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ORIGINAL RESEARCH

A Comparative Study On Functional Outcome Of Extra - Articular Distal Radius Fracture Treated With Plaster Versus Percutaneous Pinning In Tertiary Care Centre

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ABSTRACT

Background: The procedure has fewer successful outcomes in aged, osteoporotic individuals, and in highly comminuted fractures, and is consequently deemed inappropriate for these situations. Some authors, however, still advocate for its use because of how easy it is to implement and how little disruption it causes compared to other approaches like external fixation. Objectives: To compare the functional outcome of extra articular distal radius fracture treated with plaster immobilization versus percutaneous pinning. To study the complications faced, the time taken for fracture union in treating both groups. Methodology: It was a Descriptive Cohort study conducted in a tertiary centre for a period of 18 months duration. The study participants were patients of both the genders with age between 40 years to 65 years with closed extra-articular distal radius fracture admitted during the study period. Results: fracture union time is better in Percutaneous pinning group compared to plaster immobilisation group and association is statistically significant (P<0.05) Percutaneous pinning group has better VAS score compared to Plaster immobilization group at 3rd and 6th month and the association is statistically significant (P<0.05), Functional outcome is better in percutaneous pinning compared to Plaster immobilization group and association is statistically significant (P<0.05). Conclusion: Displaced fractures of the distal radius are considered to be unstable when alignment cannot be maintained in a forearm cast after closed reduction, but this definition applies retrospectively. Previous studies have attempted to identify risk factors for instability.in the present study following were the findings Mean fracture union time is better in Percutaneous pinning group compared to plaster immobilization group

Percutaneous pinning group has better SF36 score compared to Plaster immobilization group at 1st, 3rd and 6th month and the association is statistically significant (P<0.05).

Keywords: Distal radius, Fracture, K-wire fixation, Pop immobilization

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INTRODUCTION

A break in the distal radius is among the most common types of bone fractures. These fractures manifest themselves at the wrist, which is where the radius bone comes to an end. However, there has been no consensus reached regarding the proper manner in which these injuries should be defined, treated, or evaluated.[1] This has made it more difficult to evaluate the various treatment alternatives. Colles said in the first draught of his paper that there is "one consolation that remains, that the limb at some remote date will again enjoy perfect freedom in all of its motions and be completely exempt from suffering.[2]" However, it is obvious that some unstable fractures redisplaced following closed reduction and external splintage alone, resulting in a poor functional outcome for the patient.[3] Following closed reduction of a distal radius fracture, an unstable distal radius fracture is one in which the alignment of the forearm cannot be maintained in a cast. This criterion is used in a backwards fashion. Previous studies have investigated a variety of factors that may contribute to instability.[4] Important factors to take into account include the degree of primary displacement (dorsal angulation greater than 20 degrees and radial shortening greater than 5 millimetres), patient factors (age greater than 60 years and quality of bone), and the pattern of the fracture (dorsal comminution beyond the midaxial plane of the radius, intra-articular fracture, and associated ulnar fracture). Throughout the management process, it is necessary to take into account a variety of other factors, including those that are local (such as the patient's lifestyle, related medical problems, and compliance), as well as those that are patient-specific (such as the patient's inherent stability after reduction and the degree of soft-tissue damage). Several different approaches have been suggested as potential methods for lowering the probability that distal radius fractures may not 2 heal properly. You can perform a limited open reduction with or without bone grafting or bone substitutes, an extensive open reduction and internal fixation, and so on. The distal fragment can be pinned in place percutaneously, pins can be embedded in plaster to immobilise the area, external skeletal fixation can be used, and so on.[1,5] It has been reported that percutaneous pinning can be employed to provide rigidity to the cast immobilisation when anatomical reduction can be done for a distal radius fracture. This is because pinning adds more stability to the cast.[6,7,8] In older patients, those with osteoporosis, and patients whose fractures are highly comminuted, the surgical treatment has a lower chance of being successful, and as a result, it is not recommended for use in these circumstances. However, there are still authors that advocate for its application due to the fact that it is simple to put into practice and that it results in very little disruption in comparison to other methods such as external fixation

METHODS AND MATERIALS

Study design: Descriptive Cohort study

Study area: Shri Sathya Sai Medical College and Research Institute, Ammapettai, Chengalpet District, Tamilnadu.

Study population: Patients of both the genders with age between 40 years to 65 years with closed extra-articular distal radius fracture admitted to SSSMC & RI.

Study duration: 18 months.

Sample size calculation: 52 patients, equally divided into two groups. Sample size calculation based on the previous study. The mean and standard deviation of both the groups (plaster versus percutaneous pinning) (is 76 ± 26 and 93 ± 12 with 5 % level of significance and 80 % power. The total sample size is 26 in each group including 10 % of non-responsive error.

Inclusion criteria: 1. Age between 40 years to 65 years. 2. Patients with isolated extra-articular distal radius fracture.

Exclusion criteria: 1. Patients with any psychiatric illness. 2. Intraarticular distal radius fracture.

Sampling technique: Patients with extra articular distal radius fracture coming to our hospital and coming under the inclusion criteria were selected. Treatment options were informed to the patient and selected randomly.

Statistical analysis: Data entry and analysis. All the data collected was entered in MS Excel and analysis was done by SPSS version 24.0

RESULTS

Mean fracture union time is better in Percutaneous pinning group compared to plaster immobilisation group and association is statistically significant (P<0.05), Percutaneous pinning group has better VAS score compared to Plaster immobilization group at 3rd and 6th month and the association is statistically significant (P<0.05) Percutaneous pinning group has better SF36 score compared to Plaster immobilization group at 1st, 3rd and 6th month and the association is statistically significant (P<0.05) as mentioned in (Table 1) .Mean fracture union time is better in Percutaneous pinning group compared to plaster immobilisation group and association is statistically significant (P<0.05) as mentioned in (Figure 1).

Functional outcome is better in percutaneous pinning compared to Plaster immobilization group and association is statistically significant (P<0.05) Radiological outcome is better in percutaneous pinning compared to Plaster immobilization group and association is statistically significant (P<0.05) as mentioned in (Table 2).

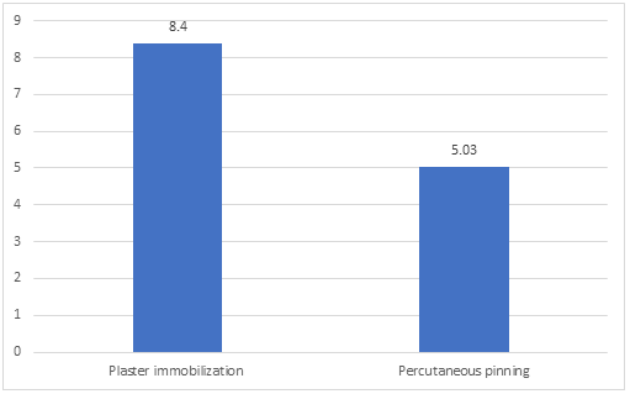

Figure 1: Comparison of mean fracture union time among study participants

Table 1: VAS score and SF36 questionnaire among study participants

VAS score	Plaster immobilization		Percutaneous pinning		P value
Time frame	Mean	SD	Mean	SD	
1 month	6.26	0.82	6.34	1.2	0.86
3rd month	8.65	0.62	6.51	1.8	0.04
6th month	9.15	0.54	7.26	1.4	0.01
SF36 **questionnaire**	Plaster immobilization		Percutaneous pinning		P value

Time frame	Mean	SD	Mean	SD	
1 month	28.76	2.1	41.26	3.4	0.02
3rd month	41.23	4.2	49.93	4.6	0.04
6th month	55.46	5.4	68.34	5.2	0.05

Table 2: Comparison of functional and radiological outcome among study participants

Functional outcome	Group	Good	Fair	Excellent	P value
	Plaster immobilization	19	5	2	
	Percutaneous pinning	4	0	22	0.04
Radiological Outcome	Group	Malunion	Union	P Value	
	Plaster immobilization	8	18	0.05	
	Percutaneous pinning	5	21		

DISCUSSION

One of the recent advances in treatment of distal radius fractures is the more frequent application of open reduction and internal fixation, especially for intra-articular fractures.[9,10,11] There are two groups of fractures for which open reduction and internal fixation is advisable. The first group includes the two-part shear fracture (Barton fracture), which actually is a radio-carpal fracture dislocation. Although anatomical reduction is possible by closed means in some cases, these fractures are very unstable and difficult to control in plaster.[12,13] The second group includes complex intra-articular fractures in which the articular fragments are displaced, rotated or impacted and are not amenable to reduction through a limited operative exposure. Melone[4] reported on a series of 15 patients who underwent operative reconstruction of the distal radial articular surface; 14 of the 15 had good or excellent results.[5]

A retrospective study reported that all patients with step off of 2 mm or more in the distal radial articular surface developed post-traumatic osteoarthrosis, whereas patients who healed with less than a 2 mm step off had only a 25% incidence of arthrosis.[14] Achievement of articular congruency in 88% of 17 patients treated with open reduction and internal fixation of comminuted intra-articular fractures of the distal end of the radius has been reported.[15] A recent study has also provided some encouraging outcome data. Patients who underwent an arthroscopically assisted procedure had greater reduction of volar tilt, ulnar variance and articular gap displacement, and increased range of motion and grip strength at a mean of 31 months after the procedure, compared with patients who underwent open reduction and internal fixation.[16] However, in the above study, intra-operative fluoroscopy was not used; hence, the usefulness of arthroscopy over fluoroscopy could not be demonstrated in precise reduction.

In 2008, Lutsky et al. did arthroscopic assessment in all patients undergoing open reduction and internal fixation and observed that a volar approach, indirect reduction and locked plate fixation is a useful technique in restoring articular congruity after distal radius fracture.[17] They also stated that the magnitude of step and gap deformity may be underestimated by fluoroscopy. Recent work assessing the follow-up functional results in patients undergoing arthroscopy and fluoroscopy-assisted external fixation with pinning versus only fluoroscopy assisted external fixation with percutaneous pinning has found better wrist range of motion in flexion, extension and supination.[18]

DASH scores were comparable in either group in both studies. These abovementioned studies focused only on single technique of fixation followed by arthroscopic assessment. No recent work demonstrates the role of arthroscopy in different types of reduction and fixation techniques and its comparative results in either. The differential role of arthroscopy in various fixation techniques has not been probed yet. The type and frequency of complications varies

among different series. McKay et al. found overall complication rates ranging from 6% to 80% and rates of post-traumatic arthritis that ranged from 7% to 65%.[19,20] The most frequent complication is malunion with an intra-articular or extra-articular deformity as the most frequent complication. Other complications include non-union, hardware complications tendon attrition/rupture and neurological injuries.

CONCLUSION

Displaced fractures of the distal radius are considered to be unstable when alignment cannot be maintained in a forearm cast after closed reduction, but this definition applies retrospectively. Previous studies have attempted to identify risk factors for instability.in the present study following were the findings, Percutaneous pinning group has better VAS score compared to Plaster immobilization group at 3rd and 6th month and the association is statistically significant (P<0.05), Percutaneous pinning group has better SF36 score compared to Plaster immobilization group at 1st , 3rd and 6th month and the association is statistically significant (P<0.05), Mean fracture union time is better in Percutaneous pinning group compared to plaster immobilisation group and association is statistically significant (P<0.05), Functional outcome and radiological outcome is better in percutaneous pinning compared to Plaster immobilization group and association is statistically significant (P<0.05).

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