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Study of clinical outcome of acromioclavicular joint injury type III-VI treated by EndoButton and threads in adults

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ABSTRACT

Background: Acromioclavicular joint dislocations are common in physically active young adults that too most common in persons who are participating in sports activities. Incidence is more in males who are participating in contact sports like rugby, basketball, hockey. It accounts for 9% of all shoulder injuries. Literature says the incidence is 3-4/1,00,000 population. The aim of the present study was to study the functional outcome of acromioclavicular joint after reconstruction of both acromioclavicular and coracoclavicular ligament using endo button system and to provide pain-free, mobile shoulder.
Methods: In the present study, 15 patients were selected of age group 20-60 years. Acromioclavicular joint injuries are classified according to Rockwood classification and the findings from the physical examination and anteroposterior and axillary radiographs. All patients were treated as per status of injury level by either conservatively or operatively with open reduction and reconstruction of both ligament by using endo button thread system and its outcomes were assessed clinically and radiologically.
Results: Patients were evaluated using American shoulder and elbow score (ASES) score and Constant shoulder score. Average ASES score was 90 (range 68.3-98.3) and constant score was 88 (range 63-96). According to constant score 7 patients had excellent outcome, 6 patients had good outcome, 2 patients had adequate outcome. All patients reported satisfaction with the treatment. The patients were followed upto 6 months.
Conclusions: The technique proved to be effective in treating acute. Acromioclavicular joint dislocations (Rockwood type III-VI) with a high degree of patient satisfaction.

Keywords: ASES score, Constant score, Rockwood classification, Acromioclavicular joint

INTRODUCTION

Acromioclavicular joint (AC) dislocations are common in physically active young adults that too most common in persons who are participating in sports activities.[1] Incidence is more in males from age group of 20-39 years who are participating in contact sports like rugby, basketball, hockey.[2,3] It accounts for 9% of all shoulder injuries.[4]

As per classification of injury various conservative and surgical techniques were published in last 15 years for AC joint repair and reconstruction but these procedures reported with more number of complication and the results are not satisfactory. For better outcome it is important to know about the anatomy and biomechanics of shoulder joint and AC joint. By reconstructing both the AC and coracoclavicular (CC) ligaments with EndoButton, it is possible to restore the near normal anatomy and stability like anteroposterior by AC ligament and vertical stability by CC ligament of AC joint and good range of movements.[5,6] It has the advantage of avoiding second surgery for implant removal, donor site morbidity, hardware related

complications like hardware prominence, implant breakage. EndoButton reduces the chances of clavicular fractures across the tunnels.

Objectives

The objective of the present study was to study the functional outcome of AC joint after reconstruction of both AC and CC ligament using endo button system and to provide pain-free, mobile shoulder.

METHODS

This was a hospital based prospective interventional study conducted in Orthopaedics department of Bundelkhand Medical College and Hospital Sagar (M.P.). On the basis of outpatient and emergency admissions 15 patients who met the inclusion criteria were selected and treated surgically using with EndoButton and threads, during the period of 1st July 2018 to 30th March 2019. These patients were classified as per Rockwood classification and treated accordingly. Patients were informed about the study, written consent was taken, and then they were evaluated using American shoulder and elbow score (ASES) score and Constant shoulder score.

Inclusion criteria

AC joint disruption Rockwood type III to type VI and skeletally mature patients of age 20-60 years of both sex were included.

Exclusion criteria

Patient who did not met the age group criteria, patients with Rockwood type I, II, poor local skin conditions, patients had other systemic disorders or not fit for surgical intervention and patients who lost follow-up were excluded.

Rockwood classification[7,8]

Type I

Sprain of the AC ligaments (35% of cases). X-ray shows no alterations.

Type II

Rupture of the AC ligaments and sprain of the CC ligaments (22% of cases). X-ray shows <25% increase in AC space.

Type III

Rupture of the AC and CC ligaments (39% of cases). X-ray shows 25-100% increase in AC space.

Type IV

Rupture of AC ligaments. X-ray may show normal CC space with posterior dislocation of the clavicle.

Type V

Rupture of the AC and CC ligaments, disinsertion of the trapezoid and deltoid muscles in the distal half of the clavicle. X-ray shows a 100-300% increase in AC space.

Type VI

Rupture of AC ligaments with inferior dislocation of the clavicle. X-ray shows inferior dislocation of the clavicle.

Surgical approach

Patient was taken on beach chair position than incision made from lateral end of acromian process to lateral third of clavicle than after soft tissue dissection coracoids process and clavicle bone was exposed than two conoid and trapezoid tunnels were made in clavicle and one tunnel in acromian process as per landmark.[9] Lateral end of clavicle and AC joint disc was removed than CC and AC ligaments were reconstructed by using EndoButton and threads by using these tunnels. Closure and suturing was done layer by layer.

Post-procedure

Patients are immobilized using a Velpeau sling for 4 weeks with immediate release of active flexion-extension of the elbow, wrist and hand. Radiographic evaluation includes the anteroposterior, axillary and shoulder profile views to assess the comparative CC distance and is conducted weekly during the first month and monthly until the sixth month.

Functional evaluation

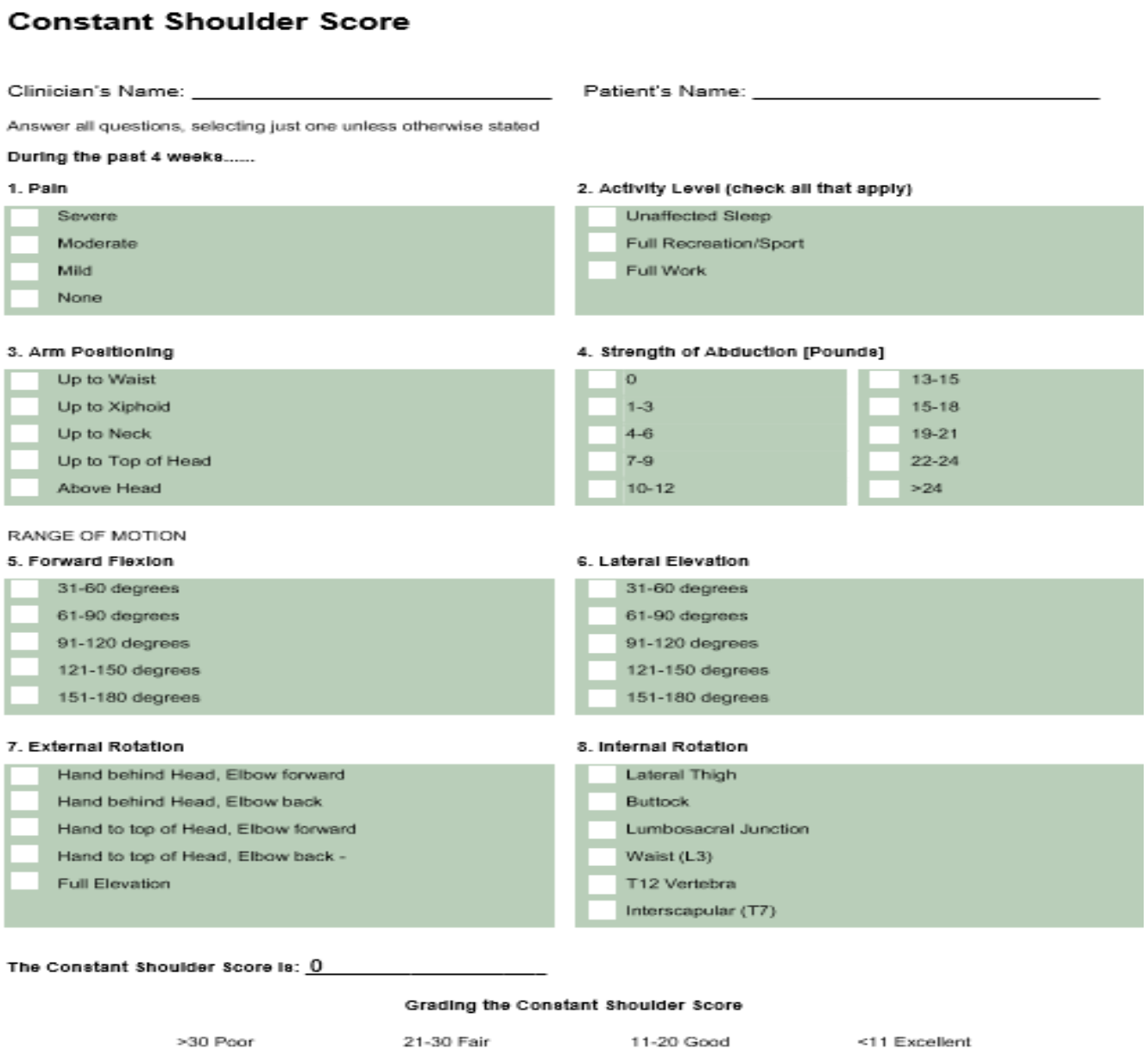
Two scoring system were used ASES score and Constant score.

ASES score

ASES score is 100 point score, 50 points for pain using visual analogue scale and 50 points for functional assessment with 10 questionnaire related daily activities. The raw score is multiplied by a coefficient. Pain sub score is multiplied by 5 and functional sub score is multiplied by 5/3. Higher the score, better is the outcome.

Constant score

Constant score is 100 point score in which 15 points for pain, 20 points for activities of daily living, 40 points for ROM, 25 points for power to assess shoulder function. Constant score of 91-100 graded as excellent, 81-90 as good, 71-80 as satisfactory and 61-70 as adequate outcome.



Constant Shoulder Score

Clinician's Name: _____ Patient's Name: _____

Answer all questions, selecting just one unless otherwise stated

During the past 4 weeks.....

1. Pain

- Severe
- Moderate
- Mild
- None

2. Activity Level (check all that apply)

- Unaffected Sleep
- Full Recreation/Sport
- Full Work

3. Arm Positioning

- Up to Waist
- Up to Xiphoid
- Up to Neck
- Up to Top of Head
- Above Head

4. Strength of Abduction [Pounds]

- 0
- 1-3
- 4-6
- 7-9
- 10-12
- 13-15
- 15-18
- 19-21
- 22-24
- >24

RANGE OF MOTION

5. Forward Flexion

- 31-60 degrees
- 61-90 degrees
- 91-120 degrees
- 121-150 degrees
- 151-180 degrees

6. Lateral Elevation

- 31-60 degrees
- 61-90 degrees
- 91-120 degrees
- 121-150 degrees
- 151-180 degrees

7. External Rotation

- Hand behind Head, Elbow forward
- Hand behind Head, Elbow back
- Hand to top of Head, Elbow forward
- Hand to top of Head, Elbow back -
- Full Elevation

8. Internal Rotation

- Lateral Thigh
- Buttock
- Lumbosacral Junction
- Waist (L3)
- T12 Vertebra
- Interscapular (T7)

The Constant Shoulder Score is: 0

Grading the Constant Shoulder Score

>30 Poor | 21-30 Fair | 11-20 Good | <11 Excellent

Figure 1: Constant shoulder score.

RESULTS

Total 15 patients of AC joint disruption type III to type VI were operated in our hospital. Out of which 12 were male and 3 female patients. It shows the prevalence is increased among male patients. Age of the patient ranges from 20-60 years with the mean age of 39 years. Among 15 patients studied 60%, 9 of patients were 20-40 years of age group. It shows increased incidence in younger population. In my study 10 patients were affected on right side and 5 patients were on left side. Right sided involvement is more in my study. Mode of injury is more with road traffic accident (57%). Post-operative rehabilitation was started according to the protocol. All the patients were followed up to 6 month. Functional outcome by ASES score and constant score. Radiological outcome by taking Zanca view to assess the amount of reduction and to rule out clavicle or coracoid fracture.

Table 1: Post-operative complications.

Post-operative complications	Frequency
Superficial wound infection	2
Paresthesia	1
Decrease range of movement	1

Table 2: Constant shoulder score outcome assessment.

Score	Interpretation	No. of patients
91-100	Excellent	7
81-90	Good	6
71-80	Satisfactory	1
61-70	Adequate	1

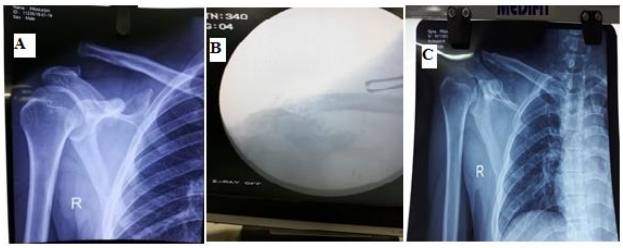


Figure 1: A) Pre op X-ray of patient, B) intra op reduction, C) follow up 6 weeks.

Figure 2: Intra operative incision, reduction, AC and CC ligament reconstruction with EndoButton and its threads.

Figure 5 (A-C): Post-surgical scar and functional range of movement.

Constant score of 91-100 graded as excellent, 81-90 as good, 71-80 as satisfactory and 61-70 as adequate outcome. Average ASES score was 90 (range 68.3-98.3) and constant score was 88 (range 63-96). According to constant score 7 patients had excellent outcome, 6 patients had good outcome, 2 patients had adequate outcome. 2 patients had surgical site complication and one patient has restricted range of motions. One patient had paresthesia over surgical site. The infection was settled in the next follow-ups. None of the patients had clavicle or coracoids fractures in my study.

DISCUSSION

In low grade injuries type I-II injuries are most common and it is most commonly treated by conservative measures with Jone's strapping and ice application.[10] Surgical treatment for type III AC joint injuries are controversial. Nevaiser et al proposed a classification system to plan the treatment for type III AC injuries in that if the AC joint reduces with upward pressure than conservative treatment can be advised if AC joint is not reduced with upward pressure surgical treatment is preferred. AC joint disruption type III-VI surgical reconstruction is advised by using different modalities like EndoButton and threads, screws, semitendinous graft etc.[11] Reconstruction of both AC and CC ligaments is done to recreate the near normal anatomy of AC joint. EndoButton avoids the stress concentration over the bone bridge between the two tunnels, coracoids is not drilled so coracoids fracture like complications avoided, distal clavicle osteotomy prevents early degenerative osteoarthritic changes and osteolysis.

CONCLUSION

From this study, I conclude that biological reconstruction with EndoButton and thread system provides near normal anatomical reconstruction of AC joint with ligament complex (AC and CC) with better stability and mobility. It has the advantage of avoiding second surgery for implant removal, donor site morbidity, hardware related complications like hardware prominence, implant breakage. EndoButton reduces the chances of clavicular fractures across the tunnels.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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