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A STUDY ON MANAGEMENT OF COMMINUTED DISTAL RADIUS FRACTURES BY LIGAMENTOTAXIS WITH EXTERNAL FIXATOR

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Abstract

Back Ground : The primary goals of distal radius fracture fixation are to put the pieces back where they belong and, most importantly, to do so by a method that does not compromise hand function. Displaced comminuted intraarticular fractures of the distal radius are difficult to treat successfully by traditional nonoperative methods. Thus, external fixation plays a very distinct role. External fixator is simple and inexpensive. Displaced, severely comminuted intraarticular fractures should be treated with an external fixator. It effectively stabilises fractures yet allowing for hand and prevents stiffness.

AIM: To study the functional outcome and complications following external fixation for comminuted intra articular fractures of distal radius.

Material And Methods : Thirty adult patients with closed comminuted intraarticular fractures of the distal radius were treated by closed reduction and immobilization with an external fixator during 2 year period (September 2017 to July 2019) Six weeks later, the fixator was removed. The patients then were observed for an average of 6 months to 1 year.

Results: An excellent outcome was seen in 5 patients (17%) good outcome in 17 patients (57%) and a fair outcome in 7 patients (23%) and poor outcome in 1 patient (3%). Minor complication, pin tenderness were present but recovered completely after removal of the fixator.

Conclusion: External fixation appears to have benefits that outweigh associated complications and, as such, make it an attractive treatment option for fractures of the distal radius that require surgical treatment.

Keywords: Radial Inclination, Radial Length, Road Traffic Accident, Triangular fibrocartilage, Triangular fibrocartilage complex, Ulnar Variance, Volar tilt

Introduction:

Treatment of displaced fractures of the distal end of the radius has changed over the course of time. In the past, closed reduction with immobilization in a plaster cast was considered the treatment of choice. Nearly 20% of all fractures that are treated in emergency departments involve the distal end of the radius and have a bimodal age distribution, with the adolescent or young adult and elderly populations being the most affected. About 50% of metaphyseal fracture of the distal aspect of the radius also have involvement of the radiocarpal and/or distal radioulnar joint. Many fractures of the distal aspect of the radius are in fact relatively uncomplicated and are effectively treated with closed reduction and immobilization in a cast. However, fractures that are either unstable and/or involve the articular surfaces can jeopardize the integrity of the articular congruence and/or the kinematics of these articulations. The goal of the treating doctor should then be to restore the functional anatomy by a method that does not compromise hand function.

Over the past twenty years, more sophisticated internal and external fixation techniques and devices for the treatment of displaced fractures of the distal end of the radius have been developed. The use of percutaneous pin fixation; external fixation devices that permit distraction and palmar translation; low-profile internal fixation plates and implants; arthroscopically assisted reduction; and bone-grafting techniques, including bone-graft substitutes, all have contributed to improved fracture stability and outcome.

The method of immobilization that maintains the reduction with the least amount of surgical morbidity is

the ideal treatment. Unstable fractures of the distal part of the radius have shown an inherent tendency towards loss of reduction after non-operative treatment. It has been recognized that, often, the ultimate functional result will depend, in large part, on the anatomical restoration of the fractured radius and joint congruity.

External skeletal fixation has been popular for the treatment of displaced, unstable fractures of the distal part of the radius because it combines a minimally invasive procedure with reduction by ligamentotaxis. Many different external fixation devices have been developed and used. Even in severe fractures of the distal radius, they allow reduction and fixation of fragments without loss of position and good functional results. Clinical and anatomic studies show that ligamentotaxis is the basic principle used by external fixation. Through prolonged distraction by the fixator, tension is provided by the capsuloligamentous structures.

Materials And Methods:

Source Of Data: All the patients attending the out-patient and in-patient department of Orthopaedics at Katuri Medical College and Hospital, Chinakondrupadu, Guntur with fracture of distal end radius fulfilling the inclusion criteria during the study period of 2 years from September 2017 to august 2019.

Sample size- 30 cases

Inclusion Criteria:

- Skeletally mature individuals
- Comminuted extra articular fractures
- Intra articular fractures
- Polytrauma with distal radius fractures
- Injury within 3 weeks

- Patient who gave consent for this procedure

Exclusion Criteria:

- Patients with age <20 and >70 years
- Open fractures
- Patients with co morbid conditions preventing surgical intervention
- Patients with injury more than 3 weeks old
- Patients with neurovascular deficit due to associated fracture at site proximal to the wrist

Instruments Used:

The static external fixator used in this series consisted of 1) 3.5mm schanz pins for the radius - 2 in number. 2) 2.5 mm schanz pins for the second metacarpal. 3) clamps. 4) 4mm connecting rods.

Surgical Technique:

The radius was drilled with 2.5mm drill bit, and 3.5mm schanz pin was fixed. Lateral aspect of the base of the 2nd metacarpal was drilled with 1.5mm drill bit, and then fixed with 2.5mm schanz pin. Then the 4mm connecting rod was fixed to the schanz pins with the clamps. The other 2 schanz pins, one in the shaft of radius and the other in second metacarpal are fixed in similar fashion. Now the external fixation device is tightened and the reduction carefully assessed clinically and under fluoroscopy.. No splint was given. The average Duration from the date of Injury to Date of operation was 1-3 days.



Fig 1: Fixation of schanz pins



Fig 2 : Instruments

Results:

1. Majority of our patients were in the age group of 41-50yrs. Youngest was 24 yrs and oldest was 61yrs
2. In this study mechanism of injury is with RTA being 53.3% and fall from height being 46.7%.
3. Out of 30 patients, 18(60) were male and 12 (40) were female.
4. In this study 6 cases had associated injuries.
5. Most of the cases were type VIII frykman constituting about 30%

Radiographic parameters after 6 months follow-up

Measurement	Average (mm)
Loss of radial length	2.32 +/- 2.23
Radial inclination	17.65 +/- 2.72
Radial tilt	1.52 +/- 5.72

Average range of movements achieved

Movements	Average movement (Degrees)
1. Dorsiflexion	69
2. Palmar flexion	67.60
3. Radial deviation	13.50
4. Ulnar deviation	24.50
5. Supination	78
6. Pronation	77.50



PRE-OP XRAY



POST-OP XRAY

Functional Result Of Present Study Using Gartland Werely System

Grade	No. of Cases	Percentage (%)
Excellent	5	17
Good	17	57
Fair	7	23
Poor	1	3

POST-OP Range Of Movements



Dorsi Flexion



Palmar Flexion



Supination



Pronation



Radial Deviation



Ulnar Deviation

Complications Seen: In our study we noticed 4 cases with residual pain which was mild to moderate and was treated by analgesics alone. Pin tract infection was not common. Restricted wrist movements and finger stiffness were seen in patients who were not complaint to physiotherapy. 1 case had mild sudek's dystrophy which responded to aggressive analgesics

Complications	Our Study
Residual pain	3
Dorsal angulation	4
Pin tract infection	2
Restricted wrist movements	3
Finger stiffness	1
Sudek's dystrophy	1
Arthritis DRUJ instability Carpal tunnel syndrome Non-union Pin loosening	0
Total cases	14

Comparison With Other Studies

Study Group	Excellent To Good	Fair To Poor	Total Cases
Cooney WP et al (1979)	85%	15%	130
Leung KS et al(1989)	80%	20%	72
Jakim I et al (1991)	83%	17%	169
Cannegieter DM et al (1997)	74.2%	25.8%	31
Gunaki RB et al (1998)	86.6%	14%	30
Jain BK et al(1998)	72.8%	23.2%	22
Kleina W et al (2000)	87%	13%	103
Mannur A et al (2001)	70%	30%	20
Yamamoto K et al (2003)	95.6%	4.4%	92
Akmaz I et al (2003)	44%	56%	25
Nagi ON et al (2004)	74.28%	25.72%	35
Our study	73.3%	26.7%	30

Conclusion:

A common algorithm for unstable distal radial fractures is external fixation, supplemental fixation with Kirschner wires, and, frequently, the use of a bone graft or bone substitute. The external fixator is a versatile tool in the treatment of comminuted intra-articular fractures of the distal radius. Our standard reduction procedure is similar to the conservative management of these fractures. Continued traction results in controlled distraction of the fracture and facilitates manipulation. This technique is simpler than other techniques. The procedure is performed during a short hospital stay. The external fixator is reliable in terms of maintaining reduction of axes as well as of radial length.

Comminuted intra-articular fractures with dorsoulnar fragments can be reduced with ligamentotaxis.

In our study, patient 7 was operated 12 days after injury, she ended with poor results. The soft tissue changes that had occurred with in these twelve days prevented adequate dorsiflexion and ulnar deviation. Hence, we recommend external fixator to be applied within seventy-two hours to achieve favorable results.

The relatively long period of immobilization (6-8 weeks) had no adverse effects on the long-term functional outcome. The fixator can therefore be left according to the radiologic evidence of fracture healing.

The rate of serious complications

is low. With careful dissection and placement of the pins, injury to the superficial sensory branch of the radial nerve and extensor pollicis longus tendon can be avoided. Aggressive pin-tract care can prevent many superficial infections from occurring. Most complications are minor and easily treated and do not affect outcome.

Careful review of the recent literature reveals that external fixation appears to have benefits that outweigh associated complications and, as such, make it an attractive treatment option for fractures of the distal radius that require surgical treatment. Both its ease of use and successful track record make it an extremely versatile tool for the treatment of these injuries.

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