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## ORIGINAL ARTICLE

# OUTCOME OF INTRAARTICULAR COMMUNI-CATED FRACTURES DISTAL RADIUS TREATMENT WITH ORTHOFIX EXTERNAL FIXATORS

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## ABSTRACT

**Objective:** Assess the outcome of intraticular comminuted fracture distal radius treated with orthofix external fixator.

**Methods:** Prospective study with inclusion criteria of Comminuted intraarticular fractures distal radius , 20 to 60 years age, close and open fractures and exclusion criteria of patient above 60 years , extraarticular fracture , volar and dorsal barton fractures , more then 10 days old fracture.

**Results:** From January 2012 to sept 2014 , 63 patient with intraarticular comminuted fracture distal radius treated with orthofix external fixator included in this study. Functional outcome was assessed on Gartland and Wesley scoring system. 40 (63%)male and 23(37%) female patients, 35(56%) road traffic accident and 28(44%) have fall. AO C1, were 32(51%), C2 ,19(30%), C3, 12(19%) patients. Additional kwire fixation applied in 54 patients.Fixator removed at 6 weeks. Functional result were excellent in 26 patient(41%) , good 32(51%) , satisfactory in 4 patient(6%) , poor in 1(2%). Complication observed were , minor and major pin track infection 30(65%), tethering of external indicis tendon 3(7%) patient, k wire loosening 10(22%) and sudecks atrophy 3(7%) patients.

**Conclusion:** Orthofix external fixator application in intraarticular comminuted fracture distal radius is recommended because it is minimal invasive technique ,have excellent to good outcome . Most of the times needs additional kwire fixation for the fragment stabilization.

**KEY WORDS:** Intraarticular , Comminuted , Distal Radius , Orthofix External Fixator, K Wire.

## INTRODUCTION

Abraham colles in 1814 describe distal radius fracture , as colles but it is now confined to extraarticular distal radius fracture<sup>1</sup>. Intraarticular distal radius fracture are classified by AO , and Melone . Severly comminuted intraarticular fracture is called as pilon radius fracture by burg<sup>2</sup>. Too many methods are tried for the fixation of distal radius fractures including, casting by Schmalholz and sarmento<sup>3,4</sup>, pin fixator, external Ao fixator, orthofix, T plate, double plating, kwires, Anatomical plates, ellis plates, bone cement , hydroxyapatite coated pins<sup>5,6,7</sup>. Each method has its own pros and cons. External fixator for distal radius fracture used 80 years before.<sup>8</sup> Orthofix external fixator is minimal invasive procedure , provide indirect fracture reduction on the principle of ligamentotaxis. Orthofix maintin the fracture reduction and longitudinal traction throughout the treatment phase.<sup>9</sup> Orthofix maintains radial length in unstable fractures. Radial length is good predictor of fracture reduction radiologically. Operative fixation for the distal radius fracture is mandatory

when fracture is unstable. Criteria for unstable fracture includes , dorsal displacement >20 degree, dorsal comminution, loss of radial height >2 mm, radioulnar separation , ulnar fracture.<sup>10</sup> Dorsal comminution is the most important factor .<sup>11</sup>

## METHODOLOGY

Prospective study was conducted at department of ortho-paedic surgery Dow university of Health Sciences/ civil Hospital Karachi from January 2012 to sept 2014 after approval from the ethical committee to determine the outcome of comminuted intraarticular distal radius fracture treated with orthofix external fixator. The inclusion criteria for the study was comminuted intraarticular distal radius fracture, age 20 to 60 and Close and open fractures. The exclusion criteria included age above 60 years, extraarticular fracture, volar and dorsal Barton and less than 10 days old fracture.

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Table 1. Demerit Point System of Gartland and Werley

Residual deformity	Prominent ulnar styloid	1
	Residual dorsal tilt	2
	Radial deviation of hand	3-3
Subjective evaluation	Excellent: No pain, disability, or limitation of motion	0
	Good: Occasional pain, slight limitation of motion, no disability	2
	Fair: Occasional pain, some limitation of motion, feeling of weakness in wrist, no particular disability if careful, activities slightly restricted	4
	Poor: Pain, limitation of motion, disability, activities more or less markedly restricted.	6
	Loss of dorsiflexion	5
	Loss of ulnar deviation	3
Objective evaluation [1]	Loss of supination	2
	Loss of palmar flexion	1
	Loss of radial deviation	1
	Loss of circumduction	1
	Pain in distal radio-ulnar joint	1
Complications	Arthritis change	
	Minimal	1
	Minimal with pain	3
	Moderate	2
	Moderate with pain	4
	Severe	3
	Severe with pain	5
	Nerve complications (median)	1-3
	Poor finger function due to cast	1-3
Result	0-2	excellent
	3-8	good
	9-20	fair
	>20	poor

The objective evaluation is based upon the following ranges of motion as being the minimum for normal function: dorsiflexion 45°; palmar flexion 30°; radial deviation 15°; ulnar deviation 15°; pronation 50°; supination 50° .18

Orthofix external fixator have site for 4 schanz pins of 3.5 mm . 2pins placed at second metacarpal because of immobility as compared to other metacarpals, either at radial border or dorsal. Radial side application sometimes restrict thumb movemets and dorsal placement of pins can lead tendon tethering. Two pins are placed at radius dorsally or laterally. Lateral application can cause irritation of superficial radial nerve. After schanz pin application distraction is applied at distal end of fixator and reduction checked on C-arm. Additional kwire applied. Fixator removed after six week.

RESULTS

From January 2012 to September 2014, 63 patient with intraarticular comminuted fracture distal radius treated with orthofix external fixator included in this study. Functional outcome was assessed on Gartland and Wesley scoring system. 40(63%) male and 23 (37%) female patients, 35(56%) road traffic accident and 28(44%) have , fall. AO C1, were 32(51%), C2, 19(30%), C3, 12(19%) patients. Additional k wire fixation applied in 54 patients. Fixator removed at 6 weeks. Functional result were excel-lent in 26 (41%) patient, good 32(51%), satisfactory in 4 (6%) patient, poor in 1(2%). Complication observed were , minor and major pin track infection 30(65%), tethering of external indicis tendon 3(7%) patient, k wire loosening 10(22%) and sudecks atrophy 3 (7%)patients.

DISCUSSION

Distal radius fractures have bimodal distribution in old age due to osteoporosis and in young age because of trauma and fall. Distal radius has few radiological parameters, that includes, Palmar tilt 0- 10 degree, radial length 6 -11mm, radial inclination 21 degrees. During treatment these should be maintained otherwise these will affect the outcome. Dorsal tilt of distal radius restoration is the most important, if not restored it will increase the contact surface and pressure at radio carpal and radio ulnar joint and increase the chances of arthritis. . Palmar tilt loss leads to ulnar impingement,

Klein reviewed 93 cases that show excellent 41%, good 46%, satisfactory 10%, and poor 3%. He assessed radio logically radial length 11mm post reduction that becomes 10 mm afterwards. <sup>11</sup>

Jupiter managed 13 patients with intraarticular fracture; He showed dorsiflexion and palmar flexion 74% of opposite side. Study shows no radiological arthritis at 2.5 year follow-up.<sup>12</sup>

Frederick evaluated the distraction with orthotic. He mentioned that as you increase the distraction outcome will be worse. Patient recovers overall 75% of motion and grip strength.<sup>13</sup>

T Gausepohi mentioned that additional procedure ie bone grafting, k wire fixation, hydroxyapatite pins used along with the external fixator. <sup>14</sup>

Gary K Frykman analyzed 11 fixators for wrist fractures, mentioned that orthofix has the highest rigidity. <sup>15</sup>

At university of Missouri Columbia 12 patient treated with orthofix external fixator, average wrist dorsiflexion 46degree, palmar flexion 55 degree, radial height was 12 mm, radial inclination 18 degree. Complication rate in this study was 42%. <sup>16</sup>

Study conducted at Italy Bologni, that shows better results with external fixator both radiologically and clinically. Negligible pin track infection noted because they put hydroxyapatite coated pins.<sup>17</sup>

CONCLUSION

Orthofix external fixator for close reduction of comminuted intraarticular fracture distal radius is recommended because of easily application, reduction of fracture with minimal invasive technique. Additional fixation with k wire adds the stability at fracture fragments.

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