

## Original Research

# Comparative Results of distal radius fractures treated with plating or K wire fixation

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### Abstract

**Background:** Fractures of the distal radius (DR) in the forearm are frequently encountered in clinical practice. Intra-articular fractures at the distal radius can pose significant challenges when addressed through conventional conservative methods. Various treatment alternatives exist to mitigate the risk of reduction loss in cases of unstable fractures at the distal end of the radius. Hence; the present study was conducted for assessing and comparing results of distal radius fractures treated with plating or K wire fixation.

**Materials & methods:** The present study was conducted for assessing and comparing results of distal radius fractures treated with plating or K wire fixation. A total of 40 patients with presence of distal radius fracture were enrolled. Complete demographic and clinical details of all the patients was obtained. All the randomized into two study groups with 20 patients in each group as follows: K-wire group: Patients operated on by closed reduction and percutaneous fixation with K-wires, Plating group: Patients received open reduction and internal fixation with palmar locking palmar plates. Preoperative and postoperative radiographic assessment of all the patients was done. Preoperative DASH score was evaluated. All the patients were followed up for 6 months and were evaluated. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

**Results:** Mean age of the patients of K-wire group and plating group was 49.3 years and 50.7 years respectively. Majority proportion of patients of both the study groups were males. Right side involvement was seen in majority of the cases. At 6 months follow-up, palmar flexion among patients of the K-wire group and plating group was 64.3° and 66.9° respectively. At 6 months follow-up, dorsal flexion among patients of the K-wire group and plating group was 57.1° and 60.8° respectively. At 6 months follow-up, ulnar deviation among patients of the K-wire group and plating group was 38.7° and 38.1° respectively. At 6 months follow-up, radial deviation among patients of the K-wire group and plating group was 26.9° and 25.5° respectively. Non-significant results were obtained while comparing the physical outcome among patients of the two study groups. Also, DASH score at six months follow-up was comparable among the two study groups.

**Conclusion:** The findings of this research indicated that there was no significant difference in the outcomes for patients who received treatment with K-wires versus those who underwent locking plate fixation for distal radial fractures.

**Key words:** Distal, Radius, K wire

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### Introduction

Fractures of the distal radius (DR) in the forearm are frequently encountered in clinical practice. As life expectancy continues to rise, the prevalence of radial fractures is also on the rise, resulting in an expanding demographic of individuals susceptible to such injuries. These fractures are primarily observed in two age groups: children/adolescents and the elderly. The characteristics of fracture patterns, their management, and associated complications vary significantly between

these populations. It is essential for healthcare providers to recognize these differences, identify which fracture patterns require urgent attention, and ensure timely referrals for further treatment.<sup>1-3</sup>

The fundamental tenet of fracture management involves achieving precise fracture reduction, followed by the application of an immobilization technique that effectively preserves this reduction. Although the primary objective in treating fractures at the distal end of the radius is to restore normal functionality, the

specific approaches to attain this outcome remain a subject of debate. Intra-articular fractures at the distal radius can pose significant challenges when addressed through conventional conservative methods. Various treatment alternatives exist to mitigate the risk of reduction loss in cases of unstable fractures at the distal end of the radius.<sup>4-6</sup> The Distal Radius Acute Fracture Fixation Trial (DRAFFT) was a large multicenter, randomized study comparing the effectiveness of Kirschner wire (K-wire) fixation and locking plate fixation for fractures of the distal radius. It found that volar locking plates offered no sustained clinically relevant advantage over K-wire fixation which is cheaper and quicker to perform. Other randomized trials have reported similar findings.<sup>7-9</sup> Hence; the present study was conducted for assessing and comparing results of distal radius fractures treated with plating or K wire fixation.

### Materials & methods

The present study was conducted for assessing and comparing results of distal radius fractures treated with plating or K wire fixation. A total of 40 patients with presence of distal radius fracture were enrolled. Complete demographic and clinical details of all the patients was obtained. All the randomized into two study groups with 20 patients in each group as follows:

**K-wire group:** Patients operated on by closed reduction and percutaneous fixation with K-wires,

**Plating group:** Patients received open reduction and internal fixation with palmar locking palmar plates.

Preoperative and postoperative radiographic assessment of all the patients was done. Preoperative DASH score was evaluated. All the patients were followed up for 6 months and were evaluated. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

### Results

Mean age of the patients of K-wire group and plating group was 49.3 years and 50.7 years respectively. Majority proportion of patients of both the study groups were males. Right side involvement was seen in majority of the cases. At 6 months follow-up, palmar flexion among patients of the K-wire group and plating group was 64.3° and 66.9° respectively. At 6 months follow-up, dorsal flexion among patients of the K-wire group and plating group was 57.1° and 60.8° respectively. At 6 months follow-up, ulnar deviation among patients of the K-wire group and plating group was 38.7° and 38.1° respectively. At 6 months follow-up, radial deviation among patients of the K-wire group and plating group was 26.9° and 25.5° respectively. Non-significant results were obtained while comparing the physical outcome among patients of the two study groups. Also, DASH score at six months follow-up was comparable among the two study groups.

**Table 1: Demographic data**

Variable	K-wire group	Plating group
Mean age (years)	49.3	50.7
Males	13 (65 %)	12 (60 %)
Females	7 (35 %)	8 (40 %)
Right side involved	15 (75 %)	13 (65 %)
Left side involved	5 (25 %)	7 (35 %)

**Table 2: Comparison of physical outcome at 6 months follow-up**

Variable	K-wire group	Plating group	p-value
Palmar flexion	64.3°	66.9°	0.52
Dorsal flexion	57.1°	60.8°	0.37
Ulnar deviation	38.7°	38.1°	0.22
Radial deviation	26.9°	25.5°	0.15

**Table 3: Comparison of DASH score at 6 months follow-up**

DASH score	K-wire group	Plating group
Mean	14.7	12.9
SD	2.3	2.1
p-value	0.719	

### Discussion

Distal radius fractures are one of the most common injuries encountered in orthopedic practice. They make up 8%–15% of all bony injuries in adults. Intra-articular

component in distal radius fractures usually signifies high-energy trauma occurring in young adults. High-energy injuries frequently cause shear and impacted fractures of the articular surface of the distal aspect of

the radius with displacement of the fracture fragments. The fracture pattern most commonly observed in geriatric age group is extra-articular while the high-energy intra-articular type is most frequent in young adult patients.<sup>10-12</sup>

Mean age of the patients of K-wire group and plating group was 49.3 years and 50.7 years respectively. Majority proportion of patients of both the study groups were males. Right side involvement was seen in majority of the cases. At 6 months follow-up, palmar flexion among patients of the K-wire group and plating group was 64.3° and 66.9° respectively. At 6 months follow-up, dorsal flexion among patients of the K-wire group and plating group was 57.1° and 60.8° respectively. At 6 months follow-up, ulnar deviation among patients of the K-wire group and plating group was 38.7° and 38.1° respectively. Sanders L et al compared the load to failure and stiffness of four common K-wire configurations to identify the strongest construct for use in extra-articular dorsally displaced distal radius fractures. A standardized model of distal radius fractures was developed using turkey tarsometatarsi, which were stabilized with either two or three K-wires (1.6 mm) arranged in four distinct configurations. After conducting a power analysis, ten fracture models for each configuration were subjected to testing under cantilever bending and axial compression. Recent randomized studies have indicated that there is no significant advantage of volar locking plates over K-wires in the management of dorsally displaced distal radius fractures, resulting in a growing preference for the more cost-effective K-wires. Although various K-wire techniques have been documented, there remains insufficient evidence to ascertain the most effective configuration and number of wires. The three-wire interfragmentary arrangement demonstrated greater stiffness compared to the three-wire Kapandji configuration during both axial compression and cantilever bending tests. However, no significant differences were observed in the load to failure for either cantilever bending or axial compression. The three-wire interfragmentary method is identified as the most rigid K-wire configuration for treating dorsally displaced distal radius fractures. Conversely, the two-wire Kapandji technique exhibited significantly lower strength compared to the other configurations, particularly in cantilever bending. The authors advocate for the use of three wires in percutaneous pinning procedures and advise against the use of two intrafocal wires in isolation.<sup>13</sup>

At 6 months follow-up, radial deviation among patients of the K-wire group and plating group was 26.9° and 25.5° respectively. Non-significant results were obtained while comparing the physical outcome among patients of the two study groups. Also, DASH score at six months follow-up was comparable among the two

study groups. Brennan SA et al compare the radiographic and functional outcomes of 318 patients who underwent k-wire fixation or volar plating for fractures of the distal radius. The study involved patients aged between 20 and 65 years, who were monitored for an average duration of 32 months. The volar plate group exhibited significantly improved mean values for volar tilt, radial inclination, radial length, and ulnar variance compared to other treatment methods. Malunion rates were observed at 13.2% for patients treated with k-wiring, in contrast to 4% for those receiving volar plate treatment. Enhanced values in radial inclination, radial length, and volar tilt were associated with improved functional outcomes, as indicated by disabilities of the arm, shoulder, and hand (DASH) scores, as well as patient-rated wrist evaluation (PRWE) scores. Additionally, lower ulnar variance values were linked to better functional performance. Despite the superior radiological outcomes associated with volar plate treatment, there was no conclusive evidence to suggest that these improvements translated into enhanced functional outcomes. Consequently, k-wiring remains a viable and cost-effective option for managing simple fractures, while volar plating should be reserved for more complex fractures that cannot be effectively managed through closed reduction techniques.<sup>14</sup>

### Conclusion

The findings of this research indicated that there was no significant difference in the outcomes for patients who received treatment with K-wires versus those who underwent locking plate fixation for distal radial fractures.

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