

## ORIGINAL RESEARCH

### Effectiveness of Modified Boytchev Procedure in Recurrent Anterior Dislocation of Shoulder irrespective of the Lesion

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#### ABSTRACT

**Background:** Recurrent anterior dislocation of shoulder is very commonly encountered problem and many different operations have been described for its treatment. On review of long term result of this procedure in literature, modified boytchev procedure is an ideal procedure for treatment of recurrent anterior dislocation of shoulder but none of the study of this procedure describes the lesion responsible for dislocation in literature.

**Material & Methods:** The mean number of dislocations in patients was  $10.22 \pm 3.08$  (4-20) times. All patients had a traumatic onset of symptoms and had a failure of initial nonoperative management All patients divided in three group according to lesion on MR arthrogram.

**Results:** All patients had significant improvement in VAS score, modified ASES score, and SANE score at the last follow up after the procedure. Each of the patients returned to the preoperative level of their respective activity. Two patients developed transient musculocutaneous nerve paresis that got resolved spontaneously within three months. There was no radiological evidence of Lossening, migration of coracoids screw or any glenohumeral instability.

**Discussion:** Modified boytchev procedure neither belongs to anatomic nor belongs to nonanatomic repairs group. The modified Boytchev procedure acts by two possible mechanisms dynamic muscular sling effect<sup>8,9</sup> and improved shoulder joint proprioception.

**Conclusion:** The result of our study indicates that the lesions thought to be responsible for recurrence of dislocation are not the cause but the effect of recurrence of dislocation. The result of our study also supports the hypothesis that the dynamic muscular imbalance and reduced shoulder joint pressure responsible for recurrence which leads to lesion thought to be responsible for recurrence

#### BACKGROUND

Recurrent anterior dislocation of shoulder is very commonly encountered problem and many different operations have been described for its treatment<sup>1</sup>. The lesions most commonly found

thought to be responsible for its recurrence anterior dislocation of shoulder are Bankart lesion, Hill-Sachs lesion and posttraumatic laxity of the subscapularis<sup>2-4</sup>. Among all those surgical procedures mentioned in the literature only few of them have given good results in terms of recurrence in long term follow up and return of preoperative range of motion.

Most of Surgical procedures described for recurrent anterior dislocation of shoulder are classified mainly in two groups anatomic and nonanatomic repairs. Current concepts of management of shoulder dislocation are anatomic repairs means to correct the essential pathology responsible for dislocation.

In Modified Boytchev procedure the detached tip of coracoids process with its attached conjoined tendon (short head of biceps and coracobrachialis) rerouted deep to subscapularis and reattaching to its anatomical location. This procedure neither belongs to anatomic nor belongs to nonanatomic repairs<sup>5-18</sup>. On review of long term result of this procedure in literature, this procedure is an ideal procedure for treatment of recurrent anterior dislocation of shoulder but none of the study of this procedure describes the lesion responsible for dislocation in literature. Aim of this study is to evaluate the long term result of this procedure in recurrent shoulder dislocation with in term of lesion thought to be responsible for recurrence.

## MATERIALS AND METHODS

From, June 2006-March 2011 modified Boytchev procedure was performed on 30 patients, who presented with recurrent anterior dislocation of shoulder and were in the age group of 18-45 years with exclusion criteria are less than three anterior dislocations, bilateral dislocation, multidirectional instability, neuromuscular disorders, epilepsy, abnormal mental status and those lost to follow-up. 28 were men and 2 were women, the mean age being  $26.83 \pm 5.65$  (20-40) years. 24 patients were affected on the dominant side and rest on non dominant side. The mean number of dislocations in these patients was  $10.22 \pm 3.08$  (4-20) times. All patients had a traumatic onset of symptoms and had a failure of initial nonoperative management. Magnetic resonance imaging of all shoulder was done before operation and lesion was categorised into groups (Table-1).

Each of them had objective and subjective measurements in preoperative and followup period at 1 month, 3 months, 6 months, 1 year, and yearly thereafter. All recording of data was done on case record form. The case record form included patient's questionnaire, subjective and objective clinical measurements for analysis of result. Each subject underwent a physical examination after he or she had completed the patient questionnaire, which included the patients profile, pain and functional status of the affected shoulder in comparison to the normal shoulder in terms of 100 percentages scale (ASES Score, SANE Score). The affected shoulder was compared with the contralateral shoulder in terms of range of motion, strength (Manual Muscle Testing), and shoulder stability (apprehension test, load and shift, sulcus sign)<sup>19-22</sup>. After modified boytchev operative procedure range of motion was examined in forward flexion, and external rotation at 0° and 90° of abduction (Table-2) and comparisons were made between preoperative and postoperative outcome scores (Table-3). All comparisons were analyzed with use of a paired Student t test for significance.

## RESULTS

Our followup period ranged from 18 months to 70 months with a mean of  $46.13 \pm 23.06$  months. Results were analysed in terms of recurrence, range of motion, VAS score, modified ASES score, and SANE score<sup>20-22</sup>. None of the patients had recurrence. All the patients regained almost preoperative range of forward flexion at the last followup. Results of modified boytchev procedure are comparable in all lesion in term of range of motion and recurrence. Pre-operative deficit in external rotation of shoulder was due to apprehension of

dislocation, which increased in immediate postoperative period due to pain. Evaluation of the patients in preoperative and at followup showed that neither of them had any decrease in strength, nor anyone showed a positive load and shift test, sulcus test or any signs of hyperlaxity. Preoperative scores were compared with the most recent followup scores for all variables with use of a paired- t test. All patients had significant improvement in VAS score, modified ASES score, and SANE score at the last followup after the procedure. Each of the patients returned to the preoperative level of their respective activity. Four patients developed superficial infection, which got resolved after antibiotics as per the culture and sensitivity report. Two patients developed transient musculocutaneous nerve paresis that got resolved spontaneously within three months. There was no radiological evidence of Lossening, migration of coracoids screw or any glenohumeral instability.

Group	Pathoanatomy	No. of Shoulder
Group 1 Bankart groups	Bankart lesion Bony bankart lesion	20
Group 2 Hill sach groups	Hill sach lesion	6
Group 3 Others		4

*Table -1 Grouping of shoulder on basis of MR Arthrogram*

ROM	GROUP 1			GROUP2			GROUP3		
	FF	ER-0	ER-90	FF	ER-0	ER-90	FF	ER-0	ER-90
PREOP	0.86±0.62	14.22±6.16	18.06±6.50	0.76±0.79	13.15±5.15	19.45±5.15	1.09±0.78	15.22±5.16	17.75±6.50
LAST FOLLO W UP	0.73±0.81	8.01±1.87	8.95±1.87	0.77±0.87	8.56±2.67	9.41±2.61	1.1±1.85	9.50±2.43	9.89±2.51

*Table-2 Comparison of Range of Motion of Shoulder*

SCORE	GROUP 1- BANKARTS			GROUP2-HILLSACHS			GROUP3-OTHERS		
	VAS	ASES	SANE	VAS	ASES	SANE	VAS	ASES	SANE
PREOP	3.6 ± 1.11	47.65± 10.8	35.63 ± 11.62	3.65± 1.56	67.74± 9.8	32.63 ± 11.62	3.5 ± 1.13	60.98± 10.8	30.73 ± 12.52
LAST FOLLOW UP	35.63 ± 11.62	87.84±7.51	89.76± 7.00	0.65±0.82	87.84±6.51	89.75 ± 7.50	0.83±0.82	87.84±6.51	87.84±6.51

*Table-3 Statistical Analysis of Shoulder Score*

## DISCUSSION

There are two basic types of surgical approaches for shoulders with anterior instability: “anatomic” and “non-anatomic” repairs depending on the pathoanatomy encountered. In most cases, the essential lesion in a shoulder with traumatic anterior instability is a Bankart lesion, which usually occurs with some degree of capsular injury or stretch. Most ‘anatomical’ procedures involve a combination of a Bankart repair performed in conjunction with a capsular shift. This can be performed open or arthroscopically. But other factors were identified as potential high-risk factors for recurrent instability like bony Bankart lesions, associated generalized ligamentous laxity, engaging Hill–Sachs lesions, contact or collision sports, younger age, “inverted pear” glenoid configurations as well as poor glenohumeral

ligament quality . In these pathologies, non-anatomical techniques were used. The goal of non-anatomic surgical procedures is to stabilize the shoulder by compensating for the capsulolabral and osseous injury with an osseous or soft-tissue checkrein that blocks excessive translation and restores stability. Examples of non-anatomic types of stabilizations include the Bristow and Latarjet procedures, which are transfers of the coracoid to the glenoid; the Magnuson-Stack procedure, which is an advancement of the subscapularis that was popularized by De-Palma; and the Putti-Platt procedure, which is an imbrication and shortening of the subscapularis.

Modified boytchev procedure neither belongs to anatomic nor belongs to nonanatomic repairs group. The modified Boytchev procedure acts by two possible mechanisms: dynamic muscular sling effect<sup>8,9</sup> and improved shoulder joint proprioception<sup>10</sup>. The subscapularis is pulled forward by the rerouted conjoined tendon during elevation of the shoulder thereby causing an increase in the lever arm and enhancing the internal rotational moment 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.

Biomechanical study of Halder *et al.*<sup>23</sup> and cadaveric study of Jiang *et al.*<sup>7</sup> provides valid scientific reason for prevention of recurrence after modified Boytchev procedure. Study by Shibata *et al.*<sup>10</sup> revealed that the efficacy of modified Boytchev procedure was not only due to the muscular sling effect but improved shoulder proprioception also played an important role in prevention of shoulder dislocation. Conjoined tendon transfer led to an increase in the pressure between the humeral head and the subscapularis tendon, which leads to stimulation of mechanoreceptors which in turn improves shoulder joint proprioception. This improvement in proprioception led to improvement of reflex which was responsible for protection against shoulder dislocation.

## CONCLUSION

Review of scarce literature on modified boytchev procedure and this study result proves that this procedure had good result in treatment of recurrent anterior dislocation of shoulder in all type of lesion<sup>24</sup>. The result of our study indicates that the lesions thought to be responsible for recurrence of dislocation are not the cause but the effect of recurrence of dislocation. The result of our study also supports the hypothesis that the dynamic muscular imbalance and reduced shoulder joint pressure responsible for recurrence which leads to lesion thought to be responsible for recurrence.

## INFORMED CONSENT STATEMENT

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Informed consent was obtained from all patients for being included in the study.

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