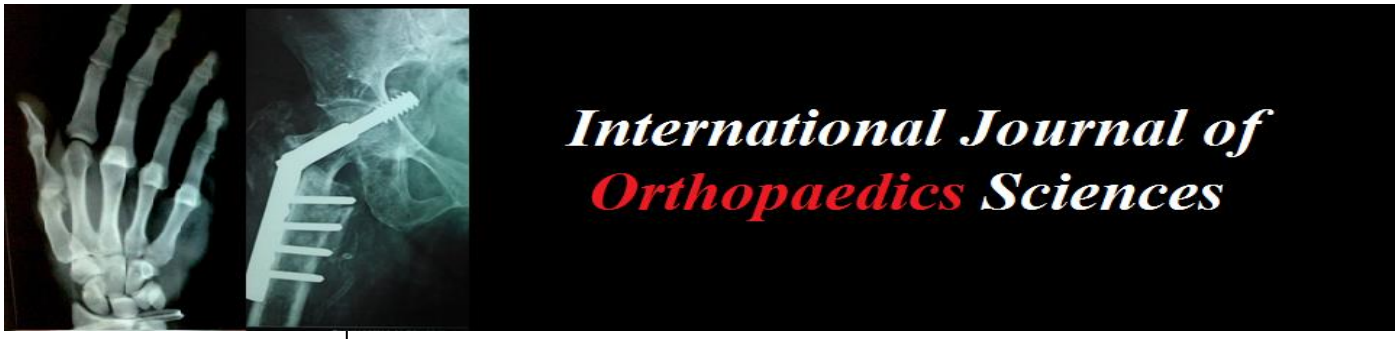

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Functional outcome of conservative treatment of acute type 3 Acromioclavicular joint dislocation

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Abstract
Background and Objectives: Acromioclavicular joint dislocation corresponds to 8.6% of all joint dislocations. Non operative treatment is considered the standard of care for type I and II Acromio - clavicular joint dislocation. But the treatment of acute type III and above injuries is still controversial. The purpose of this study is to determine the functional outcome of conservative treatment of Type III severity of acromioclavicular dislocations with respect to pain, range of movements, cosmesis and radiological displacement.
Materials and Methods: 25 patients with Acromioclavicular joint dislocation of type 3 were included in our study conducted between August 2018 and July 2020. Stress X-Rays were taken to diagnose type 3 acromioclavicular joint dislocation. All patients were treated conservatively with strapping for three weeks and gradual mobilization over next three weeks. Patients were evaluated at 6 weeks, 3months and 6months. At each follow up patients were assessed subjectively for pain, objectively for range of abduction and radiographs were taken to note any displacement.
Results: Sixteen patients had excellent results with no pain or limitation of movements. Six patients had good results with pain only on excessive activity and terminal restriction of movements. Two patients had fair results and no poor results. Improvement in subjective and objective symptoms was highly significant (p<0.01). But at final follow up all acromioclavicular joints were subluxed or dislocated.
Conclusion: Conservative treatment of acute Type 3 Acromio clavicular joint dislocation with short periods of immobilization by bandages and slings and early rehabilitation of shoulder gives good short term results clinically although not correlated radiographically.

Keywords: Conservative, acromioclavicular joint, dislocation

Introduction
Acromioclavicular joint dislocation corresponds to 8.6% of all joint dislocations [1] and represents a major injury to the shoulder girdle. Non operative treatment is considered the standard of care for grade I and II Acromio - clavicular joint dislocation. But the treatment of acute grade III and above injuries is still controversial [2]. Galen (129-199 AD) diagnosed his own acromioclavicular dislocation received from wrestling and treated himself with tight bandages when he sustained this particular injury from wrestling. He used tight bandages to hold the projecting clavicle down while keeping the arm elevated. From the earliest publications through the time of Paul of Aegina (7th century), dislocations of acromioclavicular joint have been better recognized but the treatment has remained essentially unchanged.
Hippocrates [3] stated "no impediment small or great will result from such an injury but there would be a tumefaction or deformity for the bone cannot be restored to its natural position." This statement holds good even for today. There is probably no other joint in the body that has been treated in so many different ways in attempts to "properly restore" it to its "natural position." Rockwood has classified AC joint dislocation into 6 types. Type I and II are characterized by rupture of acromio clavicular ligaments with loss of horizontal stability. In Type III there is also rupture of coraco-clavicular ligaments with loss of vertical stability, producing dislocation. In 1946 Urist [4] reviewed 101 previous papers and reported that results after surgery for internal fixation of AC joint were no better than conservative treatment. In 1959 Urist [5] published an extensive survey of treatment of AC dislocation involving 32 methods of conservative treatment and 5 open techniques.

The purpose of this study is to determine the functional outcome of conservative treatment of Type III severity of acromio clavicular dislocations and to determine whether conservative treatment is effective for AC joint dislocations of type III severity.

Materials and Methods

This was a prospective study where 25 patients admitted with acromioclavicular dislocation type III treated conservatively from August 2018 to July 2020 were studied. These patients were then followed up at 6 weeks, 3 months and 6 months interval.

Inclusion criteria

1. Men or women > 18 yrs age
2. AC joint dislocation type III and above

Exclusion criteria

1. AC joint dislocation type I and II
2. Men or women >60 yrs age
3. Open dislocation
4. Dislocation in a poly trauma patient
5. Fracture of ipsilateral coracoid process of scapula, fracture of the clavicle.

On initial presentation, a detailed clinical examination was performed. Any pain, swelling, and loss of function were noted. On examination any tenderness over acromioclavicular joint, swelling, deformity, Range of Movements and any associated injuries were noted. Stress X-Rays were taken comparing both the AC joint with 5kg weights on either side suspended through wrist joints.

Treatment

The A.C. joint was reduced with upward pressure from elbow and downward pressure applied over medial end of clavicle and was supported by Jones adhesive strapping which encircled it from middle third of clavicle to around the elbow joint. Arm was placed in adducted position with another strap applied horizontally. Careful padding was done around elbow joint and lateral end of clavicle to avoid pressure. This immobilization was continued for 3 weeks and later the strapping was removed and over next three weeks rehabilitation was started with gentle mobilization of shoulder joint. Heavy lifting or contact sports were avoided for 8-12 weeks. Patient was evaluated at each follow up at 6weeks, 3months and 6months and was evaluated subjectively for pain and stiffness, objectively for ROM (abduction) and Radiographs for displacement.

Results

Twenty - five patients matched the inclusion criteria; however one patient was lost to follow up. Of the 24 patients, 21 were male (87.5%) and 3 were female patients (12.5%). Mean age was 36 years (ranging from 23 to 48).

Mechanism of injury was road traffic accident in 17 and fall from height in 7 patients with most of them giving history of direct trauma to shoulder girdle. All patients had severe pain and tenderness localized to acromioclavicular joint. Range of movements were restricted (abduction was more affected than rest). Deformity was present in all patients and radiographs revealed superior displacement of lateral end of clavicle when compared to normal side. Results were assessed at 6 weeks, 3 months and 6 months.

Follow up results at 6 months

16 had excellent results having no pain or limitation of movements. 6 had good results, had mild pain only on excessive activity and terminal restriction of abduction. 2 had fair results and there were no poor results.

Table 1: Statistical analysis of conservative treatment

	N	Minimum	Maximum	Standard deviation	Median	Freidman test value	Mean	P
Total 6 weeks	24	6	10	1.351	9	38.079	8.46	.000
Total 3 months	24	8	11	0.875	10		9.63	HS
Total 6 months	24	8	11	0.932	11		10.46	

At final follow up, the mean score was 10.46. There was improvement in the mean score from 8.6 at 6 weeks to 10.46 at 6 months. At final follow up, minimum score was 8 seen in two patients and maximum score was 11 seen in sixteen patients. Improvement in subjective and objective symptoms were highly significant as per Freidman test value (p<0.01).

Subjective (Pain)

Table 2: Statistical analysis of pain score at each follow up

	N	Minimum	Maximum	Standard deviation	Median	Freidman test value	Mean	P
Pain 6 weeks	24	2	3	0.442	3	32.708	2.75	0.000
Pain 3 months	24	3	4	0.381	3		3.17	HS
Pain 6 months	24	3	4	0.464	4		3.71	

At final follow up, minimum score for pain was 3 and maximum was 4. Mean score for pain was 3.71 at final follow up. Reduction of pain was found to be highly significant (p< 0.01) at final follow up and also between each follow up.

Objective (Abduction)

Table 3: Statistical analysis of range of abduction at each follow up

	N	Minimum	Maximum	Standard deviation	Mean	Median	Freidman test value	P
Abduction 6 weeks	24	2	4	0.654	3.08	3.00	28.964	0.000
Abduction 3 months	24	3	4	0.495	3.63	4.00		HS
Abduction 6 months	24	3	4	0.282	3.92	4.00		

At final follow up minimum score for abduction was 3 and maximum was 4. Mean score for abduction was 3.92 at final follow up. Improvement in the range of abduction was found to be highly significant (p<0.01) at final follow up and also between each follow up. At final follow up only 2 patients had restriction of abduction (less than one third of normal side) and 22 patient's regained full range of movements.

Radiology (X-rays)

Table 4: Radiological assessment at each follow up

	N	Minimum	Maximum	Standard deviation	Mean	Median	Freidman test value	P
X-ray 6 weeks	24	2	3	0.495	2.63	3	10.00	0.007
X-ray 3 months	24	2	3	0.381	2.83	3		HS
X-ray 6 months	24	2	3	0.381	2.83	3		

Follow up x-rays at the end of 6months showed that 20 Acomioclavicular joints were still subluxed and 4 joints were dislocated. Maximum score was 3 and minimum score was 2. Mean score was 2.83 at final follow up.

Although the radiographic improvement was significant at final follow up, pair wise study showed that no statistically significant improvement between 3 months and 6 months. There was no clinical and radiological correlation as per this study as patients had significant improvement in pain and ROM although x-rays showed AC joint subluxation/ dislocation. Patients had negligible deformity at final follow up. None of the patients complained about the deformity.

Discussion

The framework of shoulder in upright position is maintained in its normal anatomical position by the interlocking of sternoclavicular ligaments. The second mechanism which resists any significant downward displacement of the distal clavicle is by upward support of the trapezius muscle. The scapula is suspended from clavicle primarily by coracoclavicular ligament. There is considerable controversy as to the best method of management of Type 3 AC dislocation. In 1959 Urist [5] published an extensive survey of treatment of AC dislocation involving 32 methods of conservative treatment and 5 open techniques. Patients younger than 18 years were arbitrarily excluded because of presence of open epiphysis which theoretically may introduce an important variable. In this study grade 1 and grade 2 dislocations were excluded as conservative treatment is the accepted standard treatment. Stress x-rays were used to differentiate between grade 3 and grade 2 at initial presentation.

In a study conducted by Timothy *et al.*, [6] 127 patients with acute acromioclavicular joint injuries were treated. 88 percent of the patients were male and 12 percent were female and 73 percent of the patients were between eighteen and twenty five years of age. J.J Dias *et al.*, [7] conducted a study on 53 patients with acromioclavicular joint injuries. There were 38 men (72 percent) and 6 women (28 percent). In this study, 87.5 percent were men and 12.5 percent were women. Acromioclavicular joint injuries were seven times more common in men compared to women as per this study. In a study conducted by Bannister G.C *et al.*, [8] out of 60 conservatively treated patients, all regained movement significantly. In our study only 2 out of 24 patients had terminal restriction of abduction (less than one third the normal limb) and rest of the patient's regained full range of movement at the end of 6 months.

Phillips A.M. *et al.*, [9] compared operative and non-operative group for grade 3 dislocations and concluded that both groups had good pain relief but non operative group had better outcome for range of movements. Similarly, J.J. Dias *et al.*, [7] treated 53 patients with grade 3 dislocations and at the end of 5 years only one patient had painful subluxation. In our study 17 patients out of 24 had no pain even on excessive activity and rest of the patients complained of mild pain on excessive activity only and none of the patients had to change their profession due to pain. A study conducted by Bernard Jacobs [10] showed that there was no definite relationship between residual joint separation and residual symptoms. In our study also there was no clinical and radiological correlation as all patients had good pain relief with near normal range of movements yet x-rays showed subluxation in 20 patients and dislocation in 4 patients. Most of our patients were not concerned with the appearance of their shoulder as the residual deformity was negligible apart from the 4 patients where A.C joints were completely displaced at the end of 6months.

Conclusion

Conservative treatment of acute Type 3 Acromio clavicular joint dislocation with short periods of immobilization by bandages and slings and early rehabilitation of shoulder gives good short term results clinically although not correlated radiographically.

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