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Functional outcome of acromioclavicular joint disruption treated using anchor sutures

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Abstract

The Acromioclavicular joint is a diarthrodial articulation which is stabilized by a combination of dynamic muscular and static ligamentous structures. Conservative management is done for Rockwood type 1 and 2 Acromioclavicular joint disruption. Operative management is being done for Rockwood types 3, 4, 5 and 6. The debate about the ideal surgical procedure for Acromioclavicular joint disruption is still unresolved and newer techniques are being evolved continuously. We studied 20 patients who underwent Acromioclavicular joint reconstruction using anchor sutures. Patients were evaluated at pre op and post op follow up period with serial radiography and Constant Murley score was used for functional assessment. The average Constant Murley score used to evaluate the functional outcome showed results to be excellent in 75% of patients, good in 15% of patients, fair in 5% of patients and poor in 5% of patients. Acromioclavicular joint reconstruction using suture anchor technique is a relatively simple technique with good functional outcome and pain relief leading to improved quality of life.

Keywords: Acromioclavicular joint disruption, anchor sutures, constant Murley score, cromioclavicular joint reconstruction

Introduction

The diarthrodial acromioclavicular (AC) joint is present between lateral end of clavicle and medial acromion. The inclination of the plane of the joint maybe vertical or inclined medially at an angle of 50 degrees. Its soft-tissue supports allow the clavicle to fulfil its role as an osseous stabilization bar, helping to maintain lateralization of the scapula on the chest wall. The average coracoclavicular distance is 1.1 to 1.3 cm^[1].

For the AC joint to be rendered unstable, both the horizontally stabilizing capsular ligaments and the stronger, vertically stabilizing coracoclavicular (CC) ligaments must be torn. When this occurs, the upper trapezius maintains the horizontal position of the clavicle while the scapula and upper limb fall away, creating the clinically visible types III through V AC joint separations^[2, 3].

Acromioclavicular (AC) joint injury accounts for 20% of all injuries of the shoulder. It is more common in second decade of life and in contact athletes^[4].

Most common mechanism of injury is due to fall onto the shoulder with arm in adduction and usually associated with lateral end clavicle fractures, acromion fractures and coracoid fractures. The injured acromioclavicular joint can cause persistent pain and comprise the function of shoulder joint. Characteristic anatomic feature is downward sag of shoulder and arm. There is step off deformity and tenderness at AC joint. Standard trauma series X-rays with a Zanca view is taken.

The injuries are classified according to Rockwood classification. The indication for non-operative treatment is well established for Rockwood types 1 and 2. Operative treatment is often applied to Rockwood type III injuries when conservative management fails or there is high-grade separation with significant instability secondary to disruption of the dynamic muscular stabilizers. A wide variety of operative techniques, such as K-wires, hook plate, button plate, and ligament reconstruction, have been reported with different success rates^[5].

However, use of suture anchors has a smaller incision and dissection limited to the region above the coracoid and could potentially reduce the risk of neurovascular injury compared with the passage of sutures around the base of the coracoid.

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Moreover, no hardware removal is needed and minimal complications from breakage or migration of implants have been reported [6].

Our objective was to describe the use of suture anchors tied over the lateral end of clavicle and to evaluate its preliminary results.

Materials & Methods

The study was conducted on 20 patients between age group of 21-60 years who were enrolled after detailed clinical and appropriate radiological evaluation in Department of Orthopedics, Mahadevappa Rampure Medical College, Kalaburagi and other Private Hospitals in Kalaburagi. It was conducted between June 2019 to March 2021. Patients were evaluated pre-op and post-op with serial radiography and Constant Murley score was used for functional assessment.

Surgical Technique

Under interscalene block, the patient was placed in the beach chair position. The shoulder and upper extremity were prepped and draped according to the standard technique. Examination under anaesthesia was performed to document the range of motion and stability of the shoulder, and ease of reduction of the acromioclavicular joint.

A strap-like 7 cm incision was made in Langer's line, starting 2.5 cm posterior to the clavicle, crossing the clavicle 2.5 cm medial to the AC joint and extending distally to a point medial to the tip of the coracoid process.

The deltoid and trapezius muscles were elevated subperiosteally from the distal clavicle and anterior acromion. The deltoid muscle was retracted anteriorly and distally to visualize the base of the coracoid. The distal inch of the clavicle was grasped with a towel clip and lifted upwards, so that the AC joint could be thoroughly debrided from the intra-articular disc, and any loose frays of the acromioclavicular ligaments were stripped off the clavicle or acromion. The base of the coracoid was identified and prepared for introduction of the anchor.

A 2 mm drill bit was used to create two tunnels through the superior cortex of the clavicle over the footprint of the two original ligaments, about 1 cm apart and 2 to 5 cm proximal to the distal end of the clavicle. A needle was passed through these tunnels to retrieve 2 strands of the suture through each hole. The 4 free ends of the sutures were passed through the holes made over the lateral end of clavicle and over a small button plate. The Acromioclavicular joint was reduced into anatomical position, and the 4 ends were tied and tightened over the plate while the assistant held the reduction. The deltoid and trapezius muscles and the fascia were reattached to the clavicle and the skin was closed.

Postoperatively, the shoulder was protected in a sling for 4-6 weeks. Pendulum exercises were started 3 weeks after surgery. In the sixth week, the patients started progressive range of motion and strengthening exercises. Neither heavy lifting nor resistive exercises were allowed for 3 months postoperatively.

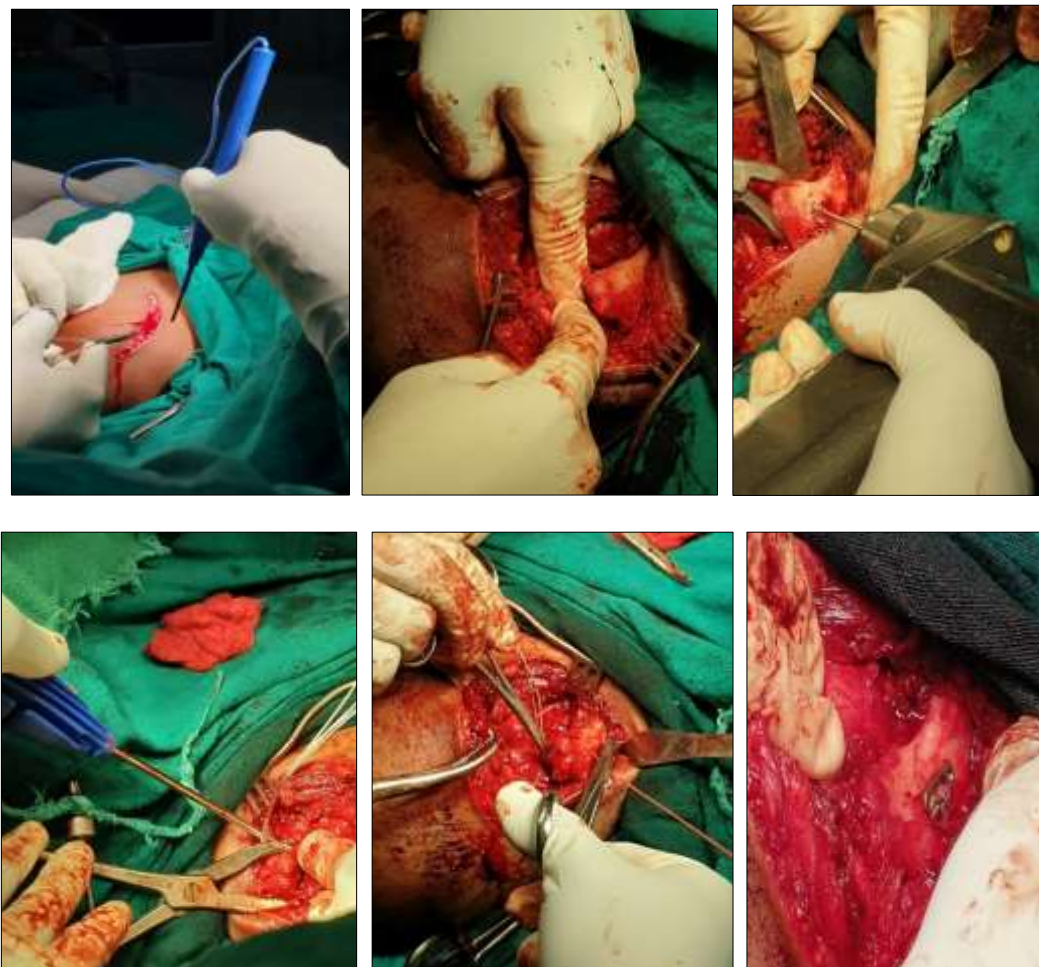


Fig 1: A. Skin Incision B. Disrupted Ac Joint C. Tunnels Made in Lateral End Clavicle D. Anchor Suture Inserted Into Coracoid Process E. Sutures Shuttled Through Tunnels Made In The Lateral End Clavicle F. Lateral End Clavicle Reduced To Anatomic Position And Sutures Tied Over A Small Button Plate



Fig 2: A And B. Pre-Op and Post Op X-Rays of Patient X

Results

In our study of 20 patients who were followed up at 6 months post operative period, majority of the patients were males with mean age of 39.80 ± 11.48 years. Right side acromioclavicular joint was more involved and road traffic accident was the common mode of injury with associated injuries seen in 5 cases.

Table 1: Distribution of cases

Parameter	Total number of cases (20)	
	Number	Percentage
Age Distribution (years)		
21-30	4	20%
31-40	8	40%
41-50	5	25%
51-60	3	15%
Sex distribution		
Male	12	60%
Female	8	40%
Side Distribution		
Right	13	65%
Left	7	35%
Mode of Injury		
Road Traffic Accidents	15	75%
Sports injury	5	25%
Distribution of cases according to Rockwood classification		
T3	8	40%
T4	3	15%
T5	9	45%

According to Constant Murley Scoring System, out of 20 patients, 15 had excellent results, 3 had good results, 1 had fair result and 1 had poor result.

Table 2: Constant Murley scores at 6 month post-operative period

Grades of Constant scores	Score interval	Post-op
		No. (%)
Excellent	90—100	15 (75.0%)
Good	80—89	3 (15.0%)
Fair	70—79	1 (5.0%)
Poor	< 70	1 (5.0%)
Total	--	20 (100.0%)
Mean \pm SD	--	90.45 \pm 8.17
Percentage of Constant score	--	90.45%

The percentage of CONSTANT score in pre-op was 38.10% and in post-op was 90.45%. The difference of CONSTANT score between pre-op and post-op was 52.35%. In our series, One patient had shoulder stiffness which was treated with NSAIDs and physiotherapy.

Two patients had superficial wound infection which was treated with antibiotics and dressing.

Discussion

Acromioclavicular joint dislocation is one of the most common injuries to the shoulder joint complex, usually caused by direct trauma via a blow or fall onto the acromion with the arm adducted.

Many procedures have been described to reconstruct the AC joint following disruption. These treatments are based on three types of fixation: acromioclavicular, coracoclavicular and dynamic muscle transfer.

Our study was done on 20 patients who had Acromioclavicular joint disruption and underwent reconstruction using suture anchors.

Breslow *et al.* found that similar stability can be achieved for coracoclavicular fixation with suture anchors or with sutures placed around the base of the coracoid for the treatment of acromioclavicular joint separations. The use of suture anchors could reduce surgical time and diminish the risk of neurovascular injury associated with sub coracoid passage of suture.

Jerosch *et al.* [7] evaluated eight different AC reconstruction techniques in ten cadaveric shoulders and found that the bone anchor system for distal clavicle fixation in the base of the coracoid process and a medialized hole in the clavicle restore anatomy best, and they recommended this technique for anatomic AC reconstruction.

Su and colleagues [8] reported on 11 consecutive patients with complete AC separations treated with 2 suture anchors moored in the base of the coracoid. There was no failure of fixation or recurrence of deformity reported.

Arthroscopic reconstruction for AC joint dislocation using suture anchors is more complicated and is technically demanding. Open surgical repair remains the gold standard treatment of high-grade AC joint disruption as it provides adequate exposure and allows for good debridement of the AC joint with perfect exposure of the base of the coracoid, and relatively less surgical time.

Certain biomechanical studies have demonstrated that suture anchors are equivalent to reconstructive techniques using the coracoacromial ligament, screw fixation, or suture or synthetic augmentations passed under the base of the coracoid [9, 10].

Our technique has many advantages: firstly, the configuration of the sutures is similar to the anatomic position of the coracoclavicular, providing a similar strength and function as the intact ligaments. Secondly, the diameter of the bone tunnels is 2.0 mm, which may decrease the risk of fracture. Thirdly, no chances of impingement as seen in hook plate fixation and no need for hardware removal.

Conclusion

In conclusion, for patients with acute acromioclavicular joint dislocation, suture anchors can achieve favorable results in reconstructing both coracoclavicular and acromioclavicular joints. This method is a good and a reliable method for the surgical treatment of acromioclavicular injuries with the advantages of ease of operation, a lower risk of complications, and no need for fixation removal. Rehabilitation course is also extremely important and should be strictly followed.

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