

# Distal end radius fractures: evaluation of results of various treatments and assessment of treatment choice

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**【Abstract】 Objective:** The rapid expansion of knowledge regarding the functional anatomy of hand and wrist, increasing functional demands of senior citizens and improved methodologies of achieving and maintaining anatomic restoration of distal radius fractures has generated a renewed interest in addressing these fractures in a more precise manner. The purpose of our study was to evaluate the difference in patients function among those treated by 1) closed reduction and Plaster of Paris cast, 2) distractor application, or 3) open reduction and internal fixation with a volar plate, and to assess the treatment choice for each particular fracture type.

**Methods:** A prospective study was carried out on 60 patients with fractures of the distal end radius. Fractures were classified according to the AO classification into type A (extra-articular), type B (partial articular) and type C (complete articular). After initial evaluation patients were taken up for either conservative or operative

treatment and were followed up for two years.

**Results:** Anatomical results were evaluated according to the Sarmiento's modification of Lindstrom Criteria, which showed that excellent results were more frequent with open reduction and internal fixation using the plating technique. Clinical and functional results were evaluated according to the demerit point system of Gartland and Werley with Sarmiento modification, which was revealed to relate with the type of treatment techniques.

**Conclusion:** There is no customized solution for all the fractures of the distal radius. The choice of treatment should be based on the fracture type, the patient's characteristics, the patient's demands and the treating surgeon's experience and preference.

**Key words:** *Distal end radius fractures; Volar plate; Radial orthofix*

*Chin J Traumatol 2014;17(4):214-219*

**D**istal end radius fracture is a common fracture type and has an approximate incidence of 1:10 000 people and represents 17% of all skeletal fractures.<sup>1,2</sup> The rapid expansion of knowledge regarding the functional anatomy of hand and wrist, increasing functional demands of senior citizens and improved methodologies of achieving and maintaining anatomic restoration of these fractures have generated a renewed interest in addressing these fractures in a more precise manner. Many treatment methods for displaced distal radius fractures are available. All of them involve obtaining and maintaining the fracture reduction with casting, functional bracing, external fixation, percutaneous pinning, internal fixation, or

a combination of these methods. Therefore a well-designed clinical, biomechanical, and cost-benefit study to compare the locking plate system with other treatments is necessary.<sup>3</sup> The purpose of this study was to evaluate the different functional recoveries in patients treated by 1) closed reduction and Plaster of Paris (POP) cast, 2) distractor application, or 3) open reduction and internal fixation (ORIF) with a volar plate. We also assessed the treatment choice for each particular fracture type.

## METHODS

This prospective study was conducted in SVBP Hospital, Meerut, and a total of 60 patients with fractures of the distal end radius who attended the outpatient or the emergency service of our institute were included. The inclusion criteria were: 1) patients who gave their consent to undergo the procedure, 2) patients presented within 3 weeks after injury, 3) patients with mature skeleton, and 4) patients who did not have other associated fractures

DOI: 10.3760/cma.j.issn.1008-1275.2014.04.006

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in the ipsilateral upper limb. Patients with comorbid condition preventing surgical intervention or with local tissue condition making surgery inadvisable were excluded.

All the patients were subjected to clinical and radiographic examination. Anteroposterior (AP) and lateral views of the wrist joint on both sides was obtained at the time of presentation. The radiographs were assessed in terms of loss of palmar tilt or presence of dorsal tilt, radial shortening and loss of radial inclination. Fractures were classified according to the AO classification into type A (extra-articular), type B (partial articular) and type C (complete articular). After pre-anaesthetic evaluation, patients were taken up for either POP cast or surgical treatment. The patients were followed up for two years. Clinical, radiological and functional reviews were performed at 6th week, 12th week, 6th month, and the end of one year. Radiological assessment was done in terms of residual dorsal angulation, radial shortening and loss of radial inclination. The results were graded according to the Sarmiento's modification of Lindstrom Criteria.<sup>4</sup> Clinical and functional evaluation of the patients was done at the last follow-up according to the demerit point system of Gartland and Werley<sup>5</sup> with Sarmiento et al's modification<sup>4</sup>.

### RESULTS

Totally 60 patients were included in this study. There were 25 male (42%) and 35 female (58%).

The mean age was 46.45 years with the youngest patient being 20 years old and the oldest being 70 years old. The distribution of patients in each age group is listed in Table 1.

The mode of injury was fall in 35 cases (58%) and road traffic accidents in 25 cases (42%). Twenty-eight fractures (47%) were classified as AO type A, 9 (15%) as type B and 23 (38%) as type C. Around 90% of cases were managed within a week of injury. Thirty patients received plaster treatment, 15 distractor treatment and 15 ORIF with plating (Figures 1-3). The minimum duration of follow-up was 21 weeks and maximum of 54 weeks (Table 2).

**Table 1.** The number of patients in different age groups

Age (yrs)	Male	Female	Total
20-30	5	0	5
31-40	7	6	13
41-50	6	14	20
51-60	4	10	14
61-70	2	4	6
Total	25	35	60

**Table 2.** Duration of follow-up based on the treatment modality

Duration of follow-up (week)	Fixation method			Total
	Plaster	Distractor	Plating	
12-24	1	-	-	1
25-36	1	0	0	1
37-48	8	5	6	19
49-54	20	10	9	39
Total	30	15	15	60



**Figure 1.** **A:** A 56-year-old female patient with type A fracture of the left distal end radius. **B:** Postoperative AP and lateral views of the radius that was treated by closed reduction and POP cast. **C:** Functional results at 6 weeks, immediately after cast removal, showing restricted dorsiflexion at the wrist.

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