



Research Paper

FUNCTIONAL OUTCOME ANALYSIS OF DISTAL RADIUS FRACTURES FIXATION USING FIVE PIN TECHNIQUE

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ABSTRACT

INTRODUCTION: Distal radius fractures are the most common fractures of the upper extremity. Most common mode of injury is a fall on outstretched hand. Management of distal radial fractures is a controversial topic with poor reported outcomes in up to one third of cases. It had wide variety of treatment options such as closed reduction and POP cast, internal fixation, external fixation and percutaneous pin fixation. Closed reduction and percutaneous pinning with 'The five pin technique' improves the reliability of fixation. Current study aimed to assess the clinical and functional outcome of fixation of distal radius fractures using the five pin technique. **MATERIAL AND METHODS:** 30 patients with fracture of distal radius were subjected to history taking, thorough clinical examination and underwent five pin technique. **RESULTS:** Functional outcome – Quick DASH scoring. Score of less than 10 in 14 patients, 11-15 score in 7 patients, 16-20 score in 6 patients and more than 20 score in 3 patients. **CONCLUSION:** "The five pin technique" is a versatile tool which provides functional outcomes better than conventional K wire fixation and comparable to volar plating as seen in our study. This study proved that customised 5-pin percutaneous fixation was sufficiently stable and controlled all fragments of distal radial fractures effectively to allow early mobilisations to prevent stiffness and reflex sympathetic dystrophy with excellent functional outcomes.

KEYWORDS

Distal Radius fractures, Five Pin Technique.

INTRODUCTION

Distal radius fractures are the most common fractures of the upper extremity seen in clinical practice. The common mode of injury is a fall on outstretched hand although it is not uncommon in high-energy trauma patients. Distal radius fractures have been a subject of ongoing discussion for over two hundred years. Pouteau¹, a French surgeon described the fracture pattern. Abraham Colles² is widely credited for the description of the most common type of distal radius fracture. In 1854, Smith³ claimed that a fall on the back of a flexed wrist results in palmar displaced distal radius fractures.

Closed reduction and casting has been the most commonly employed treatment modality but the subsequent malunion and distal radio-ulnar joint subluxation results in poor radiological and functional outcomes. Although many treatment modalities are available there is no consensus on the optimum treatment of these injuries. In 1908, Lambotte⁴ described a single pin placement from the radial styloid to stabilise the distal radius fracture. In 1976, Kapandji⁵ first described the intra focal pinning with two pins. In 1989 and 1991, John M. Rayhack⁶ described the ulnar-radial pinning for stabilisation of distal radio-ulnar joint after reduction by ligamentotaxis and manipulation of distal fragment. In 2010 Ashok K Shyam et al⁷ studied 65 comminuted distal radius fractures and compared the outcome with K-wire fixation and ligamentotaxis. They concluded that both methods worked well with good clinical and functional outcomes. In 2015, Shuang-Le Zong et al⁸ in a meta-analysis for dorsally displaced fractures comparing the volar locking plate and K-wire fixation concluded that the DASH scores although significantly different at 3 and 6 months post-operatively, at 1 year were comparable. In 2015, Tubeuf et al⁹ concluded from the Distal Radius Acute Fracture Fixation Trial (DRAFFT) that compared to the volar locking plate, K-wire fixation is a cost saving intervention and has similar health benefits.

Closed reduction and percutaneous pinning is one of the standard treatments for management of distal radius fractures and its modification 'The five pin technique' improves the reliability of fixation thus combining the advantages of noninvasiveness as in casting and stability achieved comparable to open reduction and plating. Study aimed to assess the clinical and functional outcome of fixation of distal radius fractures using the five pin technique in 30

patients managed in our institute, Narayana general hospital attached to Narayana Medical college, Nellore over a period of 1 year from September 2018 to September 2019

MATERIALS AND METHODS

A total of 30 patients with the fracture of distal radius were included in this study. After the ethical clearance was obtained from the Ethical committee of Narayana Medical college, Nellore over a period of 1 year from September 2018 to September 2019.

The patients were subjected to history taking, thorough clinical examination with analysis of pre operative and post operative radiographs. The radiographic analysis includes evaluation of standard antero-posterior and lateral views of X rays of the wrist joint of bilateral upper limbs.

INCLUSION CRITERIA

- Age greater than 20 years
- Patients with displaced intra articular and extra articular fractures of the distal radius

EXCLUSION CRITERIA

- Age lesser than 20 years
- Patients with Barton's fracture (isolated dorsal or volar lip fractures of the distal radius with subluxation of the carpus)
- Patients with compound fracture
- Patients with associated ipsilateral upper limb trauma

Fixation is done after acceptable reduction confirmed on image intensifier in the following order:

- 1) Radial styloid pin-From lateral to medial direction
- 2) Lister's tubercle pin-From dorsal to volar and lateral to medial direction
- 3) Distal radioulnar pin-Just below articular surface in ulno-radial direction
- 4) Medial corner pin-From dorsal to volar and medial to lateral direction
- 5) Proximal radioulnar pin-5 cm from wrist joint and in ulno-radial direction

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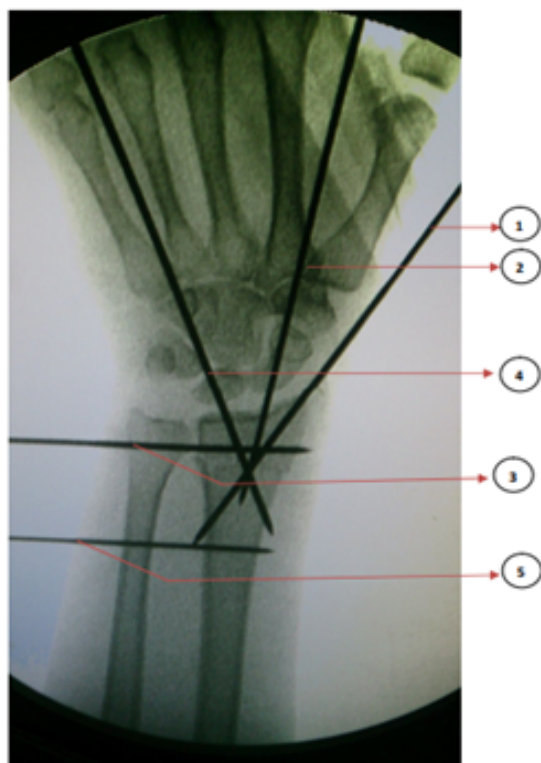


FIGURE 1: Fixation using five pin technique



Figure-2: Left distal radius fracture fixation with Five Pin Technique

Post operatively the patients were assessed based on the functional outcome, which was done using the quick DASH scoring system. The

quick DASH scoring system is a 9 item self-report questionnaire which is the shortened and modified version of the Disability of the Arm, Shoulder and Hand (DASH) scoring system

RESULTS

30 patients with fracture of the distal radius were studied both prospectively and retrospectively at Narayana Medical college, Nellore. The mean age of the patients at the time of presentation of the fracture was 45 years with the youngest patient being 25 years and the oldest patient being 70 years. Sex Distribution- There were 23 male (77%) and 7 female (23%) patients. Fracture type distribution- Frykman's type 1(5), type 2(9), type 3(3), type 4(2), type 5(2), type 6(3), type 7(3), type 8(3). Time to surgery- 18 patients were operated in less than 1 week, 8 patients in 1 to 2 weeks and 4 patients by 2-3 weeks. Functional outcome- Quick DASH scoring. Score of less than 10 in 13 patients, 11-15 score in 8 patients, 16-20 score in 6 patients and more than 20 score in 3 patients. The scores were found to be excellent or good in most cases (lower scores) and comparable to volar plate fixation as found in other studies. Complications - superficial pin tract infection, extensor tendon tethering, late fracture collapse and malunion.

DISCUSSION

Distal radius fractures cause the patient significant distress and disability if treated inadequately. The debate over the optimal treatment for distal radius fractures only sparks more questions than answers with the options ranging from conventional cast immobilisation to column specific plating. Closed reduction and cast immobilisation although simple and convenient leads on to a high rate of disabling stiffness and late fracture collapse eventually leading onto a poor functional outcome. Open reduction and plating although provides an opportunity to reduce the fracture anatomically comes with own set of complications related to the invasiveness of the procedure. The goals of managing distal radius fractures are anatomic reduction, fracture stability, early mobilisation, pain free range of movements and minimal complications. All the before mentioned goals can be achieved using the five pin technique for fixation of distal radius fractures. The five pin technique carries the advantages of early mobilisation. This is because the radio ulnar pins and the pins across the fracture site provide stability enough to permit early mobilisation leading onto lesser stiffness postoperatively. Another significant advantage the five pin technique provides is in its versatility. Distal radius fractures occur in innumerable patterns hence it is important to individualize treatment. This technique helps us achieve a much desired fragment specific fixation.

The DASH scores in the study by Brennan et al¹⁰ comparing K wire fixation vs volar plating was 13.12 vs 11.25. The DASH scores in our study were excellent or good in most cases. The average DASH score being 12.88 which is comparable to volar plating and better than conventional K wire fixation as seen from other studies. On analysis of patients with fair or poor DASH scores, one case presented late making anatomic restoration not possible, one case had poor anatomic reduction leading onto residual dorsal tilt, other cases had either severe metaphyseal or articular comminution leading onto late fracture collapse and malunion. Complications were encountered in the form of superficial pin site infections, deformity and fracture collapse and extensor tendon tethering. The superficial pin site infections settled with removal of infected pins and oral antibiotics and cases with extensor tendon tethering also resolved with removal of offending pins. The deformity and fracture collapse though not always, led to a poorer functional outcome.

Although the study series is small and further research is essential to provide directions for treatment, it is safe to conclude that the five pin technique is a technically less demanding, non-invasive and an effective way of treating both displaced intra and extra articular distal radius fractures without severe articular or metaphyseal comminution. The cases with delayed presentations and severe comminution certainly need open reduction and a more stable fixation in the form of plating.

CONCLUSION

"The five pin technique" is a minimally invasive and effective means of treating displaced intra and extra articular fractures without severe articular and metaphyseal comminution. In conclusion, the five pin technique is a versatile tool which provides functional outcomes better than conventional K wire fixation and comparable to volar plating as seen in our study.

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