Observational study to compare the outcome of non-operative and operative management of displaced fracture clavicle: A retrospective study

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Abstract

Introduction: For centuries fracture of clavicle has been treated conservatively non-union of clavicle fracture is rare, Mal-union was considered to be of radiographic importance only. The scenario has changed and there has been a shift towards operative treatment on union, cosmesis, early recovery grounds. Both the methods is compared taking into account the union, cosmesis, early recovery, functional outcome and satisfaction of the patient.

Materials and Methods: Total 70 patients of displaced fracture of clavicle (AO B1 & B2) were divided into two groups that is non-operative and operative. The informed consent was taken. The patient were explained about both modalities & procedure, cost, outcome and complications of each modality. After the decision of the patient he was allotted to Group I (conservative) & Group II (operative) the study was carried out till 35 patients were included in each group. The follow-up of both group's patients were done at 6 weeks, 3 months, 6 months using patients subjective evaluation, DASH score, range of motion, radiological assessment and complication if any.

Observation and Result: Of all 70 patients the age varied between 20-66 years with mean age was 34.5 years. In the conservative group 23(65.7%) and in operative group 26 (74.2%) had dominant side involvement. In non-operative group there were 3(8.75%) cases of non-union, 15 (42.8%) mal-union, 5 (14.2%) muscle wasting, and 4 (11.4%) pressure symptoms in upper limb 2 (5.71%) stiffness of shoulder, 8 (22.85%) pain after union. Of 15 cases of mal-union only 7 (20%). 5 (14.28%) patients complaint of hardware prominence and irritation. Total 4 (11.42%) patients needed implant removal (2 due to infection and 2 due to hardware problem). 6 (17.14%) patients complaint of postoperative infraclavicular hypoesthesia. The DASH score was superior in Group II over I at 6 weeks and at 3 months. Overall in non-operative patients 22 (62.85%) were satisfied (17.14%) were not satisfied in operative group 28(80%) were satisfied while 7 (20%) were unsatisfied. The average follow-up period was 9.5 months (6-18 months).

Conclusion: Though operative treatment is better in terms of early mobilization, union, absence of mal-union, cosmetically well accepted, it has its own complication which should also be taken into consideration while choosing between the two modalities. Seeing at satisfaction level in patient related to functional outcome the conservative treatment plays a vital role in poor patients.

Keywords: Clavicle fracture, AO B1 & B2, Displaced fracture, Conservative Treatment, Non-operative treatment, Operative treatment, Clavicular plate.

Introduction

Fracture of clavicle are common injuries with incidence of 2.6 % of all fracture[1] and 44% of the shoulder girdle fracture.[2,3] Commonest site of the clavicle fracture is middle shaft accounting to as much as 80% of clavicle fractures.[1,4] The Reason for mid shaft involvement is the transitional change of lateral curve of clavicle which is covered by muscles and medial relatively bare bone.[4] The fracture of the clavicle have been treated conservatively for years as non-union of clavicle fracture is rare, shown as low as 0.12-08% with conservative treatment. Mal-union was considered to be of radiographic importance. Recent study showed non-union of clavicle fracture was as high as 10-15% specially cases where initial shortening of the bone is more than 20 mm.[5] Hill et al in a study of 242 patient of which 66 (27%) were displaced clavicle fractures shows non-union in 15% cases. 25% had mild to moderate pain. 28 out of 52 patients available for follow-up had cosmetic complaint.[5] Functional and cosmetic outcome is related not only to union but also to the length of bone. Eskola et al reported that patient with shortening of more than 15 mm of bone had significant pain.[2] Clavicle act as strut to keep upper limb away from the trunk and transmit forces from upper limb to trunk, so displaced fracture of clavicle may result in non-union, mal-union with poor functional outcome and cosmetic deformity.[7-9] So the pendulum of the management is shifting towards operative management for clavicle fractures, but operative treatment has its own complication like cost of treatment (particularly in developing countries), infection, complication of anaesthesia and injuries to nerve and vessel. Fortunately injury to major nerve is very rare except injury to supraclavicular nerve which is a common complication with 10-29% incidence,[7-9] this leads to cutaneous hypoesthesia in the infraclavicular region shown to be as high as 55.3%.[10] So there is no uniform consensus o treatment of clavicle fracture. This study aims to compare the patient's oriented outcome after non-operative with operative treatment for fracture clavicle.

Materials and Methods

This is a prospective observational study conducted in the department of orthopaedics at Adesh institute of

medical science and research from January 2016 to December 2017. The clearance from local research and ethical committee was taken and patients of displaced fracture middle shaft of clavicle were taken for the study. Total 70 patients of displaced fracture of clavicle (AO B1 & B2) were divided into two groups that is operative and non-operative.

Inclusion Criteria:

i. Age: Above 17 years
ii. Closed mid shaft fracture
iii. No medical complication of general anaesthesia (in operative case)
iv. Shortening of > 15 mm in radiograph (width of shaft)

Exclusion Criteria:

i. Pathological fracture
ii. Compound fracture
iii. Bilateral clavicle fracture
iv. Patient with morbidities of shoulder
v. Multi trauma patient
vi. Fracture > 1month old
vii. Segmental fracture of clavicle
viii. Fracture with neurovascular injury
ix. Fracture with coracoclavicular ligament injury

The informed consent was taken. The patient were explained about both modalities & procedure, cost, outcome and complications of each modality. After the decision of the patient he was allotted to Group I (conservative) & Group II (operative).the study was carried out till 35 patients were included in each group.

Conservative Group: 35 patients of this group were treated with traditional clavicular brace or figure of 8 bandage and arm sling in ipsilateral site.

Operative Group: These patients were investigated and treated with s shaped locking clavicular plate. The surgery was performed within 4-5 days of injury. Under general anaesthesia the patient positioned supine with folded towel at inter-scapular region. Painting draping was done under strict aseptic condition. Incision was planned transversely along clavicle at fracture site. Supraclavicular nerve was dissected and was preserved. After the soft tissue dissection the fracture site was exposed and reduced. Fixation was done with locking S shaped clavicular plate. At least 3 screws were fixed on each side of the fracture to fix the fragments inter-fragmentary lag screws were used whenever required. The wound was closed over a suction drain in layers. Arm pouch or arm sling was given postoperatively.

Operative patients were discharged after 3 days. The non-operative cases were discharged same day. The operated cases were called for suture removal after 10 days and movements were started gradually as per the pain permitted. Otherwise the follow-up of both group's patients were done at 6 weeks, 3 months, 6 months using patients subjective evaluation, DASH score, range of motion, radiological assessment and complication if any.

Observation and Result

As all the patients were offered and explained about the pros and cons of both the modalities i.e. conservative and operative, the major factor for avoiding surgery was cost of the treatment. Of all 70 patients the age varied between 20-66 years with mean age was 34.5 years. The non-operative group 25 (71.4%) were males and 10 (28%) were females while in operative group 28 (80%) were male and 7 (20%) were females. In overall study there were 53 (75.7%) were male and 17 (24.3%) were female. In the conservative group 23 (65.7%) and in operative group 26 (74.2%) had dominant side involvement all the fracture were AO type B1 or B2. In non-operative group the clavicular brace or figure of 8 bandage was applied immediately after the injury while the time taken for the surgery was between 3-15 days. Time take for the wound healing was 12 days (10-15 days). Average time taken for union in non-operative cases was 16.3 (12-30) weeks, whereas in operative group it was 10.75 (8-20) weeks. In non-operative group there were 3 (8.75%) cases of non-union, 15 (42.8%) mal-union, 5 (14.2%) had muscle wasting, 4 (11.4%) had pressure symptoms in upper limb (which recovered automatically after loosening the brace), 2 (5.71%) had stiffness of shoulder(which recovered with physiotherapy), 8 (22.85%) patients complaint of pain after union (all of these had marked shortening of clavicle >15mm). Of 15 cases of mal-union only 7 (20%) patients complaint of cosmetic deformity but all were satisfied with union and functional outcome. In operated group all cases united and there was no mal-union. 2 (5.7%) patients developed infection and implant needed removal. 5 (14.28%) patient's complaint of hardware prominence and irritation. Total 4 (11.42%) patients needed implant removal (2 due to infection and 2 due to hardware problem). 7 (20%) patients complaint of ugly surgical scar. 6 (17.14%) patients complaint of postoperative infraclavicular hypoesthesia which recovered with time in most of the cases. The DASH score was superior in Group II over I at 6 weeks and at 3 months. Overall in non-operative patients 22 (62.85%) were satisfied, 7 (20%) were partially satisfied and 6 (17.14%) were not satisfied, in operative group 28(80%) were satisfied while 7 (20%) were unsatisfied. The average follow up period was 9.5 months (6-18 months)

Discussion

Considering the very low incidence of non-union (0.1-0.8%) and mal-union as of only radiographic importance the fracture clavicle were treated conservatively for decades. No studies has produced these result after that.[11] However recent studies showed that non-union incidence in the range of 10-15% and mal-union leads to poor cosmetic & functional

outcome.[12] Hence the trend has shifted towards operative treatment.[6, 7] Now the clavicular plate is widely used to fix the displaced clavicle fracture. 70% cases has dominant side involvement. The average time taken to union in conservative group was 16.3 weeks whereas in operative group it was 10.75 weeks. In conservative group there were 3 (8.75%) cases of non-union and 42.8% cases showed mal-union but in operative group there was no case of non-union or mal-union. However the infection rate in operative group was 5.7% and 5 (14.28%) patients had hardware prominence and irritation. 17.14% cases from operative group complaint of postoperative infraclavicular hypoesthesia. While 20 % operated patient has complaint of ugly surgical scar. The other complication in conservative group is wasting of muscle, pressure symptoms due to clavicular brace or figure of 8 bandage, stiffness of the shoulder which recovered with physiotherapy. The DASH score was superior in group II. Overall in conservative group 62.85% cases were satisfied 17.14 % were partially satisfied and 20% cases were not satisfied, while in operative group 80% cases were satisfied and 20 % cases were not satisfied.

The main factor involved for opting non-operative treatment was cost factor.

Conclusion

Though operative treatment is better in terms of early mobilization, union, absence of mal-union, cosmetically well accepted, it has its own complication which should also be taken into consideration while choosing between the two modalities. Seeing at satisfaction level in patient related to functional outcome the conservative treatment plays a vital role in poor patients.

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