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Characteristics of upper extremity fractures in Aricanti hospital, Gianyar

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Abstract
Extermity fractures are fractures that occur in the clavicula, scapula, humerus, radius, ulna, carpal, metacarpal, phalanx. These fractures generally occur in men of productive age, but can also occur in women. However, data regarding upper extremity fractures in Indonesia, especially in Gianyar, is still difficult to find. Thus, this study aims to determine the characteristics of upper extremity fractures at the Aricanti Emergency Room in Gianyar. This study is a retrospective descriptive study using medical record data with total sampling technique. The data obtained according to the inclusion and exclusion criteria were 194 patients analysed with SPSS version 26. This study shows 63.9% of patients are male. The majority of patients aged 17-25 years (18.56%) The most common type of fracture was closed fracture (84.1%). Most patients were managed non-operatively (50.4%). The most common mechanism of fracture was high energy injury (94.8%). The most common fracture location was the radius in 55 cases (28.5%). Most of the characteristics of upper extremity fracture patients in the Emergency Department of Aricanti Hospital are male, 26-35 years old, closed fracture type, operative management, high energy injury fracture mechanism, and the most common fracture location at the radius.

Keywords: Characteristics, upper extremity fractures, Aricanti Hospital

Introduction

Bones are rigid connective tissues that form the largest part of the skeleton, and are the main supporting tissue of the body [1, 2]. Bones are also living organs that hurt when injured, bleed when broken and grow with age. Bones serve to protect important structures, support the body, provide the basis for mechanical movement, produce some blood cells, and deposit various minerals. If there is damage to the bones, of course, it has a fatal impact on the body. one of the common bone damages is a fracture.

Fracture is a term that refers to the breakdown of bone integrity, either in total or in fragments, which is generally caused by injury [1]. The occurrence of a fracture depends on a number of factors, such as the force, angle and energy involved in the injury, the condition of the bone itself and the soft tissues surrounding the bone. Fractures can occur in the whole bone or just a part of it, and are usually caused by trauma.

In Indonesia, the incidence of fractures is high, based on data from the Ministry of Health of the Republic of Indonesia in 2012, approximately eight million people experienced fractures with different types and causes of fractures [4]. Nationally, the incidence of fractures due to trauma in 2011 reached 1.25 million cases [5]. Fractures can occur in all parts of the body, one of which is the upper extremity. Based on research conducted in hospitals in Indonesia in 2007, the number of patients with upper extremity fractures, especially in the forearm, was 11,357 male patients and 8,319 female patients [6]. This is a very high number when viewed as a whole. Anatomically, the upper extremity consists of five parts, namely the shoulder, upper arm, forearm, wrist, and hand. 1 Of these five sites, fractures are most common in the upper arm, the humerus, at 15% [7].

Fractures of the upper extremity usually result from pressure or trauma acting directly on the part. Fracture management may involve conservative approaches or surgical intervention [1]. Surgical procedures can include open repositioning, internal fixation, and closed repositioning with radiology surveillance, which requires internal fixation to follow. With a fracture of the upper extremity, patients often face a number of complaints and obstacles in daily life include decreased activity, decreased productivity, and the inability to work optimally.

Based on the above, fractures of the upper extremities are an issue that needs further research. Further research into injury characteristics, such as fracture type and cause, may provide valuable insights into prevention and protective measures that can be implemented for the community. In addition, understanding the fracture characteristics of patients, both operative and non-operative, can guide hospitals in providing the best care for these fracture cases. Currently, no research has been conducted at Aricanti Gianyar Hospital that comprehensively describes the characteristics of upper extremity fractures. Therefore, the authors are interested in gaining a deeper understanding of these characteristics.

Methods

This study was a descriptive retrospective study conducted at Aricanti Hospital, Gianyar, during the period January 2021 to December 2022. The population that was the focus of this study was patients who had fractures of the upper extremity and came to the Emergency Department of Aricanti Hospital, Gianyar. The inclusion criteria for samples in this study included patients who had been diagnosed with upper extremity fractures and had complete medical records during the period January 2021 to December 2022. The number of samples taken was 194 people. The data collected in this study included patient demographic information, fracture location, fracture type, fracture management, and mechanism of fracture occurrence. The fracture location was divided into eight categories, namely clavicula, scapula, humerus, radius, ulna, carpal, metacarpal, and phalanx. The types of fractures are

divided into open fractures and closed fractures. Fracture management is divided into operative and non-operative methods, while the mechanism of fracture occurrence is categorized as high or low energy injury. The mechanism of fracture was categorized as high energy injury and low energy injury. The collected data were then analysed using univariate statistical methods with the help of SPSS version 26 software.

Results

The results of this study, which include the distribution of various patient characteristics, such as fracture location, age, gender, fracture type, fracture treatment, and fracture cause, are listed in Table 1.

Table 1: Distribution of upper extremity fracture

Variable	Frequency	Percentage
Location	n	%
Clavicula	50	25,77
Scapula	2	1,03
Humerus	34	17,53
Radius	55	28,35
Ulna	15	7,73
Carpal	0	0
Metacarpal	10	5,15
Phalanx Age	28	14,43
0-5	12	6,19
6-11	13	6,70
12-16	17	8,76
17-25	36	18,56
26-35	35	18,04
36-45	23	11,86
46-55	29	14,95
56-65	16	8,25
≥66 Sex	13	6,8
Man	124	63,9
Woman Type of Fracture	70	36,1
Open	12	6,2
Closed Treatment	182	93,8
Operative	185	95,4
Non-Operative Mechanism of Injury	9	4,6
High Energy Injury	184	94,8
Low Energy Injury	10	5,2
Total	194	100

The results of the study regarding clavicula fractures of 50 patients showed that the majority of patients were the early elderly aged 46 - 55 years (22%). The majority of patients were male (66%), closed fracture type (100%), middle 1/3 location (96%), non-operative management (2%), and high energy injury mechanism (96%). In terms of operative management, ORIF PS was performed (100%), while non-operative management was performed with arm sling (100%).

The distribution of scapular fractures of 2 people in shows that the age distribution in early elderly patients (46-55 years), and elderly (≥66 years) is 50% each. Men and women have the same distribution of 50%, closed fracture type (100%), the most common location of fractures in the scapular body (46.2%), there are no patient with fracture locations in the glenoid neck, glenoid fossa, coracoid process. In terms of management, non-operative treatment was most common (100%), and the mechanism of fracture was more common in patients with high energy injury (100%). No operative management was performed, while in nonoperative management, arm sling was used (100%).

The distribution of humerus fractures of 34 people shows that the majority of patients belong to children (6-11 years) as much as 20.6%. The majority of patients were male (58.9%), the most common type of fracture was closed fracture (97.1%), the most common location of fracture in the humerus was the distal 1/3 (55.9%), the most common management was operative management (97%), and the mechanism of high energy injury (97%). In terms of operative management, ORIF PS was most common (54.5%), while nonoperative management was u slab (100%).

The results of the study of the distribution of radius fractures as many as 55 people show that the majority of patients belong to adulthood (26-35 years) as much as 18.2%. the majority of patients with male gender (52.7%), obtained the most common type of fracture is closed fracture (96.4%), the most common fracture location is obtained at the distal radius (85.5%), operative management (96.4%), and the mechanism of fracture is high energy injury (95%). In terms of operative management, ORIF PS was the most common (94.3%), while nonoperative treatment was short arm cast (SAC) (100%).

The distribution of ulna fractures of 15 people, shows that the majority of patients belong to late adulthood (3645 years) as much as 26.7%. The majority of patients were male (73.3%), closed fracture type (93.3%), distal 1/3 location (80%), operative management (86.7%), and high energy injury mechanism (93.3%). In terms of operative management, ORIF PS was the most common (76.9%), while nonoperative management was CR + SAC (100%).

In this study there were no patients with carpal fractures.

Based on the study of metacarpal fractures of 10 people, it can be seen that the majority of patients are classified as adults (26-35 years) as much as 70%. The majority of patients were male (90%), the type of fracture was closed (90%), the most common location of the fracture was the 5th metacarpal (50%), operative management (100%), and the mechanism of high energy injury (100%). In terms of operative management, miniplate ORIF was most common (70%).

The distribution of phalanx fractures of 28 people, found that the majority of patients belonged to late adolescence (17-25 years) as much as 32.1%. The majority of patients were male (75%), the type of fracture was closed (57.7%), the location of the 5th phalanx (42.8%), seen from the management, it was found that operative (85.7%) was most often done, and for the mechanism of fracture occurrence most often was high energy injury (100%). In terms of operative management, ORIF pinning was most commonly performed (62.5%), while in nonoperative management, buddy

Discussion

In this study, it was found that the most common cause of fractures was high energy injury with the majority of cases occurring in traffic accidents while driving. The majority of patients affected by fractures were young adults and male. This is because more men are of productive age and have high levels of mobility, such as driving motorcycles or cars, which are major risk factors for traffic accidents and fractures, when compared to women and other age groups. Regarding fracture type, the majority of patients had closed

fractures. This is because at the time of the trauma, more patients experienced an impact that was not hard enough to make the bone break through the skin and tissue under the Skin [6, 7, 8].

The study on clavicula fractures at Aricanti Gianyar Hospital in the period January 2021-December 2022, tapping was performed (100%).

showed results that were in accordance with several variables, where the majority of patients were classified as between 15-64 years old as much as 88%, followed by <15 years old as much as 10%, and the last was old age (>65 years) as much as 10%. The majority of patients were male (66%), the type of fracture was closed (100%), operative management (96%) where ORIF PS was performed (100%), and the mechanism of fracture was high energy injury in the form of a traffic accident (96%) [11]. In this study, the most common location of fracture was in the middle 1/3, this is because the middle 1/3 of the clavicula is the smallest part of the clavicula and represents a transitional region in the bone anatomically, which makes it the weakest region, besides the location of the clavicula bone which is protected by the shoulder [13].

In this study, the location of the scapula fracture was in the scapular body (100%) This is due to the shape of the scapula which is thin or not a long bone. This is supported by research by Berritto in 2018, which states that fractures in the scapular body are the most common cases (50% of cases), followed by the neck (26-29%) [15]. Research on scapula fractures at Dr. Hasan Sadikin Hospital Bandung in 2014 - 2018,

showed appropriate results in several variables, the majority of patients aged 15 - 44 years (85.71%), followed by age> 45 years (14.29%), and no cases of scapula fractures were found at the age of <15 years. The majority of patients were male (92.85%), the most common location of fracture in the scapular body (57.15%), nonoperative management (89.29%), and the mechanism of fracture was high energy injury which was mostly caused by traffic accidents (direct force) [14].

In our study of humerus fractures the incidence rate showed that the majority of patients < 35 years of age (79.4%), male gender (58.9%), with closed fracture type (97.1%), operative management (97%) compared to Research on humerus fractures at Sanglah Denpasar General Hospital in 2015-2016, showed different results in several different variables where the majority of patients were> 41 years old (40.7%), followed by < 20 years old (29.6%) and 20-40 years (29.6%). Other comparable variables were: type of closed fracture (77.8%), operative management (92.5%), mechanism of high energy injury in the form of accidents, sports injuries [16]. Research in America, showed different results in the variable of the location of the fracture, which showed that the most common location of fracture in the humerus was the proximal humerus (72.4%) [17].

This study on distal radius fractures at Aricanti Gianyar Hospital in the period January 2021-December 2022, when compared with the study at Sanglah Denpasar Hospital in 20132014 regarding distal radius fractures, showed comparable results in several variables where the majority of patients were male (52.7%), the most common location of radius fractures was the distal radius, and the mechanism of fracture was high energy injury (95%) and not similar in the age variable where the majority of patients were 20-49 years old (49.6%) [18]. Research at Dr. M. Djamil Padang Hospital in 2018 regarding distal radius fractures, showed similar results in the age variable, where the majority of patients were 26-64 years old (55.6%), non-operative management was more often performed (51.9%) and similar in several variables, namely the type of closed fracture was more common (77.8%) [19].

The study of ulna fractures at the Royal Orthopaedic Hospital, Birmingham, showed concordant results in several variables, with the majority of patients having closed fractures (96.4%), and the mechanism of occurrence of high energy injury fractures (60%) [18]. Research in Canada, showed incomparable results in the age variable, which showed patients were most often aged> 50 years with an incidence of 6.14 out of 10,000 population per year, as well as the majority of gender where it was found that the incidence of women (5.11 out of 10,000 population) was more frequent than men (5.07 out of 10,000 population) [19].

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In this study did not find any patients with carpal fractures, but in a study of carpal fracture in 2012, showed the most common fracture location is on the scaphoid (60%), this is because the scaphoid is located obliquely between the two rows of carpal bones, and also between the thumb and forearm, the pressure on the carpal bone puts heavy pressure on the scaphoid so that fractures tend to occur [22].

In a study by Dean in 2011 of metacarpals fracture, showed results that were in accordance to this study with the variable mechanism of fracture, which said that the main cause of fractures was sports injury and accidents classified as high energy injury [26].

Research on phalanx fractures in Canada, showed concordant results on the gender variable, where the majority of patients were male (64%) [26]. In a study by Dean in 2011, showed incomparable results on the fracture type variable, where it was said that phalanx fractures were more often open fractures. In the variable of management, it shows appropriate results, it is said that the most common management in phalanx fractures is non-operative management.

Conclusions and suggestions

Based on the research conducted, the majority of upper extremity fracture patients in the Emergency Department of Aricanti Gianyar Hospital in the period January 2021December 2022, are male, aged 26-35 years, classified as early adulthood, with a closed fracture type, managed non-operatively, with the mechanism of fracture classified as high energy injury, and the most common location of fracture is the radius. There are limitations to this study that can only describe some of the characteristics of upper extremity fracture patients in the Emergency Department of

Aricanti Gianyar Hospital, so it is necessary to conduct further descriptive research by adding characteristics such as outcomes with larger populations such as polyclinic patients and room patients to be more representative.

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