

Original Research

Surgical Treatment Of Rockwood Type Iii Acromioclavicular Joint Dislocation Using Bosworth Screw And Double Loop Endobutton Technique: A Hospital Based Comparative Study

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ABSTRACT

Introduction: Acromioclavicular dislocation constitutes 12% of all shoulder girdle injuries. It is common in male athletes. Treatment of Rockwood type III acromioclavicular dislocation is controversial and extensively debated in the literature. When surgery is indicated which surgical procedure produces best functional outcome is still debatable.

Aim: Aim of the study is to compare the clinical and radiological outcome of Bosworth screw and double loop Endobutton technique for the treatment of Rockwood type III acromioclavicular dislocation.

Materials and Methods: 20 patients were surgically treated for Rockwood type III acromioclavicular dislocation. Patients were divided into two groups by randomized control trial. Group A(n=10) was treated with Bosworth screw and Group B(n=10) was treated with double loop endobutton technique. All patients were followed up at 4 weeks, 3 months, 6 months and 12 months. Clinical outcome was assessed by Constant Murley score and radiological outcome was assessed by coracoclavicular distance(CCD) in each follow-up.

Results: The mean Constant-Murley score at 4 weeks, 3 months, 6 months and 12 months were higher in group B as compared to group A, which was statistically significant(p value <0.05). At the end of 12 months the mean Constant-Murley score in group A was 83.13±4.86 and in group B was 94.30±2.47. There was no statistically significant difference seen in terms of CCD between the two groups. In terms of complications, 1 patient in group A showed screw loosening and backout. No postoperative complications were seen in group B.

Discussion and Conclusion: The double loop endobutton technique showed better functional outcomes and lesser complications and can be a better alternative to Bosworth screw fixation in the treatment of Rockwood type III acromioclavicular dislocation.

Keywords: Acromioclavicular joint, Bosworth screw, Double loop Endobutton.

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INTRODUCTION

Around 9% of all shoulder injury is acromioclavicular dislocations(ACD)¹. Acromioclavicular joint has crucial functions in shoulder and arm movements and is an important stabilizer of the shoulder². AC joint dislocation is common in young male athletes which emphasizes the importance of restoring its normal anatomy and function³. Two ligaments stabilizes AC joint: acromioclavicular ligament and coracoclavicular ligament responsible for horizontal and vertical stability respectively². AC joint

dislocations was classified by Tossy⁴ and Allman⁵ as type I, II, and III dislocations. Rockwood⁶ extended this classification and added type IV, V and VI. Rockwood I and II injuries are treated conservatively and type IV and V are treated surgically; however treatment of Rockwood type III is controversial and extensively debated in the literature.⁷ Although no treatment is generally accepted for type III dislocations, surgical treatment is preferred by most surgeons as it is common in young and physically active patients.⁸ Different surgical

methods, including a variety of implants are described in the literature, however the best surgical option and implant of choice is still debatable.⁹

This study was undertaken to compare the outcome of Bosworth screw and Double loop endobutton technique in the surgical treatment of Rockwood type III AC joint dislocations.

MATERIALS AND METHODS

This study was conducted in the Department of Orthopaedics, Jorhat Medical College and Hospital after taking ethical clearance from the institution between April 2021 to March 2022. A total of 20 patients (15 male, 5 female) with radiologically diagnosed Rockwood type III AC joint dislocations and with duration of injury of <3 weeks were included in the study after obtaining informed and written consent. Patients with chronic dislocations (> 3 weeks), previous shoulder surgery, degenerative disease of the same shoulder were excluded from the study. Patients were divided by randomized control trial in to two groups Group A (n=10, 8 male and 2 female) treated with Bosworth screw and Group B (n=10, 7 male, 3 female) treated with double loop endobutton technique. The mode of injury was fall in 12 patients, road traffic accident in 6 patients and sports injury in 2 patients. The dislocation was on right side in 15 patients and on left side in 5 patients.

SURGICAL PROCEDURE

All patients were placed in beach chair position under general anaesthesia. A small towel bump was placed under medial border of scapula in the affected side to prevent protraction of scapula. A small 3 cm transverse incision was made from AC joint to the lateral end of clavicle. A vertical incision around 2.5 cm was made after splitting the deltopectoral fascia from the tip of coracoid. AC joint is reduced manually with digital pressure by pushing the lateral end of clavicle and held in place by a k-wire inserted

horizontally from the lateral side of acromion and AC joint in to the lateral end of clavicle. In Bosworth technique a guidewire was passed vertically through clavicle and coracoid and checked under fluoroscopy. Then it was drilled with a 4.5 mm cannulated drill. A Bosworth screw of adequate length was inserted and final position was checked by fluoroscopy followed by removal of the k-wire used for reduction of the joint. In Endobutton technique, a 2.4 mm guide wire was passed through the clavicle and coracoid after reduction of the joint then the clavicle and coracoid was drilled by a 4.5mm cannulated drill bit. By a cannulated pusher the endobutton was pushed under the coracoid. The Endobutton thread was tightened till anatomic reduction of the joint was achieved. Final position was checked by fluoroscopy. Follow-up: All patients were followed up at 2 weeks (for suture removal), 4 weeks, 3 months, 6 months and 12 months. Pendulum exercise was started on postoperative day one. After 4 weeks active and passive exercises were started. Clinical outcome was assessed in preoperative and postoperative in each follow-up except at 2 weeks using Constant Murley score and VAS and radiological outcome was assessed by coracoclavicular distance (CCD).

RESULTS

Out of 20 patients included in the study, 15(75%) were male and 5(25%) were female. The mean age group in Bosworth group was 38±7.645 years and in endobutton group was 37.90±8.171 years. There was no significant difference between the groups in terms of mean age and sex distribution. The general characteristics of patients are summarized in table 1. The patients were assessed in each follow-up (except at 2 weeks postoperative) both clinically as well as radiologically for both the group. Constant Murley score and Coracoclavicular distance (CCD) were compared with preoperative values.

Table 1: Patient characteristics

		Group A(Bosworth)	Group B(Endobutton)	p-value
Age		38±7.645	37.90±8.171	0.9778
Sex	Male	8	7	1.0000
	Female	2	3	
Mode of injury	Fall	12 (60%)		
	RTA	6 (30%)		
	Sports	2 (10%)		
	Total	20		
Side of injury	Right	15 (75%)		
	Left	5 (25%)		
	Total	20		

Table 2: Constant Murley Score

		Bosworth Group	Endobutton Group	P-value*
Preoperative		47±2.309	49.70±2.214	0.0156
Postoperative	4 weeks	50.30±2.497	52.50±1.716	0.0339

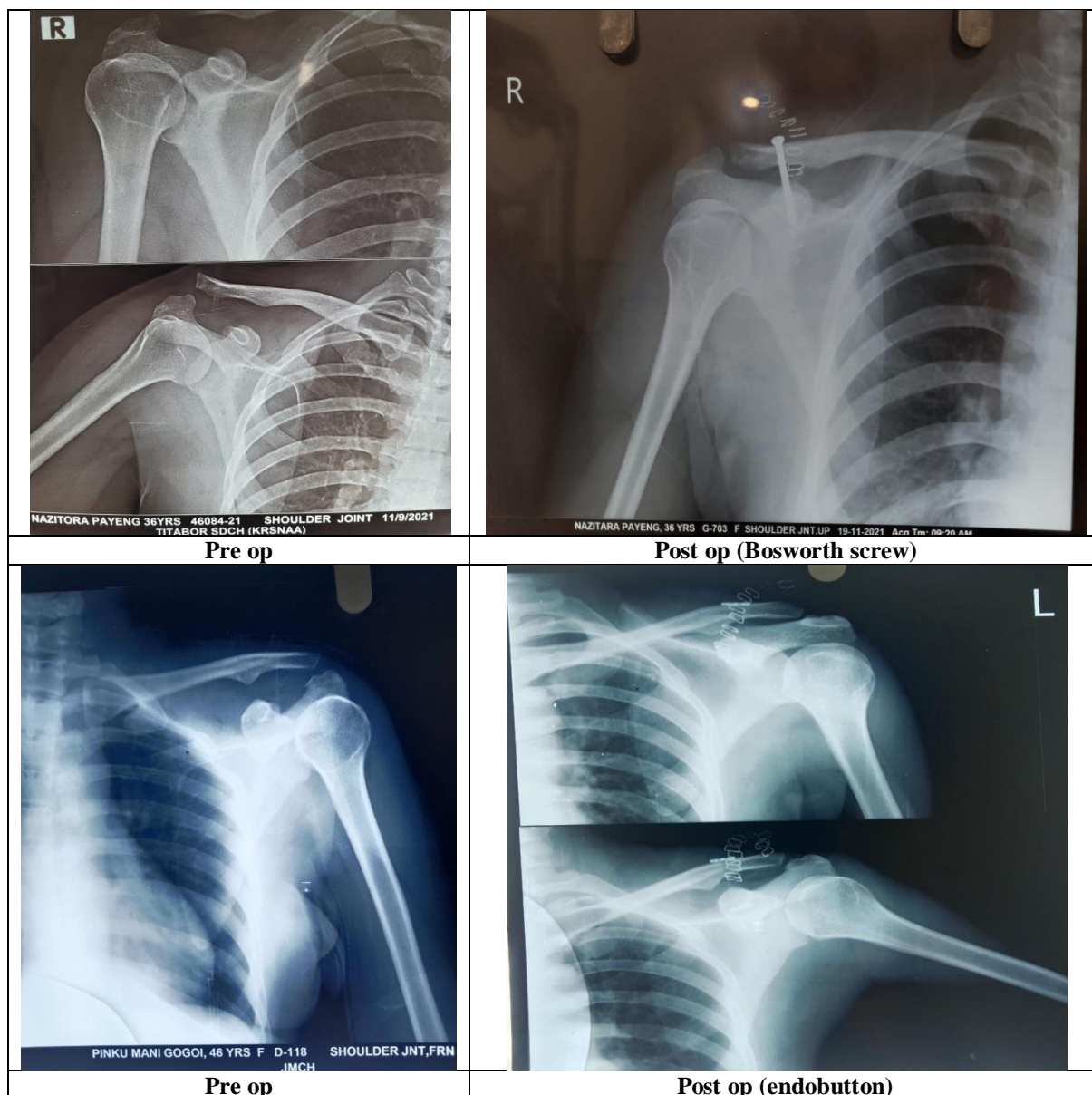
	3 months	61.10±2.183	68.50±1.121	<0.0001
	6 months	70.40±1.578	80.50±2.173	<0.0001
	12 months	80.30±1.947	91.60±2.271	<0.0001
P-value**		<0.0001	<0.0001	

(p-value*-Unpaired t-test, p-value**- one way ANOVA test)

Table 3: Coraco-clavicular Distance(CCD)

		Bosworth Group	Endobutton Group	P-value*
Preoperative		19.80±1.932	19.80±1.317	1.00
Postoperative	4 weeks	9.70±1.337	9.20±1.317	0.4106
	3 months	9.80±1.135	9.10±1.197	0.1964
	6 months	10.00±1.155	9.70±1.494	0.6215
	12 months	10.10±1.197	9.50±0.849	0.2126
P-value**		<0.001	<0.001	

(p-value*-Unpaired t-test, p-value**-one way ANOVA test)



The difference between preoperative and postoperative Constant Murley score was significantly higher in both the group (p-value <0.05). The CCD

was significantly lower in the postoperative period than the preoperative period in both the group (p-value <0.05). The mean Constant Murley score of

Endobutton group in the postoperative 4 weeks, 3rd, 6th and 12th months were significantly higher than those of Bosworth group. There was no significant difference in comparing CCD in both the groups. Postoperative complication was seen in 1 patient of Bosworth group with screw loosening and backout. No postoperative complication was seen in Endobutton group.

DISCUSSION

The Conoid, Trapezoid and Coracoacromial ligaments are the main structures of the AC joint and help in transferring weight from the axial to the appendicular skeleton¹⁰. For the treatment of Rockwood type III AC joint dislocation, no prospective randomized control trial exists. However, some guidelines prefer surgical treatment for young, active, sports persons and manual labourers⁽¹¹⁻¹²⁾. Germany prefers surgical treatment as opposed to American orthopaedic surgeons who prefer conservative treatment as first choice.⁽¹³⁻¹⁴⁾ According to few studies conservative treatment provides similar outcome in terms of muscle strength, pain level, range of motion and functionality, but it does not have any superiority over surgical treatment.¹⁵ In a meta-analysis investigating the outcomes of surgical and conservative treatment of Rockwood type III AC joint dislocation, it was found that the cosmetic outcome was poor with conservative treatment.¹⁶ Among the surgical treatment, various surgical modalities have been described, which can be grouped into two: primary repair of CC ligament and reconstruction of CC ligament. AC joint can be fixed with k-wire, hook plate or screw. Stabilisation of AC joint with rigid fixation between coracoid and clavicle using Bosworth screw fixation was introduced in 1921. But the technique is complicated by implant failure, loosening, mal positioning, osteolysis, second surgery for removal and fracture of coracoid and clavicle. Similarly in our study we have seen that the functional outcome is less when treated with Bosworth screw.¹⁷ In the double endobutton loop technique, the two surfaces of endobutton bears the physiological loads and hence, the chances of suture failure decreases. The results of our study are consistent and similar with some of the other studies where double endobutton loop technique was used in the management of acute type III AC joint injuries. Struhlet *al.*¹⁸ and Sharma *et al.*¹⁹ reported a Constant – Murley score of 98 and 91.17 respectively in their studies using closed loop endobutton device. In our study, we found that the Constant – Murley score was significantly better in patients treated with double endobutton loop technique than the Bosworth technique. However, there is no significant difference with respect to coraco-clavicular distance in both the groups. Stabilization of AC joint with a screw between clavicle and coracoid which provides a rigid fixation has been an appealing prospect in the form of screw. Due to motion between the coracoid and the clavicle, fatigue of the implant occurs over time.

Biomechanical studies in cadaveric models showed that the use of a Coraco-Clavicular screw, reduced joint motion, and significantly increased joint contact pressures, which could have implications for early joint degeneration when this technique is used [15]. Failure could present as Lateral end clavicle osteolysis, hardware failure, or even fracture of coracoid or clavicle [16–19]. There have been reports of high failure of mechanical devices [20].

CONCLUSION

Our study suggests that post-operative functional outcome is better in patients treated with endobutton for Rockwood type III AC joint dislocation with respect to treatment with Bosworth screw. But there is no significant difference with respect to coraco-clavicular distance in both the groups. However, the study is limited by the number of patients and it requires a large number of patients to ascertain the findings.

DECLARATIONS

Conflict of interest: On behalf of all the authors, the corresponding author states that there is no conflict of interest.

Informed consent: Informed consent has been taken from all the participants.

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