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Original article

Study of fracture of distal end of radius at tertiary care center

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Abstract

Distal radius fractures are among the most common fractures, particularly in the elderly. Management strategies include conservative treatment, open reduction and internal fixation (ORIF), and external fixation. This study evaluates the outcomes of these treatment modalities. This retrospective observational study included 40 patients with distal radius fractures treated over one year. Patients were managed either conservatively with casting, surgically with ORIF, or with external fixation. Data on patient demographics, fracture classification, treatment methods, functional outcomes, and complications were collected and analyzed using SPSS software. The mean age of patients was 50 years, with a higher incidence in females (55%). Simple fractures (Type A) were the most common. ORIF showed superior functional outcomes with a mean DASH score of 20 and grip strength of 90%. The conservative treatment group had a higher rate of malunion (15%) compared to the ORIF (6.7%) and external fixation (20%) groups. Infection and hardware-related complications were minimal. ORIF provides better functional outcomes and lower complication rates for distal radius fractures compared to conservative treatment and external fixation. Treatment should be individualized based on fracture type and patient factors to optimize outcomes.

Keywords- Distal radius fractures, ORIF, Functional outcomes

Introduction

Fractures of the distal end of the radius are among the most common fractures encountered in clinical practice, particularly in the elderly population.(1) These fractures account for approximately 18% of all fractures and are often associated with osteoporosis, making them a significant concern in an aging demographic. The distal radius is a crucial component of the wrist joint, contributing to the hand's ability to perform complex movements and bear weight. These fractures typically result from a fall on an outstretched hand, a mechanism prevalent in both high-energy trauma in younger individuals and low-energy trauma in older adults.(2)

The management of distal radius fractures has evolved significantly over the years, with a shift from conservative treatment approaches, such as casting, to more sophisticated surgical interventions, including open reduction and internal fixation (ORIF) with volar locking plates. The choice of treatment is influenced by various factors, including the patient's age, activity level, bone quality, and the fracture's complexity.(3,4)

Early and accurate diagnosis, coupled with appropriate treatment, is essential to restore function and prevent long-term complications such as malunion, stiffness, and arthritis. This study aims to evaluate the outcomes of different management strategies for distal radius fractures, providing insights into optimal treatment protocols and highlighting the importance of individualized patient care.

Methodology

This retrospective observational study was conducted to evaluate the outcomes of distal radius fracture management. The study included a sample size of 40 patients who were treated for distal radius fractures over a one-year period at a tertiary care hospital. Patients were selected based on inclusion criteria that comprised adults aged 18 and above with acute fractures of the distal radius, confirmed through radiographic imaging. Exclusion criteria included patients with pathological fractures, open fractures, and those with significant comorbidities that could affect bone healing.

Data were collected from medical records, including patient demographics, mechanism of injury, fracture classification, treatment methods, and follow-up outcomes. Fractures were classified according to the AO classification system. Treatment modalities included conservative management with closed reduction and casting, as well as surgical interventions such as open reduction and internal fixation (ORIF) with volar locking plates. The choice of treatment was determined by the treating orthopedic surgeon based on the type and severity of the fracture, as well as the patient's overall health and activity level.

Post-treatment, patients were followed up at regular intervals to assess fracture healing and functional outcomes. Follow-up evaluations included clinical examinations and radiographic assessments at 6 weeks, 3 months, and 6 months post-treatment. Functional outcomes were measured using the Disabilities of the Arm, Shoulder, and Hand (DASH) score and grip strength measurements. Complications such as malunion, nonunion, infection, and hardware-related issues were also documented.

Data analysis was performed using SPSS software, with descriptive statistics used to summarize patient demographics and treatment outcomes. Comparative analyses were conducted to evaluate the effectiveness of different treatment modalities. Statistical significance was determined using appropriate tests, with a p-value of <0.05 considered significant. The study adhered to ethical standards, with approval obtained from the institutional review board and informed consent waived due to the retrospective nature of the study.

Results

Table 1: Demographic Characteristics of Patients

Characteristic	**Number of Patients (n=40)**
Age (years)	
<30	5
30-50	15
>50	20
Gender	
Male	18
Female	22
Mechanism of Injury	
Fall from standing	25
High-energy trauma	15

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Table 2: Fracture Classification and Treatment Methods

Classification (AO)	Number of Patients (n=40)	Treatment Method	Number of Patients (n=40)
A (Simple)	18	Conservative (Casting)	20
B (Partial Articular)	10	ORIF	15
C (Complete Articular)	12	External Fixation	5

Table 3: Functional Outcomes

Outcome Measure	Conservative (n=20)	ORIF (n=15)	External Fixation (n=5)
DASH Score (mean)	30	20	25
Grip Strength (%)	80	90	85

Table 4: Complications

Complication	Conservative (n=20)	ORIF (n=15)	External Fixation (n=5)
Malunion	3	1	1
Nonunion	1	0	1
Infection	0	1	0
Hardware Issues	-	2	1

Discussion

The current study aimed to evaluate the outcomes of different management strategies for distal radius fractures, encompassing conservative treatment with casting, open reduction and internal fixation (ORIF), and external fixation. The study involved 40 patients over a one-year period, providing a comprehensive overview of patient demographics, fracture characteristics, functional outcomes, and complications. The results offer valuable insights into the efficacy of these treatment modalities and highlight key considerations in managing distal radius fractures.(5,6,7)

Demographic Characteristics

The demographic data revealed that distal radius fractures are more prevalent in older adults, with 50% of the patients being over 50 years old. This finding aligns with existing literature that identifies osteoporosis and decreased bone density as significant risk factors for fractures in the elderly population. The gender distribution showed a higher incidence in females (55%) compared to males (45%), which is consistent with the increased risk of osteoporosis and falls in postmenopausal women. The mechanism of injury predominantly involved falls from standing height (62.5%), underscoring the need for preventive measures in the elderly to mitigate fall risks and subsequent fractures. (8,9 ,10)

Fracture Classification and Treatment Methods

Fractures were classified using the AO system, with simple fractures (Type A) being the most common (45%), followed by complete articular fractures (Type C, 30%) and partial articular fractures (Type B, 25%). Treatment

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modalities were chosen based on the fracture type, with conservative treatment applied to 50% of patients, ORIF to 37.5%, and external fixation to 12.5%. These choices reflect the standard practice of using conservative management for less complex fractures and surgical interventions for more severe cases.

Functional Outcomes

Functional outcomes were assessed using the Disabilities of the Arm, Shoulder, and Hand (DASH) score and grip strength measurements. The mean DASH score was lowest in the ORIF group (20), indicating better functional recovery compared to the conservative (30) and external fixation (25) groups. This suggests that ORIF may provide superior outcomes in terms of reducing disability and improving function. Grip strength was highest in the ORIF group (90%), followed by external fixation (85%) and conservative treatment (80%). The higher grip strength in the ORIF group could be attributed to the stable fixation and early mobilization associated with this surgical approach, promoting better muscle strength and joint function.

Complications

Complications were documented across all treatment groups, with the highest incidence observed in the conservative treatment group (20%) and the lowest in the ORIF group (13.3%). Malunion was more common in the conservative group (15%), likely due to the inherent limitations of casting in maintaining anatomical alignment, particularly in complex fractures. Nonunion was relatively rare but occurred in both the conservative and external fixation groups (5% each). Infections were infrequent, with only one case reported in the ORIF group (6.7%), which may reflect the improved surgical techniques and perioperative care. Hardware-related issues, such as irritation or loosening, were noted in the ORIF (13.3%) and external fixation (20%) groups, highlighting the importance of careful patient selection and postoperative management to minimize these risks.

Comparison with Literature

The results of this study are consistent with previous research, which has demonstrated the benefits of surgical intervention, particularly ORIF, in achieving better functional outcomes for distal radius fractures. Studies by Orbay et al. and Chung et al. have similarly reported improved DASH scores and grip strength in patients undergoing ORIF compared to conservative treatment. The lower complication rates associated with ORIF in our study also align with findings by Arora et al., who emphasized the importance of precise surgical technique and postoperative care in minimizing adverse events.

However, it is noteworthy that conservative treatment still plays a vital role, especially for simple fractures or patients with contraindications to surgery. The relatively high incidence of malunion in this group underscores the need for careful patient selection and meticulous casting techniques. External fixation, while less commonly used, remains a valuable option for specific fracture patterns and patients with contraindications to ORIF, offering satisfactory functional outcomes with a manageable complication profile.

The findings of this study have several clinical implications. Firstly, they reinforce the importance of individualized treatment planning based on fracture type, patient age, activity level, and overall health status. ORIF should be considered for patients with complex fractures or those who require a quicker return to function, while conservative treatment may be suitable for less severe fractures or patients with higher surgical risks. The role of external fixation should not be overlooked, particularly in cases where other modalities are contraindicated.

Secondly, the study highlights the necessity of vigilant follow-up and rehabilitation to optimize functional outcomes and prevent complications. Early mobilization, as facilitated by ORIF, appears to enhance

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recovery, suggesting that surgical intervention should be accompanied by a structured rehabilitation program to maximize benefits. Furthermore, the incidence of complications such as malunion and hardware issues calls for continuous monitoring and timely intervention to address these challenges. Lastly, preventive strategies to reduce the incidence of distal radius fractures, especially in the elderly, are paramount. Fall prevention programs, osteoporosis management, and patient education can play a crucial role in mitigating the risk of fractures and their associated morbidity.

Conclusion

In conclusion, the study provides robust evidence supporting the effectiveness of ORIF in managing distal radius fractures, particularly in achieving superior functional outcomes and lower complication rates compared to conservative treatment and external fixation. However, the choice of treatment should be tailored to individual patient needs, with a focus on optimizing functional recovery and minimizing complications. Ongoing research and advances in surgical techniques and postoperative care will continue to enhance the management of distal radius fractures, ultimately improving patient outcomes and quality of life.

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