

Epidemiology and Management of Distal Radioulnar Injuries at Hadji Boejasin General Hospital, Pelaihari

Yudha Pratama¹, Muhammad Iqbal²

¹Department of Emergency Unit, Hadji Boejasin General Hospital, Pelaihari, Indonesia

²Department of Orthopaedics and Traumatology, Universitas Lambung Mangkurat, Banjarmasin, Indonesia

Correspondence Author: ydhap91@gmail.com

Abstract:

Distal radius fracture is one of the most common fractures, especially in the elderly. This fracture often followed by an ulna fracture, causing interference with the distal radioulnar joint (DRUJ). The aim of this study is to provide an overview of DRUJ trauma management along with its indications. This research is a retrospective descriptive study. Data collection was carried out from the medical record data of DRUJ trauma patients who were treated through the ED of H. Boejasin General Hospital. There were 19 samples that met the inclusion criteria, aged 18-60 years. A total of 7 patients (36.84%) underwent ORIF, 12 patients (63.16%) LAC (91.67%), and 1 patient underwent SAC (8.33%). Surgery is the main choice of treatment by orthopedic surgeons for DRUJ trauma patients due to high impact injuries, while conservative management is sufficient for low impact injuries.

Keywords: DRUJ trauma; High impact; Low impact; Operative; Non-operative

Introduction

Fractures or bone discontinuity disorders are the most common orthopedic cases resulting from injury. Distal radius fracture (DRF) is a common fracture, especially in the elderly. This fracture is often followed by an ulna fracture, causing disruption to the surrounding joints.¹⁻³ Forearm pronation and supination occur due to movement of the proximal radioulnar joint (PRUJ) and distal radioulnar joint (DRUJ) which function as one unit. The combination of bones and ligaments is essential for stability and movement.⁴ The distal radioulnar joint is a diarthrodial trochoid synovial joint, consisting of two parts in the form of a radioulnar bone articulation and peripheral soft tissue which functions for stability. Bone articulation only has 20% of DRUJ stability.⁵

DRUJ injuries require special consideration due to the quite complex movement and function of this joint. Protocols for the management of DRUJ injuries with ligament rupture are quite varied and controversial. Non-operative treatment is usually combined with pain medication, immobilization with a brace or splint, activity modification, and occupational therapy.⁴ If all conservative treatments fail to relieve symptoms, it is necessary to consider repair of the distal radioulnar ligament either by open or arthroscopic methods. Failure to recognize, anatomically reduce, and stabilize a DRUJ injury can result in joint instability, stiffness, and/or inflammation as well as various other complications.⁵

Research on the epidemiology and management of DRUJ trauma in peripheral hospitals is still very rare. This study aims to provide an overview of the management of DRUJ trauma cases at H. Boejasin Regional Hospital in 2017-2018. It describes the differences in the management of various cases of DRUJ trauma by Orthopedic

Specialists in peripheral hospitals and the indications for choosing this treatment.

Method

Research Design

This research is descriptive research with data collected retrospectively used medical record of trauma patients that treated in Emergency Unit at RSUD H. Boejasin Pelaihari.

Population and Sample

The population in the study were orthopedic surgery patients. The research sample was taken from medical record data of patients diagnosed with DRUJ trauma using total sampling technique. The inclusion criteria are the basic data of the patient who was treated through the Emergency Unit at RSUD H. Boejasin Pelaihari and managed by an Orthopedic Specialist (bone surgery). The data taken includes the treatment carried out on the patient, type of injury, age and gender.

Analysis

The characteristics of DRUJ trauma patients were analyzed descriptively by presenting the data in a table of frequency distribution. The data also presented in grafik style based on management, age, and gender.

Results

In Table 1, it is shown that there are 26 DRUJ trauma inpatients at Emergency Unit at RSUD H. Boejasin Pelaihari from 2017 until 2018. At around 16 cases (61,53%) happened from low impact trauma such as motorbike fall (6 cases), car accident (4 cases), fall from stairs (3 cases), fall from bicycle (2 cases), and blunt object blow (1 case).

The results of research by Sander, et. al. regarding the distribution of DRUJ injuries based on trauma mechanisms showed that injuries were mostly caused by low energy trauma which occurred in 73.1% (196/268) of

patients. With the distribution of cases as follows: falls – 73.1% (196/268), bicycle accidents – 9% (24/268), falls from stairs – 3% (8/268), motor vehicle accidents – 2.2% (6/268), violent attacks – 1.9% (5/268), snowboard accidents – 1.5% (4/268), falls from height – 1.5% (4/268), falls from skates – 1.5% (4/268), falls from inline roller skates – 1.1% (3/268), falls from horses – 1.1% (3/268), falls from stairs – 1.1% (3/268), crush injuries – 0.7% (2/268), injuries while playing football – 0.7% (2/268), judo/karate – 0.7% (2/268), and skateboarding accidents – 0.7% (2/268). 12.7% (34/268).⁶ Ferree et. al, in their study in tertiary health services in the Netherlands noted that only 25.2% of patients experienced high energy injuries.⁷ Likewise, studies of Western and Asian populations also show similar distributions in injury mechanisms as seen in hospital-based studies.⁸

This research sample had a mean age of 40,41 ± 19,30 years with the largest proportion of 50% (13 patients) being in the 18-60 years group. The groups of children (aged <18 years) and elderly (>60 years) amounted to only 6 patients (23,08%) and 7 patients (26,92%). Overall, cases were dominated by men with 15 cases (57.69%). Meanwhile, there were only 11 cases of women (42.31%). This shows that DRUJ injuries are more often suffered by men with a ratio of 1.3:1.

Research by Anil, et. al found a similar thing where the average age of patients who experienced distal radius injuries was 42,1 ± 15,3 years and was dominated by men (76.9%, 773/1005 patients). Male patients had a mean age of 39,7 years and females 50,2 years. The majority of patients are in the age 20-60 years. The proportion of patients involved in manual labor (n = 497) and sedentary work (n = 508) was almost the same. However, in this study around 65.5% (n = 658) of patients predominantly experienced injuries due to high energy trauma.⁸ In another study conducted over 5 years, the total number of

distal radius fractures increased by 54,2% (48,145 in 2008 and 74,240 in 2012), followed by an increase in the number of individuals aged 50 years and over who experienced such fractures by 19,5%.⁹

Research by Anil, et. al found a similar thing where the average age of patients who experienced distal radius injuries was 42,1 ± 15,3 years and was dominated by men (76.9%, 773/1005 patients). Male patients had a mean age of 39.7 years and females 50.2 years. The majority of patients are in the age 20-60 years. The proportion of patients involved in manual labor (n = 497) and sedentary work (n = 508) was almost the same. However, in this study around 65.5% (n = 658) of patients predominantly experienced injuries due to high energy trauma.⁸ In another study conducted over 5 years, the total number of distal radius fractures increased by 54,2% (48,145 in 2008 and 74,240 in 2012), followed by an increase in the number of individuals aged 50 years and over who experienced such fractures by 19.5%.⁹

After selecting the sample, it was found that only 19 patients received treatment, the remaining 7 patients chose to go home and not receive further treatment. Of the 19 people, 7 patients (36,84%) underwent surgery in the form of open reduction internal fixation (ORIF). Meanwhile, the other 12 patients (63,16%) received non-operative treatment in the form of closed reduction accompanied by the installation of a long arm cast (91,67%), 1 patient only received a short arm cast (8,33%). Based on the mechanism of injury (Table 2), ORIF is more commonly performed on patients who have experienced high impact injuries. The majority of patients who experience DRUJ trauma due to low impact only undergo closed reduction. Research by Abhijith, et. al in India during 2014-2020, the results showed that high impact trauma was more likely to undergo open reduction + plate fixation (425 cases), followed by conservative management in 108

cases. Likewise, low impact injuries also require ORIF procedures more often (195 cases).⁸

All patients who underwent surgery were in the age 18-60 years. Meanwhile, 54,54% (6 people) of non-operative patients were aged 18-60 years, 18,18% (2 people) were 14 and 15 years old respectively, and 27,28% (3 people) were over 60 years old (Graph 1a). In terms of gender, operative treatment was slightly more common in male samples (57,14%), for the gender of non-operative patients the results were the same for men

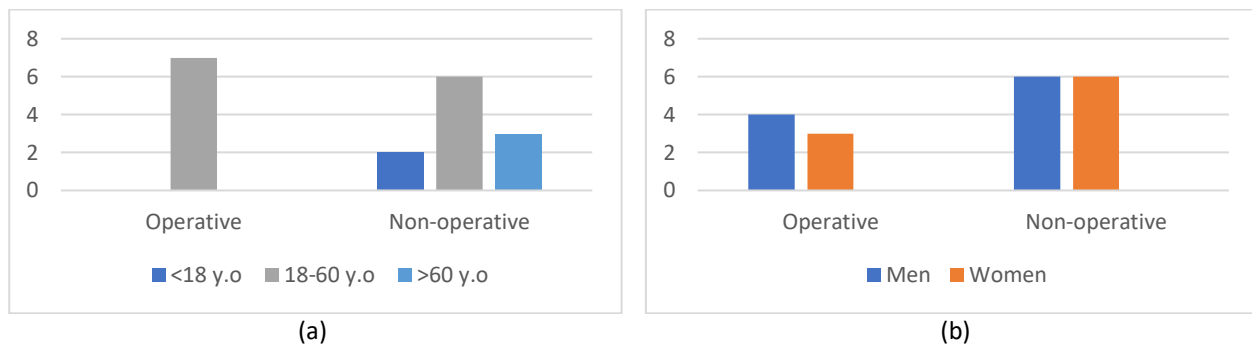
and women, 6 people each (Graph 1b). In an observational study of elderly patients who experienced DRUJ trauma, several factors were found to be significantly associated with consideration for surgical intervention. One of them is age (55-64 years, $P = 0.028$) which plays an important role in determining surgery. There are several reasons underlying these results. However, in the same study, no significant relationship was found between gender and consideration of DRUJ trauma management.¹⁰

Tabel 1 The Characteristics of research subject

Variable	N	Proportion (%)
DRUJ Trauma Case (n = 26)		
<i>High impact</i>	10	38,47
<i>Low impact</i>	16	61,53
Age (n = 26)	<i>Mean±SD = 40,41±19,30</i>	
<18 y.o	6	23,08
18-60 y.o	13	50
>60 y.o	7	26,92
Gender (n = 26)		
Men	15	57,69
Women	11	42,31
Management Type (n = 19)		
Operative	7	36,84
Non-operative	12	63,16

Table 2 Management decision based on injuries mechanism

	N
<i>High impact</i>	
ORIF	6
<i>Closed reduction</i> +LAC	3
<i>Low impact</i>	
ORIF	1
<i>Closed reduction</i> +LAC	8
<i>Closed reduction</i> +SAC	1



Grafik 1 Operative and Non-Operative Management in DRUJ Trauma Case: (a) based on 3 age groups: <18, 18-60 dan >60 tahun; and (b) gender

Discussion

half of the distal end radius fracture cases, especially intraarticular, were accompanied by DRUJ disruption. To obtain good outcomes and preventing complications the clinicians need to restore the distal end radius positions anatomically as possible.¹¹ Most of radius distal fracture is managed conservatively with closed reduction and immobilized cast, while unstable fracture needs surgery fixation.^{12,13} That is the reason why patient with high impact injury is suggested to have surgery. Open reduction and internal fixation (ORIF) provides more stable fixation results and better radiological appearance. In some cases it has also been reported to provide better functional results, and the opportunity for earlier mobilization. The goal of surgical fixation itself is to restore alignment. There are many different ways to improve DRF, but to date there is no consensus on which option is superior.¹⁴

Conservative closed reduction treatment needs to be considered if the fracture is classified as stable and bone alignment can be maintained with a cast or plaster. The recommended cast types are LAC and SAC types. SAC is indicated for distal wrist fractures that are not accompanied by

displacement of the bony components or are minimally displaced, such as Colles and Smith fractures or greenstick, buckle, and physeal fractures in children as well as fractures of carpal bones other than the scaphoid or trapezium. Meanwhile, LAC is often performed for acute and definitive treatment of fractures of the elbow, proximal and medial forearm, wrist injuries; Acute management of distal radial (nonbuckle) and/or ulnar fractures in children.¹⁵ Displaced fractures that can be manipulated into an anatomical position are simply treated with a cast or Plaster of Paris (POP) for 4 weeks. Wrist mobilization was initiated 4 weeks after cast application. Fractures should be monitored in the clinic to check for changes in alignment within 1 week and 2 weeks after manipulation. If significant displacement is found, surgical intervention may be necessary. It is generally agreed that repeated non-operative treatment has a high failure rate and is not recommended.¹⁴

Closed reduction with cast immobilization is not recommended for the elderly, because of the high risk of displacement and the possibility of poor functional results.¹⁶ As the number of people over 60 years old increasing, surgical

treatment of distal radius fractures allows them to return to daily activities more quickly than conservative approaches. Similarly, in the United States, the rate of internal fixation of distal radius fractures in the elderly increased from 3% in 1997 to 39% in 2007.¹⁷

Conclusion

ORIF treatment becomes the main option from orthopaedist for DRUJ trauma patient because of high impact injury in 18-60 patients. Conservative management in form of closed reduction using cast is more often used on low impact and young patients. All of this is based on severity level of the injuries and considers the functional capacity after the treatment.

Advanced research needs to be conducted with more sample on DRUJ trauma patients from outpatient's clinic in order to get more accurate results. Apart from that, follow-up data is needed on patients during visits to the hospital to find out complications and success of each treatment carried out.

Acknowledgement

This research conducted well because of the help from many people. The researchers delivered acknowledgement for the Head of Non-Medic Support Unit, Medical Records Unit, and Staff in Surgery Division of RSUD Hadji Boejasin Pelaihari for the cooperation in this research.

References

1. Toy S, Oktay P, Ozbay H. The Effect of the Covid-19 Pandemic on Traumatic and Non-traumatic Orthopedic Practice in a Tertiary Care Center : A Descriptive Cross-Sectional Study. *Kafkas J Med Sci*. 2021;11(3):369-75.
2. Velpula S, Gummadi, Laxmi Prasanna Vallepu N, Dasari BK, Anchuri SS. Epidemiology of orthopedic trauma admissions in a multispecialty hospital in Warangal-A retrospective study. *Clin Pr*. 2019;16(6):1423-28.
3. Mellstrand C, Id N, Brolund A, et al. Treatment of radius or ulna fractures in the elderly: A systematic review covering effectiveness, safety, economic aspects and current practice. *PLoS One*. 2019;14(3):1-28.
4. Poppler LH, Moran SL. Acute Distal Radioulnar Joint Instability Evaluation and Treatment. *Hand Clin*. 2020;36(4):429-41.
5. Hsiao YN, Chien CS, Wu TM. Treatment of acute distal radioulnar joint instability with distal oblique bundle augmentation of the interosseous membrane by suture-button suspension : A case series. *Jt Dis Relat Surg*. 2022;33(3):658-65.
6. Sander AL, Leiblein M, Sommer K, Marzi I, Schneidmüller D, Frank J. Epidemiology and treatment of distal radius fractures: current concept based on fracture severity and not on age. *Eur J Trauma Emerg Surg*. 2020;46(3):585-90.
7. Ferree S, van der Vliet QMJ, Nawijn F, et al. Epidemiology of distal radius fractures in polytrauma patients and the influence of high traumatic energy transfer. *Injury*. 2018;49(3):630-5.
8. Anil A, Acharya AM, Bhat AK. A Six-Year Clinical Profile of Distal Radius Fractures in a South Asian Population. *J Hand Surg Asian-Pacific*. 2022;27(5):824-33.
9. Kwon GD, Jang S, Lee A, et al. Incidence and mortality after distal radius fractures in adults aged 50 years and older in Korea. *J Korean Med Sci*. 2016;31(4):630-4.
10. Wu Y Sen, Yang J, Xie LZ, et al. Factors associated with the decision for operative versus conservative treatment of displaced distal radius fractures in the elderly. *ANZ J Surg*. 2019;89(10):E428-E32.
11. Pinandita T, Herman H, Ismiarto YD. Concomitant Distal Radioulnar Joint Disruption in Distal End Radius Fracture Cases Admitted to Emergency Ward Hasan Sadikin Hospital January 2013 – December 2015. *Berkala Kedokteran*.

- 2019;15(1):23
12. Bhat AK, K SK. Comparative study of orthopaedic trauma pattern in covid lockdown versus non-covid period in a tertiary care centre. *J Orthop*. 2021;23(September 2020):1-7.
 13. Ayong S, Traore A, Postlethwaite D, Barbier O. Functional evaluation of unstable distal radius fractures treated with an angle-stable volar T-plate. *Acta Orthop Belg*. 2014;80(2):183-9.
 14. Carol Chan YT, Lipscombe SJ. Surgical fixation of the adult distal radius fracture: when and why?. *Orthop Trauma*. 2021;35(4):189-97.
 15. Boyd AS, Benjamin HJ, Asplund C. Splints and Casts: Indications and Methods. *Am Fam Physician*. 2009;80(5):491-9.
 16. Blakeney WG. Stabilization and treatment of Colles' fractures in elderly patients. *Clin Interv Aging*. 2010;5(1):337-44.
 17. Mauck BM, Swigler CW. Evidence-Based Review of Distal Radius Fractures. *Orthop Clin North Am*. 2018;49(2):211-22.

