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Comparative Study between conservative and operative treatment of fracture clavicle in Adult case study.

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Abstract

Background - *Non union after clavicle fracture can cause significant disability due to pain, shoulder joint stiffness, impaired function with limitation of certain activity of shoulder joint mainly in high demand patient.*

Material and Method: *22 patient (14 males and 8 females) having fracture clavicle within 6 month old case, out of 22, 4 case were nonunited (3 male and 1 female) was treated with ORIF with plate & screw fixation with autologus bone grafting, 3 were delayed union treated with ORIF with plate and screw fixation and 5 recent fracture with history of trauma within 2 week treated with plating and Rest 10 patient were treated with conservative with figure of 8 bandage and cuff and collar sling or broad arm pouch sling. Fracture of lateral one third and open fracture of clavicle were not included in the study. Bone grafting was done in 7 patient who was case of nonunion and delayed union. The outcome was assessed with American Academy of Orthopedic Surgeons (AAOS) disability of the arm, shoulder and hand (DASH) questionnaire.*

Result: *The patients were followed up for an average of 6 months (Range from 3 months to 12 months). All case of clavicle fracture operated with ORIF with plating were united in 3 months and most of patient had their DASH score in range of 10 to 20, with average being 14.7 in our series. And patient who was treated conservatively (i.e. 10 patient). 5 patient out of 10 united well within 6 weeks and 2 out of 10 were nonunited (No sign of union within 3 month from day to injury) and 3 out of 10 patient were delayed union (having union > 6 week). And out of 10 patient 4 was having deformity with decrease pain of shoulder joint.*

Conclusion: *ORIF with plate in conjunction with an autologous bone grafting in nonunited case and only ORIF with plating in recent fracture with widely displaced is a successful procedure with good outcome and most of the patient come to a near normal level of functions.*

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I. Introduction

Despite the common occurrence of clavicle fracture, nonunion of fracture clavicle is uncommon with incidence of 1 to 4%, however nonunion can pose a difficult problem and can cause pain with stiffness and impaired function of shoulder and upper limb. Widely displaced fracture of clavicle often cannot be reduced and maintained in perfect position and at risk of nonunion and delayed union with deformity and may have weakness, limitation of certain activity and sometime deformity may lead to pressure to brachial plexus on subclavian vessel causing pain and neuralgia in upper limb. ORIF with or without bone grafting indicated in widely displaced clavicle fracture with or without nonunion having prevention of deformity and improving function. In this series of 22 patient we evaluated the functional outcome of ORIF for nonunion, delayed union and fresh fracture (within 2 week duration of injury) in compare with conservative treatment of 10 patient and compare the relief from pain and restoration of daily activity.

Case - 1
Conservative Management of middle third clavical fracture

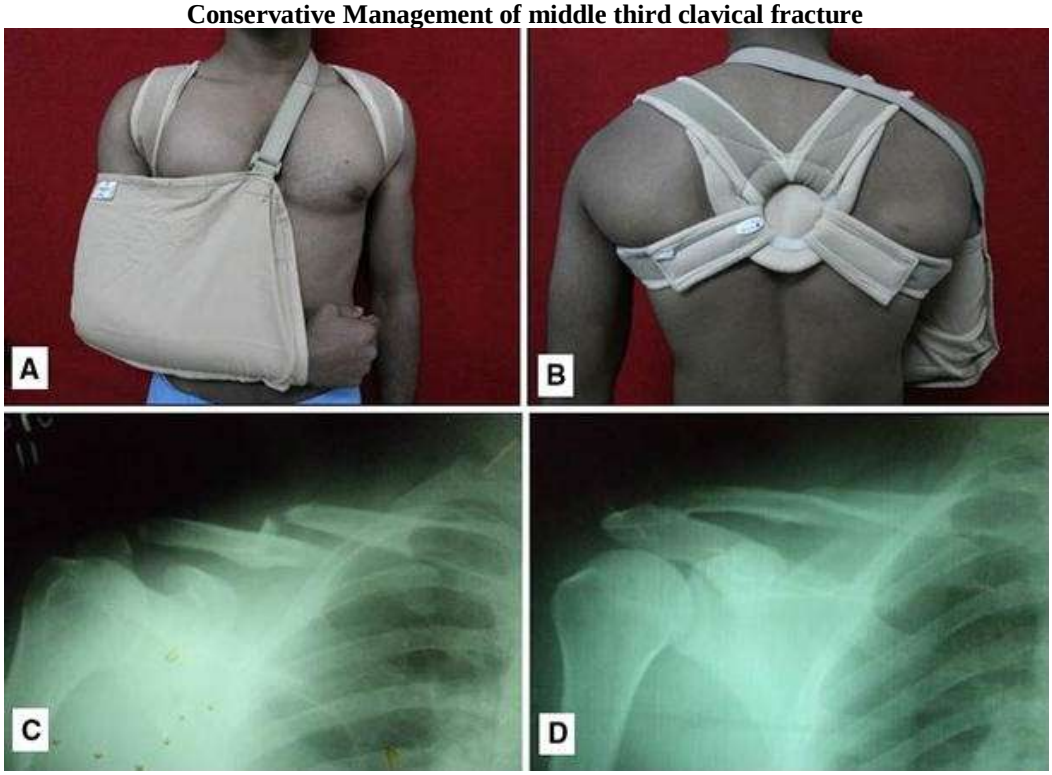

Image showing (a) & (b) showing broad arm pouch sling with figure of eight bandage, (c) immediate xray after trauma (d) xray of clavical fracture at three month follow up of conservative management.

Case - 2
Operative treatment of middle third clavicle fracture

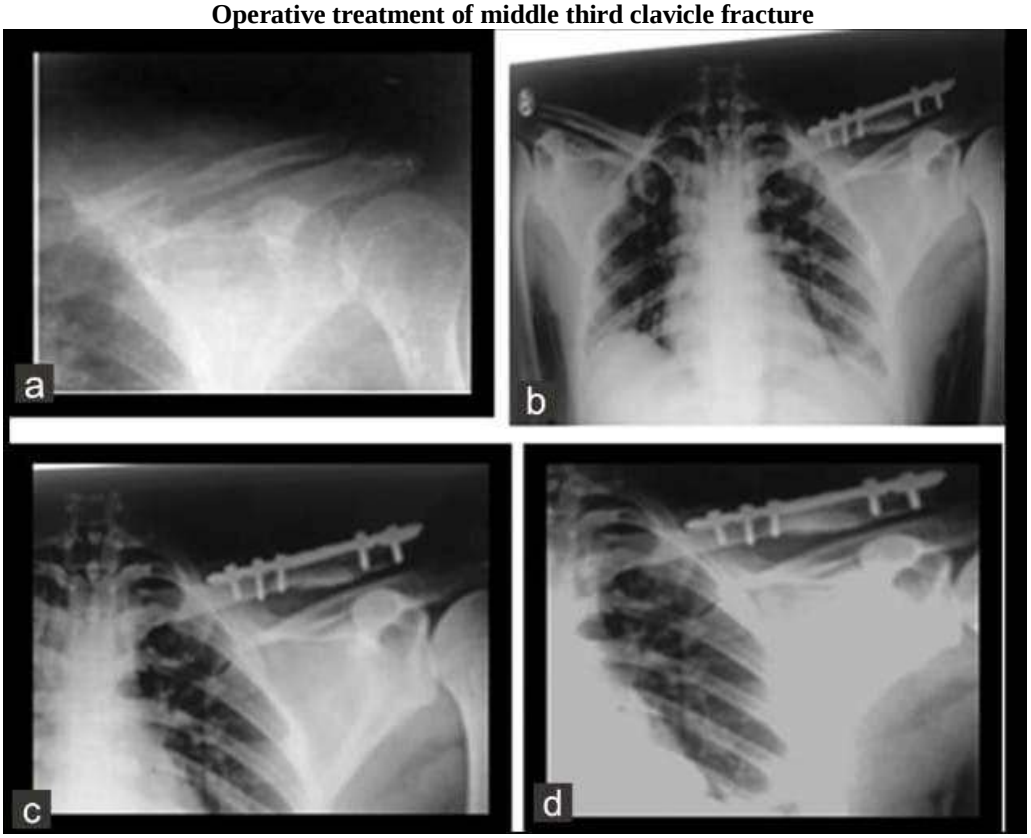

Plate group Case - 2 (a) Pre-op xray (b) Immediate Post-op xray
(c) three month post-op xray (d) 12 month post-op xray.

II. Material and Methods

22 patients of clavicle fracture of age group between 15-50 years of which 4 case non union, 3 case of delayed union and 5 case of recent fracture widely displaced were treated with ORIF with or, without bone grafting and 10 patient were treated conservatively from June 2019 to August 2021 at Nalanda Medical College and Hospital, Patna. 14 patient were male and 8 patient were female out of 22 patient 4 case sere of non union (No evidence of union on clinical and radiological examination at three months) 3 case were of delayed union (no evidence of union at 6 weeks), 15 case were of recent fracture (within 2 week from day of injury) out of 15 case recent fracture 5 were treated with ORIF and 10 out of 15 were treated conservatively. Average time of follow up is 6 month (ranging from 3 month to 12 month).

3 out of 22 patient showed clinical mobility at fracture site and inadequate callus formation on radiological examination at end of six weeks with significant morbidity due to pain, stiffness and inability to use their limb to normal function is classified as delayed union.

Weakness of ipsilateral shoulder with functional limitation seen in all case. Pain at fracture site present in 12 patient (54.5%). Neuralgia in the C7 and C8 Nerve root distribution was seen in 4 patient. Open fracture and lateral 1/3rd clavicle fracture were not included in study. We use precontoured LCP and DCP in 12 case Bone grafting was done in nonunited case. Patient were follow up for average of month (range from 3 month to 12 month).

Surgical technique

Surgery was done under general anesthesia with patient in supine position with ipsilateral shoulder and chest lift up by placing a sand bag below upper back on ipsilateral side. A curvilinear incision was made over the clavicle to expose the fracture and extreme care was taken during elevating the periosteum. Fracture end were mobilized with careful sharp dissection, margin freshened and fracture reduced with proper care not to damage the adjacent structures. Oblique fracture can be stablized by using lag screw. Cancellous bone graft was used in 4 case of nonunion with significant defect exists at fracture site after freshening bone ends. This grafting restored clavicular length but also helped to offset the aggravated stress on the internal fixation. Stability was checked clinically. Wound was closed in layer and chest arm bandage was given. Wound was inspected on 2nd day, 5th day and 12th day postoperatively. From 4th post operative day pendulum exercise were started and collar and cuff sling was given thereafter. Stitches were removed on 12th post operative day. Full range of movement was allowed once pain subsided. Patient was reviewed at 6 week, 12 week then at 3 month and 9 month interval.

Post operative evaluation was based on inquiry regarding the pain, functional recovery, assessment of mobility, strength and stability of shoulder joint and radiological appearance of the fracture. Final results were assessed using the disability of arm, shoulder and hand (DASH) score. It was taken care that the patient answered at least 28 questions of the DASH questionnaire.

DASH SCORE

DASH outcome measure is a 30 item, self report questionnaire designed to measure physical function and symptom's in patient with any or several musculoskeletal disorders of the upper limb. The questionnaire was designed to help describe the disability experienced by people with upper limb disorders and also to monitor changes in symptom and function over time.

The DASH outcome measure was jointly developed by the institute for work and health and the American Academy of Orthopedic Surgeons (AAOS) more severely disabled individuals have a higher score on a scale of 0 to 100.

Table 1: showing clinical details of the patient

Case No.	Age (years)	Sex	Time of Presentation (Day to Weeks)	Presentation complaints	Type	Ancillary Proactive	Treatment	Follow up (month)	DASH (Post op)
1	25	M	7 day	pain	Recent fracture	-	Conservative	3	8.14
2	36	F	6 week	weakness, pain	D/U	Local callus as bone graft	Operative	9	14.16
3	18	F	10 day	pain	Recent fracture	-	Conservative	6	6.34
4	16	M	10 day	pain, swelling	Recent fracture	-	Conservative	4	10.04
5	42	F	8 day	pain, deformity	Recent fracture	-	Operative	8	12.14
6	47	M	20 week	weakness, Neuralgia	N/U	Bone graft	Operative	12	20.18

7	26	M	2 day	pain	Recent fracture	-	Conservative	3	7.02
8	22	M	8 day	pain, deformity	Recent fracture	-	Operative	4	11.12
9	52	M	8 week	weakness, Neuralgia	N/U	Bone graft	Operative	9	10.82
10	24	F	1 day	pain, swelling	Recent fracture	-	Conservative	3	5.82
11	18	M	2 day	pain, swelling	Recent fracture	-	Conservative	4	6.04
12	27	M	6 day	pain, deformity	Recent fracture	-	Operative	6	10.12
13	45	F	6 week	weakness, pain	D/U	Local callus as bone graft	Operative	9	16.22
14	19	M	2 day	pain, swelling	Recent fracture	-	Conservative	3	10.11
15	22	F	8 day	pain	Recent fracture	-	Operative	3	14.52
16	54	M	14 week	weakness, pain	N/U	Bone graft	Operative	6	24.60
17	38	M	8 week	weakness, Neuralgia	D/U	Local callus as bone graft	Operative	5	12.42
18	23	F	3 day	pain, swelling	Recent fracture	-	Conservative	3	8.62
19	44	M	10 day	Deformity	Recent fracture	-	Operative	6	10.22
20	17	F	4 day	pain, swelling	Recent fracture	-	Conservative	3	8.32
21	19	M	2 day	pain, swelling	Recent fracture	-	Conservative	4	6.42
22	44	M	22 week	weakness pain Neuralgia	N/U	Bone graft	Operative	12	20.83

M = Male, F = Female, D/U = Delayed Union, N/U = Nonunion,
DASH = Disability of Arm Shoulder and hand

III. Results

All the fracture united within three months. The four patient who had iliac crest bone grafting also showed satisfactory incorporation of the graft. There was no fixation failure in the series. We didn't had any major complications. Hypertrophic scar developed in 2 patients. Except 2 patient we were able to achieve full range of motion in all cased. 4 patient present with neuralgia of which 2 patient in C7 and C8 nerve distribution and 2 patient have complete relief.

Eleven patient observed their DASH score in the range of 10 to 20 while 8 had less than 10 and three had more than 20. Mean DASH score of the patients in our series was 11.55. Functionally, this was very acceptable. In this series 20 out of 22 patients had full range of motion of the affected shoulder. Two had difficulty in abduction over 110^0.

IV. Discussion

The clavicle has an integral role not only in the mechanics of the pectoral girdle but also in the function of the upper extremity. Clavicle fracture rarely required operative fixation. Rawe suggested that the usual healing period for fracture of middle third of clavicle were two weeks for infant, three week for children four to six weeks for young adults and six weeks or more for older adults. Hence we have taken absence of union at six week, defined delayed union. And patient with clinical mobility at the fracture site and no radiological union after three month define as nonunion.

Nonunion of fracture although uncommon. If occur cause significant disability. Nonunited clavicle fracture and widely displaced clavicle fracture may cause shortening due to force from the muscle attached to it. The intramedullary pin or rods advocated in the treatment are technically difficult to insert because of curvature of the clavicle, more over they do not provide stability against the rotational forces.

Open reduction and plate osteosynthesis along with autogenous bone graft is a successful procedure with good functional outcome. Subclavian vessel and brachial plexus lie beneath the middle third of clavicle. Extreme care and meticulous dissection is required to prevent damage to these structure. Also care must be taken to avoid damage to pleura in the apical region of lung. No force applied during drilling the holes. Restoration of length is necessary for good functional outcome. Case present with shortening of clavicle in nonunion strut graft from iliac crest should be used to restore the length of clavicle and give satisfactory result in our series.

We could achieve good functional outcome in most of our patient. In this study we achieved satisfactory result with both LCP and DCP. Results depended on the stability of the fixation, biological environment to

achieve bone healing and careful surgical technique. Patient who had treated conservatively have complaining of deformity and some restriction of abduction of shoulder. But patient treated with open reduction and plate fixation have very good functional outcome.

V. Conclusion

Open reduction and internal fixation with plate in conjunction with autogenous bone graft in non united case of clavicle fracture, and open reduction and internal fixation in widely displaced fracture is a successful procedure with good outcome. With careful technique and dissection patient can return with a near normal level of function. But patient who had treated conservatively (10 patient out of 22) 4 patient united with deformity and 2 patient present at follow up with restriction of abduction beyond 110^0.

So that after a series of study on 22 patient, 12 patient were treated with open reduction and plate fixation have good functional outcome in compare to 10 patient were treated conservatively.

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