

# Outcome of Operative and Non Operative Treatment of Glenoid Fossa Fractures in a Tertiary Care Hospital in Peshawar

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## ABSTRACT

**Objective:** This study was aimed at reviewing operative and nonoperative treatment of Glenoid fossa fractures in our hospital and view to identifying measures necessary to improve outcome.

**Study Design:** Retrospective study

**Place and Duration of Study:** This study was conducted at Orthopedic Department of Lady Reading Hospital, Peshawar from March 2012 to July 2014

**Materials and Methods:** 21 patients of glenoid fossa fractures were included in this series with 14 males and 7 females. Patients with displacement of >5 mm who were fit to undergo surgery within 3 weeks of injury were operated using a posterior Judet's approach. Overall 8 patients with displaced fractures were operated (Group A) while 9 patients with displaced fractures (Group B) and 4 patients with undisplaced fractures (Group C) were managed nonoperatively.

**Results:** The incidence of associated injuries was 57.14%. The mean length of hospital stay was 15.3, 32.5, and 3.9 days in groups A, B, and C, respectively. In group A, average constant score was 86.98. The least constant score was observed for group B (57.97) while group C had an average constant score of 85.9. Brachial plexus injury and fracture-dislocations had poorer outcome.

**Conclusion:** Operative treatment for displaced glenoid fossa fractures is a viable option at centers equipped to handle critically ill patients and subset of patients with fracture-dislocation as opposed to fracture alone should always be treated operatively due to persistent loss of function.

**Key Words:** Functional Outcome, Glenoid Fracture, Non-operative, Operative

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## INTRODUCTION

Fractures of the scapula comprise 0.4-1 per cent of all fractures. Fractures of the glenoid make up around 10 percent of scapular fractures<sup>1,4</sup>. Of all glenoid fractures, approximately 10 per cent are substantially displaced<sup>5,6</sup>. Operative treatment therefore is a relatively rare procedure. most common are the anterior avulsion and rim fractures, accounting for 75-85% of all glenoid fractures<sup>6,7</sup>

The glenoid fossa fractures are mostly seen in high energy trauma patients in which the humeral head impacts on the glenoid fossa<sup>8,9</sup>. These fractures are often transverse, creating a fracture line in the direction of the applied force: either through the lateral-inferior part causing an inferior displacement due to the forces

of the triceps, or through the superior part that includes the coracoid process, resulting in an antero-inferior displacement, due to the long head of the biceps and the conjoint tendon<sup>1</sup>. the fracture can also extend through the body into the medial border of the scapula<sup>2,3</sup>. Direct forces in blunt trauma, causing a scapular fracture, may also extend into the articular surface<sup>10</sup>. Up to 60% of these high energy fractures are associated with concomitant injuries to chest, clavicle, humerus, head and brachial plexus<sup>11-13</sup>. The severity of these injuries may distract the attention from the glenoid fracture leading to a delay in its diagnosis

Scapular fractures are rare injuries and most often treated nonoperatively with acceptable results.<sup>14-16</sup> Most scapular fractures are non or minimally displaced and do well with conservative treatment.<sup>17,18</sup> This observation, however, has been based on the treatment of scapular fractures in general and its relevance is, therefore, very limited. A more differentiated approach is necessary as good results are not guaranteed with exclusively conservative treatment in all cases.<sup>19</sup>

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There is a relative paucity of articles reporting on the outcome of treatment of glenoid fossa fractures. We retrospectively analyzed the outcome in our patients of glenoid fossa fractures.

## MATERIALS AND METHODS

This study was conducted at orthopedic department of Lady Reading Hospital, Peshawar from March 2012 to July 2014. On retrospective search of hospital records, we identified patients sustaining glenoid fossa fractures and admitted in our emergency department. We were able to identify 21 cases with glenoid fossa fracture who were available for assessment. All subjects who were available for follow up and gave informed consent for their inclusion in the present series were included.

The mean age of patients at the time of trauma was 29 years (range 18-59) there were 17 males and 4 females. Road traffic accident was the most common mode of injury accounting for 15 cases, followed by fall from height (4), electrocution (1), and fall of heavy object (1). All except one case had closed injury. Associated injuries included brachial plexus injury (2), clavicle fracture (5), coracoids fracture (2), acromion fracture (2), scapular body fracture (3), ipsilateral upper limb fracture(s) (4), rib fracture(s) (9), spine injury (1), pelvic injury (2), lower limb fractures (2), head injury (4), blunt trauma chest (8), and blunt trauma abdomen (1). Overall, 12 patients had significant associated injury (excluding ipsilateral shoulder girdle fractures).

## RESULTS

The incidence of associated injuries was 57.14%. The mean length of hospital stay was 15.3, 32.5 and 3.9 days in groups A, B, and C, respectively. Time for fracture union was the least in group C (5.6 weeks) followed by group A (6.5 weeks) and was the longest in group B (9.5 weeks), but union was achieved in all cases without further intervention, with overall mean time of 7.2 weeks for union in this series Table 1.

In group A, the average Constant score was 86.98 with four excellent, two good, one fair, and one poor result. Mean operative time was 103 min (range 45-150 min). The least Constant score amongst the three groups was observed for group B (57.97) with one excellent, two good, two fair, and four poor results. In group C, the average Constant score was 85.9 with two excellent and two good results Table 2. Amongst the different parameters of Constant score, pain and function were the least affected at the final follow up, whereas range of movements followed by strength were the most severely affected.

Predictors of inferior outcome included brachial plexus injury and fracture dislocation of glenoid. Four of 7 cases with poor result in this series had either brachial plexus palsy or fracture dislocation. Only one poor result in group B was not attributable to either of these two factors. Time taken till maximal improvement in

shoulder Constant score was also compared amongst the three groups and yielded the least value for group A followed by groups C and B. There were two cases of superficial wound infection which resolved with prolonged course of antibiotic therapy for 6 weeks.

**Table No.1: Mean length of hospital stay and Time for fracture union of all three groups**

Sr. No.	Groups	Mean length of hospital stay (days)	Time for fracture union (weeks)	Incidence of Associated Injuries %
01	A	15.3	6.5	
02	B	32.5	9.5	
03	C	3.9	5.6	
				57.14

**Table No.2: Constant score of all three groups**

Sr. No	Groups	Average Constant score	Mean operative time (mins)
01	A	86.98	103
02	B	57.97	103
03	C	85.9	103

## DISCUSSION

The relative infrequency (prevalence 1%) and "benign characteristics" of a scapular fracture probably explains the limited attention in the literature. Glenoid fossa fractures represent 10% of scapular fractures with overall prevalence of 0.1%.<sup>18, 20</sup> Majority of glenoid fossa fractures are undisplaced and can be managed nonoperatively. This is in contrast to the present series, where majority of fractures were displaced. This may be due to the referral system prevalent in our region whereby we receive higher percentage of patients with high-velocity trauma. Furthermore, inpatient records searched during this study did not include the records of patients with low-velocity trauma who are kept under observation for up to 24 h before being discharged.

The glenohumeral joint affords more degree of freedom of movement than any other joint and is therefore able to compensate for severe deformities and loss of movements. Although traditionally advocated treatment for scapular fractures has been nonoperative,<sup>21</sup> recent authors have reported on favorable outcome after operative treatment for displaced glenoid fractures.<sup>22</sup> We did not encounter any immediate complication related to the operative procedure, which is similar to the observation made in previously published reports, thus indicating the safety of the approach and feasibility of surgery. Nevertheless, postoperative infection remains a major cause of poor result.<sup>23</sup>

The most important predictor of poor outcome in the present series was nonoperative treatment in association with dislocation. Patients with persistent brachial plexus injuries also fared poorly, which has been universally accepted as an indicator of poor outcome in

previously published series.<sup>24</sup> Excluding these cases with dislocation (gross displacement) and brachial plexus palsy, only one patient of the remaining six in group B had poor result. Thus, a satisfactory result might still be achieved with nonoperative treatment of displaced fractures. Time taken to achieve maximal improvement in shoulder Constant score was the least in group A followed by groups C and B. This earlier recovery of shoulder function was perhaps in part due to shorter period of immobilization and earlier institution of physiotherapy in group A.

The most common mechanism of these injuries is a violent force applied laterally to the proximal part of the humerus, which is then driven into the glenoid cavity.<sup>25</sup> A transverse fracture of the glenoid fossa occurs and then propagates in one of several directions, depending on the direction of the traumatic force.<sup>25</sup> On account of the amount of force generally required to produce these fractures, the incidence of associated injuries is relatively high.<sup>25</sup> Nearly half of these patients have a concomitant injury excluding the shoulder girdle.<sup>25</sup> In the present series, 57% (12/21) cases had associated injuries, with rib fracture and blunt trauma of the chest being the most common injuries. The treatment of these associated injuries invariably assumes priority over scapular fracture on account of their severity and often precludes surgical treatment of displaced fractures during the initial period.

Goss was one of the first authors to recommend surgical treatment of glenoid fossa fractures.<sup>25</sup> He emphasized on reduction of intra-articular step greater than 5 mm. Instability of glenohumeral joint or of fracture fragments themselves is a more compelling indication for surgery, which can occur with fracture of more than one-fourth of the glenoid cavity.<sup>25</sup> In a review of significant published series on operative treatment of scapular fractures, Nevertheless, it seems reasonable to individualize treatment based on the associated injuries, feasibility of surgery and the risks involved, presence of instability between the fractured fragments or at the joint itself, presence of gross displacement of fragment, or a fracture involving >25% of glenoid cavity.

## CONCLUSION

To conclude, due to rarity of these injuries, most reported series have included a relatively small number of patients treated operatively and even less often treated nonoperatively. Thus, endorsement of favorable results of these series might be an over simplification as the outcome of these fractures might be often dependent on factors other than the anatomy of the fracture alone. We believe that operative treatment for displaced glenoid fractures is a viable option at centers equipped to handle critically ill patients. However, lack of such treatment does not preclude a satisfactory outcome in all displaced fractures. A subset of patients with

fracture dislocation as opposed to fracture alone should perhaps always be treated operatively due to persistent loss of function with nonoperative treatment, although the sample size is too small for deriving a meaningful conclusion.

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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