Original Research Paper

Volume - 13 | Issue - 07 | July - 2023 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Orthopaedics

FUNCTIONAL OUTCOME OF DOUBLE ENDOBUTTON AUGMENTED USING CORACOACROMIAL LIGAMENT TRANSFER IN ACUTE AC JOINT DISLOCATIONS

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ABSTRACT **Purpose -** This study's objective is to assess the functional and radiological outcomes of 25 patients who underwent double Endobutton with coracoacromial ligament transfer treatment for acute type 3, 4, 5 acromioclavicular dislocation. **Methodology -** 25 adult patients (19 men and 6 women) with Rockwood types 3, 4, and 5 acromioclavicular joint dislocation were treated using this technique in our Orthopaedic department at JMCH Jorhat from January 2022 to December 2022. **Results -** Within 3 weeks of trauma, the same surgical team operated on each patient. During follow-up, 2 patients were lost. Out of the remaining 23, 15 patients (65.21%) had excellent outcomes and 8 patients (34.78%) had good results, according to the UCLA score. **Conclusion -** The method provided excellent patient satisfaction while successfully treating acute type 3, 4, and 5 dislocations.

KEYWORDS : acromioclavicular, endobutton, Weaver and Dunn, coracoacromial ligament transfer,

INTRODUCTION

The acromioclavicular joint, is a complex linkage joint and treatment for a AC joint injury can be exceedingly challenging due to the scapula's extraordinarily complicated range of motion [1]

Acromioclavicular joint (ACJ) dislocation accounts for 9% of all shoulder injuries [1]. Males between the ages of 20 and 39 experience it 10 times more frequently than females [2][3], and it is most prevalent in young. [4].

The Rockwood classification [5], initially described by Tossy et al.,[6] is most commonly used to describe the degree of injury. Tossy's classification was updated by the Rockwood classification [5].

Surgery is not used in the treatment of Rockwood types I or II [7]; however, type III therapy is still debatable and may be approached using Copeland's criteria: [8].

Treatment for types IV, V, and VI involves surgery [9]. There are various surgical techniques and the open method is the most popular; its benefits include quicker recovery times, accurate identification of the sources of the coracoclavicular ligaments, direct visualisation of the ACJ, and the ability to remove any degenerative material from the disc. A more noticeable scar and aggression towards the deltoid muscle's insertion are some drawbacks. [10], [11]

Coracoacromial ligament (CAL) transfer as an operative approach for AC joint injuries has a long history and dates back to 1917 [12], when Cadenet treated dislocations and fractures of “the outer end of the clavicle” using his technique [13]. In the early 1950s, Neviaser advocated [14] and Weaver and Dunn (WD) finally modified the technique and used it for both acute and chronic type III injuries [15].

The goal of this study was to assess the clinical and radiological outcomes of 25 patients who had been treated with coracoclavicular fixation using double Endobutton and augmentation using Coracoacromial ligament transfer and using the open technique for acute Rockwood type 3, 4, and 5 ACJ dislocation.

MATERIALS AND METHODS

The study was approved by our ethics committee and all patients gave their informed consent and signed the informed consent form. 25 individuals got surgical therapy for ACJ dislocation from January 2022 to December 2022. The same surgical team operated on each patient.

Patient Inclusion Criteria – (1) Closed Unilateral Rockwood 3, 4, 5; (2) Age ≥ 18 years; (3) Normal shoulder function before the injury; (4) Patient follows our treatment plan.

Patient exclusion criteria: (1) Chronic acromioclavicular joint dislocation (more than 3 weeks after the injury); (2) Patients with open injuries or vascular or nerve damage; (3) Age < 18 years; (4) Patients with severe osteoporosis; (5) Patients with co-morbidities that cannot tolerate surgery; (6) Patients who refuse surgical treatment.
(7) Patients with minimum 6 months follow up.

All patients were admitted to Orthopaedic Department, JMCH with a pre operative Xray of affected shoulder (Figure 1) and also contralateral shoulder for comparison. The same surgical team operated on each patient. Regular Postoperative follow-up was performed. Clinical evaluation was done using 'UCLA and Ellmann scoring system' (Table 1)

Figure 1 - Pre Op Xray

Table – 1 Ucla And Ellman Score

Scoring according to UCLA	
Pain	
Present all the time, unbearable, frequent use of strong painkillers	1
Present all the time, unbearable, occasional use of strong painkillers	2
Weak/absent at rest, present during light activity, frequent use of salicylates	4
Present during heavy/specific activities, frequent use of salicylates	6
Occasional and Weak	8
Absent	10
Function	
Unable to use the limb	1
Only light activities possible	2
Able/activities at home/activities of daily living	4
Activities at home/shopping/driving/combing hair/dressing/put on clothing that closes in the back	6
Mild restriction/able to work above shoulder level	8
Normal activities	10
Active Flexion	
>150 degrees	5
120-150 degrees	4
90-120 degrees	3
45-90 degrees	2
30-45 degrees	1
Anterior Flexion strength (manual muscle test)	
Grade 5 (normal)	5
Grade 4 (good)	4
Grade 3 (average)	3
Grade 2 (weak)	2
Grade 1 (muscle contractions)	1
Grade 0 (absent)	0
Patient satisfaction	
Satisfied and better	5
Unsatisfied and worse	0
Maximum score: 35 points	
Ellmann Score (UCLA)	
34-35	Excellent
28-33	Good
21-27	Reasonable
00-20	Poor

Surgical technique: The patient is placed in "beach chair" position under general anaesthesia. 5cm vertical incision (figure 2), 3cm medial to AC joint centred over coracoid process.

Figure 2- Incision

The deltotrapeziodal fascia is opened and blunt dissection done to expose the clavicle, coracoid and acromion (figure 3). Reduction is achieved with the help of pusher under IITV guidance and reduction maintained temporarily with 2 K-wires through the lateral border of the acromion across the AC joint into the lateral end of the clavicle. 3cm from the AC joint, clavicle is drilled with the help of a 2.5mm drill bit and drilling continued through the base of the coracoid process (using a periosteal elevator as counter) and out through the coracoid under IITV guidance. K-wires and drill bit are withdrawn. Endobutton along with loop is passed vertically through the drill hole made in the clavicle into the coracoid and out through the coracoid. Endobutton (coracoid endobutton) is then flipped. Reduction is again achieved through pusher. Loop tightened over Endobutton (clavicular endobutton) to achieve and maintain desired reduction (figure 4). The coracoacromial ligament is detached from the acromion by sharp dissection, and mobilized. A running locked stitch is placed along the medial and lateral borders of the ligament. The anterior inferior surface of the distal clavicle is decorticated to provide an optimal surface for healing. Two drill holes are then placed from an anterior inferior to a posterior superior position. The two suture limbs are passed through these drill holes so that the free ends of the sutures lie posteriorly and superiorly. The suture is then tied to secure the transferred ligament in place.

IITV imaging is done before closure (figure 5) Deltotrapeziodal fascia and skin closed in layers and antiseptic dressing is done.

Post operative X-rays (figure 6) are taken after the procedure.

Figure 3- Exposure

Figure 4- Endobutton In Situ

Figure 5- Intra-op Iitv Imaging

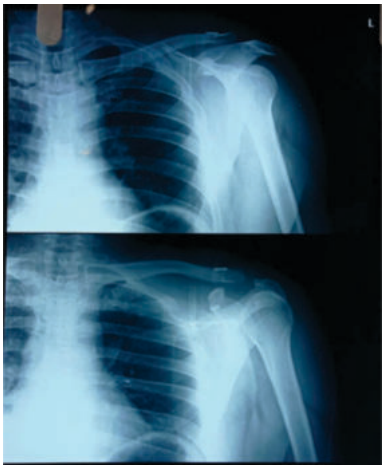

Figure 6 - Post Op Xray

Patients are immobilized using an arm pouch 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 coracoclavicular distance and is conducted weekly during the first month and monthly until the sixth month.

RESULTS

Two patients out of a total of 25 were lost during follow-up. According to the UCLA score and Ellmann criterion, out of the remaining 23, Results were outstanding in 15 patients (65.21%) and fair in 8 patients (34.78%). Every patient expressed satisfaction with the care they received.

The patients were evaluated after 6 months where 4 patients (17.39%) experienced less than 30% loss of reduction, but it was without functional impairment.

DISCUSSION

Of the various methods of AC joint fixation, Kirschner wire fixation is not commonly utilised due to the high rates of problems, such as material migration and breakage, infection, rheumatoid arthritis, and reduction loss. [16]

The coracoacromial ligament is transferred into the intramedullary region of the distal section of the clavicle after being deinserted from the acromion, as described in 1972 by Weaver and Dunn. [17]

The clavicle is fastened to the coracoid process with a screw in the Bosworth method. The screw may break or become loose, or the coracoid process may fracture, necessitating a new treatment to remove the material and presenting high rates of osteolysis in the clavicle [18], despite the fact that it is effective and recovers the reduction of the ACJ. High-strength subcoracoid knots have the potential to lead to bone erosion and anterior clavicle subluxation. [19] Arthroscopy was used by some authors to rebuild the coracoclavicular ligament. The advantage of using synthetic suture [20] or autologous semitendinous graft is that it preserves the deltoid insertion and uses a minimally invasive approach to address any associated injuries.

Several authors have reported the method of stabilisation between the clavicle and the coracoid process utilising the Endobutton or anchors, [21] with positive outcomes. Its benefits include not requiring the removal of synthetic material and it has been proven to be successful in repairing and sustaining the reduction of the ACJ. Suture cut-out, foreign body response (often seen when polytetrafluoroethylene suture is used), and possible osteolysis in the clavicle are all complications.

Weaver-Dunn procedure [22] was initially described in 1972; it utilizes the coracoacromial ligament to substitute the torn coracoclavicular ligament. However, biomechanical studies have revealed that this nonanatomic construct alone is only 30% as strong as the native ligaments and there is a tendency to displace the clavicle anteriorly and can often lead to a recurrent deformity. [23] Therefore, several modifications of the Weaver Dunn procedure have been described.

We, in our investigation, have used reinforcement of conventional procedure using a double endobutton. We feel that this reinforcement maintains the reduced position of the joint and prevents subluxation till the healing of the reconstructed ligament is complete.

In our investigation, the method allowed for a limited open approach and a swift surgical procedure. Because the Endobutton does not need to be removed, it is effective. The coracoacromial ligament transfer is a useful biological adjunct to an acromioclavicular joint stabilization.

In our study, 91% of patients who underwent the Endobutton surgery reported feeling satisfied (excellent and good).

CONCLUSION

The method demonstrated high levels of patient satisfaction while successfully treating acute ACJ dislocations (Rockwood types 3, 4, and 5).

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