

## Fixation of extra articular distal radial fractures with non bridging external fixator

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### ABSTRACT

Severely comminuted fractures of distal radius often lead to impairment of wrist function. A prospective study was performed on 30 patients aged between 35-65 years of extra-articular fractures of distal radius. All patients were treated with closed manipulation of the fracture an application of non-bridging (radio radial) external fixator under radiological control. At six months after the injury functional results were good with near normal movements of the wrist and hand. Radiological fracture alignment was satisfactory with no significant shortening of the radius. There were no re-displacements and none of the patients required a second operation. Superficial pin site infection occurred in two patients without pin loosening. We recommend non bridging external fixator as a good method of treatment of extra articular fractures of the distal radius in younger patients.

**Keywords:** Radius, External Fixator.

### INTRODUCTION

Fractures of the distal radius are common. There are many methods of treatment. There is a continuous debate regarding the best method of treatment of the fractures of the distal end of the radius in adults. The methods which are commonly practiced are closed manipulation and plaster cast, pins and plaster,<sup>1-3</sup> percutaneous pinning,<sup>4,5</sup> external fixation<sup>6-14</sup> and open reduction and internal fixation<sup>15-17</sup> with or without bone graft. A significant proportion displaces after initial reduction and management in plaster cast is difficult. Static and dynamic external fixation is a popular method which improves the maintenance of reduction but not the functional outcome. Function correlate with good alignment of the fracture. It cannot be achieved using bridging external fixator. We perform a prospective analysis to evaluate the results of non-bridging external fixators for severely comminuted distal radial fractures.

### PATIENTS AND METHODS

This prospective study is multicentered, that included 30 patients 20 females and 10 males between the ages of 35-65 years (mean 52.9 years) at Lahore General Hospital, Lahore and Sindh Govt. Lyari general hospital, Karachi, between May. 2005 and Nov 2006 with fractures of distal end of the radius. All the patients had closed extra articular fractures of the distal radius without wrist or distal radioulnar joint and fracture of the distal ulna. All fractures were treated with closed reduction under radiological control in general anesthesia and non bridging external fixator applied. Fracture was reduced with gentle traction. Reduction was maintained by an

assistant. Two stab incisions were made on either side of the lister tubercle taking care to protect the tendon of extensor pollicis longus. Two 2.5 mm schanz screws were inserted. The fracture was reduced using distal schanz screws as lever.<sup>18</sup> Two 2.5 mm schanz screws were inserted in the proximal segment. Clamps and rods were applied and tightened. All patients were discharged on the first post operative day on simple analgesics and were taught the pin track care. Regular follow-up was done on the 1<sup>st</sup> week, 3<sup>rd</sup> week, 6<sup>th</sup> week, 3 months, and 6 months. External fixator was removed at 4-6 weeks when there was evidence of early bone union and full activity of hand and wrist was started.

On every radiographs of the wrist were done with functional assessment. Radio graphically radial displacement, radial angulations, alignment and shortening were measured. Pain was assessed. The assessment of the hand and wrist function was performed. Flexion, extension, radial and ulnar deviation of the wrist and supination, pronation of forearm was measured.

### RESULTS

The results were evaluated clinically, functionally and radiographic.

**Clinical:** There were 30 patients between the ages of 35-65 years (mean 52.9 years). There were 20 females and 10 males with female to male ratio 2:1 this indicates higher incidence of the distal radial fractures in females due to post menopausal osteoporosis. Fall on the outstretched hand found in 24 out of 30 (80%). This was the most common mode of injury with almost equal

**Table-1:** Distribution of sex, side and mode of Injury

Results		n.	%
Sex	Male	10	33%
	Female	20	66%
Side	Right	14	46%
	Left	16	54%
Mode	Fall on Outstretched Hand	24	80%
Of Injury	Road Traffic Accident	3	10%
	Fall from Height	3	10%

involvement of right, 14 out of 30 (46%), and 16 out of 30 (54%) of the left wrist.

**Functional:** All the patients had pain for a few days that was settled by taking oral analgesics. 4 out of 30 patients developed superficial pin site infection which was treated with better pin site care and antibiotic. As regard movements of wrist joint, in all the cases there was mild restriction of dorsiflexion at the wrist joint. The range of wrist dorsiflexion was 65-75 till the fixator was applied. Radial deviation was 8-12, it was due to fixator was applied on the dorsoradial surface and patients were reluctant in moving the wrist radially. The decreased range of motion of wrist in dorsiflexion and radial deviation was improved after the removal of fixator and was almost full range at 3 months 6 months follow up. Range of palmar flexion and ulnar deviation was full range in all cases i.e., 75 and 45 respectively.

**Radiological:** All the patients were evaluated radiological at one, three and six weeks after the surgery for deformity, alignment, redisplacement and union of the fracture. No case showed mal-rotation, distraction and nonunion. Shortening of the radius was 1mm to 6mm with mean of 3.2 and standard deviation of 1.47.

**Complications:** In one patient one of the distal pin was passed through the fracture site. It was due to comminution at the fracture site and at was readjusted.

Oedema of hand occurred in 5 out of 30 patients. It was settled with elevation.

Two 60 years old females developed stiffness of the shoulder and required shoulder physiotherapy and they regained movements after 2 weeks.

Three patients developed pin track infection in the early period of treatment that was settled down with antibiotic treatment.

## DISCUSSION

The traditional treatment of the distal radial fractures in adults has been conservative since Colle’s described this fracture in 1814.<sup>18-21</sup> Recently trends in the treatment of these fractures are being changed. Repeated displacement of the fractures need repeated manipulation and change of cast. This leads to increased work load on hospital and financial burden on the patients and state. For these reasons external fixation of fractures of the distal radius are becoming more popular.<sup>19-21</sup>

Non bridging external fixation for fractures of distal radius without opening the fracture site has many advantages over the conservative treatment. This include better maintenance of reduction, easy nursing care, early movements of fingers and wrist joint and above all the shorter hospital stay. Non bridging external fixation is significantly better technique both anatomically and functionally. It is the treatment of choice for unstable distal radial fractures in which external fixation is contemplated and there is significant space in the distal fragment of the distal radial fracture.

Average time of hospital stay in my study was 24 hours. All the patients were discharged on the 1<sup>st</sup> post operative day. Hospital stay was bit longer than the patients being managed with plaster cast. This has to be due to observe the patients postoperatively when he is out of effect of anesthetic drugs and swelling of hand has reduced.

The functional results of our study are better than others (Table-2). There was decreased range of dorsiflexion and radial deviation in our study when the external fixator was applied. These improved after the removal of external fixator. This was due to reduction of the fracture in slight palmar flexion and ulnar deviation and application of external fixator on the dorsoradial aspect of the radius.

**Table-2:** Comparison between different Studies

Movements	Kapandgi Cross K-Wires	Trans styloid Wires	Dynamic Fixator	Static Fixator	Present Study
Flexion	59	46	50	60	75
Extension	58	44	51	47	85
Radial Deviation	60	38	12	29	12
Ulnar Deviation	61	32	27	29	45

The fracture alignment achieved was within an acceptable range. Adequate cortical contact was obtained. In no patient, method of treatment has to be changed. All the fractures united within an acceptable time period. There was no case of operative complications. No damage to neurovascular structures or adjacent joint occurred in this study. There was radial shortening but it was within the acceptable limits, (less than 3.2 mm). In this study at 6 months of follow up no case of degenerative arthritis of radiocarpal and distal radioulnar joint was noted. Kapandgi reported eight cases with symptoms related to sensory branch of radial nerve. In the study of McQueen<sup>21</sup> there was rupture of extensor pollicis longus tendon in one patient. While no such complication occurred in present study.

External fixator is a good device for extra articular fractures of distal radius and minimally comminuted intra articular fractures in young patients. Immoderately comminuted intra articular fractures, it is not possible to pass the distal pins in the distal segment and across the wrist external fixator is a better device. Pin site infection is a common problem with external fixator. It can be reduced with better pin site care as shown in our study.

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