

Original Research Article

Short and medium term outcome of surgical treatment of the floating shoulder

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ABSTRACT

Background: Floating shoulder are rare injuries just because of high velocity of trauma and road traffic accidents. The aim of this study was to evaluate the functional outcome of surgically treated clavicle, glenoid and both bone injuries.

Methods: This prospective study was conducted in the department of orthopaedics, Sir. T. Hospital, Bhavnagar from October 2009 to November 2013. Out of 25 patients all turned up for follow up. Functional and clinical assessments done with range of movements in surgically treated fractures of clavicle, glenoid and both bone group.

Results: All bone fractures are united in all the patients. The mean follow up period was 30 months. The mean functional result was assessed using Rowe score to assesses the function, pain, stability and motion. All the cases showed excellent to fair results after follow up period.

Conclusions: Surgical treatment for double disruption of the superior shoulder suspensory complex, which is inherently an unstable and rare injury, is a good option, allowing early rehabilitation and improving the functional outcome.

Keywords: Floating shoulder, Management, Outcome

INTRODUCTION

Ipsilateral fracture of the clavicle and scapula are rare and unstable called as floating shoulder. Surgical reduction and fixation to be considered in displaced one or both sides.¹ Minimally displaced fracture can be treated conservatively with acceptable results. It was first described by Ganz and Noesberger in 1975.² Floating shoulder injuries are the result of high energy mechanisms with an approximate of 0.10% of severe traumas. The outcome of the associated fractures results with poor cosmesis, reduced strength and dyskinesia of shoulder girdle.¹

Some studies have shown good outcomes with conservative treatment along with aggressive physiotherapy after a few weeks.³ Possibly latter treatment was reserved for undisplaced or minimally displaced fractures. In previous studies, it was shown that in isolated clavicle fractures excellent to satisfactory results was

noted with either conservative or operative treatment. However, significantly displaced scapular neck fractures have resulted in poor outcomes.^{4,5} Some studies have recommended that fixation of both clavicular and scapular fractures result in good outcome with significant displacements.⁶⁻⁸

Many management options are available for treating the floating shoulder that may result either equally good or bad outcomes. The present study was done with the aim to evaluate the functional outcome of surgically treated clavicle, glenoid and both bone injuries.

METHODS

This was a prospective study done on 25 patients with floating shoulders attending to the department of orthopedics, Sir. T. Hospital, Bhavnagar during the period from October 2009 to November 2013. The study

was carried out after getting approval from institutional ethics committee.

Inclusion criteria

Inclusion criteria were skeletally matured patients of age >18 years, patients with fresh ipsilateral middle third clavicular fracture and scapular fracture defining floating shoulder, patients attended for minimum follow up of 12 months were included.

Exclusion criteria

Exclusion criteria were skeletally immature patients of <18 years of age, old injuries with fracture malunion and nonunion.

All the patients were subjected to surgical treatment. Operative criteria for ipsilateral fractures are medial glenoid displacement of greater than 3.0 cm, clavicle displacement that meets indication of open reduction, multiple trauma with need for early upper extremity weight bearing and if glenoid version was greater than 40.

At the time of injury, X-ray of shoulder antero-posterior, axillary views and scapular y view was done. All patients had computed tomography (CT) scans with three-dimensional (3D) reconstruction of the scapular fracture to assess deformity which included the glenopolar angle.

Surgical technique

The patient was placed in the lateral decubitus position or in deck chair position with allowing adequate exposure of the scapula and clavicle. Initial fixation of clavicle may allow indirect reduction glenoid segment and obviate the need of posterior procedure but if even after clavicle fixation if displacement is significant then there must do posterior procedure, order of fixation is debatable and remains at the discretion of the surgeon. Conversely, fixation of the displaced glenoid segment may be deemed more important and can be carried out first, followed by open reduction and internal fixation of the fracture of the clavicle if necessary.

The clavicle was approached through an incision directly over its subcutaneous border. Care was taken to identify and protect the adjacent neurovascular structures. The fracture site was exposed subperiosteally both proximally and distally then reduced and stabilized using a standard plate and screws. Intramedullary devices, pre-contoured plates, and locking plates were preferred in certain situations, such as severe comminution, osteoporotic bone, or surgeon preference.

The glenoid neck was approached posteriorly or via modified Judet approach. The posterior deltoid is either split in the line of its fibres or detached at its origin and retracted distally. The interval between infraspinatus and teres minor was developed to expose the posteroinferior

glenoid neck and lateral border of the scapula. A superior approach was added to control the free glenoid fragment. Once a satisfactory reduction has been achieved, temporary fixation was achieved by passing K-wires through the glenoid fragment into adjacent bony structures (for example, through the glenoid fragment and into the scapular body, or through the acromial process into the glenoid fragment). Definitive fixation was achieved by means of a contoured 3.5 mm reconstruction plate applied along the lateral border of the scapula and the posterior aspect of the glenoid process. Additional fixation was provided by K-wires or lag screws.

At 1-2 weeks postoperatively, physical therapy-directed passive range of motion (ROM) was instituted in all patients. At 6 weeks postoperatively, physical therapy-directed active ROM and strengthening was started. All the patients were followed up for 30 months. Functional outcome was assessed in all types of fracture using Rowe score. The Rowe score was graded excellent (90-100 points), good (70-89 points), fair (40-69 points) and poor (39 points or less).⁹

The collected data was analysed using microsoft excel and presented in number and percentages.

RESULTS

The study included 25 patients with 2 undisplaced fractures, 3 patients with minimal displacement, 7 with displaced clavicle and undisplaced scapula, 5 with displaced glenoid with undisplaced scapula and 8 patients with displacement of both clavicle and scapula (Table 1). Majority of the patients belongs to (26-35) years (40%). Male predominance was seen in the study (64%).

Table 1: Demographic and clinical characteristics of the patients (n=25).

Characteristic	Number	Percentage
Age groups (in years)		
18-25	07	28
26-35	10	40
36-55	06	24
55-65	02	08
Sex		
Male	16	64
Female	09	36
Type of fractures		
Undisplaced	2	8
Minimal displaced	3	12
Displaced clavicle with undisplaced scapula	7	28
Displaced glenoid with undisplaced scapula	5	20
Displaced both clavicle and scapula	8	32

The mode of treatment given to the patients was given in (Table 2). The mean follow-up of the study was 30 months. Functional outcome of the study was analysed using Rowe score and data was presented in (Table 3). Out of 25 patients, 5 having undisplaced and minimal displaced fractures and they were treated conservatively by giving shoulder immobilizer and clavicle brace for 30 days to 45 days. Out of them 1 patient had an excellent result, 2 had good and 1 patient had poor result with limitations of movements. Clavicle fixation only done in 10 patients in

which 7 patients. Had only displaced clavicle fracture and 3 patients had displaced fracture both bone in which reduction of glenoid achieved passively by initial fixation of clavicle, out of which 5 excellent, 3 had good and 2 had fair result. Whereas 6 patients were fixed scapula only in which 2 patients had excellent result, 3 had good and 1 had fair result. In our study 4 patients. Had significantly displaced fracture of both bone, fixation of both bones required out of them 3 had excellent result and 1 patient had good result.

Table 2: Type of management in different types of fracture (n=25).

Type of management	Undisplaced	Minimal displaced	Displaced clavicle with undisplaced scapula	Displaced glenoid with undisplaced scapula	Displaced both clavicle and scapula
	N (%)	N (%)	N (%)	N (%)	N (%)
Conservative	2 (8)	3 (12)			
Fixation of clavicle only			7 (28)	-	3 (12)
Fixation of scapula only			-	5 (20)	1 (4)
Fixation of clavicle and scapula			-	-	4 (16)

Table 3: Functional outcome in different types of management (n=25).

Outcome	Conservative	Fixation of clavicle only	Fixation of scapula only	Fixation of clavicle and scapula
	N (%)	N (%)	N (%)	N (%)
Excellent	1 (4)	5 (20)	2 (8)	3 (12)
Good	2 (8)	3 (12)	3 (12)	1 (4)
Fair	2 (8)	2 (8)	1 (4)	-
Poor	-	-	-	-

DISCUSSION

Floating shoulders injuries are rare and their fracture patterns are complex in nature. They result due to high energy trauma and often associated with ipsilateral shoulder and chest trauma.¹⁰

Previous studies reported clinical outcomes of types of clavicular fixation with varied results. In a study by Labler et al, he reported that 17 patients were treated conservatively with clavicular fixation in some cases and with combined clavicular and scapular fixation in some cases. The outcome was assessed using Constant-Murley scores. In their operative group, 5 patients showed good to excellent results and 4 patients showed bad to fair results. The high scores was noticed in non-operative groups.¹¹ In other study by Noort et al, only 2 of 7 seven patients had only clavicular fixation with indirect scapular reduction and other 5 patients were managed with caudal displacement of the glenoid.¹² In a study by Oh et al, improved mean Rowe scores was observed in clavicular fractures treated operatively compared to conservative management.¹³ The present study also demonstrates similar observations. The findings showed excellent to fair

outcome in clavicular fixation with floating shoulder injuries.

In the current study, excellent, good and fair Rowe scores was observed in a total of 6 patients. Previously no validated surgical indications were noted for scapular fixation alone. Glenopolar angle (GPA) was introduced by Romero et al, as indicative of clinical outcomes of scapular neck fracture. GPA less than 20° was considered as severe rotational displacement and considered as criteria for surgical reduction and internal fixation. But no conclusion was drawn in his study due to less number of patients.¹⁴

Our study showed excellent and good Rowe scores with stabilization both clavicle and scapula bone fixations. Similar observations were noticed in a study done by Leung et al in 14 out of 15 patients.¹⁵

Limitations

The involvement of single center in this study and inclusion of a smaller number of patients are the weakness of the study. Absence of utilization of standard functional outcome tools such as UCLA shoulder score, Constant-

Murley score, ASES shoulder scoring scale and disabilities of arm, shoulder and hand (DASH) systems is another limitation. No validated surgical indications for scapular fixation alone are not available in the literature. Therefore, potential patient selection and management intervention bias may have occurred in the results.

CONCLUSION

The findings of the study conclude, that surgical intervention should at least be considered for all floating shoulder injuries. Acceptable results can be expected for patients with minimally-displaced fractures treated non-operatively. Significant displacement at one or both fracture sites can result in a poor functional outcome which can be improved with surgical intervention.

Operative fixation of the clavicle alone can indirectly reduce the displaced fracture of the glenoid neck satisfactorily. However, open reduction and internal fixation of the second site must be performed if significant displacement persists, which gives excellent to good range of movement of shoulder girdle.

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

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