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A Study of comparison between Operative versus Non-Operative Treatment for Clavicle Fracture

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ABSTRACT

Background: Clavicle fractures account for 5-10% of all the fractures in the body. Earlier the treatment of choice was conservative which lead to high rates of mal-union and non - union.

Objectives: To compare benefits and implication of conservative versus operative management in Clavicle Fracture.

Material and Methods: It was a 6 months prospective study in which 50 patients were enrolled and divided into two groups. In one group 25 cases of clavicular fracture were managed conservatively whereas in the other group of 25 cases were treated surgically. Regular follow was done at every four weeks. Patients were looked up for any complication and duration required for union.

Results: In present study 50 patients were enrolled. Of them 35 (70%) had middle third clavicle fracture and 15 (30%) had lateral third clavicle fracture. In conservative group, union was observed between 13 to 16 weeks in 80% patients whereas in operative group union was seen in less than 12 weeks in 88% patients. In conservative group malunion was observed in 36% patients and delayed union in 40% patients. In operative group hypertrophic scar was observed in 20% patients and plate prominence in 12% cases. Delayed union was observed in two case due to underlying bone pathology and plate loosening.

Conclusion: Operative treatment scored over conservative treatment as the former provided a significantly lower rate of nonunion and symptomatic malunion and earlier return of normal function.

Introduction:

Clavicle is the bony link from thorax to shoulder girdle and contributes to movements at shoulder girdle. Clavicle fracture is a common traumatic injury around shoulder girdle due to their subcutaneous position. Fracture of the clavicle roughly accounts 5 to 10% of all fractures and up to 44% of injuries to the shoulder girdle. About 70% to 80% of these fractures are in the middle third of the bone and less often in the lateral third (12% to 15%) and medial third (5% to 8%)[1].

Clavicle fractures are almost always the result of trauma (often a direct blow to the shoulder) and occur most often in the young male population. Evaluation begins with a thorough history and physical examination and typically progresses to plain radiographs identifying the fracture site and pattern. These fractures have been classified by Allman into groups I (mid-shaft), II (lateral), and III (medial); this classification, along with fracture characteristics (displacement and comminution) helps in determining the strategy for management.[2]

Traditionally, nonsurgical management has been favored as the initial treatment modality for most clavicle fractures because of the high nonunion rates reported after operative treatment.[3] Recent evidence suggests that specific subsets of patients may be at high risk for nonunion, shoulder dysfunction, or residual pain after nonsurgical management.[4,5] In this subset of patients, acute surgical intervention may minimize suboptimal outcomes. Also, surgical intervention may be required in cases of neurovascular compromise or significant fracture displacement. In children and adolescents, these injuries mostly consist of physeal separations, which have a large healing potential and can therefore be managed conservatively.[6]

In established cases of non-union of middle third clavicle fracture open reduction and internal fixation with bone grafting were contemplated with A) Intramedullary devices like Steinmann pins, Kirschner wires, Knowles pin and Rush rods. In this method rotational instability was noted and immobilization for longer period was required. Complications like loosening and breakage of pins were common. B) Plate and screws fixation with semi tubular plate, dynamic compression plate and reconstruction plate were used to get rigid fixation[1].

For lateral third clavicular fracture operative treatments include transacromial Kirschner wire, Cancellous compression screw and Coracoclavicular screw. AO/ASIF group has recommended the use of tension band wire construct for fixation of displaced lateral third clavicle fracture[7]. The proponents of early fixation of fresh clavicular fractures to prevent complications like malunion and nonunion emphasize the value of accurate reduction and rigid fixation in affording quick pain relief and promoting early functional recovery[8].

Aim and Objectives:

The present study was undertaken to compare the outcome of conservative and operative management in clavicle fracture.

Material and Methods:

The present study was carried out on the patients with clavicle fracture, attending the outdoor and the emergency oththopaedic services for a duration of 6 months ie. June 2016 - December 2016. 50 patients of clavicular fractures were involved in the study and divided into two groups. One group was treated conservatively and other was managed operatively. Each group contained 25 cases each.

Antero-posterior view x-rays of the affected and the normal side was done at the time of injury. Fractures were classified according to the AO Classification into Type A (extra-articular), Type B (partial articular) and Type C (complete articular). The method of treatment of a fractured clavicle depends on several factors including the age, medical condition of the patient, the location of the fracture and associated injuries It is important to achieve anteroposterior and lateral alignment of the fracture because the clavicle is a curvilinear bone.

Regular follow up was done at every 4 weeks. Local examination of the affected clavicle for tenderness, instability deformity and shoulder movements were assessed. X-rays were taken at each follow up to know about fracture union and implant position. Rehabilitation of the affected extremity was done according to the stage of fracture union and duration from day of surgery. Patients were followed up till radiological union achieved.

Results:

Table 1: Distribution of patients according to various characteristics

No.		Middle third clavicle fracture (n=35)		Lateral one third clavicle fracture (n=15)	
		%	No.	%	No.
Age Group	20-29	37.1	13	20.0	03
	30-39	34.3	12	66.7	10
	40-49	14.3	05	6.7	01
	50-59	14.3	05	6.7	01
Sex	Male	57.14	20	66.7	10
	Female	42.86	15	33.3	05
Side	Right	51.43	18	60.0	09
	Left	48.57	17	40.0	06
Mode of Injury	Fall on shoulder from two wheeler	34.3	12	53.3	08
	Road traffic accident	28.6	10	40.0	06
	Simple fall on shoulder	22.8	08	6.7	01
	Fall on outstretched hand (indirect)	14.3	05	00	00
Total		70.0	35	30.0	15

In the present study total 50 patients were enrolled. Out of them 35 (70%) had middle third clavicle fracture and remaining 15 (30%) had lateral third clavicle fracture. >70% patients of middle third clavicle fracture were less than 40 years of age whereas about 13% patients of lateral third clavicle fracture were more than 40 years of age. Majority (60%) of the patients were males. Right sided fracture was common (51.43%) in middle third clavicle fractures patient.

In middle third clavicle fractures direct injury occurred in almost 85% patients, among them 12 patients (34.3%) were due to fall on shoulder from two wheeler, 10 patients (28.6%) were due to road traffic accident and 8 patients (22.8%) were due to fall on the shoulder after slipping. Indirect injury occurred in 5 patients (14.3%) due to fall on outstretched hand. In lateral third clavicle fracture, direct injury occurred in 15 patients, among them 8 patients (53.3%) were due to fall on shoulder from two wheeler and 6 patients (40%) due to Road traffic accident.

Table 2: Distribution of patients according to duration of union

Time of union	Conservative management	%	Operative management	%
8-12 weeks	03	12.0	22	88.0
13-16 weeks	20	80.0	03	12.0
>16 weeks	02	8.0	00	00

It was observed that duration of union was more in conservatively managed group as compared to operatively managed group. In conservative group, union at fracture site was observed between 13 to 16 weeks in 80 % patients whereas in operatively managed group 88% patients showed union in less than 12 weeks.

Table 3: Distribution of patients according to complications

Types of complications	Conservative management	%	Operative management	%
Hypertrophic skin scar	00	00	05	20.0
Plate prominence	00	00	03	12.0
Plate loosening	00	00	02	8.0
Delayed union	10	40.0	02	8.0
Mal union	09	36.0	01	4.0
Restriction of shoulder movement	01	4.0	00	00

The overall rate of complications was higher in operative group but the complications were minor. In conservatively managed group malunion was observed in 36 % patients and delayed union in 40 % patients. Restriction of shoulder movements was observed in one patient. In operatively managed group hypertrophic scar was observed in 5 (20%) patients whereas plate prominence was observed in 3 cases. Delayed union was observed in one case due to underlying bone pathology and plate loosening.

Discussion:

The present study was aimed to compare the benefits and implications of conservative versus operative management in clavicle fractures. There was wide variation in the age of the patients, ranging from 20 years to 60 years. Majority of the young patients were suffering from middle third fracture whereas lateral third fracture was observed in middle age and older patients. Similar finding were also reported by Bostman et al [9] and Kao FC et al [10]. Majority of the study patients were males. Bostman et al [9] and Kao FC et al [10] also had similar scenario in their studies. Direct injury was observed in majority of the patients in the study. In middle third clavicle fractures 34.3% were due to fall on shoulder from two wheeler, 28.6% were due to road traffic accident and 22.8% were due to fall on the shoulder after slipping. Indirect injury occurred in 5 patients (14.3%) due to fall on outstretched hand. In lateral third clavicle fracture the direct injury occurred in 53.3% which was due to fall on shoulder from two wheelers and in 40% due to road traffic accident. In a study by Bostman et al,[9] the mechanism of injury in 36.8% patients was due to fall from the two wheeler, slipping and fall in 23.30% patients, motor vehicle accident in 18.45% patients and sports in injury 21.36% patients. This shows direct injury to the shoulder is the common cause of this fracture.

In our study 25 patients were managed conservatively whereas in 25 patients operative management was done. In surgically managed group reconstruction plate was used in 70% patients, semi tubular plate in 18% and dynamic compression plate in 12% cases. Similar pattern of operative technique was also reported by Bostman et al[9] and Lokesh Holagundi[11]. While studying the duration required for union of fracture it was observed that in conservative group, union at fracture site was observed between 13 to 16 weeks in 80% patients. Operatively managed group showed union in less than 12 weeks in 88% patients. Thus we can state that duration of union was more in conservatively managed group as compared to operatively managed group. According to Smekal et al[12] time to union was shorter in the operative group (12.1 weeks) as compared with the nonoperative group (17.6 weeks). Similar observations were also reported by Judd et al1[13], Witzel et al[14] and Smith et al[15]. In the present study it was observed that rate of complication was higher in operatively managed patients with minor complications. Hypertrophic scar was observed in 5 (20%) patients whereas plate prominence was observed in 3 cases. Delayed union was observed in one case due underlying bone pathology and due to plate loosening. In conservatively managed group malunion was observed in 36% patients and delayed union in 40% patients. Restriction of shoulder movements was observed in one patient. Smekal et al[12] observed delayed union (no evidence of healing at twenty-four weeks after injury) developed in six patients in the nonoperative group (six of thirty, 20%) versus one of the operative group (one of thirty, 3%) ($p = 0.02$). Judd et al[13] observed high complication rate in the operative group (48%) compared with the nonoperative group (7%).

Limitations of study:

As it was a single centre study the results cannot be genralized to entire population. Furthermore comprehensive and multicentric studies including meta analysis of various earler studies should be done, to have a more meaningful and high impact results.

Conclusion:

Thus we could state that clavicle fractures are usually treated conservatively but there are specific indications for which operative treatment is needed like comminuted, displaced middle third clavicle fractures and displaced lateral third clavicle fracture.

Operative treatment scored over conservative treatment as the former provided a significantly lower rate of nonunion and symptomatic malunion and earlier return of normal function.

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