ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Outcomes Of Percutaneous Pinning Versus Open Reduction And Internal Fixation In Distal Radius Fractures In Older Adults.

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ABSTRACT

Distal radius fractures are prevalent among older adults, necessitating effective treatment strategies. This study compares the outcomes of percutaneous pinning versus open reduction and internal fixation (ORIF) in managing these fractures. A retrospective study was conducted over one year, including 50 older adults with distal radius fractures. Patients were divided into two groups: 25 underwent percutaneous pinning and 25 underwent ORIF. Data were collected on demographic characteristics, fracture details, surgical and hospitalization metrics, functional outcomes (DASH scores and wrist range of motion), and complications. Statistical analyses were performed to compare the groups. The groups were comparable in age, gender, and fracture characteristics. Percutaneous pinning had significantly shorter surgery duration (45.2 ± 10.3 vs. 75.6 ± 12.4 minutes, $p < 0.001$) and hospital stay (2.1 ± 0.8 vs. 3.7 ± 1.2 days, $p < 0.001$). Functional outcomes (DASH scores and wrist motion) were similar at 6 and 12 months. Complication rates were low and comparable, with no significant differences. Both percutaneous pinning and ORIF are effective for treating distal radius fractures in older adults, offering similar functional outcomes and complication rates. The choice of technique should be based on individual patient factors and fracture characteristics.

Keywords: Distal Radius Fractures, Percutaneous Pinning, Open Reduction and Internal Fixation (ORIF)

https://doi.org/10.33887/rjpbcs/2024.15.4.31

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ISSN: 0975-8585

INTRODUCTION

Distal radius fractures are a common injury, particularly among older adults, due to factors such as decreased bone density and increased susceptibility to falls [1]. These fractures significantly impact the quality of life and functional independence, necessitating effective treatment strategies. Two primary methods of managing these fractures are percutaneous pinning and open reduction and internal fixation (ORIF) [2-4].

Percutaneous pinning, a minimally invasive procedure, involves the insertion of pins through the skin to stabilize the fracture. This technique is associated with reduced soft tissue disruption and shorter recovery times, making it an attractive option for elderly patients with comorbidities. Conversely, ORIF, which involves surgically exposing the fracture site to place plates and screws, offers the advantage of precise anatomical alignment and stable fixation. However, it is associated with higher surgical risks, longer operative times, and potentially extended rehabilitation periods [5].

This study aims to compare the outcomes of these two techniques in older adults, focusing on functional recovery, complication rates, and overall patient satisfaction. By evaluating these parameters, we aim to provide evidence-based guidance on the optimal management strategy for distal radius fractures in this vulnerable population, ultimately improving clinical decision-making and patient care.

METHODOLOGY

This retrospective study was conducted over a one-year period, from June 2022 to June 2023, at a tertiary care hospital. A total of 50 older adults with distal radius fractures were included in the study. The patients were selected based on specific inclusion criteria: age 60 years and above, isolated distal radius fracture, and no prior history of wrist surgery or severe comorbid conditions that could affect the outcomes. Patients were divided into two groups, with 25 patients undergoing percutaneous pinning and 25 patients undergoing open reduction and internal fixation (ORIF).

Patient data were collected from medical records, including demographic details, fracture characteristics, treatment methods, and follow-up information. Preoperative and postoperative radiographs were analyzed to assess fracture patterns and the quality of reduction. Functional outcomes were evaluated using the Disabilities of the Arm, Shoulder, and Hand (DASH) score and wrist range of motion measurements at 6 and 12 months postoperatively. Complications such as infection, hardware irritation, and need for reoperation were also recorded. Surgical procedures were performed by experienced orthopedic surgeons. For the percutaneous pinning group, closed reduction of the fracture was achieved under fluoroscopic guidance, followed by the insertion of Kirschner wires to stabilize the fracture. The wires were left protruding through the skin and were removed after 6-8 weeks once radiographic union was confirmed. In the ORIF group, fractures were reduced through a volar approach, and fixation was achieved using a volar locking plate. Postoperative care included immobilization in a splint for 2 weeks, followed by physiotherapy to regain wrist motion and strength.

Data were analyzed using statistical software. Continuous variables were expressed as means and standard deviations, and categorical variables as frequencies and percentages. The outcomes between the two groups were compared using appropriate statistical tests, such as the Student's t-test for continuous variables and the chi-square test for categorical variables. A p-value of less than 0.05 was considered statistically significant. The study was approved by the hospital's ethical committee, and informed consent was obtained from all patients prior to their inclusion in the study.

RESULTS

Table 1: Demographic Characteristics of Patients

Parameter	Percutaneous Pinning (n=25)	ORIF (n=25)	p-value
Age (years)	68.4 ± 5.2	67.8 ± 6.1	0.78
Gender (M/F)	10/15	12/13	0.57
Dominant Hand Affected (n)	15	14	0.77
Co-morbidities (n)	8	9	0.76

ISSN: 0975-8585

Table 2: Fracture Characteristics

Parameter	Percutaneous Pinning (n=25)	ORIF (n=25)	p-value
Type of Fracture (Simple/Comminuted)	18/7	16/9	0.53
Intra-articular Involvement (n)	9	11	0.58
Preoperative Radial Shortening (mm)	3.2 ± 1.4	3.5 ± 1.5	0.64
Preoperative Dorsal Angulation (degrees)	12.4 ± 3.6	11.9 ± 3.8	0.69

Table 3: Surgical and Hospitalization Data

Parameter	Percutaneous Pinning (n=25)	ORIF (n=25)	p-value
Duration of Surgery (minutes)	45.2 ± 10.3	75.6 ± 12.4	<0.001
Hospital Stay (days)	2.1 ± 0.8	3.7 ± 1.2	<0.001
Time to Radiographic Union (weeks)	7.5 ± 1.2	8.1 ± 1.3	0.14
Time to Remove Immobilization (weeks)	6.4 ± 1.1	8.0 ± 1.2	<0.001

Table 4: Functional Outcomes

Parameter	Percutaneous Pinning (n=25)	ORIF (n=25)	p-value
DASH Score (6 months)	22.3 ± 4.5	24.8 ± 5.1	0.12
DASH Score (12 months)	15.6 ± 3.2	17.1 ± 3.8	0.15
Wrist Flexion (degrees) (12 months)	62.1 ± 8.4	58.3 ± 7.9	0.08
Wrist Extension (degrees) (12 months)	66.4 ± 9.1	63.7 ± 8.5	0.22

Table 5: Complications

Complication	Percutaneous Pinning (n=25)	ORIF (n=25)	p-value
Superficial Infection (n)	2	1	0.55
Deep Infection (n)	1	2	0.55
Hardware Irritation (n)	3	5	0.45
Reoperation Required (n)	1	2	0.55
Nonunion (n)	0	1	0.31

DISCUSSION

The management of distal radius fractures in older adults is a crucial aspect of orthopedic care, given the prevalence and impact of these injuries on this population. This study aimed to compare the outcomes of percutaneous pinning versus open reduction and internal fixation (ORIF) in older adults, focusing on various parameters such as demographic characteristics, fracture details, surgical and hospitalization data, functional outcomes, and complications [6 7].

The demographic characteristics of the patients in both groups were comparable, with no significant differences in age, gender distribution, dominant hand involvement, or comorbidities. This homogeneity strengthens the validity of our comparative analysis, ensuring that the outcomes are not biased by these factors. Both treatment groups had a similar distribution of simple and comminuted fractures and comparable preoperative radial shortening and dorsal angulation, suggesting that the fracture severity was evenly matched between the two groups.

Surgical and hospitalization data revealed notable differences between the two treatment modalities. The duration of surgery was significantly shorter for the percutaneous pinning group (45.2 ± 10.3 minutes) compared to the ORIF group (75.6 ± 12.4 minutes, $p < 0.001$). This finding is consistent with the minimally invasive nature of percutaneous pinning, which involves less surgical exposure and manipulation. Consequently, the hospital stay was also shorter for the percutaneous pinning group (2.1 ± 0.8 days) compared to the ORIF group (3.7 ± 1.2 days, $p < 0.001$), reflecting the less invasive procedure and potentially quicker postoperative recovery. However, the time to radiographic union did not differ significantly between the two groups, indicating that both techniques are effective in achieving bone healing within a similar timeframe.

Functional outcomes, measured by the DASH scores and wrist range of motion, showed no significant differences between the two groups at 6 and 12 months postoperatively. The DASH scores at 6 months were 22.3 ± 4.5 for the percutaneous pinning group and 24.8 ± 5.1 for the ORIF group ($p = 0.12$), while at 12 months, they were 15.6 ± 3.2 and 17.1 ± 3.8, respectively ($p = 0.15$). These results suggest that both treatment modalities provide similar functional recovery in terms of disability and pain. Wrist flexion and extension at 12 months were also comparable between the groups, indicating similar restoration of wrist mobility. These findings align with previous studies that have reported equivalent functional outcomes for these two techniques in the long term.

Complication rates were relatively low and comparable between the two groups. Superficial infection rates were 8% for percutaneous pinning and 4% for ORIF, while deep infection rates were 4% for percutaneous pinning and 8% for ORIF. Although these differences were not statistically significant, they highlight the potential for infection with both techniques. Hardware irritation was observed more frequently in the ORIF group (20%) compared to the percutaneous pinning group (12%), although this difference was not significant. The need for reoperation was slightly higher in the ORIF group (8%) compared to the percutaneous pinning group (4%), again not reaching statistical significance. Importantly, there was one case of nonunion in the ORIF group, but none in the percutaneous pinning group. These complication rates are consistent with existing literature, which indicates that while both techniques are generally safe, they are not without risks [8].

The shorter surgical time and reduced hospital stay associated with percutaneous pinning make it an attractive option for older adults, who often have comorbidities that increase surgical risks. The minimally invasive nature of percutaneous pinning reduces surgical trauma and may contribute to quicker recovery times and lower healthcare costs. However, the potential for pin tract infections and the need for careful postoperative management to avoid complications such as pin migration must be considered.

On the other hand, ORIF offers the advantage of direct visualization and precise anatomical reduction of the fracture, which can be particularly beneficial for complex fractures with significant displacement or comminution. The stable fixation provided by ORIF allows for early mobilization, which is crucial for preventing stiffness and promoting functional recovery. However, the longer surgical time, higher associated costs, and increased risk of hardware-related complications are important considerations.

CONCLUSION

In conclusion, this study demonstrates that both percutaneous pinning and ORIF are effective treatment options for distal radius fractures in older adults, providing comparable functional outcomes and complication rates. The choice of treatment should be individualized based on the patient's fracture characteristics, overall health status, and surgeon expertise. Percutaneous pinning may be preferred for simpler fractures or patients with higher surgical risks due to its minimally invasive nature and shorter recovery time. Conversely, ORIF may be more suitable for complex fractures requiring precise anatomical reduction and stable fixation. Further research, including larger randomized controlled trials, is needed to validate these findings and refine treatment guidelines for distal radius fractures in this growing patient population.

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