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Clinical profile of patients with extra articular glenoid neck and scapular body fractures

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Abstract
Majority of the scapular fractures does not require adequate surgical intervention. The scapular fractures with minimal displacement heal without any functional deficits. But, the literature suggest that, non-operative management with minimal displacement can lead to the persistent symptoms and decreased function of the shoulder girdle. A prospective study was undertaken in the department of Orthopedics of Medical College and General Hospital among the 30 cases of glenoid neck and scapular body fractures between December 2016 to June 2018. The cases were also followed up for period of 6 months with clinical and radiological evaluations. Road traffic accident was the main reason for majority of scapular fractures in this study. About 70% of the males and 70% of the females had scapular injuries due to road traffic accidents. In males, road traffic accident was followed by, fall from height (15%), direct blow (10%) and fall of heavy object in 5% of the study group. In females road traffic accidents were followed by fall from height in 30% of the cases. This difference in mode of injury was not statistically significant between the males and females.

Keywords: Extra articular glenoid neck, scapular body, fractures

Introduction
Shoulder is one of the dynamic joint in the human body. The joint is very much mobile and has a large range of motion which comes at the expense of stability. A number of activities including dressing, eating, personal hygiene and work are hindered by the shoulder joint injury [2]. Pain in the shoulder and shoulder girdle is a common ailment in general population with a reported prevalence of 15 to 25% in middle aged adults [3, 4].
The shoulder pain has been shown to impair the ability and thus affects mood and concentration. The shoulder disorders can also lead to considerable disability, reduction in health related quality of life, absenteeism from work and substantial utilization of health care resources [5].
Scapula is an important bone in formation of the shoulder joint. It is a large, flat triangular bone lying in the posterolateral aspect of the chest wall covering some part of 2nd to 7th ribs. This bone has three processes including spine, its continuation with the acromion and the coaracoid process. The acromion projects forwards and almost at right angles from the lateral end of the spine. Medial aspect acromion gives the attachment to the lateral end of the coracoacromial ligament. The association between the upper extremity and the axial skeleton requires the integral role of scapula. It articulates with the humerus at the glenohumeral joint with the clavicle at the acromioclavicular joint and with thorax as the scapula thoracic joint. These three articulations entails full range of motion often coordinated by eighteen different muscles which originate and from or insert on the scapula. Six basic movements of the scapula including elevation, depression, upward rotation, downward rotation, protraction and retraction [6].
The literature available shows that the fractures of the scapula are quite uncommon fractures. The incidence of scapular fractures ranges from 3% to 5% of all the fractures of the shoulder girdle and less than 1% of all fractures [7, 8]. High energy trauma is mainly responsible for the fractures of the scapula and more than 50% of the fractures have associated injuries [7].
The scapular fractures include extra articular fractures including scapular body in 99%, scapular neck in 83% and intra articular glenoid in 80% of the cases and most of them will be

treated conservatively [9]. Glenoid articular surface is usually involved in 10% of the fractures. The management of the scapular fractures is unique and challenging. A number of systems have been developed for the classification of the scapular fractures but the lacked the evidences with the clinical datasets of actual fracture patterns [10, 11]. The surgical decision making is does not elucidate one set of the operative indications [12, 13].

Majority of the scapular fractures does not require adequate surgical intervention. The scapular fractures with minimal displacement heal without any functional deficits. But, the literature suggest that, non operative management with minimal displacement can lead to the persistent symptoms and decreased function of the shoulder girdle [14]. Some authors suggest open reduction and internal fixation for the management of scapular fractures. The outcome of the operative management of the extra articular glenoid neck and scapular body fractures had shown good outcomes with validate functional outcomes assessment at the end of 33 after surgery. The rationale behind the surgery is the range of motion far exceeds that which is needed for the activities of daily living. The functional compensation can occur due to the malunion, with possible loss of motion, strength, endurance or reaction time of the shoulder girdle. The literature available shows that the scapula is part of a dynamic stabilizer of the humerus and shoulder complex [15].

The reduction of scapular fracture demands a perfect anatomical fit which is important in minimizing the overlying tissue irritation, aiding in fracture reduction and improving the mechanics of the bone plate construct. The soft tissue irritation and operative time by reducing or precluding the need for intraoperative plate bending is allowed by the locking scapular plates with their site specific contouring. The scapular plates are often available in four different forms including scapular spine (S), glenoid (G), lateral border (LB) and medial border (MB). MB plates are often available in two sizes. The need for hardware removal later is reduced due to potential reduction in surrounding tissue irritation. The scapular anatomy can be more easily reconstructed by precontouring. These plate designs also direct fixation to relatively higher quality areas of bone. The site specific precontoured locking plates may offer advantages over non anatomical specific fixation methods [16].

Methodology

A prospective study was undertaken in the department of Orthopedics of Medical College and General Hospital among the 30 cases of glenoid neck and scapular body fractures between December 2016 to June 2018. The cases were also followed up for period of 6 months with clinical and radiological evaluations. Clearance from institutional ethics committee was obtained before the study was started. An informed, written and bilingual consent was obtained from all the patients before they were included in to the study.

The inclusion and exclusion criteria were as follows

Inclusion Criteria

1. Age – 20 – 50 years of age
2. Patients presenting with extra articualr glenoid neck and scapular body fractures.
3. Patients willing for surgery
4. Patients fit for surgery

Exclusion Criteria

1. Pathological fractures.
2. Associated neurovascular injuries.
3. Moderate to severe head injury Glasgow coma scale less than 12
4. Multitrauma patients
5. Patients with pre-existent morbidity and concerning arm and shoulder.
6. Pregnant women
7. Patients less than 20 years and more than 50 years.

About 30 cases with extraarticular glenoid neck and scapula body fractures were included in to the study. A detailed history was obtained from all the patients before they were subjected for the surgery. A detailed physical examination was conducted with reference to the polytrauma and severe associated injuries before subjecting them for investigations. First Aid treatment was given before taking them to surgery. X ray with AP, oblique/lateral views were done, Routine investigations as per the institution protocol were sent. All the patients were subjected for Pre-anaesthetic check-up and clearance. In case of open fractures, debridement of the wound and thorough irrigation was done with normal saline.

The fractures were classified using anatomic and OTA classification. Open reduction and internal fixation procedure was done. Reduction plates were used during the surgery. Immobilization was applied as per the fixation is achieved. The patients were treated post operatively with IV antibiotics and analgesics. The suture was removed on 10th post operative day. Follow up was done post operatively at 1 month, 3 months, 6 months respectively with evaluation of outcome clinically and radiologically.

Results

Table 1: Distribution of the study group according to age

Age group (in years)	Male n (%)	Female n (%)	Total n (%)
20 – 30 years	8 (40.0)	6 (60.0)	14 (46.7)
31 – 40 years	5 (25.0)	3 (30.0)	8 (26.7)
41 – 50 years	7 (35.0)	1 (10.0)	8 (26.7)
Total	20 (100)	10 (100)	30 (100)
Mean ± SD	34.75 ± 8.26	29.7 ± 5.94	33.07 ± 7.84
T value	1.717		
P value	0.097, NS		

The mean age of the study group was 33.07 years in this study. The mean age of the males was 34.75 years among males and 29.7 years among females. This difference in age was not statistically significant between the males and females. This study had shown that, about 40% of the males and 60% of the females were aged between 20 – 30 years. It was followed by 41 – 50 years in males and 31 – 40 years in females.

Table 2: Distribution of the study group according to mode of injury

Mode of injury	Male n (%)	Female n (%)	Total n (%)
Direct blow	2 (10.0)	0	2 (6.7)
Fall from height	3 (15.0)	3 (30.0)	6 (20.0)
Fall of heavy object	1 (5.0)	0	1 (3.3)
Road traffic accident	14 (70.0)	7 (70.0)	31 (70.0)
Total	20 (100)	10 (100)	30 (100)

χ^2 Value= 2.25 df=3 p value = 0.522, NS

Road traffic accident was the main reason for majority of scapular fractures in this study. About 70% of the males and 70% of the females had scapular injuries due to road traffic

accidents. In males, road traffic accident was followed by, fall from height (15%), direct blow (10%) and fall of heavy object in 5% of the study group. In females road traffic accidents were followed by fall from height in 30% of the cases. This difference in mode of injury was not statistically significant between the males and females.

Table 3: Distribution of the study group according to site of fracture

Site of the fracture	Male n (%)	Female n (%)	Total n (%)
Glenoid neck	7 (35.0)	5 (50.0)	12 (40.0)
Scapular body	7 (35.0)	2 (20.0)	9 (30.0)
Both	6 (30.0)	3 (30.0)	9 (30.0)
Total	20 (100)	10 (100)	30 (100)

χ^2 Value= 0.875 df=2 p value = 0.646, NS

This study had shown that, Glenoid neck of the scapula was involved in 40% of the total cases which was followed by scapular in body in 30% of the cases and both glenoid neck and body of the scapula in 30% of the cases. In males, glenoid neck and body of the scapula was involved in 35% of the cases respectively and both were involved in 30% of the cases. In females, Glenoid neck was involved in 50% of the cases, both in 30% and scapular body in 20% of the cases. This difference in involvement of the scapula was not statistically significant between the males and females.

Table 4: Distribution of the study group according to interval between fracture and surgery (in days)

Interval between fracture and surgery (in days)	Male	Female	T value	P value, Sig
Mean ± SD	15.45±8.06	18.2±7.51	0.901	0.375, NS

The mean duration of the injury to the surgery was 16.37 days in all the cases. The mean duration of injury to surgery was 15.45 days in males and 18.2 days in females which was statistically not significant between the males and females.

Discussion

The mean age of the study group was 33.07 years and the mean age of the males was 34.75 years among males and 29.7 years among females. About 40% of the males and 60% of the females were aged between 20 – 30 years. It was followed by 41 – 50 years in males and 31 – 40 years in females. The age is an important factor in scapular fractures since it involves high velocity injuries. Youths, patients below 30 years and working people who are mobile from one to another place are known to be affected than the geriatric patients. Male patients are involved due to their movement from one place to another than the males.

In a study by Tucek *et al.*, the mean age of the patients with scapular injuries was 45.3 years in all the patients, 43.5% in males and 52.4% in females. Males outnumbered females and the males to female ratio was 3.9:1 [17].

In a study by Hobbs *et al.*, the mean age was 37 years ranging from 15 to 63 years and males outnumbered females [18].

In a study by Tatro *et al.*, all the patients were aged above 18 years [19].

In a study of extra articular scapular fractures by Brandsema *et al.*, the mean age was 48 years and males outnumbered females in the study.

In a study by Naik *et al.*, the mean age in study group was 32.52 years. About 44% of the study subjects were aged between 18 – 30 years and 32% were aged between 31 – 40 years [20].

Road traffic accident was the main reason for majority of scapular fractures in this study. About 70% of the males and 70% of the females had scapular injuries due to road traffic accidents. The scapula is an important bone which is often surrounded and protected by the muscles. High velocity injuries are mainly responsible for the scapular injuries than the low velocity injuries.

In a study by Tatro *et al.*, about 32% of the scapular fractures were due to motorcycle accident, 16% was due to motorcycle accident, fall from bicycle (14%), High fall in 11% of the study subjects [19].

About 47% of the patients in a study by Brandsema *et al.* were MVC passengers and 5.2% were MVC passengers [21].

In a study by Naik *et al.*, road traffic accidents were common mode of injuries in 60% of the cases followed by fall from height, direct blow and fall of heavy object.[20]

This study had shown that, Glenoid neck of the scapula was involved in 40% of the total cases. In males, glenoid neck and body of the scapula was involved in 35% of the cases respectively. In females, Glenoid neck was involved in 50% of the cases. The review of the literature suggests that, extra articular glenoid neck and scapular bodies are affected than the glenoid fossa, coracoid and acromion process and lateral border fractures.

In a study by Tucek *et al.*, most common fracture was scapular body in 52% of the cases, glenoid fossa in 29% of the cases, processes in 11% of the cases and least frequent was scapular neck in 8% of the cases.

In a study by Hobbs *et al.*, majority of the scapular fractures were glenoid fractures followed by acromion fractures.

In a study by Tatro *et al.*, about 97% of the extra articular fractures were scapular body fractures. About 24% of the fractures involved glenoid neck [50].

In a study by Brandsema *et al.*, 48% were non comminuted body fractures and 42% were comminuted fractures.

The mean duration of the injury to the surgery was 16.37 days in all the cases. The mean duration of injury to surgery was 15.45 days in males and 18.2 days in females.

In a study by Schroder *et al.*, all the patients with glenoid neck fractures and scapular body fractures were treated with 20 days of injury.

In a study by Hobbs *et al.*, the average time to surgery was 12 days ranging from 3 to 42 days excluding non-unions [18].

In a study by Tatro *et al.*, the interval between fracture to surgery was 14 days in extra-articular fractures and 15 days in intra articular fractures [19].

The duration of the surgery was 196.47 minutes in all the cases, 196.35 minutes in males and 196.7 minutes in females in this study.

In a study by Tatro *et al.*, the duration of the surgery was 188 minutes in extra articular fractures and 263 minutes in intra articular fractures [19].

Conclusion

The younger people and males were commonly involved with the scapular fractures as evident in this study. The DASH scores and VAS scores improved when compared to the baseline scores.

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