Section: Orthopaedics

Original Research Article

SURGICAL OUTCOME OF GALEAZZI FRACTURE DISLOCATION IN TRIBAL POPULATIONS IN NORTH ANDHRA: A SINGLE-CENTERED PROSPECTIVE STUDY

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ABSTRACT

Background: Galeazzi fracture dislocation is an unstable fracture dislocation of forearm in which fracture occurs at middle to distal 1/3rd of radius with DRUJ subluxation or dislocation.

Materials and Methods: The present prospective study was conducted on adults with Galeazzi fracture from May 2022 to January 2024. They were clinically and radiographically assessed for functional outcome as well as union, distal radioulnar joint stability. 25 patients were treated with open reduction with internal fixation by plating and followed up for 9-12 months.

Results: Out of 25 patients, 16 patients (64%) had fracture of radius within 7.5 cm of the articular surface. Average injury to surgery time is 3.5 days. Average post operative hospital stay period is 4 days. No case had DRUJ laxity. Average Time for bony union is 17.4 weeks. There is no malunion, delayed union, non-union case in our study. Functional Status is regained by 14 weeks. 60% Patient had Good outcome & 40% have Fair outcome as per DASH score.

Conclusion: Rigid Anatomical fixation of radius with stability of DRUJ & immobilisation for 6 weeks followed by physiotherapy is key to success in Galeazzi fracture. Proper education and counselling for surgical management plays an important role in treating tribal population. Postoperative Immobilisation should be followed specifically for Tribal population to prevent early weight lifting.

Keywords: Galeazzi fracture Dislocation, Distal radioulnar joint

INTRODUCTION

Galeazzi fracture-dislocation is an unstable fracture dislocation of the forearm in which fracture occurs at middle to distal 1/3rd of radius with distal radio-ulnar joint (DRUJ) subluxation or dislocation. Junction of middle & distal third junction of radius between the insertion of pronator teres & pronator quadratus is commonly involved in Galeazzi fracture. Separation of distal ulnar epiphysis along with fracture shaft of radius is seen in Galeazzi Fracture dislocation in children. The Fracture pattern was first described by Cooper in 1822, but in 1934, Galeazzi presented incidence patho-mechanics & management of Galeazzi fracture.[1] He also reported that the incidence of Galeazzi fracture (6%) is more than Monteggia fracture (2%) among forearm fractures.[1] The fracture is also known as Reverse Galeazzi fracture & Darrach-Hughston-Milch fracture. The fracture has been notoriously known for its instability. The instability of this fracture-dislocation complex results from the large force lead to radial shaft fracture and was then transmitted via the interosseous membrane to the ulna. The ulnar head is dislocated and tearing of the triangular fibrocartilage complex occurs, rendering the entire DRUJ complex unstable. Surgeon should show high index of suspicion when the radiographs show a widening of gap between the distal radius and the ulna, dorsal or volar displacement in lateral view, a relative shortening of the radius and ulnar styloid fracture.

Jack Hughston in 1956 described the anatomical basis of instability.[2] He highlighted the common mistakes and recorded 92% failure rate in closed reduction.[2] Campbell described it as "Fracture of Necessity" & stressed upon open reduction with internal fixation.[3] Stewart Stressed that open reduction with internal fixation should be rigid in form of plating than nailing with proper intraoperative assessment & bone graft should be considered in communited fractured radius.[4] He discouraged the primary excision of lower end of ulna.[4] There are number of complications of unsatisfactorily treated Galeazzi fracture like DRUJ Instability, Malunion, chronic wrist pain, osteoarthritis wrist, restricted range of motion wrist.

Aim & Objectives: The aim of the study was to evaluate the management & functional outcome of Galeazzi fracture-dislocation with plate fixation of the radius with or without DRUJ fixation with K-wires in tribal population of north-andhra.

MATERIALS AND METHODS

The present prospective study was conducted on adults with Galeazzi fracture admitted to Department of Orthopaedics, GMC, Srikakulam from May 2022 to January 2024. Clinical & radiological assessment is done for functional outcome as well as union, distal radioulnar joint stability and any arthrosis of the wrist joint. 25 patients of age group 18-60 years were included in the study. All the patients were treated with open reduction with internal fixation by plating and followed up for 9-12 months.

Inclusion Criteria

1. Radiologically proven Galeazzi fracture-dislocation
2. 18-60 years of age
3. Closed Fracture
4. Open Fractures not above Gustilo Anderson Grade 1
5. Absence of Other pathologies around wrist & elbow

Exclusion Criteria

1. Age Below 18 and Above 60 years
2. Open fractures above Gustilo Anderson Grade 1
3. Old fractures around Wrist and Elbow
4. Arthritis around Wrist and Elbow

Thorough clinical examination revealed deformity and swelling on inspection. Tenderness is elicited by palpating both the bone of forearm. Abnormal mobility and crepitus were elicited. Limitation of Pronation & Supination increases the suspicion for DRUJ disruption. Patient may feel a click with forearm motion. Ballottement test is checked for DRUJ disruption. Prominence of ulnar head over dorsal or volar aspect should also be checked. Neurovascular Examination is mandatory although it is rare in Galeazzi fracture dislocation. Radiographic evaluation is done by taking X-rays of Wrist, Forearm & Elbow. Widening of gap between the distal radius and the ulna, dorsal or volar displacement in lateral view, a relative radial shortening of around 5mm or more and ulnar styloid fracture confirms DRUJ disruption.[5] Distal 1/3rd shaft of radius fracture along with DRUJ disruption in x-ray confirms Galeazzi Fracture Dislocation. In case of Negative Radiograph with High Suspicion of DRUJ disruption, axial CT can be recommended.[6] Galeazzi fracture dislocation can be classified as per the following classifications.

Classification

1.Beneyto Classification,[7]

a. Type 1: Fractures occurs between distal 10 cm of radius [60%]
b. Type 2: Fractures occurs between 10-15 cm of wrist [30%]
c. Type 3: Fractures occurs more than 15 cm of wrist [10%]

2.Chatterji & Arunava Chattopadhyaya Classification,[8]

a. Radial Fracture with distal fragment displaced medially and proximally because of obliquity of fracture line running distally and radially from above downward [75%]
b. Distal fragment displaced radially because of obliquity of fracture line running distally and medially from above downward [25%]

3.Rettig and Raskin Classification,[9]

a. if radial fracture is <7.5 cm from articular surface, 55% of fracture is unstable
b. if radial fracture is >7.5 cm from articular surface, 6% of fracture is unstable

4.AO Classification,[10]

Table 1: AO classification for Diaphyseal Fracture of Radius

2R2-A SIMPLE	2R2-B WEDGE	2R2-C MULTIFRAGMENTARY
2R2-A1 Spiral		
2R2-A2 Oblique	2R2-B2 Intact Wedge	2R2-C2 Intact Segmental
2R2-A3 Transverse	2R2-B3 Fragmentary Wedge	2R2-C3 Fragmentary Segmental

Closed reduction and an above elbow POP slab was applied. Routine investigations like Hb%, Blood Urea, Creatinine, RBS, Serology, ECG, Chest Xray were done. The patients were taken for surgery as early as possible once the general condition is stable and fit for surgery.

Operative Technique: All Patients were operated under brachial block. The patient was placed in supine position. Arm & forearm is kept on arm board. Pneumatic Tourniquet is applied. Surgery is performed in blood less field for visualisation for anatomical reduction.

Surgical Approach & Fracture Fixation: For all cases volar (Henry Approach) is used. Biceps tendon, Mobile Wad, Radial styloid, Flexor carpi radialis (FCR) are identified. Skin incision is given over the

line joining biceps tendon to radial styloid process centered on the fracture site. Inter-nervous plane is created between brachioradialis and FCR. Radial artery is identified by two venae comitantes accompanying it & is protected. Pronator teres and flexor digitorum superficialis need to be detached partially. Sometimes flexor pronator quadratus need to detached. Periosteum is elevated. Fracture is reduced & fixed with Dynamic compression plate and screws.

DRUJ Fixation: Radial shaft fracture is fixed first for all the patients. Intraoperatively, pronation and supination movements are checked. DRUJ disruption is evaluated clinically and radiologically by C- Arm. In many cases DRUJ is reduced on fixing the radial shaft fracture. For some cases, in which DRUJ disruption persists after radial shaft fixation, DRUJ is fixed with Horizontal k wires.

Postoperative Management: All cases are immobilised for 6 weeks by above elbow POP slab. K wires are removed after 6 weeks. All cases had developed some degree of stiffness following immobilisation. So physiotherapy is advised for all cases. All cases are followed up in 6, 12, 18, 24 weeks for clinical and radiological evaluation. Fracture Union, DRUJ Stability, Range of movements, Implant position & stability are accessed. Union is considered if 3 out of 4 cortex is united in both the views of Xray is achieved. Patients are also analysed by DASH Score.

Case 1



Figure1: Pre op – Post op – Follow up Xray of Case 1

A 40 years old male following RTA had presented with pain swelling over left wrist and forearm. He was diagnosed as Galeazzi fracture left forarm [Figure 1]; AO type 2R2A3, Rettig & Raskin type A (Fracture <7.5cm from articular surface, unstable type). Open Reduction is done & fixed with 8 holed Dynamic compression plate. Intraoperatively, Ballottement was positive, So DRUJ is fixed with 2 K wires. After 6 weeks, K wires are removed. Fracture Union was noticed on 12 weeks follow up Xray. Patient did not have Pain & able to perform Day to Day activities.

Case 2

A 21 years old male following bike accident was diagnosed as Galeazzi Fracture left forearm (figure 2); AO type 2R2A3, Rettig & Raskin type A (Fracture <7.5cm from articular surface, unstable type). Open Reduction is done & fixed with 7 holed Dynamic compression plate. Intraoperatively, Ballottement was negative, So, no k wires were applied. Fracture Union was noticed on 15 weeks follow up Xray.

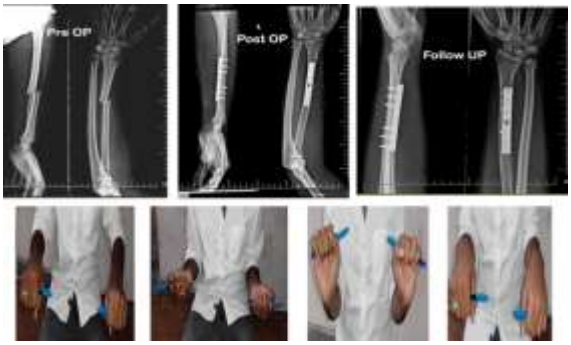


Figure2: Pre op – Post op – Follow up Xray – Range of Movement of Case 2

RESULTS

The cause of Injury was Fall on Outstretched Hand which included Road Traffic Accident in 20 cases (80%) & 5 cases (20%) were fall from height. Average age of the patients was 40.2 yrs (chart-1). 19 patients were male & 6 were female. In 14 cases fracture was in Left side & 11 cases it was on Right side. 16 patients (64%) had fracture of radius within 7.5 cm of the articular surface. Average injury to surgery time is 3.5 days. Average post operative hospital stay period is 4 days. No case had DRUJ laxity. Average Time for bony union is 17.4 weeks. There is no malunion, delayed union, non-union case in our study. Functional Status is regained by 14 weeks. Average Range of motion was 65° flexion, 63° extension, 28° ulnar variation, 14° Radial variation, 135° supination & 56° of pronation [Table 2]. DASH Score [Table 3] was analysed on 26th week. 60% Patient had Good outcome & 40% have Fair outcome [Table 4].

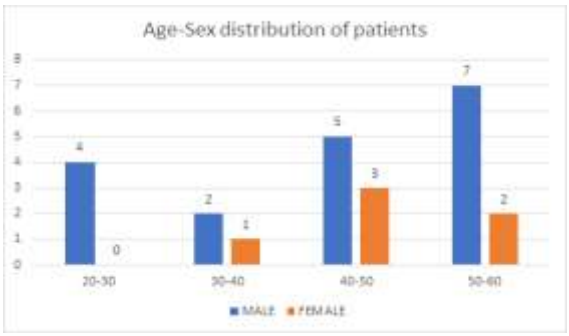


Chart 1: Age-Sex distribution of patients.

Table 2: Post operative range of movements

Rom	Average	Normal
Flexion	65°	60-80° (73)
Extension	63°	60-80° (71)
Ulnar Deviation	28°	25-35° (33)
Radial Deviation	14°	10-25° (19)

Supination	135°	130-150° (140)
Pronation	56°	45-75° (60)

Table 3: DASH Score & Outcome

Dash Score	Outcome
0-24	Good
25-49	Fair
50-74	Poor
75-100	Severe

Table 4: Functional Outcome as per DASH score

Dash Score	No. Of Cases With >7.5 Cm Fracture from Articular Surface	No. Of Cases With <7.5 Cm Fracture from Articular Surface	Total(%)
Good (0-24)	7	8	15(60%)
Fair (25-49)	2	8	10(40%)
Poor (50-74)	0	0	0
Severe (75-100)	0	0	0
Total	9	16	25

DISCUSSION

Galeazzi fracture dislocation is unstable fracture due to deforming force of muscle and ligaments. As a major lower-middle-income country, India has a significant indigenous demographic, with Scheduled Tribes representing 8.6% of its population.[11] Despite seven decades of independence, India continues to struggle with healthcare disparities between its tribal and non-tribal populations. Tribal populations in this area mostly rely on traditional treatments. After proper education and counselling, they opted for surgery. We also anticipated that patients may loss to follow up. Some of them started early weight lifting against post- op advice. So we followed 6 weeks of immobilisation to decrease early weight lifting.

Hughston,[2] in 1957 reported unsatisfactory results in 35 patients out of 38 patients treated with closed reduction and casting. He also observed similar result in 1 case out of 3 cases treated with open reduction. He believed that high percentage of unsatisfactory end results is due to most physicians lack the knowledge of deforming forces acting during reduction and immobilisation.

Mikic,[12] observed angulation, loss of reduction in cast after 7 to 10 days of closed reduction and cast application leading to loss of supination pronation in 20 cases. He got 13 excellent, 5 fair & 1 poor results in cases treated with Rush Nail with closed reduction & 6 excellent, 4 fair with 2 poor results on cases treated with plating.

Mohan et al,.[13] in 1988 showed plating is superior than square nailing for Galeazzi fracture. In general, diaphyseal fractures were treated by closed reduction and nailing. But Galeazzi fracture has shown better results with plating. 28 out of 29 plating cases had excellent outcome. In our study we have applied dynamic compression plate in a rigid anatomical fixation. Rigid fixation stabilises the fracture & DRUJ & yields early healing.[9]

Dodge & Cady.[14] reported 21 cases of Galeazzi fracture dislocation treated with compression plate without k wire fixation to DRUJ. 1 case reported screw back out after lifting weight in 7month post op, which was healed by cast application. 2 cases had post operative pain & 1 case had loss of motion.

Strehle & Gerber,[15] reviewed clinically & radiologically 19 patients with Galeazzi fracture treated with open reduction & internal fixation. He found all the cases with anatomic fracture reduction had minimal sequelae and better or equal functional results than patients with imperfect reduction. He observed excellent to fair outcome in every patients. He also concluded that DRUJ was completely restored by open reduction and internal fixation. In our study also, we get good to fair outcome in all the cases following open reduction and anatomical rigid fixation with DRUJ stability.

Mestdagh et al,[16] conducted a retrospective study of 29 Galeazzi fracture cases treated by open reduction and internal fixation & reported 8 cases having DRUJ instability by means of dorsal displacement of ulna over radius. He found at-least 25° of supination-pronation deficit in all the 8 cases. He also highlighted that additional k wire fixation is not necessary for all cases of Galeazzi fracture. He emphasized the importance of POP slab for 4-6 weeks to hold the reduction of Radio-ulnar dislocation. In our study, we have followed post operative POP slab for 4-6 weeks.

Donndorff et al,[17] in a study in 2022 reported 6 cases out of 14 Open reduction internal fixation patient had mild DRUJ instability in Ballottement test. 3 of them developed symptoms of pain. Grip strength is decreased to 77% compared to contralateral wrist. Good outcome in our study is achieved as importance is given on anatomical reduction & interfragmentary compression by rigid fixation with stability of DRUJ.

CONCLUSION

Galeazzi fracture is more common in young adults, predominantly males in Tribal population. Galeazzi fracture Results from the study suggested that prognosis of Galeazzi fracture is favourable when Rigid Anatomical fixation of radius by Dynamic compression Plate is achieved along with stability of DRUJ. Intraoperative DRUJ assessment is required

for stability of DRUJ. Operative interventions should be taken as soon as possible for good bony union. Postoperative Immobilisation should be followed specifically for Tribal population. Physiotherapy after removal of slab should be done. Radiological union can be achieved by 18 weeks. Hospital Stay can be decreased. DASH score was good to fair.

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