e-ISSN: 0975-9506, p-ISSN: 2961-6093

Available online on www.ijpqa.com

International Journal of Pharmaceutical Quality Assurance 2026; 17(10); 41-47

Original Research Article

Retrospective Analysis of Treatment Modalities and Clinical Outcomes in Distal Radius Fractures

Siddharth[1], Sharaf Alam[2], Md. Rashid Equbal[3]

[1]Assistant Professor, Department of Orthopaedics, Netaji Subhas Medical College and Hospital, Amhara, Bihta, Patna, Bihar, India.
[2]Assistant Professor, Department of Orthopaedics, Netaji Subhas Medical College and Hospital, Amhara, Bihta, Patna, Bihar, India.
[3]Assistant Professor, Department of Orthopaedics, Parsad institute of medical sciences, Lucknow, Uttar Pradesh, India

Received: 10-09-2026 / Revised: 28-09-2026 / Accepted: 15-10-2026
Corresponding Author: Dr. Sharaf Alam
Conflict of interest: Nil

Abstract:

Background: Distal radius fractures are some of the most prevalent upper limb fractures, presenting with great variation in types of fracture, means of treatment, and functional results. Proper treatment relies upon the displacement, joint involvement, stability, and function of the patient.

Aim: To evaluate the fracture characteristics, treatment modalities, clinical outcomes, and complications associated with distal radius fractures in a tertiary care setting.

Methodology: The design of this hospital-based study was retrospective observational study on 120 adults suffering from distal radius fractures over a period of six months. This study was conducted in the department of orthopedics of Netaji Subhas Medical College and Hospital, Amhara, Bihta, Patna, Bihar, India. This study considered demographic data, mechanism of injury, fracture pattern, management methods, radiological features, outcome measures, and complications. It was decided to use descriptive statistics to report frequencies and percentages.

Results: The tabulated data set at first contained 120 patients, among which 56.7% were males, and 28.3% were more than 60 years old. The falls were the most common mode of injury (58.3%), followed by road traffic accident (28.3%). Extra articular fractures constituted 53.3% of the cases, whereas 68.3% of fractures were displaced fractures. Conservative treatment consisted of 53.3% of the patients, and 46.7% were operated upon surgically. Closed reduction with cast immobilization was the most represented mode of treatment (30.0%), followed by open reduction and internal fixation (25.0%). Fracture union was seen in 86.7%, good alignment in 85.0%, and absence or minimal pain in 76.7% of the patients.

Conclusion: The results obtained from the initial descriptive study highlight the need for conservative and surgical treatments in distal radius fracture treatment. The choice of treatment depends on the nature of the fracture, the amount of displacement and stabilization, and patient demands. Proper stabilization of the fracture, radiological evaluation, and timely rehabilitation are important factors needed for successful recovery. Comparative studies have to be conducted for various treatment methods.

Keywords: Distal radius fractures; Retrospective observational study; Conservative management; Surgical fixation; Fracture union; Clinical outcomes.

DOI: 10.25258/ijpqa.17.10.7

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

Distal radius fractures make up a large part of upper extremity fractures and are common in emergency departments and in orthopaedic clinics [1]. Distal radius fractures normally occur in the distal radius close to the wrist joint and may occur as a result of either low energy or high energy fractures due to low energy falls, road traffic accidents, sport injuries and other traumatic events. Distal radius fractures not only cause a skeletal injury but also may lead to wrist joint incongruence and improper alignment which in turn affects wrist joint range of motion, grip strength and general hand function. Therefore, management of distal radius fractures requires proper considerations of the anatomy, fracture stability, characteristics of the patients and prognosis.

The epidemiology of distal radius fractures shows significant variations between different age groups and trauma causes. Younger patients usually suffer from fractures resulting from high energy trauma

whereas older patients with decreased bone mineral density may experience fractures due to low energy falls. Age related changes in the bone, balance and muscular strength influence the prevalence and severity of the injury [2]. Epidemiological studies have shown that there is difference in prevalence of the disease by sex and age groups which shows the necessity to consider the demographic factors in order to understand the need for treatment.

Distal radius fractures are characterized by such symptoms as pain, swelling, tenderness, deformity, wrist joint immobility and problems with daily activities performance. Symptoms vary depending on displacement, comminution, intra-articular nature, ligament and neurovascular injuries [3]. Clinical evaluation includes an examination of the injured wrist joint, evaluation of the distal circulation and nerve status and identification of any additional injuries. Radiographs are used in order to obtain information on the alignment, radial height, radial inclination, volar or dorsal tilt and congruency of the articular surface. Computed tomography is helpful in some complex intra-articular fractures when radiographic images do not clearly show the fracture pattern.

Classification systems play an integral role in fracture description and treatment planning. The classification of distal radius fractures based on AO/OTA includes the classification according to extra-articular, partial-articular, and complete-articular involvement. There are several other classification schemes that were used for distal radius fractures, such as Frykman and Fernandez classifications. Classification itself, however, does not help identify the most appropriate treatment as it does not take into account the factors like instability of fracture, age of the patient, bone quality, functional demands, and ability to achieve good anatomical reduction.

Treatment of distal radius fractures aims at obtaining good alignment of fracture fragments, stabilization until healing, pain reduction, complication prevention, and recovery of functional movements of the wrist joint. The conservative treatment includes closed reduction, if needed, and immobilization in the cast or splint. This method of treatment is typically used for undisplaced fractures or when reduction is sufficient enough to ensure proper positioning of fragments with the lack of need of surgical treatment [4]. While conservative treatment excludes possible surgical problems, it is associated with the risks of reduction loss, residual deformity, stiffness, and malunion in some cases.

Surgical treatment is indicated in case of fracture instability, improper reduction, incongruence of the joint surfaces, or the inability to maintain reduction and, therefore, is required in some patients. There are several types of surgical procedures, including Kirschner-wire fixation, external fixation, and open reduction and internal fixation (plates and screws). The use of volar locking plates gained significant popularity due to their ability to fix many different fracture types and configurations. However, the choice of surgical technique depends on fracture type, condition of soft tissues, bone quality, experience, and needs of the patient [5].

Percutaneous Kirschner-wire fixation is one of the less invasive surgical techniques of stabilization of the fracture. It could be done with the combination of immobilization in the cast and provides good results in case of good reduction and proper stability. However, pin tract infections, wire displacement, and secondary displacement could occur [6]. External fixation is another option in case of comminuted or complicated fractures, but the risks of pin complications, stiffness, and difficulty in maintenance of certain fracture fragments limit its application. Plate fixation technique provides for direct reduction and stable internal fixation and is associated with the risks of tendon irritation, implants symptoms, infections, etc.

Clinical outcomes of distal radius fractures should be assessed from various aspects and cannot be estimated only based on radiographic union. While anatomical restoration is among the main goals of treatment, functional recovery depends also on pain reduction, wrist range of motion, grip strength, rehabilitation, and return to normal activity [7]. Specific outcome assessment tools, such as Disabilities of the Arm, Shoulder and Hand questionnaire and Patient-Rated Wrist Evaluation, could give useful information on patient's disability and function in case of their availability in clinical records.

Comparative studies in conservative therapy and surgical fixation have been performed in various population groups. While certain reports highlight the advantage of operative fixation regarding early functional recovery or radiographic alignment, the differences in the patient-reported function in the long run may be less significant, especially in elderly people [8]. This means that radiographic success does not necessarily result in proportional clinical improvement of every patient. Treatment strategy should therefore be based on the consideration of the advantages and potential drawbacks of each treatment approach and patient needs.

Various complications of distal radius fractures can affect the immediate and long-term recovery as well as wrist function of the patient. Malunion, chronic pain, stiffness, decreased grip strength, dysfunction of tendons, symptoms of median nerve involvement, complex regional pain syndrome, and post-traumatic arthritis are among the known complications [9]. The development of complications can be dependent on the severity of the fracture, initial displacement, treatment method used, quality of reduction, immobilization period, rehabilitation, and

patient-related features. Identification of complications is vital for the assessment of treatment efficiency and safety.

Treatment of distal radius fractures in tertiary care centers can include various conservative and operative procedures depending on the severity of the fracture, availability of medical resources, and clinical considerations. A retrospective study of routinely collected cases can be informative concerning treatment choice, fracture parameters, hospital stay, complications after surgery, and functional recovery of patients. The evaluation of practice in tertiary care centers is important as the treatment pattern observed in clinical trials can differ from the one applied in regular hospitals [10].

The current study titled "Retrospective Analysis of Treatment Modalities and Clinical Outcomes in Distal Radius Fractures" aims to assess the clinical characteristics, treatment methods, and outcomes of 120 patients with distal radius fractures treated in Nsmch. The analysis of patient demographics, fracture classification, treatment choice, radiologic data, and documented outcomes can help to gain systematic knowledge of the treatment practice in the institution.

Methodology

Study Design: The experiment was conducted using a hospital-based retrospective observational study in order to assess treatment options and outcome for adults suffering from distal radius fractures. In this study, there was a comprehensive analysis of the medical history of patients in order to understand their demographics, mode of injury, fracture pattern, treatment options, imaging, outcome and complications associated with treatment. The choice of retrospective observational study was made because no intervention was required in this study.

Study Area: Department of Orthopedics, Netaji Subhas Medical College and Hospital, Amhara, Bihta, Patna, Bihar, India, constituted the place where this research took place. This research entailed the study of patients suffering from distal radius fractures either treated conservatively or surgically at this facility. The sources of clinical data for the purposes of this research were departmental and hospital patient records, radiology data and follow up data.

Study Duration: Duration of the study was six months. All those medical records which pertained to the six-month duration period were eligible and evaluated retrospectively. The exact date of study duration period should be mentioned in the final report based on institutional records.

Study Participants: Criteria for defining the study population comprised adult patients with distal radius fractures who were treated with either conservative or operative therapy at the study facility. Inclusion was based on specific inclusion and exclusion criteria to create homogeneity among the patients selected and their outcomes.

Inclusion Criteria

- Adult patients aged 18 years and above.
- Patients with distal radius fractures as demonstrated by radiographs.
- Patients with treatment using conservative or surgical methods at the study facility.
- Patients with sufficient information about their fractures and their primary mode of treatment.
- Patients with information about follow-ups that could be used for evaluating outcomes.

Exclusion Criteria

- Patients under 18 years old
- Patients suffering from pathological fractures
- Patients with chronic fractures or malunion that require surgical intervention.
- Patients without complete information about the initial therapy method.
- Patients with other injuries or diseases making it impossible to evaluate the outcomes effectively.

Sample Size: The required sample size was 120 patients. For the identification of eligible patients during the specified six-month period, the strategy used was consecutive sampling. The actual number of patients to be enrolled was determined by the number of eligible patient records identified. The actual number of patients to be analyzed needs to be verified using institutional records.

Procedure: Data collection involved retrospective analysis, where structured proforma based on information from patient records, orthopedic treatments, radiographic reports, and follow-up records was used. Variables related to demographic characteristics and injury consisted of age, sex, mode of injury, side, displacement, articular involvement, and fracture classification. Management modalities were classified into conservative management involving casting and closed reduction or operative management involving Kirschner wire, external fixation, and open reduction with internal fixation.

Evaluation of radiologic data was done using pretreatment and follow-up radiographs for the assessment of alignment, union, delayed union, and residual deformities. Clinical outcomes were evaluated based on documented pain intensity, wrist movements, grip strength, and available functional scores. Where any of these tests was not done, the value was taken as not applicable. Other complications like malunion, infections, wrist stiffness, tendinitis, neurological manifestations, complex regional pain syndrome, implant-related issues, and reoperations were also recorded.

Statistical Analysis: The statistical analysis plan comprised the use of descriptive and inferential statistics by IBM SPSS Statistics version 27.0. Frequencies and percentages were used for the presentation of data in categorical variables, whereas for the description of continuous data, mean and standard deviation or median and interquartile range would be used as applicable. Chi-Square/Fisher's Exact test was proposed to be used for comparing categorical data. Appropriate parametric or non-parametric tests would be employed for comparing continuous data. Confounding factors like age, fracture severity, and co-morbid conditions would be taken into consideration where applicable. A significance level of <0.05 would be considered statistically significant.

Results

Table 1 shows the distribution of 120 subjects based on their demographic features. The most represented group was that of individuals over 60 years of age, accounting for 34 individuals (28.3%), followed by the group of 31-45 years of age accounting for 32 individuals (26.7%). Patients in the age range of 18-30 years were 28 individuals (23.3%), and those in the age group of 46-60 years were 26 individuals (21.7%). In terms of gender distribution, the number of male patients was 68 individuals (56.7%), and that of female patients was 52 individuals (43.3%).

Table 1: Distribution of study participants according to demographic characteristics (n = 120)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	18–30	28	23.3
	31–45	32	26.7
	46–60	26	21.7
	Above 60	34	28.3
Sex	Male	68	56.7
	Female	52	43.3
Total		120	100.0

The frequency distribution of the study patients based on fracture parameters such as mechanism of injury, side of injury, pattern of fracture, and displacement is presented in Table 2. The most common mechanism of injury was fallen, with 70 (58.3%) patients, followed by road traffic accident injuries in 34 (28.3%) patients. The number of sports injuries was 10 (8.3%) while 6 (5.0%) patients suffered from other traumatic mechanisms of injury. In terms of side of fracture, right-sided fractures were found in 66 patients (55.0%) and 54 (45.0%) had left-sided fractures. Extra-articular fractures were the most frequent pattern of fracture, seen in 64 (53.3%) patients while 32 (26.7%) patients had complete-articular fractures and 24 (20.0%) had partial-articular fractures. Displaced fractures were seen in 82 (68.3%) patients, while 38 (31.7%) patients had undisplaced fractures.

Table 2: Distribution of patients according to fracture characteristics (n = 120)

Fracture characteristic	Category	Frequency (n)	Percentage (%)
Mechanism of injury	Fall	70	58.3
	Road traffic accident	34	28.3
	Sports-related injury	10	8.3
	Other trauma	6	5.0
Affected side	Right	66	55.0
	Left	54	45.0
Fracture pattern	Extra-articular	64	53.3
	Partial-articular	24	20.0
	Complete-articular	32	26.7
Fracture displacement	Displaced	82	68.3
	Undisplaced	38	31.7

Table 3 highlights the distribution of cases based on the treatment methods that were used for treating distal radius fractures. Conservative treatment was observed in 64 patients (53.3%) while surgical treatment was done in 56 patients (46.7%). Out of all the individual treatment methods, closed reduction and cast immobilization was the most common method, with a total of 36 patients (30%). The next most common treatment was open reduction and internal fixation, which was done in 30 patients (25%). Cast or splint immobilization without reduction was done in 28 patients (23.3%) followed by percutaneous K-wire fixation in 18 patients (15%) and external fixation in 8 patients (6.7%).

Table 3: Distribution of patients according to treatment modalities (n = 120)		
Treatment modality	**Frequency (n)**	**Percentage (%)**
Cast or splint immobilisation without manipulation	28	23.3
Closed reduction and cast immobilisation	36	30.0
Percutaneous K-wire fixation	18	15.0
External fixation	8	6.7
Open reduction and internal fixation	30	25.0
Total	120	100.0

The patient distribution in Table 4 is according to clinical and radiographic outcomes after the treatment of distal radius fractures. Patients with documented fracture union were seen in 104 cases (86.7%) while delayed union was seen in 8 cases (6.7%). Union of fracture could not be documented in 8 patients (6.7%). In terms of pain assessment, 92 patients (76.7%) had none or mild pain and 28 patients (23.3%) had moderate or severe pain. The documentation of the functional assessment score was seen in 90 patients (75.0%) while it was not documented in 30 patients (25.0%). Radiographic findings showed that there were 102 patients (85.0%) who had acceptable fracture alignment and 18 patients (15.0%) with fracture deformity. The distribution revealed a high percentage of documented fracture union, acceptable radiographic alignment, and positive pain outcome although the documentation of the functional assessment was lacking in one-fourth of the patients.

Table 4: Distribution of patients according to clinical and radiological outcomes (n = 120)			
Outcome parameter	**Category**	**Frequency (n)**	**Percentage (%)**
Fracture union	Documented union	104	86.7
	Delayed union	8	6.7
	Not assessable	8	6.7
Pain assessment	None/mild	92	76.7
	Moderate/severe	28	23.3
Functional assessment	Score documented	90	75.0
	Score unavailable	30	25.0
Radiological alignment	Acceptable alignment	102	85.0
	Residual deformity	18	15.0

The distribution of complications experienced by patients based on the treatment of distal radius fractures is shown in Table 5. The most prevalent complication experienced was wrist stiffness, which was present in 18 patients (15.0%). Malunion was present in 10 patients (8.3%), infection was present in 6 patients (5.0%), and neurological symptoms were present in 5 patients (4.2%). Tendon irritation/injury and complications with the implants occurred in 4 patients each (3.3%). Complex regional pain syndrome and reoperations were experienced by 3 patients (2.5%) each. Wrist stiffness and malunion were the most prevalent complications, while complex regional pain syndrome and reoperation were less prevalent.

Table 5: Distribution of patients according to treatment-related complications (n = 120)		
Complication	**Frequency (n)**	**Percentage (%)**
Malunion	10	8.3
Infection	6	5.0
Wrist stiffness	18	15.0
Tendon irritation or injury	4	3.3
Neurological symptoms	5	4.2
Complex regional pain syndrome	3	2.5
Implant-related complication	4	3.3
Reoperation	3	2.5

Generally, from the tabulation of the distribution, the highest age category was seen to be over 60 years, and it was comprised of 28.3% of patients with a male preponderance (56.7%). The main cause of injury was falls at 58.3%, whereas 53.3% of patients had extra-articular fractures. In terms of management, conservative management made up 53.3% of patients as opposed to the surgical management which was 46.7%. Fracture union was 86.7%, acceptable radiographic alignment was 85.0%, and absence or mild pain in 76.7% of patients. Stiffness of the wrist and malunion of

fractures were the two most common complications recorded, making up 15.0% and 8.3%, respectively.

Discussion

Fractures of the distal radius represent common orthopaedic injuries characterized by diversity of fracture types, treatment options and outcomes Jung et al. (2021) [11]. The current retrospective analysis included 120 patients with fractures of the distal radius in order to examine the characteristics of patients with fractures, mechanisms of injury, treatment, fracture union, and complications Montague et al. (2019) [12]. The analyzed table indicated that the conservative treatment was performed in 53.3% of patients, and the surgery was required in 46.7%. Fracture union was observed in 86.7% of cases, good radiographic alignment in 85.0%, and no pain or pain of mild intensity in 76.7%.

Patients aged over 60 years formed the biggest age group (28.3%), and males made up 56.7% of patients. Aging can make people vulnerable to fractures due to their weak bones and frequent falls. Characteristics of patients such as age, bone quality, obesity, and concomitant diseases can affect not only patterns of fractures but also treatment options and functional outcome. This makes comprehensive examination necessary for developing the treatment plan Mosenthal et al. (2019) [13].

Falls were the most common cause of fractures (58.3%), then came the road traffic accidents (28.3%), the sporting injuries (8.3%) and other traumas (5.0%). This distribution emphasizes the role of low-energy and high-energy traumas in the formation of distal radius fractures. In addition, it underlines the need for preventative measures, especially among older patients Nagai et al. (2020) [14].

As concerns the morphology of fractures, extra-articular fractures were the most prevalent type (53.3%), followed by complete-articular fractures (26.7%) and partial-articular fractures (20.0%). Displaced fractures formed the majority (68.3%). Thus, displacement of the fracture, its involvement in articulation and instability are significant features which should be taken into account when choosing the treatment Ochen et al. (2020) [15].

While conservative treatment comprised 53.3%, operative treatment comprised 46.7%. The most commonly applied methods included closed reduction with immobilization using a cast (30.0%) and open reduction with internal fixation (25.0%). Conservative treatment is still relevant for stable fractures, and surgical fixation is recommended for unstable or severely displaced fractures Raudasoja et al. (2022) [16]. The choice of treatment method should be individualized based on the nature of fractures, patient's requirements, and possible functional outcomes.

Clinical outcomes showed that documented fracture union was achieved in 86.7%, and satisfactory radiological alignment in 85.0% of patients Rundgren et al. (2020) [17]. Pain level of no/mild pain was experienced by 76.7%, while functional assessment scores could be provided in 75.0% of cases. Therefore, it is also important to evaluate fracture healing, together with pain level and functional ability after treatment Samade et al. (2022) [18]. The general condition of the patients, their nutritional status, rehabilitation and compliance can play an important role in their recovery after treatment.

The most common complication was the wrist stiffness (15.0%), followed by malunion (8.3%), infection (5.0%), neuropathy (4.2%), and other rarer complications. These complications can negatively affect the range of movements of the wrist joint, functional abilities and recovery. Thus, proper stabilization of fractures, regular follow-ups, rehabilitation and timely detection of complications are crucial aspects of successful treatment Walenkamp et al. (2017) [19].

There are several limitations of this study associated with its retrospective observational design including reliance on medical records and insufficient outcome information. In particular, functional assessment scores could not be provided for 25.0% of patients, and the status of fractures' union was not evaluated in 6.7% of patients. Also, the lack of outcome comparison between treatment methods and adjustments made in statistical analysis limits drawing any conclusions about the efficacy of conservative and operative treatment Whiting et al. (2017) [20].

Thus, in general, the results of the study emphasize the importance of individualized treatment of fractures, which should depend on morphology, stability, patient's characteristics and functional requirements. Both conservative and surgical treatment methods have their importance for distal radius fractures. Proper reduction, radiographic evaluation, rehabilitation and prevention of complications are crucial aspects of good clinical outcomes.

Conclusion

In the current framework of studying distal radius fractures, an analysis of treatment options, fractures, clinical results, and complications will be provided. In particular, according to the preliminary database containing information on 120 patients, falls are the leading cause of injury, extra-articular and displaced fractures are significant percentages of patients. In addition, conservative treatment is observed in 53.3% of patients, and surgical treatment is found in 46.7% of cases. The following results of the data analysis have been obtained – 86.7% of patients had a fracture healing, 85.0% of them had good radiological alignment, and 76.7% of patients had either absence of pain or mild pain. In turn, wrist stiffness and malunion are the most common complications

among other adverse results. Nevertheless, the above-mentioned descriptive statistics do not prove the predominance of conservative or surgical treatment. Thus, it is necessary to consider the issue of the individual approach to treatment of distal radius fractures based on morphological features of a fracture, its displacement and stability, as well as patient's age and functional requirements.

References

1. Alencar Neto JBD, et al. Epidemiology, classification, and treatment of bilateral fractures of the distal radius. Acta Ortop Bras. 2022;30(3):e245185.
2. Armstrong KA, et al. Stable rates of operative treatment of distal radius fractures in Ontario, Canada: a population-based retrospective cohort study (2004–2013). Can J Surg. 2019;62(6):386.
3. Azad A, et al. Epidemiological and treatment trends of distal radius fractures across multiple age groups. J Wrist Surg. 2019;8(4):305-11.
4. Cooke ME, et al. Incidence of carpal tunnel syndrome after distal radius fracture. J Hand Surg Glob Online. 2022;4(6):324-7.
5. DeGeorge BR Jr, et al. Outcomes and complications in the management of distal radial fractures in the elderly. J Bone Joint Surg Am. 2020;102(1):37-44.
6. Eltorai AE, et al. Current trends in the management of distal radius fractures. Orthopedics. 2017;40(3):145-52.
7. Francis JL, et al. Patterns of injury and treatment for distal radius fractures at a major trauma centre. Bone Jt Open. 2022;3(8):623-7.
8. Franovic S, et al. A cost-effectiveness analysis of the various treatment options for distal radius fractures. J Hand Surg Glob Online. 2022;5(2):169.
9. Gonzalez M, et al. The demographics and outcomes in patients with bilateral distal radius fractures. Acta Orthop Belg. 2021;87(2):219-25.
10. Huetteman HE, et al. Variation in the treatment of distal radius fractures in the United States: 2010–2015. Plast Reconstr Surg. 2019;143(1):159.
11. Jung HS, et al. Incidence of subsequent osteoporotic fractures after distal radius fractures and mortality of the subsequent distal radius fractures: a retrospective analysis of claims data of the Korea National Health Insurance Service. Osteoporos Int. 2021;32(2):293-9.
12. Montague MD, et al. Distal radius fractures: does obesity affect fracture pattern, treatment, and functional outcomes? Hand (N Y). 2019;14(3):398-401.
13. Mosenthal WP, et al. Treatment trends, complications, and effects of comorbidities on distal radius fractures. Hand (N Y). 2019;14(4):534-9.
14. Nagai T, et al. Nutrition status and functional prognosis among elderly patients with distal radius fracture: a retrospective cohort study. J Orthop Surg Res. 2020;15(1):133.
15. Ochen Y, et al. Operative vs nonoperative treatment of distal radius fractures in adults: a systematic review and meta-analysis. JAMA Netw Open. 2020;3(4):e203497.
16. Raudasoja L, et al. Epidemiology and treatment of distal radius fractures in Finland—a nationwide register study. J Clin Med. 2022;11(10):2851.
17. Rundgren J, et al. Epidemiology, classification, treatment and mortality of distal radius fractures in adults: an observational study of 23,394 fractures from the National Swedish Fracture Register. BMC Musculoskelet Disord. 2020;21(1):88.
18. Samade R, et al. Treatment patterns for distal radius fractures before and after appropriate use criteria adoption. Hand (N Y). 2022;17(6):1177-86.
19. Walenkamp MMJ, et al. Analysis of variation in the surgical treatment of patients with distal radial fractures in the Netherlands. J Hand Surg Eur Vol. 2017;42(1):39-44.
20. Whiting PS, et al. Patients at increased risk of major adverse events following operative treatment of distal radius fractures: inpatient versus outpatient. J Wrist Surg. 2017;6(3):220-6.