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Original Article

Functional and Radiological Outcomes of Double Endobutton Fixation for Acute Acromioclavicular (AC) Joint Dislocation

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ABSTRACT

Introduction: There are various surgeries described in the literature for acromioclavicular (AC) joint dislocation. These surgeries have their own advantage and disadvantages. We routinely practice the double endobutton technique for acute AC joint dislocation for Rockwood type III-VI injuries. The aim of this study was to evaluate the functional outcome using the University of California, Los Angeles (UCLA) Shoulder Rating Scale and also assess the biomechanical stability coracoclavicular distance (CC) distance radiographically.

Methods: This was a prospective observational study done in twenty-five patients selected by convenience sampling method. The double endobutton was made using two 4.5 mm endobutton and fiber wire. The clavicular tunnel and coracoid tunnel were made, the endobutton was flipped underneath the coracoid, and the construct was tightened and secured.

Results: The functional outcome was measured using the University of California and Laos Angle Shoulder rating scale (UCLA), which showed an average score of 30.24. The score was excellent in 80%and fair in 20% of the cases. The radiological outcome was measured using CC distance, and a comparison was made between uninjured and injured limbs, which was not statistically significant (p=0.57). The immediate postop CC distance was compared in one year, which also did not show any statistical significance difference (p=0.074).

Conclusion: AC joint repair using double endobutton had excellent functional outcomes and radiological outcomes.

Keywords: Acromioclavicular Joint; Coracoclavicular Distance; Endobutton.

INTRODUCTION

The Acromioclavicular (AC) joint is commonly injured, representing 9% of all shoulder injuries.[1,2] It is commonly injured as a result of a fall on the shoulder (direct injury), as seen in contact sports, skiing, cycling, and Road traffic accidents (RTA). Rockwood's classification is commonly used to classify the injury based on the degree of injuries (Grade I to VI). Grade IV-VI injuries are unstable in both horizontal and vertical planes and, hence, commonly treated surgically. Grade III are mostly conserved as Grade I-II unless patient are heavy manual workers or overhead competitive athletes. The injuries to the AC joint can result in persistent pain and alteration in the shoulder biomechanics, which has been shown in various studies.[3] There are numerous methods of surgical fixation that have been used to treat acute AC joint dislocations. We are using a double endobutton device to reconstruct the coracoclavicular (CC) ligament. This study aims to assess the functional and radiological outcomes in acute AC joint dislocations treated using the endobutton fixation method.

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METHODS

This was a prospective observational study done in AC joint dislocation in Chitwan Medical College after the approval of ethical committee board members IRC(CMC-IRC/ /078-066). All patients, irrespective of the dominance of hand and profession, presenting to the Emergency department (ED)/Outpatient Department (OPD) from June 2020 to June 2022 with a history of trauma to the shoulder, then an Xray of the involved shoulder (AP view), Zanca view and Xray of both the shoulder was done, and those meeting the inclusion criteria were included in the study. Age older than 16 years and below 50 years with Rockwood Type III-VI with a duration of injury of less than three weeks were included in the study. The cases with previous surgery or ipsilateral same limb trauma or head injury and duration of more than three weeks were excluded from the study because this could affect the functional outcome of the patients.

Surgery

The base of the coracoid tip was palpated, and an incision

5cm above it was made, extending to the anterior edge of the distal clavicle. Flaps are raised medially and laterally. Along the fibers of the deltoid, it was split, and the coracoid was identified and cleared up to the base. The reduction of the clavicle was made, and the reduction can be held with a temporary k wire passing from the acromion to the clavicle. The drill hole for the clavicle was chosen to be 3.5 cm medial to the AC joint. The drill hole should be positioned directly over the base of the coracoid, and the drill should be directed a little anteriorly. When the guide wire was drilled through the clavicle, the guide wire was easily viewed in between the clavicle and coracoid. The tip of the guide wire was drilled throughout the base after the confirmation of its position in the center, between the medial and lateral edge, which can be confirmed by the C Arm image. A 4.5 mm endobutton reamer was used to drill the clavicle and coracoid base, and the tactile feel of the reamer and C arm image was used. The Endobutton, with its fiber tape, was passed through the tunnel with the help of k wire and was flipped at the base of the coracoid. The suture was tied at the endobutton at the clavicle side, all the fascia around the AC joint was closed in layers, and the K wire was removed. [Figure 1-3]

Fig. 1: Surgical Exposure

Fig. 2: Endobutton preparation

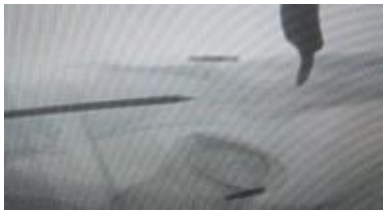

Fig. 3: AC joint fixed with double endobutton

Pendulum exercises were started on the 2nd postoperative date, and passive mobilization started as the patient tolerated. Within three weeks, active exercises were started, and a full range of movement was started after three weeks. The patients were followed up at two weeks, six weeks, three months, and at 1year. At each visit, a Zanca view of the shoulder and the cross-body lateral view was done, and the radiological CC distance was measured using RADIANT DIACOM at immediate postop and one year of both the injured and uninjured side. The CC distance was measured at the upper border of the center of the coracoid to the clavicle's lower border by three radiologists, and an average was taken. [Figure 4 and 5] Range of motion was measured with a goniometer. The functional outcome was evaluated by the University of California, Los Angeles (UCLA) Shoulder Rating Scale at six months and at one year. The patients were followed up several times to see any complications like infections, osteolysis around acromion, and fixation failureThe data was entered in Microsoft Excel 2019 and uploaded into SPSS version 25 for statistical analysis.

Fig. 4: CC distance measured pre-operatively

Fig. 5: CC distance measured post-operatively

RESULTS

The Demographic Profile of the patients is shown in Table 1. The most common cause of AC joint dislocation was Road traffic accidents. Out of the 25 cases, 9 cases were Rockwood Type III, 4 patients were Type IV, 11 patients were Type V, and one patient was Type VI. The average time in which the operation was done was 7.6 days. The functional outcome was measured using the University of California and Laos Angle Shoulder rating scale (UCLA), which showed an average score of 30.24. The score was excellent in 80%, and fair in 20% of the cases.

Table 1: Demographic Characteristics of the patients

Characteristics	Frequency(n=25)	Percentage (%)
Age	Mean:35.68 Range: 23-48	
Gender		
Male	18	72
Female	7	28
Rockwood Classification		
Type III	9	36
Type IV	4	16
Type V	11	44
Type VI	1	4
Side of Injury		
Right Side	11	44
Left Side	14	56
Time of injury and surgery	Mean:7.6 Range:2-18 days	

Table 2: UCLA Shoulder Score

Outcome	6 months		1 year	
	No of cases	Percentage	No of cases	Percentage
Good/ Excellent	17	68	20	80
Fair/ Poor	8	32	5	20

Table 3: Comparison of CC distance with Normal side and injured side at one year

	Injured Side	Contralateral normal side	P value
Coracoclavicular Distance	9.18 (5.9-12.9)	8.82(6.5-12.3)	0.57

Table 4: Comparison of CC Distance of immediate post-op and Last visit at one year

	Immediate post-op	Last visit	P value
Coracoclavicular Distance	8.76 (6.1-18.9)	9.18(5.9-12.9)	0.074

The radiological outcome was measured using CC distance, and a comparison was made between uninjured and injured limbs, which was not statistically significant (p=0.57). The immediate postop CC distance was compared in one year, which also did not show any statistical significance difference (p=0.074). There was no radiological evidence of AC joint arthritis or osteolysis in the distal clavicle or coracoid fracture. There was not any surgical site infection in any of the cases. All the patients were able to return to their routine normal activities like riding a vehicle, doing kitchen work, taking a bath, etc.; at around 12 weeks, there was one case of complete failure of endobutton reconstruction, for which reconstruction was done with semitendinosus graft.

DISCUSSION

There is various surgical treatment described in the literature for AC joint dislocation. There is various problem related to implant, like breakage and implant removal surgeries.[4] The endobutton technique avoids the implant-related problem, and the second surgery is to remove the implant. In this technique, we have made only one clavicular tunnel in between conoid and trapezoid insertion instead of two tunnels, which avoids complications like clavicular fracture, as shown in various studies.[5] The early surgical intervention has the advantage of biological healing and good functional outcomes, as shown in our study, which showed an average UCLA score of 30.24 and excellent outcomes in 80 percentage of patients, which has also been shown in metanalysis study done by Song et al.[6] The Coracoclavicular distance measured immediate postoperative and at one year was statistically insignificant which shows the biomechanical stability provided by the endobutton despite lot of cyclical loading over period of time.

In our study, 20 percentage of the people had fair outcomes despite the CC distance maintained for up to 1 year and was also comparable to uninjured limbs. This could be due to association with other intra articular pathologies like SLAP lesions and PASTA lesions, which can be addressed with only the Arthroscopies procedure.[7] The arthroscopic procedure could be useful for dealing with such pathologies, but it also has the disadvantage of a fixation failure rate from 28 to 43%.[8,9] This facility is not available in every institute and has a difficult learning curve.

CONCLUSION

The double endobutton technique for acute AC joint dislocations was successful in restoring stability in our study patient over a period of 1 year. Excellent outcomes were achieved for both clinical scores and radiological parameters. The double endobutton fixation maintains a stable AC joint, allowing enough time for strong soft tissue healing to develop.

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