

OUTCOMES OF DISTAL RADIAL FRACTURES TREATED WITH CLOSED REDUCTION AND PERCUTANEOUS PINNING

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Abstract-

Background; Distal radial fractures account for 16% of all fractures treated in emergency departments, Most of the fractures are effectively treated with closed reduction and immobilization in a plaster cast. Percutaneous pinning provides additional stability and is one of the earliest methods of fixation. If segmental or unstable fractures are not treated properly, serious complications can occur.

Aim; Aim of the study to assess the functional and radiological outcome of percutaneous pinning in distal radial fractures.

Material and methods: in this Prospective study 40 cases of distal radius fracture taken the parts were 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 dorsoulnar cortex of the radial shaft. Another K-wire was passed either parallel to the first wire or from the dorsoulnar aspect of the distal radius between the 4th and 5th extensor compartments and directed to engage the volar radial cortex of the proximal fragment. Patients asked to review weekly for pin site inspection and follow up. At the end of four weeks a check X-ray was taken.

Results: Cases as per AO classification states that 23 patients had A type fracture, 13 patients had type B pattern and 4 patients had type C fracture. AO classification states that 31% had excellent result, followed by 6% cases who had good result, 5% had fair result, 2.5% had poor result. The association of outcomes with result is significant

Conclusions: At final follow-up by the Gartland and Werley criteria for functional outcome 31 patients had excellent result, 6 had good result, 2 had fair result and 1 had a poor result. There were no major complication noted except for pin site infection in 9 cases and pin loosening in 2 cases. Kirschner wire fixation is cheaper and quicker to perform.

INTRODUCTION:

The history of distal radius fractures (DRF) reflects the evolution of the understanding of many conditions in orthopedic trauma. Distal radius fractures are the most common injuries seen in orthopaedics casualty due to more number of vehicles on road and increased industrialization. Many confounding variables exist, all of which are somewhat controversial: the level to which the anatomy is restored, the quality of the bone, the emergence of new techniques and devices, the experience and ability of the surgeon, and outcomes in older populations. Early method of closed reduction and cast immobilization has resulted in malunion, joint stiffness, and deformity. Percutaneous pinning provides additional stability and is one of the earliest methods of fixation. So study was to assess the functional and radiological outcome of percutaneous pinning in distal radial fractures.

AIMS AND OBJECTIVES:

To quantify and draw inferences on functional and clinical outcome through Patient-Rated Wrist Evaluation (PRWE, a validated assessment of wrist function and pain) by surgical fixation with close reduction and percutaneous pinning in the first year after the injury.

MATERIALS AND METHOD:

A Prospective study at Department of Orthopaedics, Pacific Medical College and hospital, Udaipur, Rajasthan carried with Eligible 40 cases of distal radius fracture will be taken.

INCLUSION CRITERIA-

Eligibility Patients will be eligible for inclusion into the trial if:

They have sustained a dorsally displaced fracture of the distal radius, which is defined as a fracture within 3cm of the radiocarpal joint.

They are over the age of 16 and able to give informed consent.

The treating consultant surgeon believes that they would benefit from manipulation of the fracture.

The patients present within 2wks of injury.

EXCLUSION CRITERIA

Patients will be excluded from this trial if:

The injury is more than 2weeks old.

The fracture extends more than 3cm from radiocarpal joint.

The fracture is open with a Gustilo grading greater than 1.15

The articular surface of the fracture (specifically the radiocarpal joint) cannot be reduced by indirect techniques. In a small number of fractures, the joint surface is so badly disrupted that the surgeon will have to open up the fracture in order to restore the anatomy. There is evidence that the patient would be unable to adhere to trial procedures or complete questionnaires, such as cognitive impairment.

OBSERVATIONS & RESULTS:

Age distribution of patients stated that majority i.e. 42.5% belonged to 45-65 year, followed by 40% who were in 30-45 yr age group. Minimum patients were of 15-30 year age group.

Sex distribution in above study states that majority of them were males i.e. 70% and 30% were females Among 40 patients, only 5 patients had history of diabetes

Mode of injury states that cause of distal radius fracture in 65% was road traffic accident, while in 35% the cause was fall.

Cases as per AO classification among study

AO type	Number of Cases	Percentage
A	23	57.5%
B	13	32.5%
C	4	10%
TOTAL	40	100%

Cases as per AO classification states that 23 patients had A type fracture, 13 patients had type B pattern and 4 patients had type C fracture.

Results of the functional outcome analysis

Result	Subjective evaluation	End result
	Number of cases	Number of cases
Excellent	27 (62.2%)	32 (69.8%)
Good	10 (30.2%)	6 (24.5%)
Fair	3 (5.7%)	2 (3.8%)

Functional outcome of patients states that 69.8% patients had excellent outcome, 24.5% had good outcome and 3.8% had fair outcome.

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

Result	Gartland & Werley	Sarmiento	P value = 0.004
Excellent	31,77.5%	27 (67.5%)	
Good	6,15%	10 (25%)	
Fair	2,5%	3 (7.5%)	
Poor	1,2,5%	0	
TOTAL	40	40	

There is significant change in functional and anatomical outcome. The anatomical evaluation by Sarmiento's Criteria showed 27 patients with excellent result, 10 patients with good result and 3 with a fair result. At final follow-up by the Gartland and Werley criteria for functional outcome 31 patients had excellent result, 6 had good result, 2 had fair result and 1 had a poor result.

There were no major complication noted except for pin site infection in 9 cases and pin loosening in 2 cases

DISCUSSION:

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. Most of the fractures are caused by a road traffic accident. Distal radius fractures are the most common type of orthopedic fracture. Some surgeons advocate treatment by manipulation and plaster immobilization. A study by Young and Rayan found favorable outcomes in low-demand older-aged patients despite deformity, most authors agreed that radial shortening more than 4 mm and radial dorsal angulation of more than 11° would reduce range of motion of the wrist. An accurate reduction in the fracture is the first step in the treatment of the distal radius fracture. The methods of immobilization include casting, percutaneous pinning, external fixation, internal fixation with plate, or internal fixation combined with external fixation depending on the different types of fractures. The mean age of patients in our study was 49 years (range 15-65). As age advances, there is osteoporosis and more chance of collapse of the fracture; also the elderly may have a harder time keeping to the rehabilitation protocol. In this study there were marginally more men than women. This might be accounted for by the fact that more involvement of men in outdoor activities, riding vehicles, heavy manual labour and willing to undergo surgical intervention. The mode of injury was fall on

outstretched hand in 14 patients and RTA in the other 26 patients. RTAs were generally associated with greater forces and therefore more severe fracture pattern.

Study by Uzzaman et al showed anatomical results (acc. To Sarmiento and Latta's score) was satisfactory in 80% cases of percutaneous K-wire fixation group whereas in conventional group it was 35%.¹⁶ Functional results (Sarmiento and Latta) in above study was satisfactory in 70% of percutaneous fixation group and 30% in conventional group. All these anatomical and functional results correlate with the study of Max Scheck – where satisfactory results were in 75% case⁴ and Gartland and Werley's series – where the satisfactory result was 70%. Loss of reduction usually happens after 2 weeks of casting despite a perfect initial anatomic reduction.¹¹ Gartland and Werley obtained a 68.3% satisfactory result, and Sarmiento et al reported an 82% satisfactory result treated with the casting technique.¹⁸ Spira and Weigl reported a 51.4% unsatisfactory result with reduction and use of cast in the treatment of comminuted fracture of distal radius with articular involvement.¹⁹

The pin-in-plaster technique is a combination of percutaneous pinning, casting, and external fixation. The potential biological advantage is that it allows treatment of the fracture with minimal manipulation and devascularization of the bone

The comparison between the results of the functional outcome and the anatomical outcome, confirmed what other studies had previously shown, that the functional result need not mirror the anatomical evaluation

SUMMARY

During the period between 1ST January 2021 and 30th June 2022, 40 patients weretreated with Closed Reduction and Percutaneous Pinning at the Pacific College of Medical Sciences and Hospital, Udaipur. Out of the 80 cases treated in this manner, all cases were available for the follow up period. Patients with age 15 years and above were with Distal Radius Fracture were included in the study. The average age of the study patients was 49 years with predominance of right side. All the patients were operated under regional anaesthesia or general anaesthesia with 2 k-wires, one through the radial styloid and the other through the dorso-ulnar aspect of the radius. There were 9 cases of pin site infection, 2 cases of pin loosening and 1 case of Reflex Sympathetic Dystrophy.

The anatomical evaluation by Sarmiento's Criteria showed 27 patients with excellent result, 10 patients with good result and 3 with a fair result.

At final follow-up by the Gartland and Werley criteria for functional outcome 31 patients had excellent result, 6 had good result, 2 had fair result and 1 had a poor result. There were no major complication noted except for pin site infection in 9 cases and pin loosening in 2 cases. The results of our study were in accordance with standard studies of distal radius fractures treated with closed reduction and percutaneous pinning. Kirschner wire fixation is cheaper and quicker to perform.

CONCLUSION

During the period between 1st January 2021 and 30th June 2022, 40 patients with distal radius fracture were treated with closed reduction and percutaneous pinning and followed up for an average period of 6 months at the Pacific Medical College, Udaipur, Rajasthan. The age group of the patients was from 15-65 years with the average age being 49 years with predominance of right side. In our study, according to AO classification, 23 cases were of Type A, 13 were of Type B and 4 were of Type C. The anatomical evaluation by Sarmiento's Criteria showed 27 patients with excellent result, 10 patients with good result and 3 with a fair result. At final follow-up by the Gartland and Werley criteria for functional outcome' 31 patients had excellent result, 6 had good result, 2 had fair result and 1 had a poor result. There were no major complication noted except for pin site infection in 9 cases and pin loosening in 2 cases. The results of our study were in accordance with standard studies of distal radius fractures treated with closed reduction and percutaneous pinning. Kirschner wire fixation is cheaper and quicker to perform.

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