deaths across the country and fractures are only small loss compared to the loss of life [15]. In 2017 each day India lost 405 lives in RTAs and more than 1200 injuries [16].

In other studies mentioned the type of fracture mentioned are predominantly similar to what we observed. They too had mentioned about finding more of Type C while more of open fractures owing to the high velocity impact owing to the RTAs as the reason for injury.

In these descriptive studies they have not detailed the types of treatments given. We have described the treatment as was offered without any prejudices. In our setting below elbow pop cast as the commonest modality being offered. As mentioned before in Indian setups "There is no personalized remedy for any of the distal radius fractures. The treatment choice should be based on the type of fracture, the features of the patient, the specifications of the patient and, last but not least, the expertise and preference of the treating surgeon. As long as stable reduction and anatomical reconstruction are assured, a successful treatment will result in several ways [1].

CONCLUSION

During the last few decades, the epidemiology of distal radius fractures has improved. In our research, such fractures are more common in young adults and middle-aged individuals. The most common cause of road traffic accidents is in young adults, where osteoporosis is common in elderly people because of falling on extended hands. Fractures were more on the right side hand side. Our study shows that extremely comminuted distal radius intra-articular fractures are normal and result from high velocity accidents such as collisions with motor vehicles. Understanding the epidemiology of distal radius fractures allows the treating surgeon to choose the most suitable fracture care choices and also to prioritize risk groups for preventive steps. As mentioned treatments need not to be tailor made but must consider many other factors. A more robust study which evaluate the pros and cons of the treatment being offered might settle the question which treatment is better.

REFERENCES

1. Gauresh V. Distal end radius fractures: evaluation of results of various treatments and assessment of treatment choice. Chinese journal of traumatology. 2014 Aug 1;17(4):214-9.
2. Singer BR, McLauchlan GJ, Robinson CM, Christie J. Epidemiology of fractures in 15 000 adults: the influence of age and gender. The Journal of bone and joint surgery. British volume. 1998 Mar;80(2):243-8.
3. Owen RA, Melton 3rd LJ, Johnson KA, Ilstrup DM, Riggs BL. Incidence of Colles' fracture in a North American community. American Journal of Public Health. 1982 Jun;72(6):605-7.
4. Song J, Yu AX, Li ZH. Comparison of conservative and operative treatment for distal radius fracture: a meta-analysis of randomized controlled trials. International journal of clinical and experimental medicine, 2015; 8(10):17023–17035.
5. Louis S, David W, Selvadurai N. Apley's system of orthopaedics and fractures. The back, London. 2001:397-9.
6. Havemann D, Busse FW. Accident mechanisms and classification in distal radius fracture. InLangenbecks Archiv fur Chirurgie. Supplement II, Verhandlungen der Deutschen Gesellschaft fur Chirurgie. Deutsche Gesellschaft fur Chirurgie. Kongress 1990 (pp. 639-642).
7. Meena S, Sharma P, Sambharia AK, Dawar A. Fractures of distal radius: an overview. Journal of family medicine and primary care. 2014 Oct;3(4):325-332.
8. Mueller ME, Nazarian S, Koch P. Berlin: Springer-Verlag; AO classification of fractures. 1987.
9. Ruch DS, Papadonikolakis A. Volar versus dorsal plating in the management of intra-articular distal radius fractures. J Hand surg. 2006; 31A:9-16.
10. Margaret WM, Klausmayer MA, Fernandez D, Orbay JL, Bergada AL. Volar plate fixation of intra-articular distal radius fractures: A Retrospective study. J Wrist Surg. 2013; 2(3):247-254.
11. Abe Y, Tokunaga S, Moriya T. Management of intra-articular distal radius fractures: volar or dorsal locking plate – which has fewer complications. J Hand surg Am. 2016, 1-7.
12. Abe Y, Tokunaga S, Moriya T. Management of intra-articular distal radius fractures: volar or dorsal locking plate – which has fewer complications. J Hand surg Am. 2016, 1-7.
13. Kapoor H, Agarwal A, Dhaon BK. Displaced intra articular fractures of distal radius: a comparative evaluation of results following closed reduction, external fixation and open reduction with internal fixation. Injury. 2000; 31(2):75-79.
14. Brogren E, Petranek M, Atroshi I. Incidence and characteristics of distal radius fractures in a southern Swedish region. BMC Musculoskelet Disord. 2007; 8:48.
15. Sharma N, Kumar AA. Road accidents in India: Dimensions and issues. [online]. Available from: http://www.teriin.org/library/files/Road_Accidents_in_India.pdf
16. Pal R, Ghosh A, Kumar R, Galwankar S, Paul SK, Pal S, Sinha D, Jaiswal AK, Moscote-Salazar LR, Agrawal A. Public health crisis of road traffic accidents in India: Risk factor assessment and recommendations on prevention on the behalf of the Academy of Family Physicians of India. Journal of family medicine and primary care. 2019 Mar;8(3):775.