

MANAGEMENT OF DISTAL RADIUS FRACTURE BY CLOSED REDUCTION, PERCUTANEOUS KIRSCHNER WIRE FIXATION AND PLASTER IMMOBILISATION – A PROSPECTIVE STUDY

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Abstract:

Introduction: Distal radius fracture is one of the most common fractures. It may sustain due to low energy trauma or high energy trauma.

Aims and Objectives: To compare the clinical effectiveness and outcome of Kirschner wire fixation with plaster immobilisation for patients with fracture of distal radius.

Material and Methods: 35 patients presented with distal radius fractures in tertiary care centers at PIMS, Udaipur and G. R. Medical College, Gwalior between the period of Dec. 2017 to Oct. 2018 were managed by fixation with Kirschner wires to hold the fracture in the correct anatomical position and immobilization with plaster cast done. 20 males and 15 females between the age group of 16 to 62 years were included in this study.

Results: Majority of patients (n = 25, 71.4%) sustained injury due to road traffic accidents. Injury on right side was more predominant than left. Anatomical evaluation by Sarmiento's criteria showed 21 patients with excellent result, 12 with good result, 1 with fair result and 1 had poor result. At final follow up by 'the Gartland and Werley criteria for functional outcome', 22 patients had excellent result, 11 had good result, 2 had fair result and none had poor result.

Conclusion: This study implies that Percutaneous Kirschner Wire Fixation is a minimally invasive technique that provides an effective means of maintaining the anatomical fracture reduction.

Keywords: Percutaneous Kirschner Wire Fixation, distal radius fracture, plaster immobilization.

Introduction:

Distal radius fractures representing 16% of patients reported in casualty.¹ The management of distal radius fracture has undergone tremendous changes in the recent past due to better understanding of pathological anatomy, mechanism of

injury and development of newer implants.

The objective of treatment of distal radius fracture is to restore the anatomy of the wrist in order to obtain early painless function. Closed reduction and cast immobilization, percutaneous pin fixation, external fixator, volar locking plate, intramedullary nail fixation had been used as single or combined

procedures in the management of distal radius fractures.^{2,3} Closed reduction in percutaneous K wire fixation with plaster immobilization is one of the commonest technique of treatment implied in the management of distal radius fracture.⁴ In some cases of pin tract infection, early removal of K wire and antibiotics are advocated.^{2,3,5} Purpose of this prospective study is to evaluate clinical effectiveness and outcome of K wire fixation with plaster immobilization with fracture of distal radius.

Material and Methods:

This was prospective study conducted at tertiary care centers at Pacific Institute of Medical Sciences, Udaipur and G. R. Medical College, Gwalior between December 2017 and October 2018. 35 patients consisting of 20 males and 15 females, ranging between the age group of 16 and 62 years according to inclusion criteria were included in the study. Patients were followed up for an average period of 6 months. During the follow up, X-rays were taken and the patients were assessed. Anatomical evaluation was done using 'Sarmiento modification of Lindstorm criteria' and functional assessment was done using 'Saemiento, et al modification of demerit point system of Gastland and Werley'.

Inclusion criteria:

Closed extra-articular fractures of radius sustained within 2 weeks period were included in this study.

Surgical technique:

Patient was positioned supine on OT table, with the limb on a side table. Under regional anaesthesia (if unsuccessful, then it was converted to general anaesthesia at the discretion of anesthetist), part was painted and draped. The fracture alignment was achieved by traction – counter traction and the reduction confirmed by the image intensifier. 1.5 or 2 mm K wire was passed from the radial styloid crossing the fracture site obliquely to exit the dorso-ulnar cortex of the radial shaft. Another K wire was passed from the dorso-ulnar aspect of distal radius between the 4th and 5th extensor compartment and directed to engage the volar radial cortex of the proximal fragment. The exposed ends of the K wires then bent and cut. The pin sites were dressed. Then a below

elbow slab was applied on the volar surface with the wrist in neutral position.

Post-operative protocol:

Patient was encouraged to begin active finger movements as soon as the effect of anaesthesia was out. After 24 hours, pin sites were dressed and if immobilization was found satisfactory, then patient was discharged next day.

Follow-up:

Patients were called for follow-up with weekly interval and pin site inspection and dressing were done. At the end of 4 weeks, check X-ray was taken and if satisfactory signs of union were present, the pins and slabs were removed and crepe bandage was applied to the patients. Patients were advised to mobilize the wrist. If at 4 weeks union was not satisfactory, then patients were followed up for further 2 weeks and after that pins were removed if the signs of union were found satisfactory. Subsequently patients were asked to mobilize the wrist. We did not encounter any case not showing satisfactory union at 6 weeks. The patients were reviewed monthly after removal of pins as regard to range of motion of the wrist. If there was no range of satisfactory motion, patients were advised to visit the physiotherapist.

Results:

Results were evaluated by anatomical Sarmiento's criteria and by the Gartland and Werley criteria for the functional outcome.

Table 1: Anatomical analysis: (Sarmiento's modification of Lindstorm criteria)

Result	Number
Excellent	21
Good	12
Fair	2
Poor	0

Table 2 Functional analysis: (Sarmiento et al modification of demerit point system of Gartland and Werley)

Residual Deformity	
Prominent ulnar styloid	1
Residual dorsal tilt	2
Radial deviation of hand	2 – 3
Point range	0 – 3
Subjective evaluation	
Excellent – No pain, disability or limitation of movement	0
Good – Occasional pain, slight limitation of motion, no disability	2
Fair– Occasional pain, some limitation of motion, feeling of weakness in the wrist, no particular disability if careful, activities slightly restricted	4
Poor– Pain, limitation of motion, disability, activities more or less markedly restricted	6
Objective evaluation	
Loss of dorsiflexion	5
Loss of ulnar deviation	3
Loss of supination	2
Loss of palmar flexion	1
Loss of radial deviation	1
Loss of circumduction	1
Loss of pronation	2
Pain in DRUJ	1
Grip strength – 60% or less of opposite side	1
Point range	0 – 5
End result point ranges	
Excellent	0 – 2
Good	3 – 8
Fair	9 - 20
Poor	21 and above

Table 3 Comparison of results between the functional and anatomical outcome in the present study

Result	Sarmiento	Gartland & Werley
Excellent	60.00%	62.86%
Good	34.28%	31.43%
Fair	2.86%	5.71%
Poor	2.86%	0%

Discussion:

Fracture of distal end of radius is an injury that orthopaedic surgeons deal with frequently, accounting for one-sixth of all the injuries present in emergency department.¹

Percutaneous K wire fixation of the reduced distal end radius fracture is one of the commonest treatment modality followed (Fig. 1).^{1,2,3} It is one of the simplest procedures in the management of distal radius fracture which commonly happens in early patients who may not be fit candidates to tolerate other long surgical procedures and the anaesthetic effects due to other associated medical co-morbidities. Pin tract infection is the minor most common complication with percutaneous K wire fixation of distal radius fracture. Keeping the cut ends of K wire outside bearing an impact on the final outcome.^{2,5,6,7,8} In our study in 5 cases (14.2%), pin site infection and in one case (2.7%), pin loosening was encountered. Clancy reported a 96.4% satisfactory results in 30 patients treated with percutaneous pinning.

Conclusion:

This study demonstrates that percutaneous Kirschner wire pinning is a minimally invasive technique that provides an effective means of maintaining the anatomical fracture reduction. It does not require highly skilled personnel. It is suitable method of fixation of displaced Colle's fracture.

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