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FUNCTIONAL OUTCOME OF CLAVICLE FRACTURES TREATED BY PLATE OSTEOSYNTHESIS – A PROSPECTIVE STUDY.

Orthopaedics

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ABSTRACT

Introduction: Clavicular fractures are common injuries, accounting for 3.6 – 5% of all fractures. Fractures of the middle third (or midshaft) account for approximately 80% of all clavicular fractures. A variety of surgical techniques have been used to address unstable distal clavicular fractures, including locking compression plate fixation of the distal clavicle, hook plating. **Methodology:** A cross-sectional study conducted at Tagore Medical College Orthopaedics OPD. Patient visiting our OPD were our study population. We included only adult participants, who has given consent for participation. Our sampling method were simple random sampling, and our sample size was 40. A pre-structured and pre-tested questionnaire were used for data collection. SPSS version23 was used for analysis. **Results:** Most of the participants had constant shoulder score above 90 with an outstanding score except for some patients. Of these, 2% of them had wound infection and function improved after implant removal; and around 3.8% were above 60 years of age they developed shoulder stiffness due to improper follow-up and physiotherapy. **Conclusion:** Internal fixation by plate osteosynthesis has the advantage of early pain resolution, early return of shoulder function and potentially early return to work. The encountered complications in our study were similar to other recent studies.

KEYWORDS

Clavicle, Compression plate, Midshaft fracture, Dynamization

INTRODUCTION:

Clavicular fractures are common injuries, accounting for 3.6 – 5% of all fractures. Fractures of the middle third (or midshaft) account for approximately 80% of all clavicular fractures. A variety of surgical techniques have been used to address unstable distal clavicular fractures, including locking compression plate fixation of the distal clavicle, hook plating, anchor suture fixation, and arthroscopic reconstruction of the conoid ligament[1].

In our clinical practice, we encounter clavicle fracture patients who often complain that their shoulders feel inadequate after a given treatment period. Their shoulder strength and motion are reduced compared to their pre-injury condition and to their contralateral shoulder. In certain situations, the patients were unable to perform the same activities they performed before their injuries. A clavicle fracture is also known as a broken collarbone. Clavicle fractures are very common injuries in adults (2–5%) and children (10–15%) and represent the 44–66% of all shoulder fractures. It is the most common fracture of childhood. A fall onto the lateral shoulder most frequently causes a clavicle fracture. Radiographs confirm the diagnosis and aid in further evaluation and treatment. While most clavicle fractures are treated conservatively, severely displaced or comminuted fractures may require surgical fixation[2].

There are various methods of treating clavicle mid-shaft fractures such as intramedullary K-wires or Steinmann pins fixation and plate fixation. In particular, locking compression plate fixation can help obtain firm anatomical reduction in severe displaced or comminuted fractures[3].

Traditionally, clavicular fractures have been treated with conservative methods, but the outcome was poor, leading to patient dissatisfaction. An option is the precontoured locking plates which provide immediate relief, stabilization and early mobilization, more so because they do not require further bending[5].

Objectives:

· To analyse the functional outcome of the clavicular fractures treated with compression plating.

MATERIAL AND METHODS:

A prospective study was conducted at Ortho OPD of Tagore Medical College Hospital among patients came with clavicular fracture who was above 18 years of age and without any chronic bony deformities. We consider only closed fractures. Patients with head injury, who were comatose and with open fractures or any other neuro vascular illness were excluded. Patients were excluded from the study if they had an age of less than eighteen years or greater than sixty years, a fracture in the proximal or distal third of the clavicle, Pathological fractures, undisplaced or minimally displaced clavicle fractures Our study setting was Tagore Medical College Hospital. We did simple random sampling in our study and our sample size was 40. Operative technique used was open fracture fixation and locking compression plating. Patients were seen at six weeks and at three, four, six, and twelve months. Ethical committee approval was obtained before start of the data collection. Assessment included standardized clinical evaluation and completion of the Constant shoulder score. Both an anteroposterior and a 20° cephalad radiographs were made for each patient. A pre-structured and pre-tested questionnaire was used for data collection. Collected data was entered into Microsoft excel sheet after coding the analysis was done using SPSS version-21 software.

The Constant Murley Shoulder Score is a 100-point functional shoulder-assessment tool in which higher scores reflect increased function[6]. It combines four separate subscales: subjective pain (15 points), function (20 points), objective clinician assessment of range of motion (40 points), and strength (25 points). The CMS system is used internationally as a means of establishing normal levels of shoulder function appropriate for different age groups and to establish what constitutes disability in normal individuals. It has also been used to establish differential rates of progress after injury or treatment. Grading the Constant Shoulder Score (Difference between normal and Abnormal Side) >30 Poor 21-30 Fair 11-20 Good <11 Excellent.

RESULTS:

Table -1 shows about the socio-demographic profile of the participants, which is about their age and sex distribution, occupation etc. Total no. of participants was 40

Table-1 Distribution Of Participants According To Socio-demographic Characteristics (N=40)

S.no	Content	N (%)
1.	Age group (years)	
	18 – 30	13 (32.5)
	31 – 40	17 (42.5)
	41 – 50	5 (12.5)
	51 – 60	5 (12.5)
2.	Gender	
	Male	28 (70)
	Female	12 (30)
3.	Marital status	
	Single	17 (42.5)
	Married	23 (57.5)
4.	Occupation	
	Employed	34 (85)
	Unemployed	06 (15)
	Total	40 (100)

In our study most of the participants were in the age group of 18 – 40 years of age and majority of them were employed and married. Male population were high when compared to females (Table-1).

Table – 2 shows the post operative assessment results of our study participants and stability of the bone both anatomically as well as functionally.

Table-2 Distribution Of Participants According To Their Post Operative Assessment (N=40)

S. no	Profile	N
1.	Constant shoulder score >30 21-30 11-20 <11	 0 2 19 19
2.	Shoulder stiffness Yes No	 6 34
3.	Range of motion Normal Abnormal	 24 16
4.	Fracture union <16 weeks >16 weeks	 11 29
5.	Wound infection Yes No	 2 38
6.	Non-union Yes No	 1 39

Majority of patients had excellent and good constant shoulder score and also, they didn't develop any kind of shoulder stiffness. Most of the patient's (24) range of motion were found normal and fracture union noticed at the mean period of 16 weeks (Table-2).

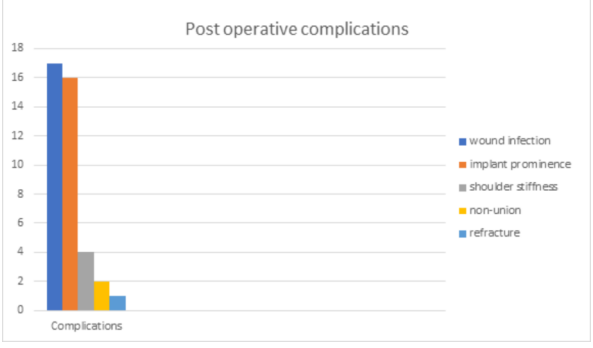

Figure-1 Showing Various Complications For Plating Osteosynthesis Of Clavicular Fracture (N=40)

Of the forty patients studied on fourth, eighth and sixteenth week post operatively, all had primary plate fixation except the one with painful non-union for whom plate osteosynthesis with bone grafting was done. All our participants had a mean of 2 months follow-up. All 39 patients had fracture union in a mean of 16 weeks. Most of the patients had constant shoulder score of above 90 with an excellent grade except for two patients. Of these, two of them had wound infection and function improved after implant removal; and 6 patient developed shoulder stiffness due to improper follow-up and physiotherapy.

DISCUSSION:

Modern studies on primary plate fixation of acute midshaft clavicular fractures have described high rates of successful results with rates of union ranging from 94% to 100% and low rates of infection and surgical complications: a recent meta-analysis of plate fixation for 460 displaced fractures revealed a non-union rate of only 2.2%. With improved implants, prophylactic antibiotics, and better soft-tissue handling, plate fixation has been a reliable and reproducible technique[7].

Late neurovascular compromise up to 6% was seen in patients treated conservatively due to non-union and excessive callus formation. In our study we had no transient neurological abnormalities. The range of motion was good and the mean constant score was above 90 in our study. On reviewing the literature, we found patients treated conservatively had substantial residual disability of the affected shoulder with minimal loss of muscle strength[8].

The advantages of internal fixation of clavicle fractures, which includes early pain resolution, early return of shoulder function and potentially early return to work makes it an appealing option for the treatment of displaced fractures in active individuals. Many different methods of operative fixation of mid-shaft clavicle fractures have been described. Intramedullary pinning techniques have been associated with a high number of complications, such as pin migration and rotational instability and fixation with interfragmentary screws or wire sutures show insufficient immobilization[9].

As a result, we prefer rigid fixation with a plate osteosynthesis which provides superior fracture stability and excellent clinical results in the treatment of acute fractures and non-unions. In our study, the majority of complications were post-operative wound disorder (10%). Literature review shows infection rate up to 10% for plate fixation of displaced mid shaft fracture. The other major complication of our study was hardware irritation and prominence in 5% of patients. All cases were followed up regularly we have no refractures till date[10].

Taking these percentages into account, we believe that operative treatment of acute middle-third clavicle fractures should be reserved for persons who wishes to return early to activity and who accept the risk for potential complications. Especially wound disorders and infection may lead to disasters and the patient should be duly informed before deciding to have the operation[11].

CONCLUSION:

The traditional view that the vast majority of clavicular fractures heal with good functional outcomes following nonoperative treatment is no longer valid. Recent studies have identified a higher rate of non-union, late neurovascular compromise and specific deficits of shoulder function in subgroups of patients with these injuries who are treated by conservative means. Internal fixation by plate osteosynthesis has the advantage of early pain resolution, early return of shoulder function and potentially early return to work. The encountered complications in our study were similar to other recent studies.

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