ORIGINAL ARTICLE

MODIFIED BOYTCHEV PROCEDURE IS AN EFFECTIVE SURGICAL TREATMENT FOR RECCURRENT ANTERIOR DISLOCATION OF SHOULDER

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HOW TO CITE THIS ARTICLE:
R. Srikanth Varma, Satish Kumar K, P. S. Jaya Prasad, Krishna Subramanyam. "Modified Boytchev Procedure is an Effective Surgical Treatment for Recurrent Anterior Dislocation of Shoulder". Journal of Evidence based Medicine and Healthcare; Volume 1, Issue 13, December 01, 2014; Page: 1690-1696.

ABSTRACT: BACK GROUND: Recurrent anterior dislocation of shoulder is a common orthopedic problem. The pathology is well known i.e. bank arts lesion, hill sachs lesion and capsular laxity. In the literature more than 150 types of surgeries were proposed but with their own limitations and recurrence. In the modified Boytchev procedure an active biomechanically dynamic sling is created by rerouting the conjoint tendon of coracobrachialis and short head of biceps under the subscapularis and fixed with a screw. This creates a(1) buttressing effect over anterior portion of head of humerus and(2) improves the stretch proprioceptive reflex in the subscapularis muscle and thus early and effective contraction of subscapularis. **MATERIALS AND METHODS:** This paper discusses our experience and results in the treatment of recurrent anterior dislocation of shoulder in 22 patients (n=22) during the period Aug 2007 to Dec 2011, with age group of 21-49 years with mean age 30.6 yrs with a mean follow up of 96.3 weeks with mean preop dislocations 10.5.All patients were evaluated by Visual analogue score {VAS} and Modified American Shoulder and Elbow Surgeon Score {ASES} at each follow up. The scores were statistically compared at each follow up. **RESULTS:** There were no dislocations in any of the patients. All patients had significant improvement in visual analogue score and modified American Shoulder and Elbow surgeon score at the last follow up. There was no loosening of screw at all the follow ups. One patient had screw removal. There was no loss of shoulder range of motion. **CONCLUSION:** The technically simple modified Boytchev procedure is an effective surgical treatment for recurrent anterior dislocation of shoulder.

KEYWORDS: Anterior dislocation of shoulder, recurrent, modified, boytchev, sling, mecham receptors.

INTRODUCTION: Recurrent anterior dislocation of shoulder is a common orthopedic problem. In the literature more than 150 different surgeries were described for its treatment. The recurrence is due to mainly Bankarts lesion, Huge hillsachs lesion and capsular laxity.[1,3] Often patients were referred to tertiary shoulder surgeons with failed multiple procedures like arthroscopic bankarts repair. In these patients most of the times there will be no structure found intraarticularly to repair. Most of the surgical procedures described are based mainly on two basic active (rotator cuff and biceps) and passive (capsuloligamentous) mechanisms.[4]

After going through the literature we found a technique called modified Boytchev procedure for the treatment of recurrent anterior dislocation, in which detached tip of coracoid process along with conjoint tendon of coracobrachialis and short head of biceps will be rerouted to its anatomical position underneath the subscapularis and fixed with a screw.[5]

Ha 'Eri GB etal., in 1986 had concluded that Modifed boytchev procedure provides immediate stability to the shoulder allowing range of motion exercises to begin from the first post op day onwards.[6] Shibata et.al has measured the pressure between humeral head and the subscapularis tendon in 32 patients before and after modified Boytchev procedure. They have concluded that the modified Boytchev procedure increases the pressure between the humeral head and the subscapularis tendon.[7]

They also suspected that the increased pressure increases proprioceptive stimuli in the subscapularis tendon and thus accelerates the protective reflex needed to prevent shoulder dislocation.[8] Yozo shibata etal., had measured the muscular strength before and after Modified Boytchev procedure and found no difference. In their study there was 4% dislocation rate.[8] Dalsagard in year 2000 had published his results with boytchev procedure in 27 shoulders.[8] He had 44% redislocation rate.[9] Zamora-Navas etal in the year 2001 concluded that 20% of redislocation rate with Boytchev procedure.[10] As there was ambiguity in the literature about this procedure, we conducted a study on the evaluation of results of modified Boytchev procedure.

MATERIALS AND METHODS: Since Aug 2007, the modified Boytchev procedure was performed on 22 patients, who presented to us with recurrent anterior dislocation of shoulder. The age group of patients was 18 to 49 years. All were men the mean age being 30.63 yrs.5 patients were affected on non-dominant side. The mean number of dislocations in these patients was 10.5. Four patients had arthroscopy to see for any repairable tissue but ultimately we have to do Modified Boytchev procedure.

Patients who had less than 3 dislocations, bilateral dislocations and neuromuscular disorders were excluded from the study. All patients had traumatic onset of symptoms and had initial failure of non-operative management. Six patients were having both banakarts and hill sachs lesion. One patient underwent arthroscopic bankarts repair for recurrent anterior dislocation of shoulder but was failed later subsequently underwent Modified Boytchev procedure.

All the patients who were satisfying the inclusion criteria were preoperatively examined with visual analogue score and modified ASES score, after obtaining pre procedural informed consent. Contralateral and ipsilateral shoulder muscles were evaluated for any associated neurological problem. All the data was entered in case record form at each visit i.e., pre op, at 1 month,3 months,6 months, at 1 year and at last follow up.

Demographic data:

	Range	**Mean**	**Median**
Age in yr	18-49 yrs	30.63	28
No. of dislocations	3-25	10.5	8
Follow up period weeks	50-242	99.5	94

OPERATIVE PROCEDURE: Patient was put on supine position under general anesthesia with a folded towel under the scapula to stabilize the shoulder and to make the coracoid prominent, on radiolucent table. 8 to 10 cms skin incision was taken starting from coracoid process and carried

over distally deltopectoral groove. Deep fascia was dissected and cephalic vein was identified, protected and retracted laterally with a cuff of tissue of deltoid muscle. Pectoralis major was retracted medially to expose the tip of coracoid. Coracoid tip along with conjoint tendon of coracobrachialis and short head of biceps was exposed. Under c –arm guidance a 2.5 mm k-wire was drilled in to the coracoids along its direction.

Osteotomy was done at about 1.5 cm proximal to the tip of coracoid process. After securing the detatched tip of coracoids with an ethibond suture the conjoint tendon was mobilized distally taking care of musculocutaneous nerve. Just proximal to the lower border of subscapularis, its fibres were split carefully (taking care of anterior circumflex humeral vessels) and a tunnel was created between the subscapularis and joint capsule. The tip of coracoid was passed through this tunnel and rerouted to its anatomical position and fixed with a screw, while the assistant held the arm in flexion, internal rotation at shoulder and flexion at elbow.

Position of screw was confirmed under c-arm. Hemostasis was achieved and wound closed in layers over suction drain. Arm was immobilized with a shoulder immobilizer and maintains flexion, adduction and internal rotation of shoulder. Sutures were removed on 10th post-operative day. From 14th day onwards passive pendular movements and abduction was allowed and from third week on wards active movements were started. After 8 weeks the patient was allowed to do normal activities.

Incision Dethatched coracoid Rerouted Fixing with a screw wound closure

Pre op coracoid post op coracoid 1 year later

All preoperative and post-operative outcome scores were compared and analysed with student t test for significance.

RESULTS: All the results were analyzed in terms of recurrence, range of motion, VAS SCORE, Modified ASES score. Follow up period was ranged from 50 – 242 weeks.

None of our patients had recurrence. All the patients got preoperative range of flexion at the last follow up. There was no decrease in muscle strength postoperatively. There was no positive apprehension in any of the patients postoperatively. No signs of any laxity of muscles.

Pre-operative scores were compared with the most recent follow up for all variables with use of paired t test. All the patients had significant improvement in the VAS score and in Modified ASES score. There was no radiological evidence of screw loosening and for one patient screw removal was done. There was no evidence of any arthritic changes in gleno humeral joint and there was no malunion or non-union of coracoid.

Analysis of scores:

Follow up	VAS SCORE (mean)	Modified ASES score
Pre op	4 (3-8)	61.1 (30.33-64.5)
4 weeks	6(4-9)	42.34(22.45-59.32)
12 weeks	3(2-6)	72.33(58.32-82.22)
24 weeks	2(0-2)	86.43(72.32-94.12)
1 year	1.22(0-2)	88.22(73.22-95.11)
Last visit	0.7(0-1)	88.33(75.21-96.13)
P value (pre op –last follow up)	<0.001	<0.001

DISCUSSION: In the original Boytchev[11] procedure three tendons i.e., tendon of coracobrachialis, short head of biceps and pectoralis minor along with detached tip of coracoid were rerouted underneath the subscapularis and fixed with a screw. The results were diverging and most of them had high re dislocation rate as the 3 tendons were rerouted behind the subscapularis muscle might pull this stabilizing muscle forward, so that re dislocation is favored in fact specially if the tendons are placed under great tension. In the modified Boytchev procedure only two tendons were rerouted exempting pectoralis minor as the direction of its muscle fibres was different compared to the other two.[5] This creates a dynamic muscular sling effect and improved shoulder joint proprioception.

The subscapularis is pulled forwards by the rerouted conjoint tendon during elevation of the shoulder there by causing an increase in the lever arm and enhancing the internal rotational moment of arm. Since the rerouted muscles have to pass through a longer course, deep to the subscapularis, the tension within them increases which counteracts the physiological dislocation action of the subscapularis which is responsible for anterior dislocation of the shoulder.[12] Conjoint tendon transfer led to an increase in the pressure between humeral head and subscapularis muscle (shibata etal..), which leads to stimulation of mechanoreceptors which in turn improves shoulder joint proprioception.[7] This improvement in proprioception led to improvement of reflex which was responsible for protection against dislocation.[7]

In the literature there were low Rowe scores after an arthroscopic or open procedure as there was high recurrence and loss range of motion respectively.[13] The success of any surgery for the treatment of recurrent anterior dislocation of shoulder depends on the rate of recurrence. A

good rehabilitation programme will improve the post-operative functional scoring system after any surgical procedure provided there is no redislocation.[14]

The incidence of recurrence reported after the bankart, putti platt and Bristow latarjet procedure varies from 2 to 10%, 0 to 12.5% and 2 to 10% respectively with their own limitations like loss of range of motion and arthritic changes in the joint. The success of the procedure depends on the technical expertise of the surgeon as they were having long learning curve.

Reported results of modified boytchev procedure in the literature:

Author	year	No. of shoulders	Recurrence	Follow up	Comment
Conforty[5]	1980	17	Nil	Mean 6 years	Excellent
Ha Eri GB[6]	1986	26	Nil	Mini 2 year	Excellent
Yozo S etal[8]	1999	63	3.1 %	Mean 50 months	Excellent
Chattarjee ND etal[15]	2002	46	One subluxation	Mean 88 months	Excellent
Zamora –Navas p etal[10]	2001	27	20%	Mean 13.3 year	Attractive but might be avoided
Li SP etal[16]	2007	15	Nil	Mean4yr 5 months	Simple and effective
Han TY etal[17]	2008	18	One subluxation	10 month to 4.5 yr	Simple and effective
Garg etal[18]	2011	48	Nil	58 months	Simple and effective

CONCLUSION: Modified boytchev procedure is an effective surgical procedure in the management of recurrent anterior dislocation of shoulder. On comparison with other procedures for treatment of recurrent anterior dislocation of shoulder, modified boytchev procedure has given good results in terms re dislocation rate, range of motion and number of complications. So, this procedure can be practiced by all orthopedic surgeons where basic operative facility is available.

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Date of Submission: 11/11/2014.
Date of Peer Review: 12/11/2014.
Date of Acceptance: 18/11/2014.
Date of Publishing: 01/12/2014.