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## Assessment of outcome of ligamentotaxis of fracture distal end radius by distractor apparatus

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### Abstract

**Background:** Distal radius fractures are one of the most common injuries encountered in orthopedic practice. The present study was undertaken for assessing the outcome of ligamentotaxis of fracture of distal end radius by distractor apparatus.

**Materials & Methods:** A total of 20 patients who reported with the fracture of distal end radius were enrolled. Complete demographic details of all the patients were obtained. Clinical and radiographic examination of all the patients was carried out. All the surgical procedures were carried out under the hands of skilled and experienced orthopaedic surgeons. Patient was discharged from hospital depending upon the local condition and was called for follow up in out-patient department every three weeks till the fracture unites. Gartland and Werley criteria were used for assessing the outcome. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

**Results:** While analysing though Gartland and Werley score grading, excellent results were obtained in 20 percent of the patients while good results were obtained in 75 percent of the patients.

**Conclusion:** Ligamentotaxis is effective in neutralizing detrimental compression forces, which are likely to cause displacement of unstable fracture with radial shortening.

**Keywords:** Ligamentotaxis, radius

### Introduction

Distal radius fractures are one of the most common injuries encountered in orthopedic practice. They make up 8%–15% of all bony injuries in adults. Most of the fractures are caused by a fall on the outstretched hand with the wrist in dorsiflexion. The form and severity of fracture of distal radius as well as the concomitant injury of disco-ligamentary structures of the wrist also depend on the position of the wrist at the moment of hitting the ground. The width of this angle influences the localization of the fracture. Pronation, supination and abduction determine the direction of the force and the compression of carpus and different appearances of ligamentary injuries<sup>[1-3]</sup>.

External fixation is generally accepted as superior to plaster immobilization in the young patients with an intra-articular comminuted fracture of the distal radius. Other indications for external fixation include some unstable extra-articular fractures with significant comminution and failure to maintain reduction after an initial attempt at closed management in a cast, certain situations of multiple trauma, presence of dysfunctional contralateral limb, severe open fractures with significant soft tissue injury and neurovascular compromise, and bilateral injuries<sup>[4-6]</sup>.

With the recent advent of improved implants used for open reduction and internal fixation of distal radius fractures, external fixation of these fractures has fallen out of favour. Currently, volar fixed-angle fixation with plates and screws is popular; however, published studies have not shown that this technique yields clearly superior results in the long term over other methods of treatment. It has been debated whether this postoperative stiffness is due to the severity of the original injury or the effect of distraction of the external fixator<sup>[7]</sup>. Hence; under the light of above mentioned data, we planned the present study to assess the outcome of ligamentotaxis of fracture of distal end radius by distractor apparatus.

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## Materials & Methods

The present study was conducted with the aim of assessing the outcome of ligamentotaxis of fracture of distal end radius by distractor apparatus. A total of 20 patients who reported with the fracture of distal end radius were enrolled. Complete demographic details of all the patients were obtained. Clinical and radiographic examination of all the patients was carried out. The exclusion criteria include:

- Patients with comorbid conditions preventing surgical intervention
- Patients with more than 3 weeks duration of injury
- Patients with immature skeleton
- Patients with local tissue condition making the surgery inadvisable.

Routine haematological examination of all the patients was carried out. As soon as the patient is fit for surgery, the patient was operated under appropriate anaesthesia, taking all aseptic precautions with proper cleaning and draping. The fracture was stabilized by transarticular external fixator device. All the surgical procedures were carried out under the hands of skilled and experienced orthopaedic surgeons. Patient was discharged from hospital depending upon the local condition and was called for follow up in out-patient department every three weeks till the fracture unites. Gartland and Werley criteria were used for assessing the outcome. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

## Results

In the present study, a total of 20 patients were enrolled. 40 percent of the patients belonged to the age group of 41 to 50 years. Mean age of the patients was found to be 46.8 years. 35 percent of the patients belonged to the age group of 51 to 60 years. 75 percent of the patients were males while the remaining were females. Right side involvement occurred in 70 percent of the patients. Mean duration of surgery was found to be 60.36 minutes.

In the present study, while analysing though Gartland and Werely score grading, excellent results were obtained in 20 percent of the patients while good results were obtained in 75 percent of the patients.

**Table 1:** Age-wise distribution of patients

Age group (years)	Number of patients	Percentage
18 to 30	2	10
31 to 40	3	15
41 to 50	8	40
51 to 60	7	35
Total	20	100
Mean age (years)	46.8	
SD	10.39	

**Table 2:** Gender-wise distribution of patients

Gender	Number of patients	Percentage
Males	15	75
Females	5	25
Total	20	100

**Table 3:** Distribution of patients according to Side involved

Side involved	Number of patients	Percentage
Right	14	70
Left	6	30
Total	20	100

**Table 4:** Duration of surgery

Duration of surgery (Minutes)	Value
Mean	60.36
SD	7.36

**Table 5:** Gartland and Werely score grading

Gartland and Werely score grading	Number of patients	Percentage
Excellent	4	20
Good	15	75
Fair	1	5
Poor	0	0
Total	20	100

## Discussion

The basic principle of fracture treatment is to obtain accurate fracture reduction and then to use a method of immobilization that will maintain and hold that reduction. While the goal of treatment in fracture distal end of radius is restoration of normal function, the precise methods to achieve that desired outcome are controversial. Intra-articular fractures of distal end of the radius can be difficult to treat, at times, with traditional conservative method [7]. External fixation relies upon the principle of ligamentotaxis to apply traction and restore displacements. The use of an external fixation device is the only practical means of overcoming the force of the muscles of the forearm that pull comminuted distal radial fractures into a collapsed position. The use of an external fixator in the treatment of unstable intra-articular fractures of the distal radius has recently received support [8, 9]. Hence; under the light of above mentioned data, we planned the present study to assess the outcome of ligamentotaxis of fracture of distal end radius by distractor apparatus.

In the present study, a total of 20 patients were enrolled. 40 percent of the patients belonged to the age group of 41 to 50 years. Mean age of the patients was found to be 46.8 years. 35 percent of the patients belonged to the age group of 51 to 60 years. 75 percent of the patients were males while the remaining were females. Right side involvement occurred in 70 percent of the patients. Mean duration of surgery was found to be 60.36 minutes. In a previous study, authors interpreted the wrist as consisting of three distinct columns, each of which is subjected to different forces. This theory emphasizes that, (1) the lateral, or radial, column is an osseous buttress for the carpus and is an attachment point for the intracapsular ligaments; (2) the intermediate column functions in primary load transmission and may be considered the cornerstone of the radius because it is critical for both articular congruity and distal radioulnar function; and (3) the medial, or ulnar, column serves as an axis for forearm and wrist rotation as well as a post for secondary load transmission [10].

In the present study, while analysing though Gartland and Werely score grading, excellent results were obtained in 20 percent of the patients while good results were obtained in 75 percent of the patients. A study conducted in 2006 documented that, although the distal radio-ulnar joint is primarily stabilized by the triangular fibrocartilage complex (TFCC), additional stability is imparted by the joint capsule, interosseous membrane, pronator quadratus, and extensor carpi ulnaris [11]. In a previous study, authors evaluated internal distraction plating for the management of comminuted, intra-articular distal radius fractures in patients greater than 60 years of age at two level 1 trauma centers. They specifically desired to determine whether patients would have acceptable results from the clinical

standpoint of range of motion, Disabilities of the Arm, Shoulder, and Hand (DASH) score, and the radiographic measurements of ulnar variance, radial inclination, and palmar tilt. Their hypothesis was that distraction plating of comminuted distal radius fractures in the elderly would result in acceptable outcomes regarding range of motion, DASH score, and radiographic parameters and would, thereby, provide the upper extremity surgeon with another option for the treatment of these fractures. Mean radial inclination was 20°. Mean values for wrist flexion and extension were 46° and 50°, respectively. Mean pronation and supination were 79° and 77°, respectively. At final follow-up, the mean DASH score was 32. In the elderly, distraction plating is an effective method of treatment for comminuted, osteoporotic distal radius fractures <sup>[12]</sup>.

### Conclusion

From the above results, the authors conclude that ligamentotaxis is effective in neutralizing detrimental compression forces, which are likely to cause displacement of unstable fracture with radial shortening.

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