

Functional Outcome of Galeazzi Fracture Dislocation in Adults Treated With Dynamic Compression Plate and Kirschner Wire

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ABSTRACT

Introduction: Galeazzi fracture-dislocation is a complex traumatic disruption of the distal radioulnar joint (DRUJ) that is associated with lower shaft radius fracture. Galeazzi fractures are extremely unstable, and the results of nonsurgical treatment are uniformly unsatisfactory. Galeazzi fractures managed with closed modalities have unsatisfactory clinical results in most of the patients in published literature so open reduction and internal fixation with plating is the standard treatment for this fracture. **Aim:** The aim of this study was to evaluate the functional outcome of Galeazzi fracture dislocation. **Methods:** This prospective study was conducted in the Department of Orthopedics at Nepalgunj Medical College Teaching Hospital Kohalpur, from April 2016 to March 2019. It included 35 patients of age group 19 to 49. All of the fractures in this study were treated by open reduction and internal fixation (ORIF) with 3.5 mm narrow dynamic compression plate (DCP) and cortical screws via Henrys anterior approach and distal radioulnar joint (DRUJ) stabilization was done with 1 Kirschner wire (K-wire) inserted parallel to the wrist joint. Patients were observed at 6, 10, 16 and 24 weeks and 52 weeks both radiographically and clinically. **Results:** In this study of 35 patients, 24 (68.57%) were males and 11 (31.43%) were females with the age range of 19 to 49 years and mean age of 35 and standard deviation (SD) of ± 1.5 years. Majority of fractures were observed between 31 to 40 years of age. Most of the injuries were due to fall injury 51.42%. The average duration from time of injury to surgery was 5 days and bone grafting was not needed in any cases. The average time period for union was about 16 weeks. The most common complication seen in this study was stiffness of wrist (11.42%). Twenty four patients (68.57%) had good result, 10 patients (28.57%) had fair result and one patient (2.86%) had poor result in DASH score at final follow-up. **Conclusion:** Open reduction and internal fixation with plating and stabilization of distal radioulnar joint with K wire yields good to fair outcome on Disabilities of Arm, Shoulder and Hand Score.

Keywords: Disabilities of Arm, Shoulder and Hand Score (DASH score), Galeazzi fracture, Kirschner wire (K-wire), Open reduction and internal fixation (ORIF)

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INTRODUCTION

Galeazzi fracture-dislocation is a complex traumatic disruption of the distal radioulnar joint (DRUJ) that is associated with lower shaft radius fracture. This fracture pattern was first described by Cooper in 1822¹ but it is Galeazzi who in 1934 presented a series of 18 patients with this injury, and elaborated on the incidence, pathomechanics, and management.^{2,3} This fracture is also eponymically referred to as a reverse Monteggia fracture,^{4a} Piedmont fracture,^{4a} Darrach- Hughston-Milch fracture,⁵ and a fracture of necessity.⁶

Galeazzi lesions are frequently underdiagnosed, and the true incidence may vary. Reports indicate an incidence of $\leq 3\%$ of all forearm fractures in children and $\leq 7\%$ of those in adults.⁷ In adults, Galeazzi fractures are extremely unstable, and the results of nonsurgical treatment are uniformly unsatisfactory. A high risk of deformation following nonsurgical management has been linked to various deforming forces, including gravity, which acts through the weight of the hand and causes fracture displacement and subluxation of the DRUJ, as well as the deforming forces associated with the brachioradialis, pronator

quadratus, and thumb abductors and extensors.⁸Galeazzi fractures managed with closed modalities have been reported to yield up to 92% unsatisfactory clinical results.⁶Therefore open reduction and internal fixation is the standard of treatment for this fracture.⁶The aim of this study was to evaluate the demographic details and functional outcome of Galeazzi fracture dislocation managed with dynamic compression plate and DRUJ stabilization with one Kirschner wire inserted parallel to the wrist joint. Open reduction and internal fixation with stabilization of DRUJ is simple, cost effective and gold standard procedure for Galezzi fracture and as per the author’s knowledge this will be the first study of its kind in mid-western part of Nepal.

METHODS

This descriptive observational study was conducted in the Department of Orthopedics at Nepalgunj Medical College Teaching Hospital Kohalpur, Banke, Nepal over the period of 36 months from April 2016 to March 2019. All adult patients aged above 18 who had closed or Gustilo and Anderson grade I open fracture without any pre-existing fracture around the wrist on the ipsilateral and without pre-existing arthrosis of the wrist and radiographically confirmed Galeazzi fracture (fracture of the middle or distal third of the radius with fracture at the base of the ulnar styloid, widening of the joint space of the DRUJ, angulation of the radius relative to the ulna on lateral radiographs, and more than 5 mm of shortening of the ulna) were included in the study. Patients who had distal radius fracture without radiographical DRUJ subluxation/dislocation, open fractures above grade I, pre-existing fracture around the wrist or arthrosis of the wrist, pathological fracture, pre-existing forearm fractures, fracture with associated ulna fracture and fractures old than 2 weeks were excluded from the study. All patients with suspected forearm fractures presenting to the emergency department were initially immobilized in above elbow Plaster of Paris slab, and after the general condition of the patient was stabilized, detailed history was taken to determine the demographic details, mode of injury, and clinical evaluation was done to determine the status of soft tissue, fracture pattern, and neurovascular status. Plain radiographs were taken in anteroposterior and lateral views. Patients were enrolled in the study after confirming diagnosis and considering inclusion and exclusion criteria. All the cases were approached via standard Henrys anterior approach, in all the patients radius shaft fracture was fixed first with 3.5 mm narrow dynamic compression plate (DCP) and lag screw (oblique fractures) and autologous iliac crest bone grafting was used in patients who had comminution and in all cases stability of the DRUJ was assessed at the operation and restored using one 2.0 mm percutaneous Kirschner wire inserted parallel to distal radioulnar joint. Wound was closed in layers followed by above elbow posterior slab in 90 degrees

of flexion with forearm in supination after dressing was done. All the patients were administered intravenous antibiotics for at least of 48 hours and then converted to oral antibiotics. The dressing was changed after 48 hours of surgery and the patients were generally discharged from hospital after 48 hours and second look dressing was advised to the patient on 5th to 7th day. On 14th post-operative day sutures were removed and above elbow slab was continued till 6 weeks. Kirschner wire was removed at 6 weeks duration and range of movement exercises and physiotherapy were started after this period. Patients were observed at 6, 10, 16 and 24 weeks and 52 weeks both radiographically and clinically. At every follow up patients were observed for fracture union, range of movement, arthrosis, implant position and stability of the DRUJ. Union was defined as bridging of at least 3 out of 4 cortices on two radiograph views. Patients were given a questionnaire at the end of follow up to assess their functional disability. This was done using the disability of arm, shoulder and hand (DASH) score⁹and tabulated for analysis. In this study, the score result was divided into 4 categories as follows 75-100 indicated severe disability, 50-74 indicated poor, 25-49 showed fair and 0-25 showed good function.

RESULTS

1. Distribution of demographic profile in total patients (n=35)

There were 35 patients in the study. There were 24 (68.57%) males and 11(31.43) females.

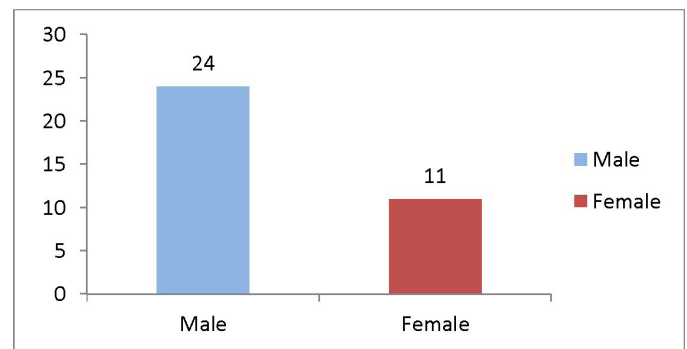


Figure 1 : Bar diagram showing gender ratio in total population

2. Distribution of age group in total patients (n=35)

In my study the patients were from 19 years to 49 years with mean age of 35.00±1.5 years.

Age group	Number	Percentage	Mean
18-30	9	25.7%	35.00±1.5
31-40	22	62.9%	
41 and above	4	11.4%	

Table 1 :

3. Distribution of patients according to Mode of Injury

The common modes of injury is as shown below which consisted of 18 patients (51.42%) with fall injury, 7 patients (20%) with direct blow, 6 patients (17.14%) with road traffic accident and 4 patients (11.42%) with sport injury.

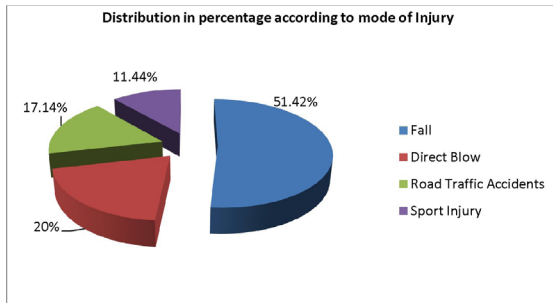


Figure 2 : Pie chart showing mode of injury in total patients

In this study 26 patients (74.28%) had involvement of right limb and 9 patients (25.71%) had involvement of left limb. The average duration from time of injury to surgery was 5 days and bone grafting was not needed in any of the cases.

The average time period for union was about 16 weeks and there were no patients with delayed union and nonunion. Malunion which was defined as angulations greater than 5 degrees in each plane were reported in 1 patient (2.86%)

4. Complications in the study

Complications	Number	Percentage (%)
Stiffness of wrist	4	11.42
Surgical site infection	2	5.71
Irritation of extensor tendon due to long screws	2	5.71
Malunion	1	2.86

Table II :

The ROM in this study is
 Flexion 70 degrees
 Extension 60 degrees
 Ulnar deviation 30 degrees
 Radial deviation 15 degrees

5. The DASH score at the final follow-up

In final follow-up on the basis of DASH score 24 patients (68.57%) had good results, 10 patients (28.57%) had fair results and 1 patient (2.86%) had poor result with no any severe results.

DASH score	Number	Percentage
Good	24	68.57%
Fair	10	28.57%
Poor	1	2.86%
Severe	0	0%
Total	35	100%

Table III :

DISCUSSION

Galeazzi fracture dislocation is highly unstable injury involving fracture of distal third/fourth of radius with dislocation of the distal radio ulnar joint.¹⁰ The results of conservative treatment are poor. Anatomical reduction and internal fixation with plating with additional stabilization of DRUJ with K wire with or without immobilization in plaster in full supination is considered standard treatment in most of published literature. In the present study most of the patients were male (68.57%) which is similar to the study by Mikic¹¹ (74% males) and study by Moore et al.¹² (80% males). A male preponderance is common considering the higher risk of violent injury among men. Right limb is involved in most of the patients (74.28%) which is comparable to the study done by Riju KP¹³ where 76.19 % patients had involvement of right side, most of the patients were in age group 31 to 40 which fits in accordance with most of the published literature. Fall injury accounts for the most of mode of injury (51.42 %) which is comparable to the study by Riju KP¹³ where 50 % patients had injury due to fall. The most common age group is 31- 40 (62.9%) of the patients which is comparable to most of established literature. In this present study 97.14 % of the patients had good to fair outcome which is comparable to the study done by Varma R et al¹⁴ where 94 % of patients had good to fair outcome.

LIMITATIONS

The major limitation of this study are study design; sample size, outcome variables and duration of follow up. It is a descriptive; observational study with 35 patients; few variables; and follow up for 52 weeks. This study would have been more meaningful if it were a randomized controlled trial with large sample, more variables and longer duration of follow up.

CONCLUSION

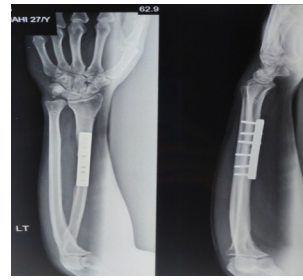
Galeazzi fracture is an inherently unstable injury involving disruption of the DRUJ so ORIF with plating and stabilization of DRUJ is the gold standard method of treatment. It can be concluded from this study that this fractures are more common in young to middle aged males and in dominant limb and the most common mode of injury is fall injury in mid-western part of Nepal unlike other mode of injury in literature. Open reduction and internal fixation with plating and stabilization of DRUJ with K wire yields good to fair outcome on DASH score.

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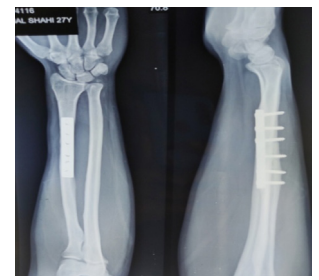
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Follow up X-ray at 6 weeks



Follow up X-ray at 10 weeks



Follow up X-ray at 16 weeks



Follow up X-ray at 52 weeks

PHOTOS



X-ray A/P and Lat of left forearm



1st Post-operative X-ray