ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 01, 2024

# FUNCTIONAL OUTCOME OF INTRAARTICULAR DISTAL RADIUS FRACTURES MANAGED WITH COLUMN SPECIFIC K WIRE FIXATION

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## ABSTRACT

**Background:** Bimodal distribution of distal radius fractures is observed, with approximately 25% of fractures occurring in the pediatric age group and 18% in the adult age group. Treatment for distal radius fractures aims to restore articular congruity, radial alignment and length, stability, and functional mobility**.**

**Goal:** To evaluate the functional outcome of column-specific K wire fixation of intraarticular distal radius fractures.

**Material and Methods:** 30 patients with intra-articular distal radius fractures were included in our study, which took place in the orthopaedics department of the VIMS between Jan 2019 and Jan 2021. Follow-up was conducted for at least six months, and the Quick DASH scoring system was used to evaluate the functional outcome.

**Results:** Based on our quick DASH scores, out of the 30 patients, 27 had excellent to good results; 3 had satisfactory results; no patient had poor results; two had wrist stiffness linked to noncompliance with physiotherapy for mobilization; one patient had malunion due to malreduction linked to her delayed hospital admission.

**Conclusion:** A less invasive technique for treating intraarticular distal radius fractures is column specific fixation using k wire. Even though issues like malunion and stiffness were observed, they were brought on by noncompliance and a delayed presentation. Therefore, we would like to draw the conclusion that using k wire to treat intraarticular distal radius fractures in a column specific manner results in satisfactory long-term functional outcomes.

**Keywords:** Ligamentotaxis, K-wires, and intraarticular distal radius fracture

## Introduction

One common fracture of the upper extremity is an intra-articular fracture of the distal radius. Distal radius fractures account for roughly 25% of fractures in the paediatric age range and 18% of adult fractures, according to the bimodal distribution. In young people, high energy trauma can potentially cause an intra-articular fracture.[1] The best course of therapy and functional outcome for these fractures are crucial since the patients' everyday activities depend heavily on their ability to move their wrists and hands. Fixation presents particular challenges in the case of intraarticular distal radius fractures.[2]

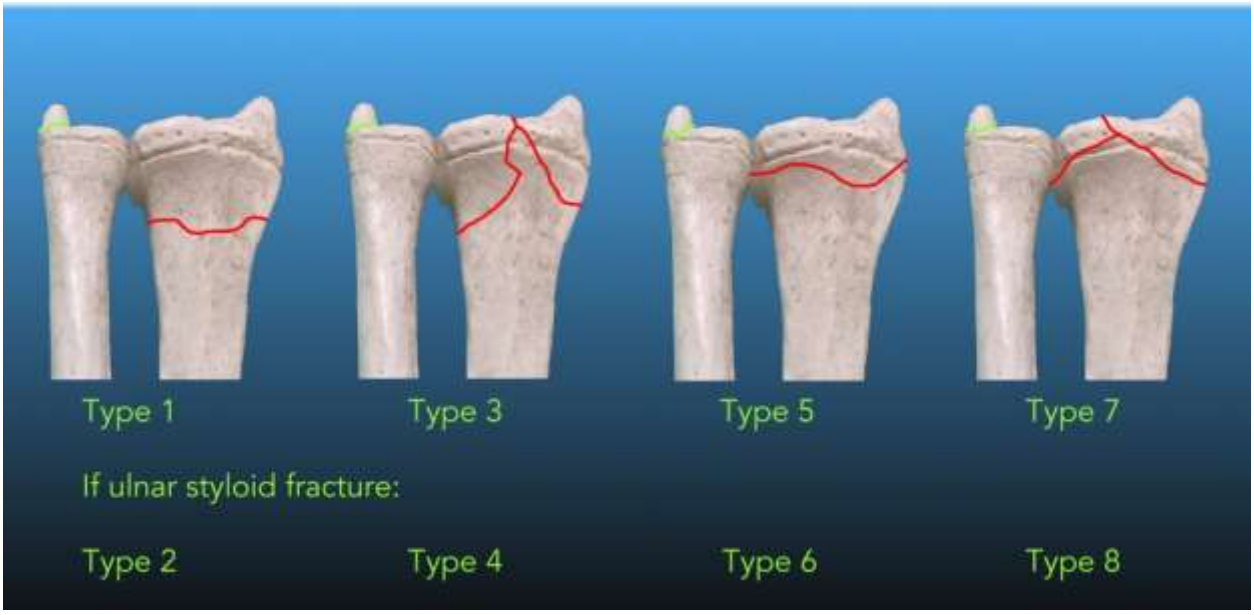
ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 01, 2024

Because of the intricate network of tendons, neurovascular structures, and retinacular sheaths surrounding the distal radius, fixing it with large plates is challenging. Moreover, iatrogenic comminution may result with screw use if the distal pieces are too tiny to allow for sufficient screw purchase.[3,4]

Treatment for distal radius fractures aims to restore articular congruity, radial alignment and length, stability, and functional mobility.

## CLASSIFICATIONS

1. The Frykman classification
2. The classification of AO
3. Werley and Gartland
4. A Melon
5. Fernandez




## MATERIALS AND METHODOLOGY

The study was carried out in the department of orthopaedics VIMS bellary from Jan 2019 to Jan 2021. Patients who had intra-articular distal radius fractures were included in the study. Follow-up was conducted for at least six months, and the Quick DASH scoring system was used to evaluate the functional outcome.

## INCLUSION CRITERIA

- Older than 20 but under 60 years old
- All distal radius intraarticular fractures without neurovascular impairments are being surgically fixed.
- Consent to participate from the patient, who signs the informed written consent form

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 01, 2024

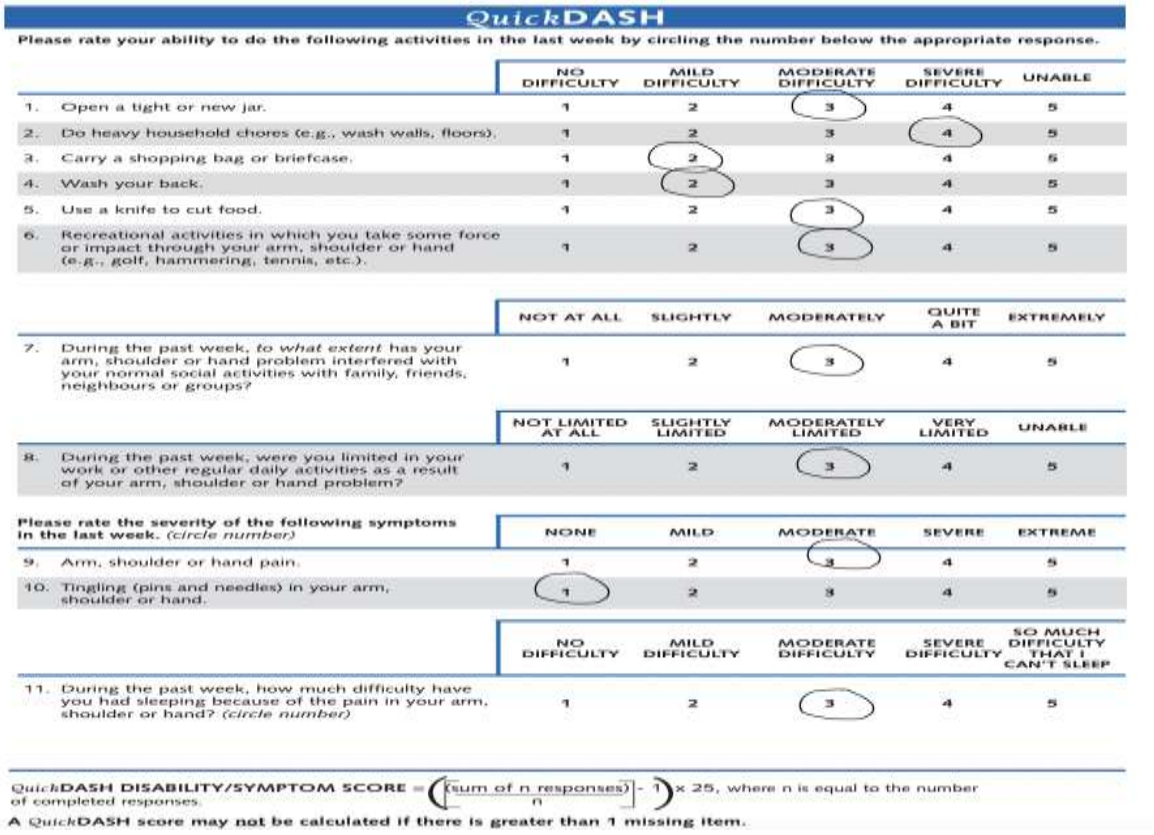
## EXCLUSION CRITERIA

- Age less than 20 or more than 60 years old.
- Individuals suffering from neurovascular deficiencies and cognitive impairments
- Previous upper limb fractures associated with a distal radius fracture or surgery.

Functional convention K wires were used to repair patients who had little to no comminution at the fracture site and no ligamentotaxis. Individuals who had disruption of the distal radioulnar joint were treated using additional radioulnar k wire, and those who had fracture site comminution were treated with augmented k wire and ligamentotaxis.

## POST OPERATIVE PROTOCOL

For six weeks, patients were immobilised with a POP cast below the elbow. Within six weeks, the implant was removed. Wrist mobilisation was performed out following implant removal. Observation X-rays were obtained 3, 6, and 12 months after surgery. After surgery, functional outcome grading was carried out 3, 6, and 12 months later.



**QuickDASH**

**Please rate your ability to do the following activities in the last week by circling the number below the appropriate response.**

| | NO DIFFICULTY | MILD DIFFICULTY | MODERATE DIFFICULTY | SEVERE DIFFICULTY | UNABLE |
|---|---|---|---|---|---|
| 1. Open a tight or new jar. | 1 | 2 | 3 | 4 | 5 |
| 2. Do heavy household chores (e.g., wash walls, floors). | 1 | 2 | 3 | 4 | 5 |
| 3. Carry a shopping bag or briefcase. | 1 | 2 | 3 | 4 | 5 |
| 4. Wash your back. | 1 | 2 | 3 | 4 | 5 |
| 5. Use a knife to cut food. | 1 | 2 | 3 | 4 | 5 |
| 6. Recreational activities in which you take some force or impact through your arm, shoulder or hand (e.g., golf, hammering, tennis, etc.). | 1 | 2 | 3 | 4 | 5 |

| | NOT AT ALL | SLIGHTLY | MODERATELY | QUITE A BIT | EXTREMELY |
|---|---|---|---|---|---|
| 7. During the past week, *to what extent* has your arm, shoulder or hand problem interfered with your normal social activities with family, friends, neighbours or groups? | 1 | 2 | 3 | 4 | 5 |

| | NOT LIMITED AT ALL | SLIGHTLY LIMITED | MODERATELY LIMITED | VERY LIMITED | UNABLE |
|---|---|---|---|---|---|
| 8. During the past week, were you limited in your work or other regular daily activities as a result of your arm, shoulder or hand problem? | 1 | 2 | 3 | 4 | 5 |

| **Please rate the severity of the following symptoms in the last week.** *(circle number)* | NONE | MILD | MODERATE | SEVERE | EXTREME |
|---|---|---|---|---|---|
| 9. Arm, shoulder or hand pain. | 1 | 2 | 3 | 4 | 5 |
| 10. Tingling (pins and needles) in your arm, shoulder or hand. | 1 | 2 | 3 | 4 | 5 |

| | NO DIFFICULTY | MILD DIFFICULTY | MODERATE DIFFICULTY | SEVERE DIFFICULTY | SO MUCH DIFFICULTY THAT I CAN'T SLEEP |
|---|---|---|---|---|---|
| 11. During the past week, how much difficulty have you had sleeping because of the pain in your arm, shoulder or hand? *(circle number)* | 1 | 2 | 3 | 4 | 5 |

QuickDASH DISABILITY/SYMPTOM SCORE = $\left(\left[\frac{\text{sum of n responses}}{n}\right] - 1\right) \times 25$, where n is equal to the number of completed responses.

A QuickDASH score may not be calculated if there is greater than 1 missing item.

## RESULTS

Results based on our quick DASH scores for the 30 patients 27 patients had excellent to good results, 3 patients had satisfactory results, 2 patients had wrist stiffness linked to noncompliance with physiotherapy for mobilization, 1 patient had malunion due to malreduction linked to a delayed hospital presentation and 1 patient had a superficial pin site infection.

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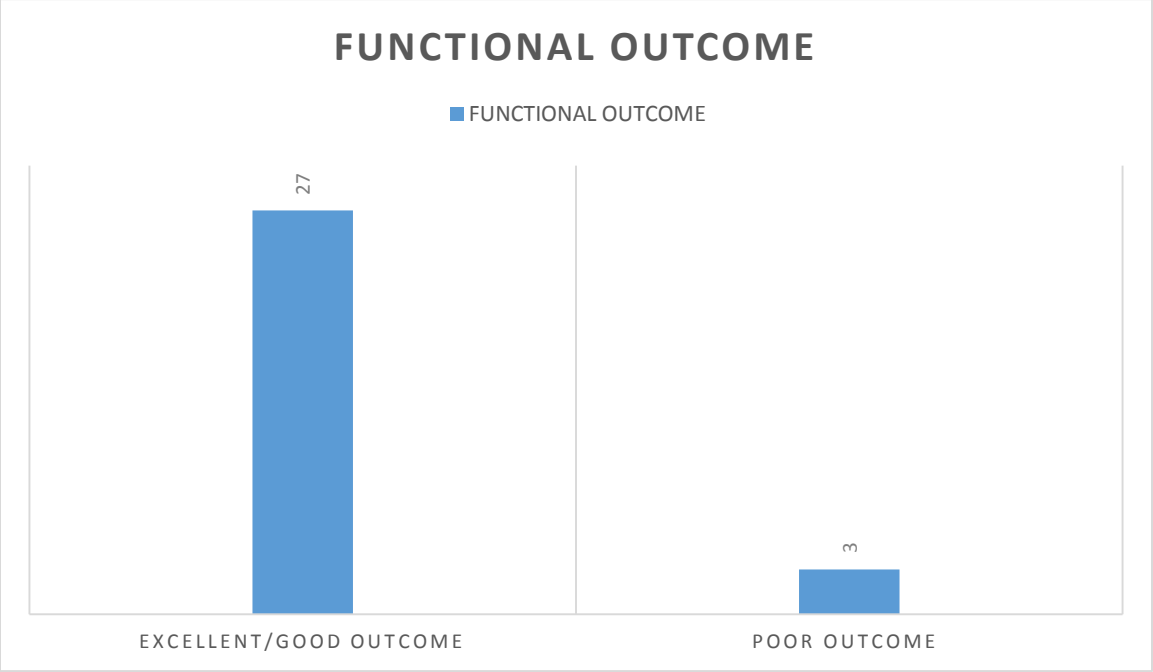


## DISCUSSION

Closed reduction and cast immobilisation are the standard treatments for distal radius fractures. These methods have the benefit of maintaining the fracture haematoma and inducing biological healing, but they also carry a high risk of reduction loss and subsequent malunion rates. On the other hand, open reduction and internal fixation with plate osteosynthesis exhibit good immediate post-operative functional outcomes, but they also carry a high risk of invasiveness[5, 6]. For extra articular distal radius fractures, closed reduction and internal fixation with k wires have been widely employed, with great results in long-term follow-up.

K wires are a useful tool for intraarticular fractures because they harness the benefits of biological healing while lowering the risk of problems associated with invasive procedures [7]. While patients who arrive late for intervention have a worse immediate post-operative functional outcome, long-term follow-up results were on par with invasive procedures. Anatomic reduction, fracture stability, range of motion, and articular congruity are the objectives of distal radius fracture care. The fixation approach mentioned above aims to achieve these objectives[8]. Ligamentotaxis and augmentation with column-specific K wires produced good outcomes in treating extremely comminuted fractures; they avoided fracture collapse and radial shortening.[10]. In the Brennan et al. trial comparing volar plating vs. Kwire fixation, the fast DASH scores were 11.25 vs. 13.12.[11] In our study, the majority of the fast DASH scores were either outstanding or good. In our study, the average quick DASH score after one year's follow-up was 12.34, which is similar to volar plating. In two of the patients in our study, stiffness developed as a result of noncompliance with mobilisation. And one patient underwent a malunion as a result of their delayed hospital admission and inability to achieve reduction.

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## CONCLUSION

In summary Because of loss of reduction, decreased stability, intraarticular malreduction, and diminished functional result, conservative treatment for an intraarticular distal radius fracture is frequently not possible. We are forced to select an intermediate non-invasive and invasive mode of management because, while invasive surgical procedures like plate osteosynthesis may show good immediate and long-term follow-up, they may also cause complications due to their invasiveness and require a second surgery for implant removal. An alternative less intrusive technique for treating intraarticular distal radius fractures is column specific fixation using k wire. Even though issues like malunion and stiffness were observed, they were brought on by noncompliance and a delayed presentation. Therefore, we would like to draw the conclusion that using k wire to treat intraarticular distal radius fractures in a column specific manner results in satisfactory long-term functional outcome.

## REFERENCES

1. Canale ST, Beaty JH. Campbell's Operative Orthopaedics. 12th edition, Vol 3. Philadelphia : Elsevier Mosby; 2013. Chapter 57, Fractures of the shoulder, arm and forearm; p.2890-2916.
2. Belloti JC, Tamaoki MJ, Franciozi CE, Santos JB, Balbachevsky D, Chap Chap E, Albertoni WM, Faloppa F. Are distal radius fracture classifications reproducible? Intra and interobserver agreement. Sao Paulo Med J. 2008 May 1;126(3):180-5
3. Philippe Saffar, William P. Cooney III, editors. Fractures of the distal radius. 1st ed. London: Martin Dunitz; 1995.pp.136.
4. Gereli A, Nalbantoğlu U, Kocaoğlu B, Türkmen M. Comparison of palmar locking plate and K-wire augmented external fixation for intra-articular and comminuted distal radius fractures. Acta Orthop Traumatol Turc. 2010;44(3):212-9. doi:10.3944/AOTT. 2010. 2325. PubMed PMID: 21088462.
5. Rogachefsky RA, Lipson SR, Applegate B, Ouellette EA, Savenor AM, McAuliffe JA. Treatment of severely comminuted intra-articular fractures of the distal end of the radius by open reduction and combined internal and external fixation. J Bone Joint Surg Am. 2001 Apr;83-A(4):509-19. PubMed PMID: 11315779.
6. Shuang-Le Zong, Meta-analysis for dorsally displaced distal radiusfracture fixation: Volar locking plate versus percutaneous Kirschner wires Journal of Orthopaedic Surgery and Research 2015;10:108
7. Rayhack J, Langworthy J, Belsole R. Transulnarpercutancous pinning of displaced distal radial articular fractures. Presented at the American Society for surgery of the Hand Annual meeting Orlando, FL, October 3, 1991 7.
8. Ashok K Shyam, Chetan Pradhan, Rajiv Arora, Gaurav Pardesi, Parag Sancheti, Atul Patil, Chetan Puram. A Comparative Study of the Functional Outcome of k-wire Fixation with Cast versus Ligamentotaxis In Management of Distal End Comminuted Fracture Radius. Journal of Orthopaedics ISSN 0972-9782x
9. Rosenthal AH, Chung KC. Intrafocal pinning of distal radius a simplified approach. Ann PlastSurg 2002:48:593ã 599

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10. Dunning CE, Lindsay CS, Bicknell RT, et al. Supplemental pinning improves the stability of external fixation in distal radius fractures during simulated finger and forearm motion. J Hand Surg 1999:24:992ãe 1000.
11. Brennan et al. Volar plate versus k-wire fixation of distal radius fractures JINJ 6367.