

## Short Term Results of K-Wire Pinning of Comminuted Intra-Articular Distal Radius Fracture

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### Abstract:

**Background:** K-Wire pinning of comminuted intra-articular distal radius fracture is a good technique and has been shown good results in various ages of patients. **Purpose:** Spotlight the technique of k-wire pinning of comminuted intra-articular distal radius fracture with focus on the sound technique, follow up, results and complications. **Methods:** The study included 20 patients after obtaining informed consent who underwent k-wire pinning of comminuted intra-articular distal radius fracture between January 2019 and December 2019. We have evaluated the cases using DASH Score, VASP Score and presence or absence of complications. **Results:** good results were obtained using this technique with low rate of complications. 10 % of cases were infected, 20 % of cases with bad range of motion, 10 % of cases develop distressing pain after fracture union. **Conclusion:** Our results show that k-wire pinning is a safe technique for fixation of comminuted intra-articular distal radius fracture. The adopted technique show satisfactory results among patients. Our

results show that majority of patients have low DASH Score and excellent to good range of motion and minimal complications

**KeyWords** Comminuted; Fixation; k-wire; radius

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### Introduction

Distal radius fractures have been estimated to account for one sixth of all fractures that are seen and treated in emergency Department and represent the most common fracture of upper extremity. Two main different mechanisms of injury are reported:

high-energy trauma, usually related to motor car accidents or sport injuries, and low-energy trauma such as falls from standing in the elderly (1). Fractures caused by severe high energy trauma usually result in intra-articular fracture and comminution and

treatment of these fractures is difficult as these fractures are usually unstable and difficult to reduce and associated with high rate of complications (2).

Abraham Colle of Dublin, Ireland in the year 1814 was the first to describe what is now known as Colles fracture. Other descriptions of distal radius fracture were added by Barton 1838, Dupuytren 1849 and Smith 1854 (3).

There are numerous treatment modalities available to orthopedic surgeons in the treatment of distal radius fracture; these include closed reduction and casting, closed reduction and percutaneous pinning by different methods as Kapandji intrafocal technique, transradial styloid pinning, pinning via Listers tubercle or transulnar pinning. Other modalities of treatment include closed reduction and external fixation by means of ligamentotaxis to reduce the fracture, open reduction by volar or dorsal approach and internal fixation by implants such as screws, plates, or screws with locking plate (4).

The main advantages of internal fixation with plate and screws are represented by anatomical reconstruction of the fragments and articular surface, if the joint is involved. It could allow early mobilization of the wrist, reducing the time to restore appropriate range of motion. On the other

hand, percutaneous Kirschner wire fixation has the advantage of being cheaper, easier to perform and less invasive (5).

While deciding the treatment modality there are numerous factors to consider, these factors include patient's age, lifestyle, other associated injuries, co-morbidities, functional demands, hand dominance, fracture type, alignment of fracture, soft tissues condition, whether the fracture is open or closed and economic constraints of the patient. All these factors play an important role in the final decision in the treatment of distal radius fracture (6).

#### **Aim of the work**

Spotlight the technique of K-wire pinning of comminuted intra-articular distal radius fracture with special focus on this technique, follow up, results and complications.

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#### **Material and methods**

It is a cohort prospective clinical study that was conducted in Benha University Hospital, Sohag El-helal Health insurance hospital and Ahmed Maher Teaching Hospital from January 2019 to December 2019. Our study included 20 patients with comminuted intra-articular distal radius fracture. Percutaneous K-wire pinning was done to all cases as shown in figure 1, 2, 3, with approval of Institutional Review Boards and Institutional Ethical Committee (IRB).



Fig. (1)



fig. (2)



fig. (3)

**Figure 1:**Figure Showing Antero-posterior view of a case of k-wire pinning of Distal radius fracture

**Figure 2 :**Figure showing lateral view of a case of k-wire pinning of distal radius fracture

**Figure 3:**Figure showing Antero-posterior and lateral views of another case of k-wire pinning of distal radius Fracture

We used Disability of Arm Shoulder and Hand Score (DASH Score), Visual Analogue Scale For Pain Score (VASP Score), rate of union and presence or absence of complications to evaluate the results of fracture fixation (7).

#### **Inclusion Criteria:**

- 1) Intra-articular distal radius fracture
- 2) Closed injuries and open grade 1 injuries
- 3) Skeletally mature patients (8)

#### **Exclusion Criteria**

- 1) Extra-articular distal radius fracture
- 2) open injuries (grade 2 or 3 injuries)
- 3) Pediatric age group patients

5) Patient with neurological deficit of upper limb

6) Associated Injuries as Essex-lopresti, Radial styloid fracture and Die- punch fracture (9)

#### **Statistical Analysis**

We used different statistical methods for analysis of this study. we have used program IBM SPSS Statistics Version 24 Chicago, Ill, USA

1-Male to female ratio is shown in table 1

2-Diabetics to non-diabetics' ratio is shown in table 2

3-Pin tract infection ratio is shown in table 3

4-Visual Analogue scale for pain is shown in table 4

5-Simple T-Test of age is shown in table 5

6-Simple T-Test of Disability of Arm, Shoulder and Hand (DASH) Score is shown in table 6

7-Histogram showing DASH Score of patients in Figure 4

## Results

The number of female cases is 5 (25%) and male cases is 15 (75%) as shown in (table 1).

Table 1 :Table showing male to female ratio

Gender	Male	Female
Number of Cases	15	5
Percentage	75%	25%

The ages of these patients are variable , The mean value is 41.20 ,the median is 39.50, the minimum value is 22 ,the maximum value is 66 , the range value is 44 , the

Table 2 : Table showing Diabetics to non-diabetics ratio

Diabetes	Diabetics	Non diabetics
Number of cases	4	16
Percentage	20%	80%

variance is 146.484 , the Standard Deviation is 12.103 as shown in (table 5).

The follow up period of all cases was 2 months.

The number of cases with pin tract infection is 2 cases (10%) and the number of non-infected cases is 18 (90%).

The visual Analogue scale for pain of 10 cases is (0) no pain with percentage of 50% and for 6 cases is (2) mild pain with percentage of 30% and of 2 cases is uncomfortable pain with percentage of 10% and 2 cases is distressing pain with percentage of 10% as shown in (table 4).

The Disabilities of the Arm, Shoulder and Hand (DASH) Score is variable among cases , the mean value is 16.110 , the median is 8.050 and the minimum value is 1.7 and the maximum value is 46.7 and the range is 45 and the variance is 245.855 and the standard deviation is 15.6798 as shown in (table 6).

**Table 3:** Table showing pin tract infection

<b>Pintract infection</b>	<b>Non infected cases</b>	<b>Infected cases</b>
<b>Number of cases</b>	<b>18</b>	<b>2</b>
<b>Percentage</b>	<b>90%</b>	<b>10%</b>

**Table 4:** Table Showing Visual Analogue Scale for Pain

<b>VASP Score</b>	<b>(0) No pain</b>	<b>(2) Mild pain</b>	<b>(4)uncomfortable pain</b>	<b>(6) Distressing pain</b>
<b>Number of cases</b>	10	6	2	2
<b>Percentage</b>	50%	30%	10%	10%

**Table 5:** Table Showing Simple T-Test of Age

<b>Descriptive</b>		<b>Statistic</b>	<b>Std. Error</b>
<b>Age</b>	<b>Mean</b>	41.20	2.706
	<b>95% Confidence Interval</b>		
	<b>Lower Bound</b>	35.54	
	<b>Upper Bound</b>	46.86	
	<b>5% Trimmed Mean</b>	40.89	
	<b>Median</b>	39.50	
	<b>Variance</b>	146.484	
	<b>Std. Deviation</b>	12.103	
	<b>Minimum</b>	22	
	<b>Maximum</b>	66	
	<b>Range</b>	44	
	<b>Interquartile Range</b>	18	
	<b>Skewness</b>	.515	.512
	<b>Kurtosis</b>	-.444	.992

**Table 6** :Table Showing simple T-Test of (DASH) Score

Descriptive		Statistic	Std. Error
DASH Score	Mean	16.110	3.5061
	95% Confidence Interval for Mean	8.772	
	Upper Bound	23.448	
	5% Trimmed Mean	15.211	
	Median	8.050	
	Variance	245.855	
	Std. Deviation	15.6798	
	Minimum	1.7	
	Maximum	46.7	
	Range	45.0	
	Interquartile Range	19.9	
	Skewness	1.018	.512
	Kurtosis	-.378	.992

## Discussion

Fractures of the distal radius account for 15–25% of all fractures. The peak of age of distal radius fracture incidence is approximately 30 years in men, secondary to high-energy injuries and post-menopausal women, secondary to low-energy injuries (10).

When comparing to another study we found that active range of motion and grip strength of injured wrist were statistically equal to those of uninjured wrist except wrist flexion with a minimal difference between two groups, eighty-five percent of the patients were pain free (11).

When comparing to another study, we found that the infection rate was 2% and this study do not recommend the use of prophylactic antibiotics, depending on that antibiotic administration does not affect infection rate and also eliminating potential antibiotics adverse effects (12).

In another study, we found evaluation of closed reduction and percutaneous pinning as a method of treatment of distal radius fracture in elderly patients. Good result was achieved by 36.3%, fair in 50% & poor in 13.3%.

When comparing this with our study we found that we have excellent results and more good results than this study regarding range of motion , Visual analogue scale for pain and (DASH) Score **(13)**.

When comparing K-wire pinning technique with other techniques of fixation of distal radius fracture in another study, we found that this study has included seven randomized clinical trials , with a total of 875 patients, were included in this meta-analysis. Open reduction and internal fixation with Volar locking plate provided statistically lower DASH scores of patients , reduced incidence of total postoperative complications and specifically lowered the rate of superficial infection, when compared, over a 1-year follow-up, to percutaneous K-wire fixation **(14)**.

### **Conclusion**

K wire pinning is a safe technique for fixation of comminuted intra-articular distal radius fracture. K-wire pinning has many advantages such as K-wires are cheap in price and they are easily removed after union of fracture **(15)**.

The results of this study are calculated using Disability of Arm, Shoulder, Hand Score and Visual Analogue Scale for Pain .Our results show that majority of patients have low DASH Score and excellent to good

range of motion and minimal complications **(16)**.

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