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Post-operative complications of displaced unstable distal end radius fracture treated by volar plating

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ABSTRACT

Background: Fracture of the distal radius (DRF) is one of the most common fractures present in emergency. The most common operative treatments of these fractures are open reduction and internal fixation with volar locking plates. The incidents and types of complications associated with the use of these operations is an ongoing process till date. The objective of the study was to find demographic profile of patients of displaced unstable distal end radius fracture, and to study the post-operative complications among above patients treated by volar plating.
Methods: We performed a prospective study documenting types of complications and their occurrence in a group of patients who received open reduction and internal fixation. Our definition of a complication was a case in which the patient had one or more complications which required an intervention medical or surgical.
Results: A total of 33 patients were included, most of the cases, (63.63%) were from the age group 21-40 years. We had 4 cases (12. 12%) females, and 29 cases (87.88%) males. Post-operative complications were noted in 7 individuals 22.2 % and no complications noted in 26 cases (78.8%). In 30 cases there was no any deformity found in postoperative one year follow up, 2 patients develop prominent ulnar styloid found in follow up of one year ,and 1 residual dorsal tilt found after one year.
Conclusions: Our finding that 22.2% suffer from complication when treated using a volar locking plate must be taken into consideration when surgeons choose between conservative or operative treatment for DRF treatment. A few other studies have looked at the incidents of complications and have reported similar results.

Keywords: Radius fracture, Volar plating, Modified Gartland, Werley score

INTRODUCTION

Displaced/unstable distal radius fractures (DRFs) can be managed in many ways: plaster cast, closed reduction and plaster cast; and various methods of osteosynthesis are available: external fixation, percutaneous fixation using k-wires and internal fixation using screws with or without plating. Furthermore, many different kinds of plates are available. Fracture of distal end of radius is one of the common fractures due to trauma and self-fall accounting for more than 20 % of all fractures seen in the casualty department.[1] Open reduction and internal fixation (using first dorsal locking plating and later volar locking plates) have become the standard treatment within the past decade.[2,3]

Many studies have shown that volar plating allows for early mobilization owing to stable fixation. As in intra-articular distal end radius fractures if there is displacement of intra-articular fragments greater than 2 mm this may lead to development of posttraumatic osteoarthritis and stiffness which are associated with worse functional outcomes. These specialized implants come in form of dorsal and volar locking plates form because of high rates

of hardware related complications with dorsal plates like tendinitis and rupture of extensor tendons are common and well documented.[4] Volar plates fixation gained popularity for displaced unstable intra-articular distal radius fractures Volar plating has become the treatment of choice despite the scarcity of studies documenting which complications the patient may experience when receiving this treatment and how often such complications occur.[4,5] The risk of complications may increase whenever a surgeon uses a new technique or implant.[6]

The purpose of this study was to document complications associated with the use of a volar plating technique. In this study we prospectively reviewed 33 consecutive cases of volar plating for distal radius fractures and focused on the complications observed. The aim of this study was to identify possible problems and pitfalls that may generate complications.

The objective of the research was to study demographic profile of patients of displaced unstable distal end radius fracture, and to study the post-operative complications among above patients treated by volar plating.

METHODS

This is a prospective observational study. After obtaining approval from the Institutional ethics committee, 33 patients with distal end of radius fracture admitted in male and female orthopedic wards, in a tertiary care center were taken in the study. The detailed history of the patient was taken regarding personal data history, mode of injury, pre-injury ambulatory status, preexisting local and systemic condition that may affect recovery. Full clinical examination was done to assess the general condition of the neighboring joints and any associated injuries. The radiographs were assessed in terms of loss of radial inclination, loss of palmar tilt, or presence of dorsal tilt, radial shortening fractures would be classified according to Frykman classification and AO (Arbeitsgemeinschaft für Osteosynthesefragen) classification of findings on dead lateral and anteroposterior radiographs. Patients with open fractures, fractures due to malignancy, stable fractures were excluded.

The data was quantified by modified Gartland and Werley score in which outcome was evaluated by clinical measures that included flexion, extension, pronation, supination, percentage grip and power.[7] The dressing was done on post-operative 12th day. Patient was discharged on 12th post-operative day and followed up after 1st, 2nd, 3rd, 6th month and then yearly. Functional evaluation of the patients was done according to the demerit point system of Gartland and Werley with Sarmiento et al modification.[7] All the relevant data was entered in pre tested case record form. The data was analyzed by using Microsoft Excel. Results on continuous measurements are presented on mean ± standard deviation (SD) (min-max) and results on categorical measurements are presented in number (%).

RESULTS

In the present study, most of the patients (11, 33.33%) were from age group 20-30 years followed by 10 (30.30%) cases from 31-40 years. We found only 1 (3.03%) case were >60 years (Table 1).

Table 1: Distribution of study subjects according to age.

Age group (in years)	Frequency	Percent (%)
20-30	11	33.33
31-40	10	30.30
41-50	6	18.18
51-60	5	15.15
>60	1	3.03

In the present study, most of the patients, 29 cases (87.88%) were males and 4 cases (12. 12%) females with females that male to female ratio 6.75:1 (Figure 1).

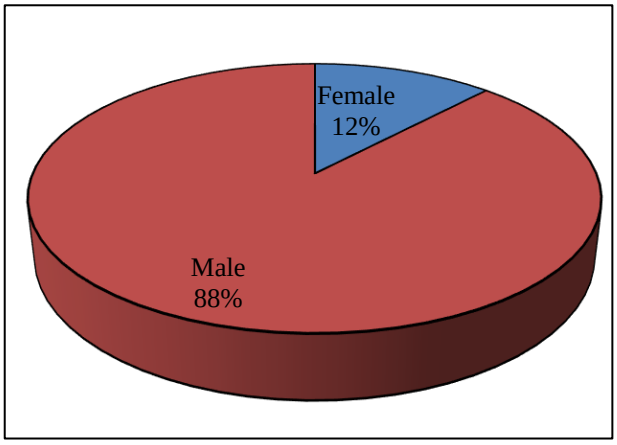

Figure 1: Distribution of study subjects according to gender.

Cause of injury

Most of the patients, 18 (54.55%) were having history of road traffic accident followed by 13 cases (39.39%) were having self-fall, injury during sports was seen in 1 case (3.03%) and 1 case (3.03%) having history of fall from tree.

Type of fracture according to Frykman and AO classification

Most of the patients 21 cases (63.64%) were having Frykman VIII type of fracture followed by 7 cases (21.21%) were having VI type of fracture, 3 cases (9.09%) were having VII type of fracture and only 1 case (3.03%) was having type and III and only 1 case (3.03%) was having type IV. And according to AO type fracture, most common type of fracture was C3 type, seen in 13 cases (39.39%).

Post-operative complications

No post-operative complications were noted in 26 cases (78.8%) (Figure 2). Post-operative arthritis was seen in 4 cases (12.12%). X-ray images of the development of postoperative arthritis is shown in Figure 3. Carpal tunnel syndrome was seen in only 1 case (3.03%) and superficial infections seen in 2 cases (6.06%) (Figure 4).

In our study in 30 cases there was no any deformity found in postoperative one year follow up, 2 patients develop prominent ulnar styloid found in follow up of one year, and 1 residual dorsal tilt found after one year (Table 2).

Table 2: Residual deformity.

Deformity	Frequency	Percentage
No deformity	30	90.09
Residual dorsal tilt	1	3.03
Radial deviation of hand	0	0
Prominent ulnar styloid	2	6.06

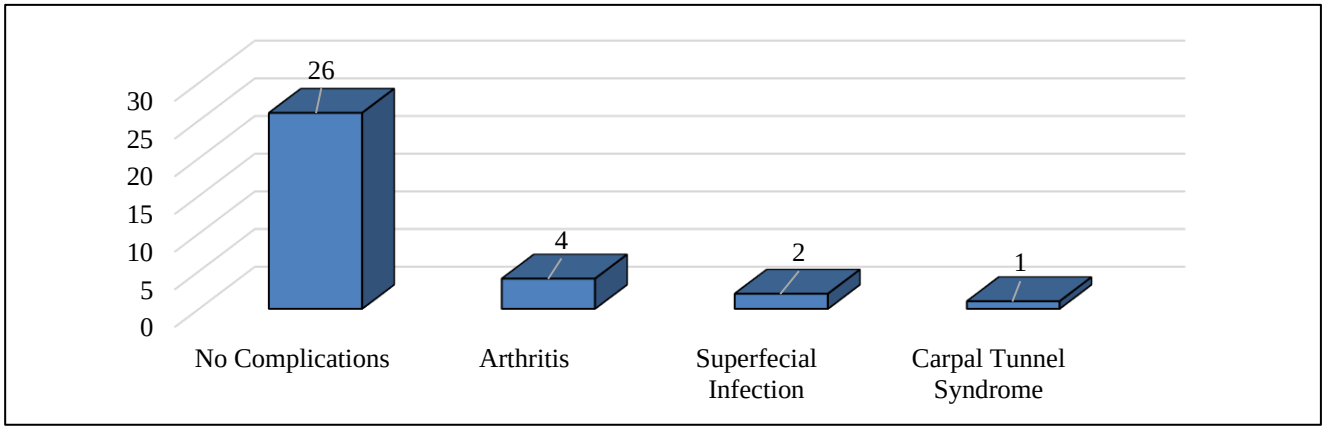

Figure 2: Absence of post-operative complications.

Figure 3: Development of postoperative arthritis.

Figure 4: Development of carpal tunnel syndrome.

DISCUSSION

One patient developed carpal tunnel syndrome just after 3 months of surgery. For carpal tunnel syndrome by median nerve irritation steroids physiotherapy and cockup splint was given and patient recovered in 3 to 6 months. One more after a long term follow up 4 patients develops postoperative arthritis as the fracture pattern was very displaced and due to lack of physiotherapy.

Superficial infection develops to 2 patients at the postoperative day 7 and 8 respectively which was treated by culture sensitivity of discharge and antibiotics accordingly infection get resolved after 7 days course of antibiotics. These complications found in our study for other complications which are related to hardware it requires longer follow up.

Orbay and Fernandez reported 1 case among 31 of dorsal tendon irritation from an excessively long peg, which was treated with hardware removal of nine patients with preoperative median nerve symptoms who had carpal tunnel release, the final neurologic examination showed complete resolution at the time of late follow-up.[8]

Rohit et al reported an overall 31 patients (27%) with complications. There were 17 tendon complications. Early hardware removal was performed in all patients who developed tenosynovitis. Among other complications, three patients suffered, carpal tunnel syndrome (3%), screw loosening occurred in two patients (2%), and intra-articular screw displacement occurred in one patient

(1%).[9] Rozental and Blaza reported the overall complication rate in the volar plate group was 22% as compared to 32% in the dorsal plate group. Further, the volar plate cohort had a 10% rate of loss of reduction while the dorsally plated patients did not the volar plate group had a 7% rate of hardware removal secondary to tendon irritation while the dorsal plate group had a 32% rate of hardware-related tendon complications 66% excellent and 44% good results in their series of 41 cases of dorsally displaced unstable fractures of the distal radius, 4 loss of reduction in 41 patients (9.75%).[10]

Orby et al found loss of reduction in 3 out of 24 patients (12.5%) treated with volar locking plates. Tarallo et al showed that 18 of 303 (5.9%) DRFs patients suffered from complications after volar locking plate fixation and extensor tendon injury accounted for 50% of all complications due to technical defect of the internal fixation.[11,12]

Kamano et al found that out of 40 patients developed a complex regional pain syndrome. Kavin Khatri et al stated the following complications were noted hypertrophic scar in one, to cases of infection recovered with conservative management and one had carpal tunnel syndrome. Paritosh Gogna had excellent results in 79% (n=26), good in 18% (n=6), and fair in 3% (n=1) patients. Three patients had loss of reduction but none of the patients had tendon irritation or ruptures, implant failure, or nonunion at the end of a one-year follow up.[13-15]

CONCLUSION

Our finding that 22.2% suffer from complication when treated using a volar locking plate must be taken into consideration when surgeons choose between conservative or operative treatment for DRF treatment. With volar locking plates one can achieve good anatomical reduction and stable fixation which is helpful to attain good to excellent functional outcome in many patients with limited complications. A few other studies have looked at the incidents of complications and have reported similar results.

Limitations

The sample size was small in study and follow up period was insufficient. As of many patients was managed by cast and k wire only due to patient non-compliance to give proper follow up and unwillingness for surgery. Thus, further prospective study with large population and longer follow up time were required to evaluate the clinical outcome. Also, time period of the study was limited so some other complications couldn't be assessed.

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Ethical approval: The study was approved by the institutional ethics committee

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