ORIGINAL RESEARCH PAPER

Volume-8 | Issue-7 | July - 2019 | PRINT ISSN No. 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

ACROMIO CLAVICULAR INJURIES- A PROSPECTIVE CLINICAL STUDY AT A TERTIARY CARE CENTRE IN KERALA FROM 15 -11-2018 TO 30-06-2019.

Orthopaedics

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ABSTRACT

INTRODUCTION: Most of the acromio-clavicular injuries result from direct trauma; when an individual lands on the point of the shoulder. Indirect trauma, such as a fall on a flexed elbow or outstretched arm, also may lead to AC joint injury. The AC joint is subcutaneous in nature and thus at high risk for direct trauma. The magnitude of the force determines the severity of injury and the structures involved. If the force is high, the coracoclavicular ligaments and delto-trapezial fascia are involved in the injury.

The aim of the study:

1. To determine the outcome of acromio-clavicular injuries seeking service in a tertiary care center.
2. To compare the outcome of type 3 acromio-clavicular injuries treated with conservative and operative methods.

MATERIALS AND METHODS: A total of 52 cases identified during study period from 14.11.2018 to 31.03.2019 were included and followed up to 3 months. Rockwood classification was followed to classify these injuries. 4 persons do not came for follow up ; 3 of them were having type 1 injury and 1 had type 2 injury. Among 52, 10 were degenerative subluxation; 15 were type 1 and 12 were type 2 injuries. 4, r type 3 injuries who had given consent were operated and 7 persons who doesn't give consent treated conservatively. All type 1 and 2 were undergone with conservative line of management. Clinical outcome was assessed by UCLA Shoulder rating scale (University of California at Los Angeles Shoulder Rating Scale). 1 case of degenerative subluxation developed severe pain at the site and treated with excision of lateral end of clavicle and had regained function at 3 months period. On case had associated smith fracture which was treated with open reduction and internal fixation and type 3 AC subluxation was treated conservatively.

DISCUSSION: A total of 52 cases excluding 4 lost to follow up were included in the study. The male female ratio was 4:1. The average age is 45 yrs ranges from 23 to 80. A sub set of 12; Type III acromio-clavicular dislocation were separately assessed excluding one case of degenerative one which was excluded from analysis.

The patterne of Acromio Clavicular Injuries :

	Frequency	Percent	Cumulative Percent
TYPE 1	16	33.3	33.3
2	20	41.7	75.0
3	12	25.0	100.0
TOTAL	48	100.0	

CONCLUSION: There is no statistical difference between those treated conservatively vs operative at 3 months follow up in Type 3 injuries (p value=0.883). Conservative management of type III acromio-clavicular dislocation gives excellent or good outcome but the cosmetic appearance is not improved by conservative treatment.

KEYWORDS

Classification of acromio-clavicular injuries, degenerative subluxation, Rockwood classification, UCLA Shoulder rating scale.

INTRODUCTION:

Govt. Medical College, Kollam has got an average of 8000 out patients per month in orthopaedic department. The acromio-clavicular joint is commonly involved in traumatic injuries that affect the shoulder. Treatment of these injuries has been controversial and continues to evolve. According to literature type I and II injuries are treated by conservative modalities and stage IV, V, and VI injuries are advised to undergo surgery[1]. There is no consensus regarding management of Type III acromio-clavicular dislocation[3,4].

In this study classification of acromio-clavicular by Tossy-Rockwood is followed. In Type 3 acromio-clavicular dislocation, a severe force is applied to the point of the shoulder which tears the acromio-clavicular and coracoclavicular ligaments resulting in a complete acromio-clavicular dislocation. The distal clavicle appears to be displaced superiorly as the scapula and shoulder complex drop inferomedially. Radiographic findings include a 25-100% increase in coracoclavicular space in comparison to normal side[1].

The key to the diagnosis of type III injury is that the acromio-clavicular joint can be reduced with upward pressure under the elbow or by having the patient actively shrug and reduce the joint. This is known as "shrug test." A Type III reducible injury is thus differentiated from type 4 or 5 injury which cannot be reduced if the deltopectoral fascia is interposed[5].

The AC joint is a diarthrodial joint formed by the distal clavicle and the medial facet of the acromion and a fibrocartilaginous disc interposed in between. The joint has a thin capsule that is stabilized by anterior, posterior, superior, and inferior AC ligaments, of these the superior is the most important one. The trapezoid and conoid parts of coracoclavicular ligaments pass from the inferior surface of the clavicle to the base of the coracoid process of the scapula. These strong ligaments provide vertical as well as horizontal stability. AC joint injuries represent approximately 40% of shoulder injuries in athletes. Peak incidence is in the second decade of life. The injury is rare in skeletally immature patients. The injury is 5 times more common in males than in females. Type I and type II injuries each occur twice as frequently as the other types[11].

MATERIALS &METHODS

The Aim of The Study:

1. To determine the outcome of acromio-clavicular injuries seeking service in a tertiary care center.
2. To compare the outcome of type 3 acromio-clavicular injuries treated with conservative and operative methods.

Study Subjects: 52 patients with acromio-clavicular injuries.

Exclusion Criteria; Patients with stiffness earlier and with other fractures around the shoulder were excluded. Along with these 4 lost to follow up were also excluded from the study.

Study Period: 14.11.2018 to 30.06.2019 including 3 months follow up.

Settings: Govt. Medical College, Kollam. Orthopaedic Department.

Study Procedure: Total number of persons were 52 (4 lost to follow up were excluded) and a subset of 12 (1 case of degenerative type III acromio-clavicular dislocation treated conservatively was excluded) were included in the study. The sub group analysis of conservative vs surgically treated cases was done seperately. Type III acromio-clavicular dislocation was confirmed when a complete dislocation of the joint is seen on A.P (15degree cephalic tilt) view. No stress studies

were performed. The patients were assessed 3 months after injury for functional outcome by Modified UCLA Scale (University of California at Los Angeles Shoulder Rating Scale).

Analysis: Done by SPSS Software.

RESULTS:

TABLE1: AGE DESCRIPTIVE STATISTICS

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	48	23	80	44.92	15.102

TABLE2: GENDER DISTRIBUTION

	Frequency	Percent	Cumulative Percent
MALE	39	81.3	81.3
FEMALE	9	18.8	100.0
Total	48	100.0	

TABLE 3: CLASSIFICATION OF AC INJURY

TYPE	Frequency	Percent	Valid Percent	Cumulative Percent
1	16	33.3	33.3	33.3
2	20	41.7	41.7	75.0
3	12	25.0	25.0	100.0
Total	48	100.0	100.0	

TABLE 4: CAUSES OF INJURY

	Frequency	Percent	Valid Percent	Cumulative Percent
RTA	22	45.8	45.8	45.8
Fall	13	27.1	27.1	72.9
Degenerative	10	20.8	20.8	93.8
Others(sports&violance)	3	6.3	6.3	100.0
Total	48	100.0	100.0	

Table 5: Gender & Causes Of Injury Cross Tabulation

		Causes Of Injury 1- RTA 2- FALL 3- Degenerative 4- Other				Total
		1	2	3	4	
Gender	M	19	10	8	2	39
	F	3	3	2	1	9
Total		22	13	10	3	48

Table 6:sub- Group Of Type 3 Treatment Distribution

	Frequency	Percent	Valid Percent	Cumulative Percent
CONSERVATIVE	7	63.6	63.6	63.6
SURGERY	4	36.4	36.4	100.0
Total	11	100.0	100.0	

TABLE 7: OUTCPME OF STUDY

Result	Frequency	Percent	Cumulative Percent
Excellent	29	60.4	60.4
Good	6	27.1	87.5
Fair	13	12.5	100
Total	48	100.0	

Table 8: Ac Injury Type & Outcome Result Cross Tabulation

Type	Excellent	Good	Fair	Total
1	11	4	1	16
2	9	1	10	20
3	9	1	2	12
Total	29	6	13	48

Table 9: Conservative VsSurgery & Outcome Result Cross Tabulation

Modality	Excellent	Good	Fair	Total
Conservative	26	5	13	44
Surgery	3	1	0	4
Total	29	6	13	48

Subset Analysis of 11; Type 3 injuries: 1 Case excluded which was degenerative subluxation.

TABLE 10: GENDER DISTRIBUTION

	Frequency	Percent	Valid Percent	Cumulative Percent
MALE	9	81.8	81.8	81.8
FEMALE	2	18.2	18.2	100.0
Total	11	100.0	100.0	

TABLE 11: AGE DISTRIBUTION

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	11	26	60	40.73	9.582
	11				

TABLE 12:SCORE RANGE IN TYPE 3

	N	Minimum	Maximum	Mean	Std. Deviation
SCORE	11	25	35	33.55	3.205
	11				

Table 13: Average Score Between Conservative Vs Surgery

METHOD OF TREAT.	Mean	N	Std. Deviation
CONSERVATIVE	33.43	7	3.735
SURGERY	33.75	4	2.500
	33.55	11	3.205

TABLE 14: CAUSES OF INJURY TYPE 3

	Frequency	Percent	Valid Percent	Cumulative Percent
RTA	8	72.7	72.7	72.7
FALL	3	27.3	27.3	100.0
Total	11	100.0	100.0	

Table 15: Sub Set Analysis:
Conservative Vs Surgery & Outcome Result Cross Tabulation.

Modality	Excellent	Good	Fair	Total
Conservative	6	0	1	7
Surgery	3	1	0	4
Total	9	1	1	11

Functional outcome was evaluated using UCLA Scale (University of California at Los Angeles Shoulder Rating Scale).

Grading was done using difference in score between normal and injured side.

SCORE	N	Mean	Std. Deviation	Std. Error Mean
Conservative	7	33.43	3.735	1.412
Surgically Treated	4	33.75	2.500	1.250

There is no statistically significant difference in the outcome between surgical and conservative methods adopted for type 3 Acromio-Clavicular Injuries.

TABLE 16: SIGNIFICANS ANALYSIS

	Levene's Test for Equality of Variances		t-test for Equality of Means					
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
								Lower
Equal variances assumed	.136	.721	-.152	9	.883	-.321	2.115	-5.106
Equal variances not assumed			-.170	8.566	.869	-.321	1.886	-4.620

Table 17: Complications Came Across In The Study:

	Conservative Treatment	Surgery
Skin Blisters	2	0
Step Deformity at the Lateral end of Clavicle	7	0

TABLE 18: SURGICAL PROCEDURES OPTED:

Surgical Procedure	Number	Complications
Closed K-Wire after Reduction	1	Nil K-Wire removed After 4 weeks.

Repair with Fig. of 8 pattern using No.2 Ethibond from coracoid to clavicular side and K-Wire fixation.	1	Nil K-Wire wire removed at 6 weeks
Excision of lateral end of clavicle and repair with Coraco- Humeral ligament and K-Wire fixation	1	Nil K-Wire removed at 4 weeks
Coraco-Clavicular fixation with 4.5 Cancellous screw with washer.		Nil Not willing for implant exit

DISCUSSION:

Age of the patients ranges from 23 to 80 years and the average age is 45 yrs. There were 39 male patients and 9 female patients. The mechanism of injury includes RTAs, fall on out stretched hands and fall on the side of the shoulder, Degenerative and others which included sports and violence .

Type I injuries gives satisfactory results by conservative measures because they lack instability of the joint. A sling for 14 days, analgesic medication to provide comfort, and ice to reduce swelling. Type II injuries are treated similarly to type I injuries: A sling (for up to 3 weeks), analgesics, and ice as necessary for patient comfort. Type III injuries still has some confusion among experts , whether to treat conservatively or surgically and it remains controversial.

Non-operative treatment is similar to that used for type I and II injuries: A Robert Jones strapping along with sling up to 4 weeks followed by protected gentle mobilization and strengthening exercises are we usually practice. Early surgical treatment is recommended for all type IV, V, and VI injuries. Degenerative type 2 injuries gives best results with physiotherapy, ultrasound treatment and other supportive medications. In our study All the Type 3 injured who undergone conservative treated were given Jones strapping for 3 weeks followed by arm sling for 3 weeks and a short course of analgesics. 2 of them developed skin blisters and abandoned strapping for them given sling application. Home exercises and physiotherapy were started as early as possible in all patients. Normal activity is achieved in 6-12 weeks. All the operated cases were put in arm sling and mobilized after 1 week when the pain subsides.

Tossy et al. classified AC joint injuries into 3 types; Rockwood et al. classified it into 6 types based on physical examination findings and radiographs.

Type I: Sprain of the AC ligaments only; no displacement of the distal clavicle

Type II: Disrupted AC ligaments and joint capsule; intact coracoclavicular ligaments; less than 10% vertical subluxation of the clavicle

Type III: Disrupted AC ligaments, coracoclavicular ligaments, and joint capsule; complete separation of the AC joint with the clavicle displaced superiorly; complete loss of contact between the clavicle and acromion

Type IV: Disrupted AC ligaments, coracoclavicular ligaments, and joint capsule; completely displaced AC joint with the clavicle displaced posteriorly into or through the trapezius muscle

Type V: Disrupted AC ligaments, coracoclavicular ligaments, and joint capsule; completely displaced AC joint with the clavicle displaced superiorly (>300%); distal clavicle detached from the deltoid and the trapezius.

Type VI: Disrupted AC ligaments, coracoclavicular ligaments, and joint capsule; completely displaced AC joint with the clavicle displaced inferiorly to the acromion and coracoid process.

Associated Conditions:

Fractures of the distal clavicle or the coracoids, Brachial plexopathy. In this study one case was associated with smith fracture at the same side.

Physical Exam:

Inspection may reveal prominence of the outer end of the clavicle, abrasion, or swelling in the area of the AC joint. Palpation reveals local tenderness and swelling. A palpable step-off may be felt in type III to VI separations. Pain is associated with arm movements. In type VI injuries, the shoulder has a flat appearance with a prominent acromion.

Investigations:

X ray Examination: AP view of the AC joint and an axillary view of the shoulder. Axillary views are useful for evaluating the position of the distal clavicle with respect to the acromion in the anteroposterior plane, particularly in type IV injuries.

Type I injuries: Return to sports should not be allowed until the athlete has painless Range of motion, which ussally take 2 weeks. Type II injuries may take 6 to 8 weeks and Type III injuries even take more days for a higher job. The time to return to sports is controversial, and many high-level athletes never return to their previous levels of function with non-operative treatment.

Surgical treatment is recommended for:

Open injuries, Closed type IV, V, and VI injuries and Patients who sustain type III injuries but continue to have pain and discomfort despite an adequate trial of non-operative therapy. Some clinicians[2,4] also recommend surgery for Type III injuries in overhead athletes and heavy manual laborers, Patients with brachial plexopathy.

Surgical treatment options for type III injuries include: Dynamic muscle transfers, Primary AC joint fixation, Primary coracoclavicular ligament fixation, Distal clavicle excision with or without coracoclavicular ligament reconstruction. A dynamic muscle transfer may be performed as the tip of the coracoid process and the attached coracobrachialis and short head of the biceps are transferred to the undersurface of the clavicle. The usual surgical complications are of muscle transfers are Nonunion , musculocutaneous nerve injury, high rate of failure with persistent pain etc.

In this study 3 of the 4 cases K wire AC fixation was done which was removed under local anesthesia around 6 weeks period. Literature says ; Primary AC joint transfixion may be performed using wires, pins, plates, or screws. This procedure: Usually is undertaken with repair or reconstruction of the AC or coracoclavicular ligaments. Currently is unpopular because of risks of loss of fixation, pin breakage, and pin migration, and the necessity for a 2nd surgical procedure for hardware removal. Primary coracoclavicular ligament fixation with a coracoclavicular screw may be performed with or without supplemental repair of the coracoclavicular ligaments.

The most commonly performed surgical intervention for AC separation is an anatomic reconstruction of the injured ligaments. Reconstruction of the coracoclavicular ligaments is performed by using the coracoacromial ligament as a substitute, and by the placement of a synthetic augmentation device (such as a band made of absorbable braid or ribbon) between the coracoid and clavicle. Distal clavicle excision often is used to supplement this procedure. Increasingly popular is reconstruction at the coracoclavicular ligaments with a free tendon graft, which allows anatomic reconstruction and obviates the need for supplemental fixation. Surgical treatment options for type IV injuries include: Closed reduction, converting the injury to a type III, and then treating non-operatively or with open reduction. Meticulous closure of the deltotrapezial fascia over the clavicle augments stability.

Follow up and Prognosis: In this study 60% showed excellent outcome and 12% good results. Rest 27% showed fair results. Literature showed Excellent results in >90% of all patients[5]. Excellent results in nearly 100% of patients with type I and type II injuries. Most patients return to their usual activities in several months.

Different studies in the literature explains 1. Associated fractures of the distal clavicle or the coracoids. 2. Propensity toward degenerative arthritis of the AC joint and osteolysis of the distal clavicle 3. Complications related to surgical treatment include: Injury to the great vessels, Possible mortality related to pin migration, Continued pain if resection of the distal clavicle is inadequate, particularly if the joint remains unstable, Compromised stability if clavicle resection is excessive, Erosion into the clavicle by synthetic augmentation devices, Wound infection, Osteomyelitis, AC arthritis, Late fracture, Recurrent deformity.

The cardinal finding in this study is that there is no statistically

significant difference in the outcome between surgical and conservative methods adopted for type 3 acromio-claviculatr injuries management.

The functional assessment was done by Modified UCLA Scale.The scale is shown in Anexxure:1

The sub set of 11 Type 3 injuries showed excellent results in 9 persons and 1 had good and the other Fair result. One fair result was in the conservative group.

Even if the clinical results are comparable regarding pain relief, range of motion and strength, complications are more in the surgery group than in the conservative group[9]. But this study couldn't demonstrate any difference between conservatively and surgically treated cases in the pain , movements, strength and complications that had developed. Literature narrates Complications of surgery include early complications like infection, wound break down, fixation failure and residual deformity and late complications like hypertrophic scar, traumatic arthritis, calcification of coracoclavicular ligament etc. but this study those two developed skin blisters were conservatively treated group.

Rehabilitation started as early as possible after removal of strapping in conservative group and after 7 days in surgically treated group when pain subsides. Suture removal usually at 10 days in surgically treated group. All persons returned to their original work at 3 months.

Limitations of the study: Only include small sample size and Short term follow up.

CONCLUSIONS:

1. Age group of injury ranges from 23 to 80 yrs.
2. Male female ration 4:1
3. 22 % were type 3, 20% degenerative type 2 subluxation, 31% type 1 and 25% type 2 injuries.
4. 60% showed excellent outcome in conservatively treated group and 75% In surgically treated group.
5. Conservative management of type III acromioclavicular dislocation gives excellent or good outcome but the cosmetic appearance is not improved by conservative treatment.
6. Causes of injury RTA-46% comes first followed by fall-27%, Then degenerative-21% and sports and violence -6%.
7. There is no statistical difference between those treated conservatively vs operative at 3 months in Type 3 injuries (p value=0.883).

ACKNOWLEDGEMENT:

I sincerely thankful to my Head of The Department ; Prof. Dr. CS Vikraman and To all my staff members.

Annexure 1:

Patient satisfaction

0 Patient feels procedure was not successful
5 Patient feels procedure was a success

Active forward flexion range of motion

0 Less than 30°
1 30°-45°
2 45°-90°
3 90°-120°
4 120°-150°
5 Greater than 150°

Strength of forward flexion

0 No active contraction
1 Evidence of slight muscle contraction, no active elevation
2 Complete active forward flexion with gravity eliminated
3 Complete active forward flexion against gravity
4 Complete active forward flexion against gravity with some resistance
5 Complete active forward flexion against gravity with full resistance

Pain

1 Present always and unbearable, strong medication frequently
2 Present always but bearable, strong medication occasionally
4 None or little at rest, present during light activities; salicylates frequently
6 Present during heavy or particular activities only, salicylates occasionally
8 Occasional and slight
10 None

Function

1 Unable to use limb
2 Only light activities possible
3 Able to do light housework or most activities of daily living
6 Most housework, shopping, and driving possible; able to do hair and to dress and undress, including fastening brassiere
8 Slight restriction only, able to work above shoulder level
10 Normal activities

Total

Excellent: 34-35
Good: 28-33
Fair: 21-27
Poor: 0-20

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