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ORIGINAL RESEARCH

Factors Affecting Functional Outcomes after Clavicle Fracture- A Clinical Study

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ABSTRACT:

Background: The clavicle is one of the most frequently fractured bones in the body, the fracture most often resulting from a direct blow or a fall on an outstretched hand. The present study was conducted to assess functional outcome in patients undergoing treatment for clavicle fractures. **Materials & Methods:** The present study consisted of 50 cases of clavicle fracture in adults of either sex in the Department of Orthopaedics, Guru Nanak Dev Hospital, Amritsar. All were treated by following methods; Conservative management which included webbing and ring in children, figure of 8 bandage, broad arm sling and K wire fixation. For lateral 1/3rd clavicular fracture, two K wires introduced through acromion into lateral end clavicle after reduction of fracture. Open reduction and internal fixation with plating was done wherever necessary. American shoulder & elbow surgeon (ASES) score were used to assess function on scale of 100 points, with higher score indicating better function and low score meaning greater pain and disability. **Results:** Males were 39 (78%), male child were 3 (6%) and females were 8 (16%) in number. The difference was significant (P< 0.05). The mean score for difficulty on putting coat was 2.89, difficult sleeping affected side was 2.15, difficult washing back was 2.88, manage toileting was 2.18, comb hair was 2.56, reach high shelf was 2.48, lift 10 lbs above shoulder was 2.80, throw a ball overhand was 2.72, difficult doing usual work was 2.94 and difficult doing sport/ leisure activity was 2.64. The mechanism of injury was fall seen in 19 (38%), road side accident in 28 (56%), physical assault in 3 (6%). The difference was significant (P< 0.05). **Conclusion:** We can conclude that clavicle fractures can be managed both conservatively and surgically. Type of fracture and type of treatment are factors affecting outcome of clavicle fracture management.

Key words: Clavicle, and internal fixation, Open reduction

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INTRODUCTION

The clavicle is one of the most frequently fractured bones in the body, the fracture most often resulting from a direct blow or a fall on an outstretched hand. With ever increasing number of automobile accidents fracture of clavicle in adult too has increased manifold.¹ Fractures of the clavicle, which primarily occur in young males, constitute 2.6–4% of all fractures in adults. A male dominance of approximately 70% has been reported. The incidence of clavicle fractures in adolescent and adult

population is suggested to be between 29 and 64 per 100,000 persons. As usual, in many traumas, its prevalence is highest among the young population even if also shows a bimodal age distribution with a rate in females that overtake males after the sixth decade of life as a result of osteoporosis and differences in life expectancy. The mean age has been reported to be 29.3 years, and the incidence appears to decrease significantly after the second decade of life.²

Males are affected approximately twice as often as females. These injuries may also have a seasonal correlation, with one epidemiologic analysis noting an increase during the summer. The most frequent injury mechanism is a direct fall on the shoulder. Fractures are often sustained during sports activities or traffic accidents.³

Different surgical treatments are reported in literature liked by different type of fractures and injury. Surgical treatment of medial-end clavicle fractures is indicated if mediastinal structures are placed at risk because of fracture displacement, in case of soft-tissue compromise, or when multiple trauma and/or “floating shoulder” injuries are present. Closed or open reduction should be performed to reduce the displaced fragment in an emergent fashion. When open reduction is necessary, several techniques have been described for internal fixation of fracture fragments.⁴The present study was conducted to assess functional outcome in patients undergoing treatment for clavicle fractures.

MATERIALS & METHODS

The present study consisted of 50 cases of clavicle fracture in adults of either sex in the Department of Orthopaedics,

Guru Nanak Dev Hospital, Amritsar. The study protocol was approved from institutional ethical committee. All were informed regarding the study and written consent was obtained in local language.

General information such as name, age, gender etc. was recorded in case history proforma. All were treated by following methods; Conservative management which included webbing and ring in children, figure of 8 bandage, broad arm sling and K wire fixation. For lateral 1/3rd clavicular fracture, two K wires introduced through acromion into lateral end clavicle after reduction of fracture. Open reduction and internal fixation with plating was done wherever necessary.

The patient were followed at every 3 week interval and assessed clinically and radiologically each time till the union occurs. Active physiotherapy of the shoulder, elbow and hand encouraged after 3-6 weeks.

American shoulder & elbow surgeon (ASES) score were used to access function on scale of 100 points, with higher score indicating better function and low score meaning greater pain and disability. Results were subjected to statistical analysis. P vale less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Gender	Number	Percentage	P value
Male	39	78	0.01
Male Child	3	6	
Female	8	16	
Total	50	100	

Table I shows that males were 39 (78%), male child were 3 (6%) and females were 8 (16%) in number. The difference was significant (P< 0.05).

Table II ASES Score

Parameters	Mean	SD
Put on coat	2.48	0.50
Difficult sleeping affected side	2.52	0.50
Difficult washing back	2.53	0.51
Manage toileting	2.38	0.49
Comb hair	2.26	0.44
Reach high shelf	2.44	0.50
Lift 10 lbs above shoulder	2.40	0.49
Throw a ball overhand	2.44	0.50
Difficult doing usual work	2.46	0.50
Difficult doing sport/ leisure activity	2.38	0.49

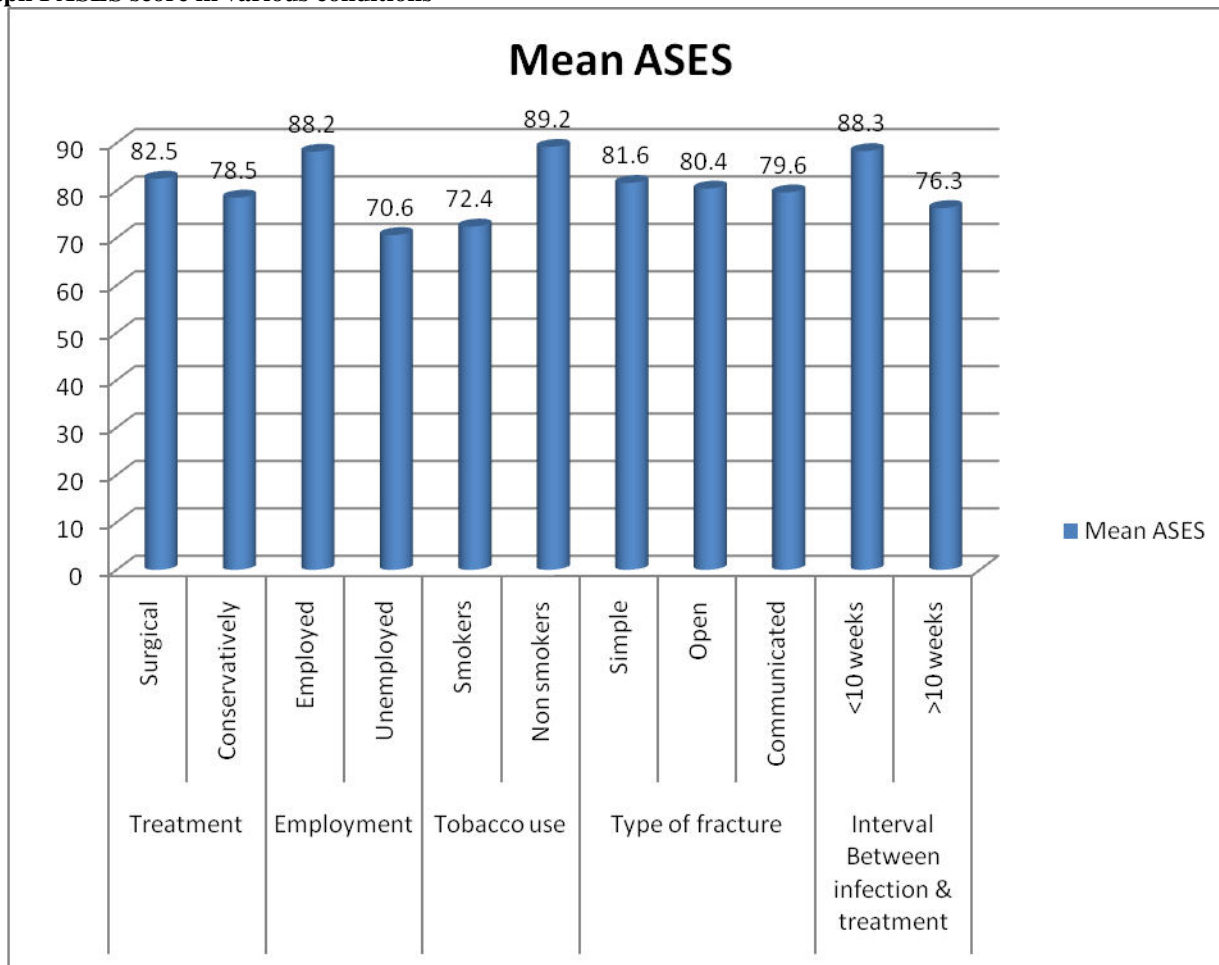
Table II shows that mean score for difficulty on putting coat was 2.48, difficult sleeping affected side was 2.52, difficult washing back was 2.53, manage toileting was 2.38, comb hair was 2.26, reach high shelf was 2.44, lift 10 lbs above shoulder was 2.40, throw a ball overhand was 2.44, difficult doing usual work was 2.46 and difficult doing sport/ leisure activity was 2.38.

Table III Mechanism of injury

Injury	Number	Percentage	P value
Fall	19	38	0.01
Road side accident	28	56	
Physical assault	3	6	
Total	50	100	

Table III shows that mechanism of injury was fall seen in 19 (38%), road side accident in 28 (56%), physical assault in 3 (6%). The difference was significant ($P < 0.05$).

Graph I ASES score in various conditions



Graph I shows that mean ASES score in patients treated surgically was 82.5 and conservatively was 78.5. Employed had better score ie 88.2 than unemployed 70.6. The difference was significant ($P < 0.05$). Smokers had score 72.4 whereas non smokers had good score 89.2. There was no difference in ASES score in simple, communicated and open fracture ($P > 0.05$). Fractures treated within 10 weeks had better score (88.3) than after 10 weeks (76.3). The difference was significant ($P < 0.05$).

Table IV Treatment given to patients

Treatment	Number	Percentage	P value
K wire	9	18	0.01
RC plate	10	20	
Figure of 8	18	36	
Arm Sling	13	26	

Table V Results of treatment

Result	Number	Percentage
Excellent	40	80
Good	10	20

DISCUSSION

Clavicular fracture is one of the most common bony injuries. They account for 2.6% to 4% of adult fractures and 35% of injuries to the shoulder girdle. The Malaysian Orthopaedic Association meeting concluded that there is a need to operate on certain clavicle fractures. Neer⁵ (1960) reported 3 non-unions out of 2,235 fractures that were treated with the closed method, whereas Rowe⁶ reported 4 non-unions out of 566 that were treated with the closed method. The majority of clavicle fractures are treated non-operatively with good outcomes. Measures such as an arm sling, analgesia and, in the case of mid shaft fractures, a figure of eight bandage across the shoulders, often provide ample treatment. Early comparisons of conservative and operative measures were in favour of conservative treatment.

A range of implants are available on the market for internal fixation of diaphyseal fractures, broadly divided into plate/screw configurations and intramedullary devices. The use of dynamic compression plates (DCP), locking plates (LP) and reconstruction plates have all been reported in the literature.⁷ Reconstruction plates have largely fallen out of favour due to their weakness and potential to deform at the site of the fracture leading to mal-union. The use of locking plate devices provides stability of the fracture, pain relief and facilitates early mobilization of the shoulder.⁸

Undisplaced fractures of the lateral end of the clavicle (Neer type 1, Edinburgh type 3A) are generally treated conservatively as they have an intact periosteal sleeve and are relatively stable, due to the intact coronoid and trapezoid CC ligaments. Good results have been reported with conservative measures using analgesia and an arm sling. Occasionally these fractures may have an intra-articular component, which can cause late pain and/or stiffness. If problematic, the small distal fragment can be removed surgically with favourable outcomes. Displaced lateral clavicle fractures are often treated operatively with conservative measures being associated with high rates of non-union.⁹

In present study we evaluated the effects that patient demographics, injury, and social characteristics have on functional outcomes of clavicle fracture in patients which were treated by conservative management, K wire fixation and reduction and internal fixation with plating.

We observed that there were 39 (78%) males, 3 (6%) male child and 8 (16%) females. In a study conducted by Eskola A et al¹⁰ there were 118 patients (males- 78, females- 40). Nordqvist A et al¹¹ found 125 males and 100 females in 225 patients treated for clavicular fractures.

We found that mean age of males was 30.78 years, male child was 11.0 years and female was 41.12 years. Hockers

et al¹² conducted a study on 79 patients and mean age of patients was 40.2 years in males and 42.4 years in females.

In present study, the mean score for difficulty on putting coat was 2.89, difficult sleeping affected side was 2.15, difficult washing back was 2.88, manage toileting was 2.18, comb hair was 2.56, reach high shelf was 2.48, lift 10 lbs above shoulder was 2.80, throw a ball overhand was 2.72, difficult doing usual work was 2.94 and difficult doing sport/ leisure activity was 2.64. Davies D et al¹³ recorded the severity and duration of pain, analgesic requirements, ability to perform daily activities, return to work, driving and sport along with appearance of the shoulder in 56 patients between 1 and 2 years after fracture.

In present study, mechanism of injury was fall seen in 19 (38%), road side accident in 28 (56%), physical assault in 3 (6%). Vander et al¹⁴ in their study found that in >74% cases, the cause was road traffic accident followed by physical assault and fall.

We observed that mean ASES score in patients treated surgically was 82.5 and conservatively was 78.5. Fractures treated within 10 weeks had better score (88.3) than after 10 weeks (76.3). Napora JK et al¹⁵ found that the mean ASES score for the entire group of 214 patients was 80.5.

In present study, different treatment given in patients such as conservative in 21, K wire in 8, RC plate in 9, Ex fix in 2, figure 8 in 5, flexi nail in 4 and sling in 1 case. Paladini et al¹⁶ suggested that open reduction and internal fixation of clavicle fractures can be performed with either plate or intramedullary pin fixation. Plate fixation can provide immediate rigid fixation, helping to facilitate early mobilization. However, it is thought that superior clavicle plating may result in a greater risk to underlying neurovascular structures and may be more prominent than anterior plating or intra-medullary pin fixation.

CONCLUSION

We can conclude that clavicle fractures can be managed both conservatively and surgically. Type of fracture and type of treatment are factors affecting outcome of clavicle fracture management.

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