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Original Research Paper

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MODIFIED BOYTCHEV PROCEDURE FOR THE TREATMENT OF RECURRENT ANTERIOR DISLOCATION OF SHOULDER

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ABSTRACT

The **Modified** Boytchev is no more **a** controversial procedure for treatment of shoulder instability and it is only procedure **which has** valid **and** proved scientific study **illustrating** the mechanism of prevention of dislocation. Since June 2002 this procedure was performed on 48 patients, in **the** age group of 18-40 yr,.All the patients regained almost pre-operative range of forward flexion at the last follow-up. At the last follow-up the mean external rotation deficit at 0 degree and at 90 degree of abduction was 8.06±2.47 & 8.95±2.07 respectively. This improvement in external rotation deficit is statistically significant ($p<0.05$).All patients had significant improvement in VAS score, modified ASES score and SANE score at the last follow up after the Modified Boytchev procedure..

KEYWORDS : Boytchev Procedure, Shoulder Dislocation

INTRODUCTION -

Recurrent anterior dislocation of shoulder is not uncommon and more than 200 different operations have been described for its treatment. 1- 4Amongst most of the operative procedure for recurrent anterior dislocation of shoulder; relatively few of them have good result in terms of recurrence and loss of shoulder movement in follow-up period. Most of the surgical procedures described for recurrent anterior dislocation of shoulder are based mainly on two basic active (rotator cuff and biceps) and passive (capsuloligamentous) mechanisms. About half a century ago, BOYTCHEV 5 a Bulgarian orthopaedic surgeon in 1951 described a surgical technique for recurrent anterior dislocation of the shoulder. This procedure involves rerouting of the detached tip of coracoid process with its attached conjoined tendon (short head of biceps and coracobrachialis) along with the pectoralis minor muscle deep to subscapularis and reattaching to its anatomical location. Later Conforty 6 in 1980 modified this procedure by rerouting the conjoined tendon of the short head of biceps and coracobrachialis only.

On reviewing the literature theoretically it stands out that this procedure would be very effective in preventing the recurrence . However there are few studies which criticizes the procedure. In order to overcome the ambiguity over the procedure we decided for an evaluation of its long term effect and to compare our results with other studies based on Boytchev Procedure . So the objective of our study was to evaluate the long term result of Modified Boytchev procedure, and to compare our results with the results of other procedures published in literature .

MATERIALS AND METHODS -

Since June 2002 the Modified Boytchev procedure was performed on 48 patients, who presented with recurrent anterior dislocation and were in the age group of 18-40 yr, the mean age being 27.83 ±4.95years. Amongst the total 48 patients 45 were men and 3 were women. 40 patients were affected on the dominant side and rest on the non-dominant side. Three of the male patients were professional district level football player. The mean number of dislocations in these patients was 18.22±12.08 [table-1]. Patients who were in extremes of age, had less than three anterior dislocations , bilateral dislocation, multidirectional instability, neuromuscular disorders, epilepsy ,abnormal mental status and lost in follow-up were excluded from the study. All patients had a traumatic onset of symptoms and had a failure of initial nonoperative management .One of them had initial failure of Putti Platt operation which was done 3 years back.. Thirty eight patients presented with radiographs taken before reduction which showed an anterior dislocation , however radiographs of six shoulders showed anterior instability with small Hill-Sachs lesion(Less than 15% of the humeral head).

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). 7 Range of motion was examined in forward flexion, and external rotation at 0 and 90 degree of abduction. Comparisons were made between preoperative and postoperative outcome scores. All comparisons were analyzed with use of a paired Student t test for significance.

RESULTS & ANALYSIS:

Our follow-up period ranged from 18 months to 96 months with a mean of 58.13±19.06 months. Results were analyzed in terms of recurrence, range of motion[Table-2,3a&b], VAS score, modified ASES score and SANE score. 8, 9,10 None of the patients had any recurrence Evalution of the patients in pre-operative and at follow-up 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 .Thirty eight patients demonstrated a positive apprehension sign in the pre-operative period.

Preoperative scores were compared with the most recent follow-up 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 follow up after the Modified Boytchev procedure [Table-4, 5, 6, 7]. Analysis using pearsons coefficient corelation of data between modified ASES score and SANE score show statistically significant linear correlation [Table-8]. Each of the patients including the professional football player, returned to the preoperative level of their respective activity. 2 of the patients developed transient musculocutaneous nerve paresis. In both cases it got resolved within 3 months without any active intervention. There was no radiological evidence of loosening and migration of coracoid screw or any glenohumeral arthritis on subsequent follow-up of skigrams in any of our patients

DISCUSSION-

.The Modified Boytchev procedure is biomechanically sound by two possible mechanisms: dynamic muscular sling effect 11 12,13

and improved shoulder joint proprioception.14 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 .When the arm is in the vulnerable position of abduction and external rotation, the rerouted muscles prevent the superior displacement of the subscapularis and dislocation.The anterior dislocation of the humeral head is prevented by the increased muscle bulk composed of the subscapularis , coracobrachialis and the short head of the biceps which enhances the bracing effect over the anteroinferior aspect of the glenohumeral joint. Since the rerouted muscles have to pass through a longer course, deep to the subscapularis , the tension within them increases and this increase in the tension counteracts the physiological dislocation action of the subscapularis which are responsible for anterior dislocation of the shoulder. Biomechanical study of Halder et al 15 and cadaveric study of Jiang et al 11 provides valid scientific reason for prevention of recurrence after Modified Boytchev procedure. Study by Shibata etal. 14 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 improves in proprioception led to improvement of reflex which was responsible for protection against shoulder dislocation.

Review of scarce literature on Boytchev procedure and our study indicates that Modified Boytchev procedure is no more controversial 6,12-14,16-24. The prime goal of any operative procedure for recurrent anterior dislocation of shoulder is directed towards prevention of recurrence. On review of literature 25 many studies show that Low Rowe Score following an open procedure was not due to high recurrence but was due to diminished range of motion or function. Whereas a Low Rowe Score following an arthroscopic procedure is due to high recurrence. When the individual recurrence score of these two procedure are matched open procedures gain superiority over the arthroscopic procedures. Inspite of high rowe score associated with arthroscopic procedures , open procedures are better as because more than half of the rowe score is attributed to functional evaluation , while the stability contributes to less than 1/3rd of the total rowe score. So the use of Rowe Score to compare the results in term of recurrence is one of the limitations. . Systemic review and meta-analysis of literature shows open procedure for recurrent anterior shoulder instability are more reliable than arthroscopic procedures. Pooled data demonstrates significantly lower risk of recurrent instability , dislocation and re-operation after open procedure On comparison with other common open procedure it was found that low Rowe score was due to diminished range of motion. So in order to minimise it,, we followed a rehabilitation program 26 with special attention to strengthening exercises of the conjoined tendon results in full range of motion with minor restriction in our study.
The incidence of recurrence reported after the Bankart, Putti-Platt and Bristow laterjet procedure ranged from 2 to 10 per cent, from 0 to 12.5 percent and 2-10 percent respectively with restriction of external rotation (average 10 degree) and glenohumeral osteoarthrosis in long term followup study. Athletic individuals with involvement of the dominant shoulder were not capable of returning to high performance levels of overhead sports activity (particularly throwing) after the operation in follow up period. all these procedure require expertise and long learning curve. On comparison with other procedure for treatment of recurrent anterior dislocation of shoulder modified boytchev procedure had comparable result in term of recurrence, range of motion and complication

So this procedure fulfils most of the criteria of an ideal procedure 27 for recurrent anterior dislocation of shoulder and allows us to conclude that this procedure is an effective procedure, technically simple, does not require expert skills or any sophisticated instruments. As a result of its simplicity and effectiveness it can be performed by all orthopaedic surgeons where basic operative facility is present.

Table-1

	RANGE	Mean ± SD	Median
Age (yr)	18-40	27.83±4.95	28
Preinjury activity	1-3	±.62	1
Age at initial dislocation(yr)	15-30	20.56 ± 4.6	20
Duration at presentation-to initial dislocation	2-20	7.27 ± 4.41	5
No of dislocation	5-58	18.22±12.08	13
Follow Up period(months)	18-96 month	58.13±19.06	56.00

Table-2 loss of motion compared to opposite normal side (Mean ± standard deviation)

Forward Elevation deficit	RANGE	Mean ± SD	Median
Preop	0-3	0.81±0.78	1.00
4wks	8-25	15.60±5.31	15.00
12wks	1-18	9.66 ±3.49	9.00
24wks	0-3	1.75±1.03	2.00
1yr	0-3	1.1±0.85	1.00
Last follow up	0-3	0.77±0.87	1.00

Table- 3 a loss of motion compared to opposite normal side (Mean ± standard deviation)

External rotation deficit at 0 degree abduction of shoulder	RANGE	Mean ± SD	Median
Preop	4-25	13.22±5.16	13.50
4wks	9-29	17.68±5.52	18.50
12wks	6-17	11.12 ±2.69	11.00
24wks	5-15	9.91 ±2.76	11.00
1yr	5-15	8.50±2.78	8.50
Last follow up	4-13	8.06±2.47	8.00

Table – 4 Road map of VAS Score

Pain (VAS)	RANGE	Mean ± SD	Median
Preop	2-7	3.5 ± 1.11	3
4wks	3-8	5.64±1.31	5
12wks	2-5	3.33±0.80	3
24wks	0-3	1.02±0.80	1
1yr	0-3	0.92±.76	1
Last follow up	0-3	0. 83±0.82	1

Table – 5 Road map of ASES Score

ASES score	RANGE	Mean ± SD	Median
Preop	28.33 -76.27	57.98± 10.8	60.00
4wks	21.66-63.32	41.00± 9.31	43.32
12wks	56.67-81.67	71.97±5.19	71.67
24wks	69.99-94.98	85.46±5.68	86.65
1yr	69.99-98.30	87.70±5.96	87.48
Last follow up	70 – 98.33	87.84±6.51	88.33

Table-6 Road map of SANE Score

SANE score	RANGE	Mean ± SD	Median
Preop	10-50	30.625±11.62	30
4wks	10-50	27.39±9.45	30
12wks	65-90	79.16±4.49	80
24wks	70-95	86.45±6.76	90
1yr	70-100	88.23±7.76	90
Last follow up	70 – 100	88.75±8.003	90

Table-7 Comparison ofshoulderscore (Mean ± standarddeviation)

SCORE	PAIN(VAS)	MODIFIED ASES	SANE SCORE
PREOP	3.5 ± 1.11	57.98± 10.8	30.62±11.62
LAST FOLLOWUP	0. 83±0.82	87.84±6.51	88.75±8.00
P value	<0.001	<0.001	<0.001

Table -8 Correlation among the shoulder score [modified ASES Score & SANE Score] in recovery road map

Pearson's coefficient correlation	ASES SCORE	SANE score	Correlation value	Interpretation
Preop	57.98± 10.8	30.625±11.62	+.36	Significant linear correlation
4wks	41.00± 9.31	27.39±9.45	+.42	Significant linear correlation
12wks	71.97±5.19	79.16±4.49	+.52	Significant linear correlation
24wks	85.46±5.68	86.45±6.76	+.39	Significant linear correlation
1yr	87.70±5.96	88.23±7.76	+.45	Significant linear correlation
Last follow up	87.84±6.51	88.75±8.003	+.50	Significant linear correlation

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