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Management and functional outcome of Galeazzi fracture dislocation: a single centre retrospective study

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ABSTRACT

Background: Galeazzi fracture dislocation is an unstable fracture dislocation of forearm that includes fracture of distal third or fourth shaft of radius with dislocation of distal radioulnar joint. The aim of the study was to analyse the management and functional outcome of Galeazzi fracture dislocation managed with fixation of radius fracture and distal radioulnar joint stabilisation with two Kirschner wires.
Methods: Thirty one patients with Galeazzi fracture dislocation were managed with plate fixation for radius fracture and distal radioulnar joint stabilisation with 2 Kirschner wires. They were clinically and radiographically assessed for functional outcome as well as union, distal radioulnar joint stability and any arthrosis of the wrist joint.
Results: Functional outcome was assessed based on disability of shoulder, arm, and hand index. 94% of the patients in our series had good to fair outcome with 6% having poor outcome.
Conclusions: All Galeazzi fracture dislocation should be managed with plate fixation for radius fracture and Kirschner wire stabilisation of distal radioulnar joint followed by splinting for 6 weeks for best functional outcome.

Keywords: Galeazzi fracture, Distal radioulnar joint, Dislocation, Arthrosis, Triangular fibrocartilage

INTRODUCTION

The Galeazzi fracture is an unstable fracture-dislocation of the forearm that includes a fracture of the shaft of the radius and a dislocation of the distal radio-ulnar joint (DRUJ). Fracture of the radius at the junction of the middle and distal thirds commonly occurs in association with a dislocation of the DRUJ. This lesion, reported by Galeazzi in 1934, is characterized by its unstable nature and the need for open reduction and internal fixation to achieve a satisfactory functional outcome. The instability of this fracture-dislocation complex results from the large force that caused the 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. A high index of suspicion should be maintained by the surgeon, especially when the radiographs show a widened gap between the distal radius and the ulna and a relative shortening of the radius. Any instability of the DRUJ must be detected by careful ballottement after the radius fracture has been surgically stabilized. Sometimes disruption of the distal radioulnar joint may be overlooked. In adults, nonsurgical treatment typically fails because of deforming forces acting on the distal radius and DRUJ. Riccardo Galeazzi presented the largest series (n=18) of this injury at that time, and cited an incidence of 6% in his series of 300 forearm fractures. He reported this injury as occurring more frequently compared to the Monteggia fracture (2%).[1] There are a

number of complications of unsatisfactorily treated Galeazzi fracture dislocation. These include DRUJ instability, malunion, restricted range of motion at wrist, chronic wrist pain, and osteoarthritis of the wrist joint.[2]

The aim of the study was to evaluate the management and functional outcome of Galeazzi fracture dislocations managed with plate fixation of the radius and DRUJ stabilisation with 2 Kirschner wires inserted parallel to the wrist joint.

METHODS

This is a series of thirty one (n=31) patients with Galeazzi fracture dislocation that were managed operatively. The study is a retrospective study conducted at a tertiary care centre during the period Mar 2014- May2016. All the patients had radiographically proven Galeazzi fracture dislocation. Average age of the patient group was 37.8 years with 23 male patients and the remaining were female patients (Figure 1). The inclusion criteria of the study were: 1) Patients had radiographically confirmed Galeazzi fracture, 2) Closed fracture, 3) Open fractures not above Gustilo Anderson grade I, 4) Absence of any pre-existing fracture around the wrist on the epsilateral side, 5) Absence of pre-existing arthrosis of the wrist. Likewise, exclusion criteria were: distal radius fracture without radiographical DRUJ subluxation/dislocation, open fractures above grade I, pre-existing fracture around the wrist or arthrosis of the wrist. We classified Galeazzi fractures on the basis of AO classification as 22-A2.3 or 22-B2.3.[3] 22-A2.3 is Galeazzi fracture dislocation with simple fracture of radius and dislocation of DRUJ, whereas 22-B2.3 has wedge fracture of radius. 15 cases were (n_1=15) type 22-A2.3 and the remaining 16 were (n_2=16) type 22-B2.3. Cases with type 22-B2.3 fracture had more severe dislocation of the DRUJ than type 22-A2.3. Figure 2 shows example of type 22-A2.3 and Figure 3 shows example type 22-B2.3. All the cases were examined for distal neurovascular deficit and compartment syndrome. None of our cases had any of these complications. The mechanism of injury in all the cases was fall on outstretched hand that caused fractures of the radius, the weight acts longitudinally on the ulna.[4] The ulna in proportion to the radius becomes too long and bends inevitably. If the bone does not resist the force of longitudinal energy, it breaks. However when the bone resists the force, it is forced to luxate at the lower end, as the upper end is connected very strongly to the humerus. Another cause of luxation is muscle movement, which does not happen at the moment of actual trauma, but rather a few days later. The distal fragment of the radius pronates and comes closer to the ulna through the action of the pronator quadrates.[5]

The average duration from time of injury to surgery was 4 days. In all the cases we used the standard Henrys anterior approach. After the skin incision, the fascia was split at the edge of the brachioradialis muscle. The dissection is then extended between the flexor-pronator mass on the ulnar side and the radial artery and the mobile wad on the radial side. In the distal third of the radius, retraction of the FCR tendon to the ulnar side exposes the transverse fibres of pronator quadratus which was elevated subperiosteally from the radial side of the radius to expose the bone. In all the patients radius shaft fracture was fixed first, peroperatively every case was assessed for DRUJ stability. Intraoperatively determined DRUJ instability after radial shaft fixation was used as the gold standard for diagnosis of a Galeazzi fracture-dislocation. This was done by subluxating the distal ulna dorsally out of the sigmoid notch. The radius shaft was fixed with a dynamic compression plate (DCP).

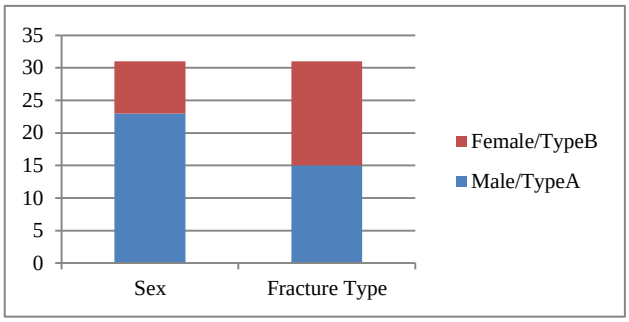

Figure 1: Bar chart showing distribution of sex and fracture type of case series.

Figure 2: Radiograph showing example of type 22-A2.3 fracture.

All the cases had demonstrable intraoperative DRUJ laxity, stability of the DRUJ was restored using 2 percutaneous Kirschner wires inserted parallel to distal radioulnar joint.[6] Figure 4 and 5 shows example of management of case with type 22-A2.3 and 22-B2.3 respectively. All the cases were maintained in an above

elbow posterior PoP slab.[7] The total duration of the slab immobilisation was 6 weeks. Kirschner wires were removed after an average 6 weeks duration and range of movement exercises were started after this period. All most all the patients had stiffness of the wrist joint after immobilisation, hence they were put on wax bath physiotherapy to assist there range of movement.[8] Patients were observed at 6, 10, 16 and 24 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.[9] 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) score. All the data thus generated was tabulated for analysis.[10]

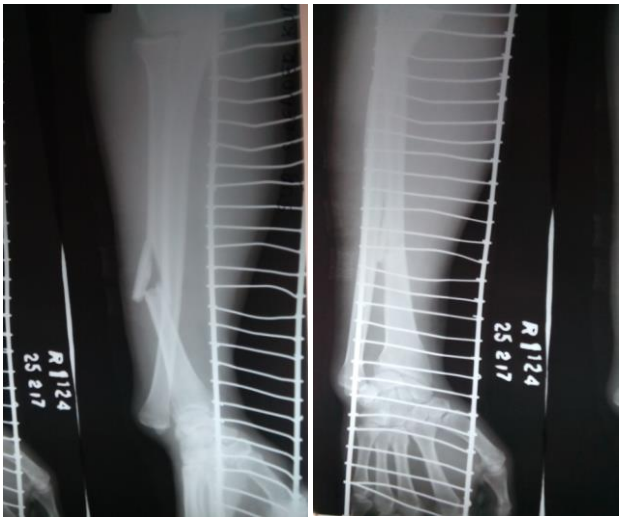

Figure 3: Radiograph showing example of Type 22-B2.3 fracture.

Figure 4: Radiograph showing management of case in Figure 2.

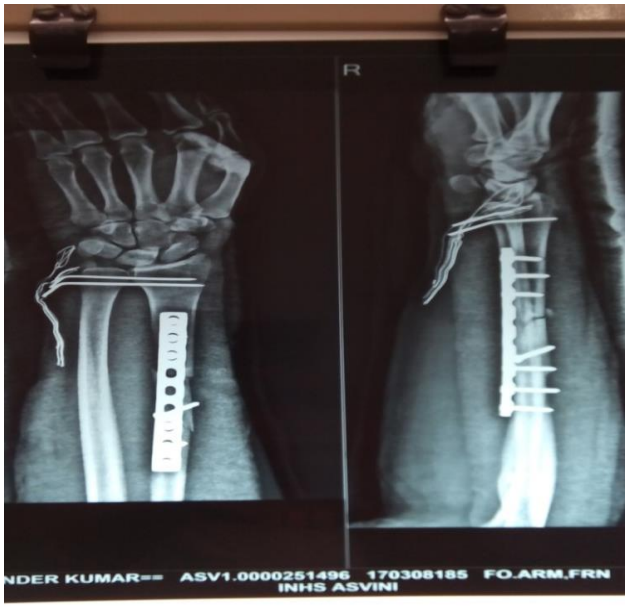

Figure 5: Radiograph showing management of case in Figure 3.

Figure 6: Radiograph and clinical picture of a case with poor DASH score. Both malunion and chronic dislocation of DRUJ can be seen.

RESULTS

The study was a retrospective study conducted at a tertiary care centre. 31 patients were examined for an average of 26 weeks. In the first 3 follow ups radiographs of the wrist were taken or till such time bony union occurred. The average time period for union was about 16 weeks. There was no case of delayed or non-union in our series.[10] Malunion was defined as angulations greater than 5^0 in any plain. There were 2 cases of malunion in our series. The range of movement at the wrist joint was the principal determinant of the functional out come and was measured precisely at every follow up.[11] The average range of movement for type 22-A2.3 was flexion: 70^0, extension: 65^0, radial deviation: 15^0, ulnar deviation: 30^0.

The average range of movement for type 22-B2.3 was flexion: 60^0, extension: 55^0, radial deviation: 5^0, ulnar deviation: 20^0. Hence, in general the outcome of patients with type 22-A2.3 fracture was functionally better than type 22-B2.3 (Table 1). None of the patients in our series had any demonstrable DRUJ laxity. Also there was no reported case of arthrosis of the wrist joint in our series for the duration of the follow up. 29 patients in our series had no demonstrable DRUJ laxity and no arthrosis of the wrist joint. Remaining 2 cases, who had poor functional outcome on DASH score had both chronic DRUJ laxity and wrist arthrosis alongwith malunion of radius fracture.

Table 1: Showing functional outcome of two fracture types.

Range of movement (Degrees)	22-A2.3	22-B2.3
Flexion	70	60
Extension	65	55
Ulnar deviation	30	20
Radial deviation	15	05

Table 2: Showing functional outcome of Galeazzi fracture dislocation based on DASH score.

DASH Score	Number of Cases
0-25 (Good)	18
26-49 (Fair)	11
50-75 (Poor)	2
76-100 (Severe)	NIL
Total	31

We also used the disability of arm, shoulder and hand (DASH) index for assessment of functional outcome. The final DASH score was analyzed at the end of 26 weeks. It measure physical function and symptoms in patients with any or several musculoskeletal disorders of the upper limb. It gives clinicians and researchers the advantage of having a single, reliable instrument that can be used to assess any or all joints in the upper extremity. Quick DASH score was used by us. It contains 11 questions about the ability of patients to do daily activities. Quick DASH was calculated by adding up all the assigned values for each response divided by the number of items which is than subtracted by 1 and multiplied by 25. The range of results is between 0 to 100. The higher the quick DASH score the higher the disability and lower score indicates better functions. Scores 75-100 indicated severe disability, 50-74 indicated poor, 25-49 showed fair and 0-25 showed good function. 18 patients had good function, 11 had fair and 2 had poor function (Table 2).[12]

DISCUSSION

Galeazzi fracture dislocation is highly unstable injury involving fracture of distal third/fourth of radius with dislocation of the distal radio ulnar joint.[13] Results of conservative management are exceedingly poor owing to deforming forces of muscles, ligaments and gravity. In our series 16 patents had fracture of radius within 7.5 cm of the articular surface, they had more severe dislocation of the DRUJ and were classified as type 22-B2.3. Remaining 15 had fracture of radius more than 7.5 cm from articular surface and had less severe dislocation of DRUJ, they were classified as type 22-A2.3. All type 22-A2.3 (i.e. 15) had good functional outcome on DASH score and 3 of type 22-B2.3 had also had good outcome. 11 of type 22-B2.3 had fair and 2 had poor outcome. Overall 58% had good and 36% had fair outcome (Table 3).

Table 3: Showing functional outcome distribution based on DASH score.

DASH Score	Type 22-A2.3 (n=15)	Type 22-2.3 (n=16)
Good	15	3
Fair		11
Poor		2
Severe	Nil	Nil
Total	15	16

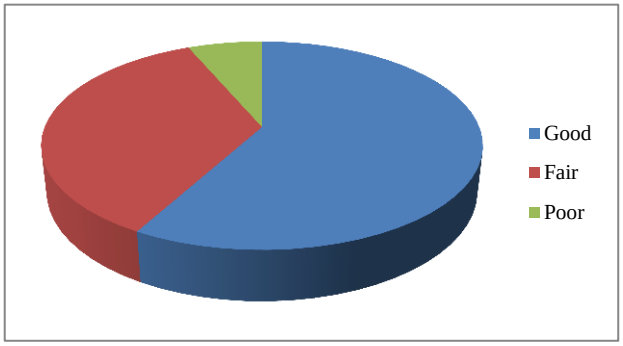

Figure 7: Pie chart showing distribution of functional outcome based on DASH score.

Hence, 94% patients had good to fair outcome. This result can be attributed to the importance of DRUJ stabilisation given in our series. All the cases were treated with two percutaneous Kirschner wires inserted parallel to the wrist joint followed by splinting in long cast for 6 weeks. This held the DRUJ against the destabilising forces of muscles acting on it and prevented recurrence of dislocation at DRUJ. Also radius fracture fixation was anatomical and maintained throughout the period of union. In these patients the functional status was regained after an average 14 weeks.

The remaining 2 cases with poor outcome had a persistent dislocation of the DRUJ with dorsal subluxation of distal ulna and restricted supination/pronation.[14] Both the cases had loss of anatomical fixation of radius (Figure 6). Both the cases were treated by open repair of DRUJ. But this only reduced the dislocated DRUJ with no functional improvement.[15,16].

CONCLUSION

All Galeazzi fracture dislocations should be stabilised with 2 Kirschner wires inserted parallel to wrist, and maintained for 6 weeks. All the cases should be maintained in a posterior splint for 6 weeks. Intraoperative assessment of DRUJ is the gold standard for checking stability of DRUJ. Galeazzi fractures with radius fracture within 7.5 cm of distal articular surface have poorer outcome than those with radius fracture more than 7.5 cm from articular surface. Operative procedure should be ideally done within 4 days for best postoperative results. Institutional physiotherapy to regain function is advisable.

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