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Functional Outcome Following Bristow and Boytchev Surgery in Recurrent Dislocation of Shoulder

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ABSTRACT

Introduction: *The aim of the treatment of recurrent dislocation shoulder is to achieve a stable and painless glenohumeral joint with complete range of motion .Various surgical procedures have been enumerated. With this study we compare two commonly done procedures for the treatment of recurrent dislocation of shoulder.*

Materials and Methods: *It was a prospective case series study design done at Orthopaedics department, Govt Medical College Trivandrum from July 2012 to August 2014 who presented with recurrent anterior dislocation shoulder. We used Descriptive statistical analysis (SPSS). Sample size was 40 patients with recurrent anterior dislocation of shoulder. They were admitted through either emergency department or outpatient department of Medical College Hospital Trivandrum. These patients were followed up for 24 months -30 months*

Results: *Shoulder dislocation is more prevalent in younger age group <30 years, more in muscular individuals. There was a positive co relation between period of immobilisation post dislocation and further recurrences. More the dislocation frequencies, lesser was the Rowe functional score.*

Recurrence rate in patients who underwent Boytchev surgery (40%) were higher and statistically significant as compared to the Bristow surgery (10%). Mean external rotation deficit in Boytchev surgery (28+/- 2 degree) were higher than the Bristow surgery (20+/-2 degree) .Patients who underwent Bristow surgery had less recurrent dislocation and lesser shoulder pain and better Rowe score (60 % good functional score, 10 % poor Rowe score) as compared to those who underwent Boytchev surgery(45% good functional score, , 40 % poor functional score)

Conclusion: *Patients who have undergone Bristow surgery had better Rowe functional shoulder score as compared to boytchev surgery. Predisposing factors for shoulder dislocation were improper post-dislocation immobilisation. mean external rotation deficit was more in Patients who have undergone Boytchev surgery.*

Keywords: *Recurrent dislocation of shoulder, Boytchev surgery, Bristow procedure.*

Introduction

Recurrent dislocation of the shoulder, a condition recognized and treated by ancient physicians, has been the subject of considerable investigation in recent years.

Blundell Bankart[1] believed that detachment of glenoid labrum is the "essential lesion" and that injury to head of humerus is relatively unimportant. Ivar Palmer[2] on the other hand believes that the defect in the humeral head is the

"essential lesion" and that labral detachment is relatively not important , but the study of Crewford Adams[3,4], and the investigations of Eyre-Brook[5] and Gallie[6] made it clear that there is no one "essential" element in the pathology, any more than there is a single essential feature in the pathological anatomy of any dislocation, whether of ankle, patella, hip, elbow or spine. In all these joints, dislocation causes detachment of capsule from the periphery of the socket, sometimes fractures of the margin of the socket, and often compression injury of the dislocating bone. In addition, any of these elements may predispose to recurrent dislocation if the first injury is not immobilized adequately.

The treatment of the condition ranged from the anterior scarification procedure of Hippocrates to the most complicated form of the joint reconstruction. More than 150 operations and many modifications of some have been devised[7]. The large number of operative procedures which have been advocated for the treatment of recurrent dislocation of shoulder bears witness to the uncertainty of the end results.

Helfet (1958)[8] described the Bristow procedure. May (1970)[9] modified the Bristow operation. In this procedure, the coracoid process is transplanted with the attached conjoined tendons of the short head of biceps and coracobrachialis to the anterior rim of glenoid and fixed with a screw. Bristow procedure is also utilized to reinforce a poor quality anterior capsule-muscular wall in combination with other procedures, usually stapling of the detached anterior capsule and labrum. Results of Bristow were outlined in subsequent studies and were encouraging.

Boytchev's technique comprises rerouting of the coracoid process with its attached conjoint tendons (short head of biceps and coracobrachialis) along with the pectoralisminor muscle deep to the subscapularis and reattachment to its anatomical location. Conforty used the conjoint tendons of the short head of biceps and coracobrachialis only, omitting the pectoralis minor muscle. Satisfactory results were reported in 1980 and later by Ha'Eri, but not reported their long term follow –up

Materials and Methods

Methodology

Study design- Prospective case series study.

Study setting- Orthopaedics department, Govt Medical College Trivandrum.

Study period- Cases recruited from July 2012 to August 2014

Study population- people of South Kerala and South Tamil Nadu presented with recurrent anterior dislocation shoulder.

Statistical analysis- Descriptive statistical analysis (SPSS).

Sample size- 40 Persons with recurrent anterior dislocation of shoulder. They were admitted through either emergency department or outpatient department of Medical College Hospital Trivandrum.

Inclusion Criteria

- All Patient who presented with recurrent anterior dislocation of shoulder in Orthopaedics Unit from July 2012 to August 2014.
- Recurrent anterior dislocation of shoulder- more than 3 episodes.

Exclusion Criteria

- Persons who do not give consent.
- Multidirectional instability/Habitual dislocation
- Psychiatric disorders and seizure disorder.
- Arthritic changes, neurovascular complications

Pre Operative Evaluation

The different factors influencing recurrent dislocation are studied viz,

* The age distribution,

*The side affected and relation with hand dominance,

*Bilateral involvement,

Any relevant family history, bodily habitus, occupation and athletic activity of individual.

The mechanism of initial dislocation, the initial treatment given and the post reduction management are followed up. History of the first recurrence, time interval between primary dislocation and the first recurrence, duration of illness in relation to surgery, total number of recurrences between the first dislocation and the date of surgical repair, cause of subsequent dislocations, severity of force required, ease of reduction and method of reduction of subsequent dislocations noted.

Surgical Technique

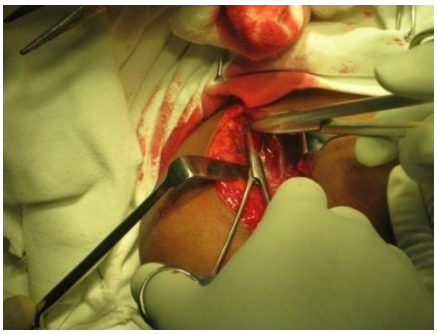
All the 40 persons in this series are treated by either Bristow or Boytchev procedure.

Bristow Procedure

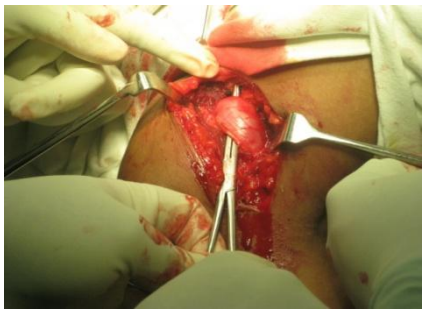
Helfet (1958)[8] described the Bristow procedure. May (1970)[9] modified the Bristow operation. In this procedure, the coracoid process is transplanted with the attached conjoined tendons of the short head of biceps and coracobrachialis to the anterior rim of glenoid and fixed with a screw. Bristow procedure is also utilized to reinforce a poor quality anterior capsulomuscular wall in combination with other procedures, usually stapling of the detached anterior capsule and labrum.

Incision over the delto pectoral groove

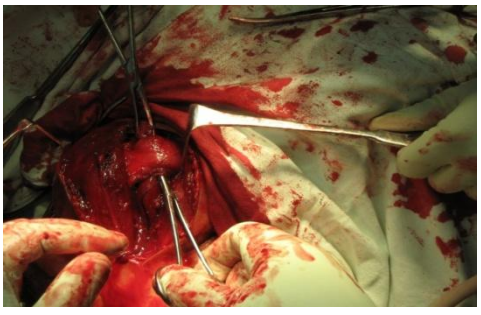
Identifying coracoid process



Identify the muscles on coracoid



Rerouting to just below equator



Boytchev Procedure

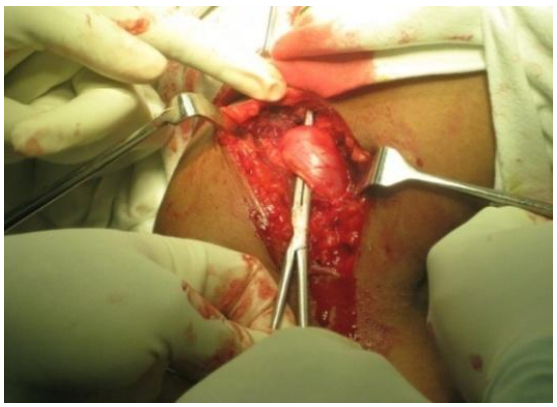
The surgical procedures for recurrent anterior dislocation of shoulder are based on two principles[10]: either passive control of humeral head with capsular repair, like in the Bankart procedure, or active control, in which the muscle power prevents redislocation, as in the Bristow procedure and in Boytchev procedure. Boytchev (1902-1971)[11] was a Bulgarian orthopaedic surgeon, who described his technique in 1951.The Boytchev[10,12,13] technique can be classified under the procedures based on active muscular control. A musculotendinous flap, obtained by disinserting the origin of the short head of the biceps, the pectoralis minor and the coracobrachialis from the coracoid process, is passed under the subscapularis muscle and then reinserted with a screw. Theoretically, the net result of the Boytchev technique is an active "belt" which prevents anterior displacement of the head of the humerus.

Modification in Boytchev Procedure

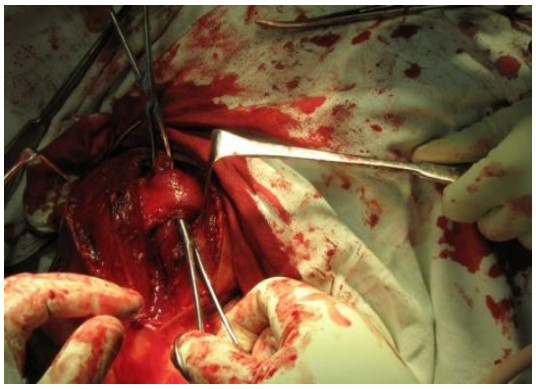
Later on, the original design was simplified to include only the vertical fibers of the pectoralis minor (2)[10,12,13]. Our team limited the rerouting to the coracobrachialis and to the short head of the biceps, so that only muscle fibers with a single direction were used. We also made a tunnel through the upper 2/3rd and lower 1/3rd of subscapularis muscle through which the conjoint tendon is passed and reattached to the coracoid process with a 4 mm cancellous screw or OS vicryl. Whereas in original Boytchev technique the conjoint tendon is passed posterior to the whole, subscapularis muscle. This may result in anterior displacement of subscapularis muscle, which is an important stabilizing structure of shoulder, hence, it was modified.

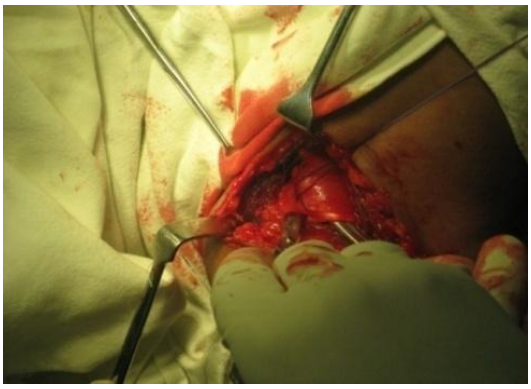
The surgery is done under general anaesthesia. Patient is placed supine and the affected shoulder is elevated by placing a sand bag under scapula. The operating field was prepared with povidon iodine and spirit and carefully draped. The limb to be operated was separately draped to allow easy manipulation. Shoulder joint is approached through deltopectoral approach. Conjoint tendon of coracobrachialis and biceps are freed from coracoid process either by osteotomising the coracoid process or by resecting the conjoint tendon near to the coracoid process. Subscapularis muscle is identified and a tunnel is made through its upper 2/3rd and lower 1/3rd. the conjoint tendon is then passed through this tunnel and reattached to the coracoid process either with the help of a 4mm cancellous screw and a washer or sutured to the coracoid process with OS vicryl. Wound is then closed in layers over a suction drain after attaining heamostasis.

Incision –Delto Pectoral approach identify Conjoint Tendon

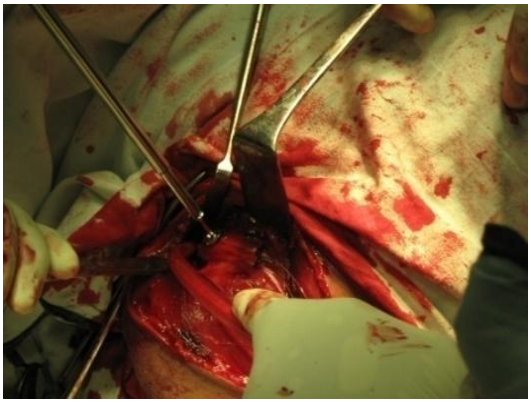


Release Conjoint Tendons making A Tunnel in Sub scapularis





Re -Routing Through the Tunnel fix Conjoint Tendon with Screw



Post Operative Management

The shoulder is immobilized in a position of adduction and internal rotation with elbow flexed for 3 weeks with arm chest strapping. Suction drain is removed after one day and sutures are removed after 10 days. At the end of 3 weeks strapping is removed and a collar and cuff sling is used for an additional 1 week and during this time pendulum rotation of the shoulder is encouraged. At the end of 1 week sling is discarded and active shoulder exercise is started.

Four types of exercises are instituted:

The person actively abducts and adducts the shoulder as fully as possible.

The person actively flexes and extends the shoulder as fully as possible.

The person makes a circle in clockwise direction, making the diameter of the circles as large as possible.

The person makes a circle in an anticlockwise direction, again making the circles as large as possible.

In addition to active exercise active assisted range of movement exercise and passive range of movement exercises of all joints of shoulder girdle in all direction are given to restore mobility.

Post Operative Follow Up

All 40 patients were reviewed to assess the success of both the procedures in preventing recurrence at the end of 6 months and 12 months

Stability of shoulder

Stability of shoulder joint is assessed from history of recurrence of dislocation,

subluxation or apprehension when placing arm in certain positions.

It is clinically assessed by:

*Apprehension test

*Anterior shoulder drawer test

*Posterior shoulder drawer test and test for inferior instability is also done to exclude multidirectional instability.

2. Pain in the shoulder

Pain in the shoulder joint is assessed and patients are grouped into three.

1) No pain
2) Moderate pain
3) Severe pain

3. Movement of shoulder

All movement of shoulder- abduction, adduction, flexion, extension, internal rotation, external rotation and circumduction are tested to find out any restriction. Restriction of external rotation and abduction are noted in particular.

4 Function of shoulder

The overall function of shoulder is assessed and based on their function they are grouped into five.

A. No limitation/ throw/ return to sports and atheletic activity

B.No limitation/ return, but not same as before

C.Minimal limitation/ no return to sports/daily routine activities done

D.Moderate limitation/ no return to sports/daily routine activities restricted

E.Marked limitation/ no work overhead

5. Other complications

Any neurologic deficits affecting the musculocutaneous, axillary or radial nerve is taken into account.

Assessment of Functional Outcome

The results in the 40 persons were evaluated and graded into four: excellent, good, fair and poor. A scoring system (modified C.R.Rowe, Dinesh Patel and Southmayd 1978)[14] is constituted based on pain, stability, motion and function of shoulder for grading the results. Scoring system is given in annexure-II.

Modified C.R. Rowe, Dinesh Patel, and W.W. Southmayd Scoring System

FACTOR		UNITS	% OF POINTS
PAIN			10
	NONE	10	
	MODERATE	5	
	SEVERE	0	
STABILITY			30
	NEG. APPREHENSION TEST/NO SUBLUXATION	30	
	NEG.APPREHENSION/PAIN WITH ABDUCTION/EXTERNAL ROTATION	15	
	POSITIVE APPREHENSION/POSITIVE SENSE OF SUBLUXATION	0	
			10
MOTION			
	FULL RANGE	10	
	<=25% LOSS IN ANY PLANE	5	
	>25% LOSS IN ANY PLANE	0	
FUNCTION			50
	NO LIMITATION/THROW/RETURN TO SPORTS	50	
	NO LIMITATION/RETURN, NOT SAME	40	
	MINIMAL LIMITATION/ NO RETURN TO SPORTS	35	
	MODERATE LIMITATION/ NO RETURN	20	
	MARKED LIMITATION/ NO WORK OVERHEAD	0	

Total Score-100

Final Results

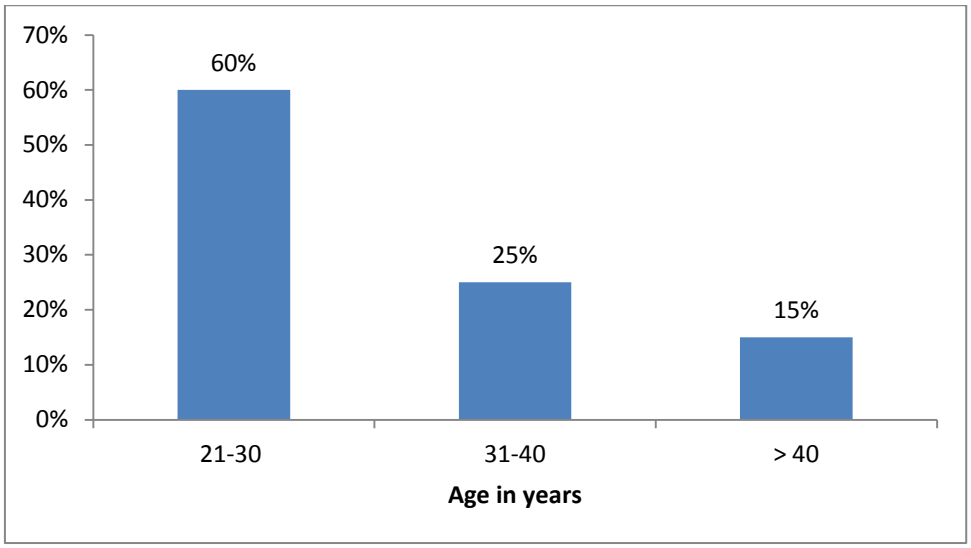
CLASSES	POINTS
EXCELLENT	90-100
GOOD	75-89
FAIR	51-74
POOR	50 OR LESS

Results

Observations based on the study of 40 cases of recurrent anterior dislocation shoulder treated by both procedures are given below.

Table-1
Age Distribution

Age	Cases	%
21-30 years	24	60%
31-40 years	10	25%
Above 41	6	15%



Inference: The maximum incidence was found between 21 -30 years. There were only six patients above the age of 40 years.

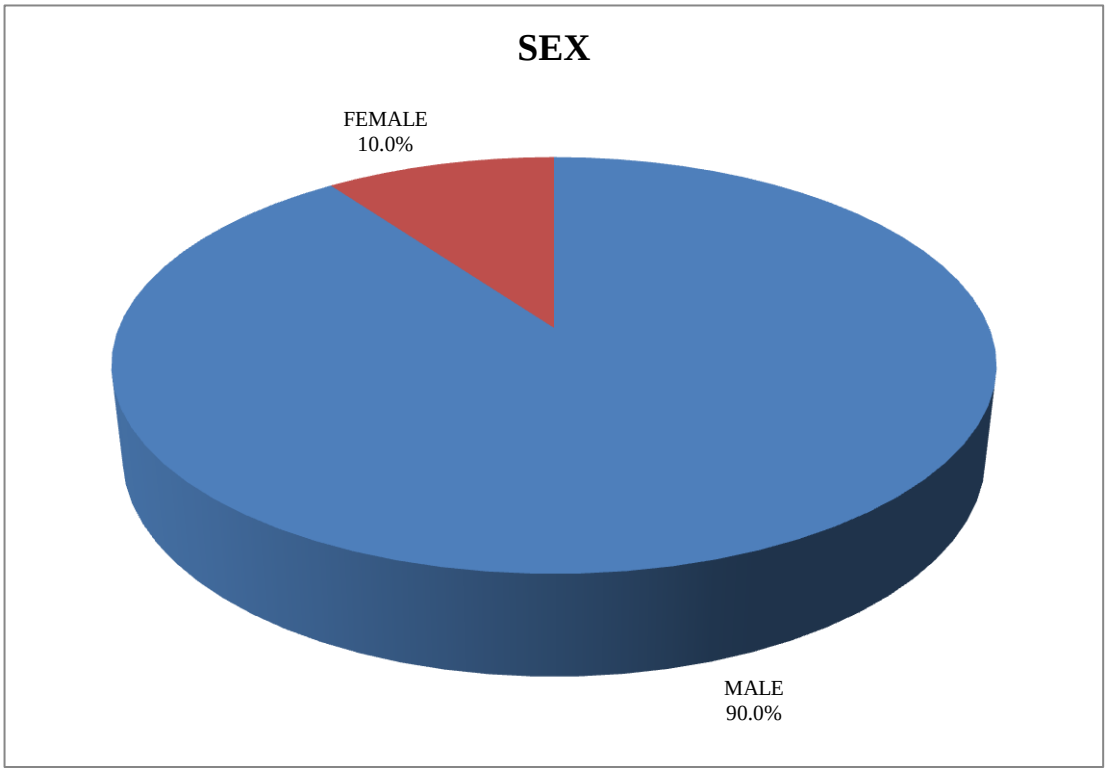
Table -2 Sex Distribution.

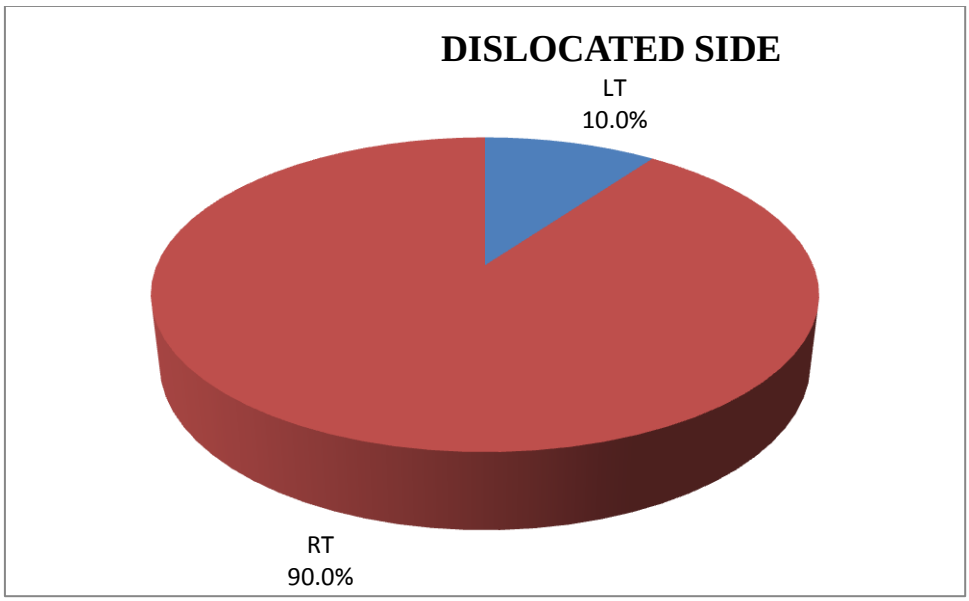
SEX	NO.OF CASES	PERCENT
MALE	36	90%
FEMALE	4	10%

Inference: The sex distribution indicates a marked male predominance

Table 3 Side of Dislocation

DOMINANT SIDE	Frequency	Percent
RT	40	100.0
DISLOCATED SIDE	Frequency	Percent
LT	4	10.0
RT	36	90.0
Total	40	100.0





Inference: Dominant side dislocation is more common

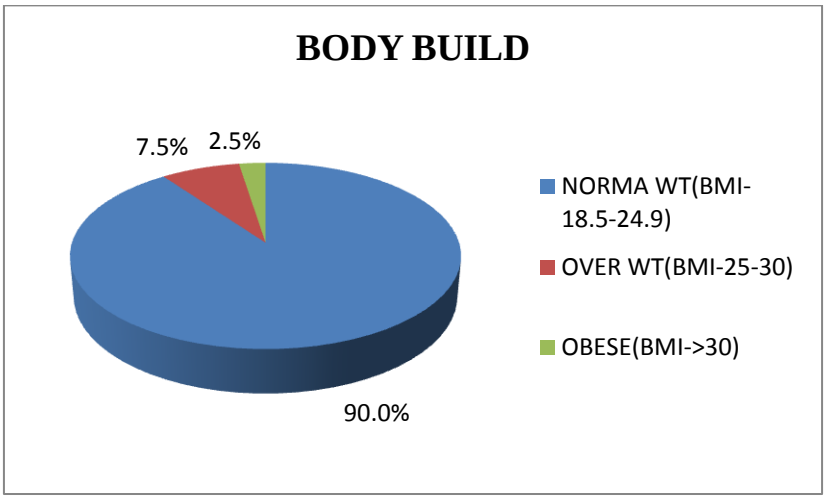
Table-4 Family History

	NO. OF CASES	PERCENT
H/O FAMILIAL INCIDENCE	0	0
NO POSITIVE FAMLY HISTORY	25	100

Inference: All the patients in this series denied any familial incidence of recurrent dislocation of shoulder.

Table-5 Body Built of the Affected Individual

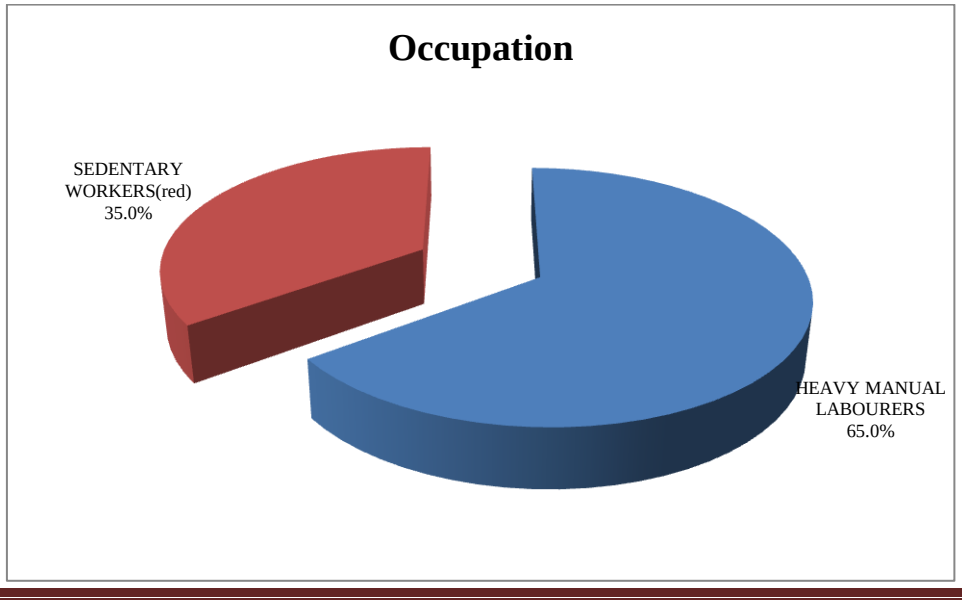
BODY BUILD	NO. OF CASES	PERCENTAGE
NORMA WT(BMI-18.5-24.9)	36	90.0
OVER WT(BMI-25-30)	3	7.5
OBESE(BMI->30)	1	2.5



Inference: Body built of the affected shows predilection towards the subjects with good muscular development.

Table-6 Occupation In Relation to the Dislocation

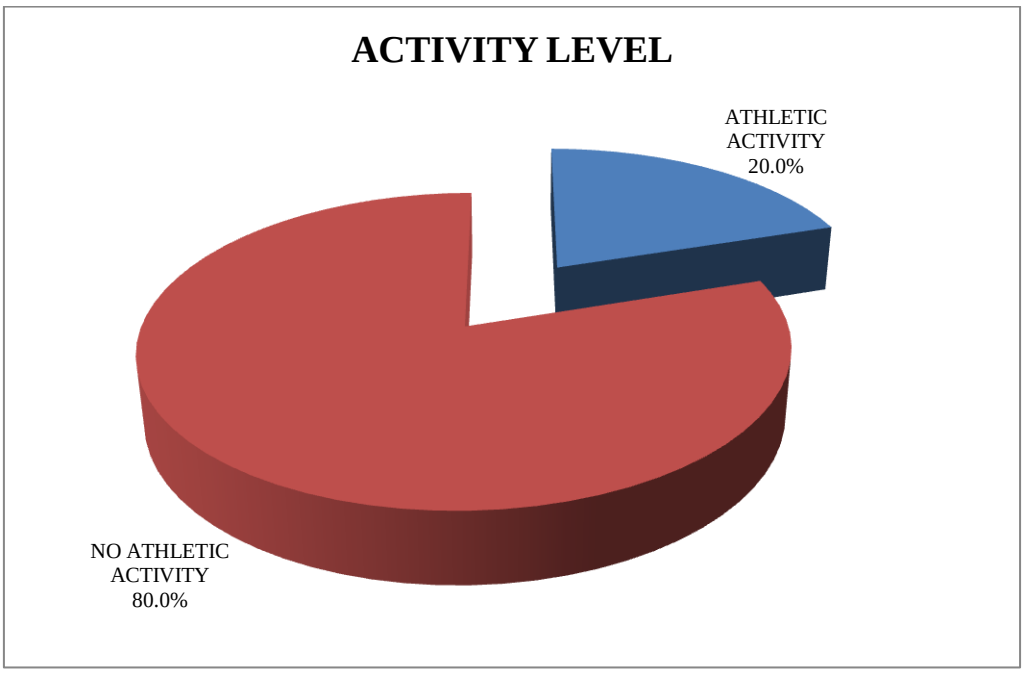
OCCUPATION	NO. OF CASES	PERCENTAGE
HEAVY MANUAL LABOURERS	26	65.0
SEDENTARY WORKERS(red)	14	35.0



Inference: Occupation and activities of the individual reveals that recurrent dislocation is most frequently seen in the heavy manual workers.

Table-7 Individuals Involved in Athletic Activity

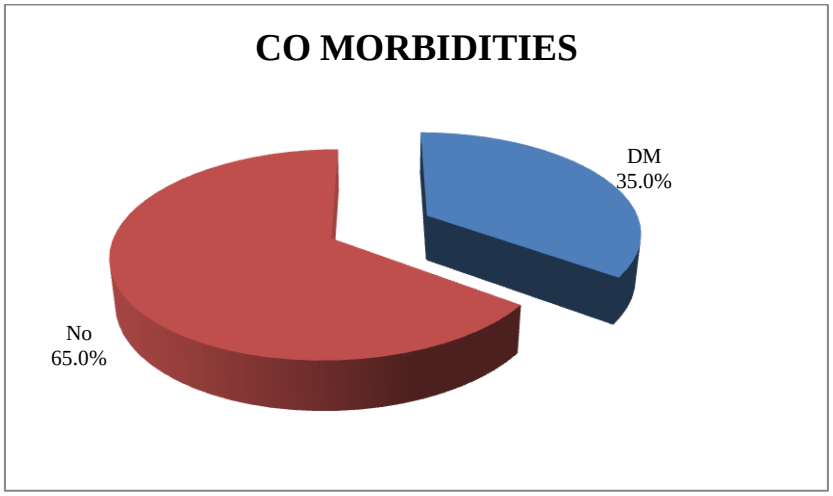
ACTIVITY LEVEL	NO. OF CASES	PERCENTAGE
ATHLETIC ACTIVITY	8	20
NO ATHLETIC ACTIVITY	32	80



Inference: Of the 40 persons 8 had athletic activities. There were no professional sports persons in this series. The initial dislocation was caused by the athletic activity, fall while playing foot ball, abduction and external rotation of arm while playing cricket, volley ball or badminton.

Table 8 Co Morbidities

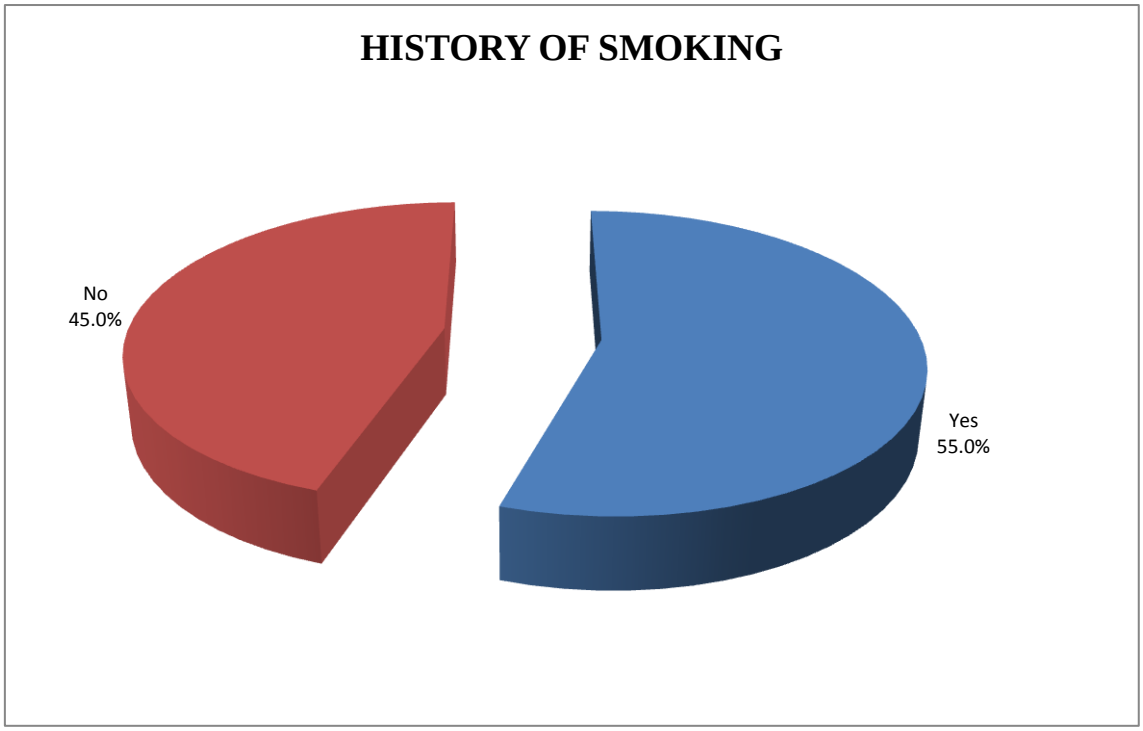
CO MORBIDITIES	Frequency	Percent
DM	14	35.0
No	26	65.0
Total	40	100.0



Inference: From the study group of 40 individuals, around 35% (14 individuals) had diabetes mellitus .

Smoking Predisposition

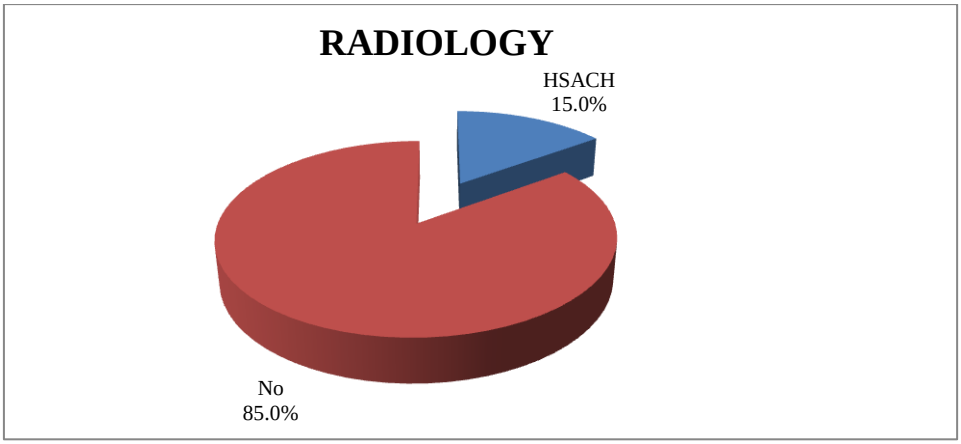
	Frequency	Percent
Yes	22	55.0
No	18	45.0
Total	40	100.0



Inference: In our study design 22 individuals have a predisposing factor for smoking i.e around 55 %

Table 9 Radiological Parameters

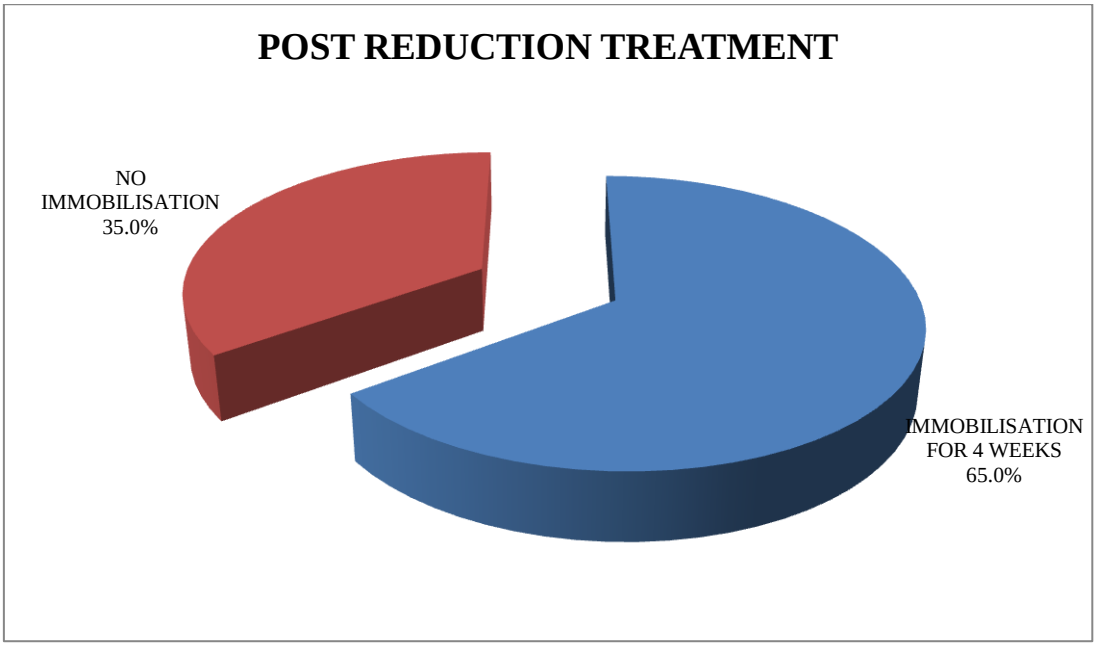
RADIOLOGY	Frequency	Percent
HSACH	6	15.0
No	34	85.0
Total	40	100.0



Inference: 15% of the subjects had hill sach's lesion confirmed on radiology

Table -10 Post Reduction Treatment

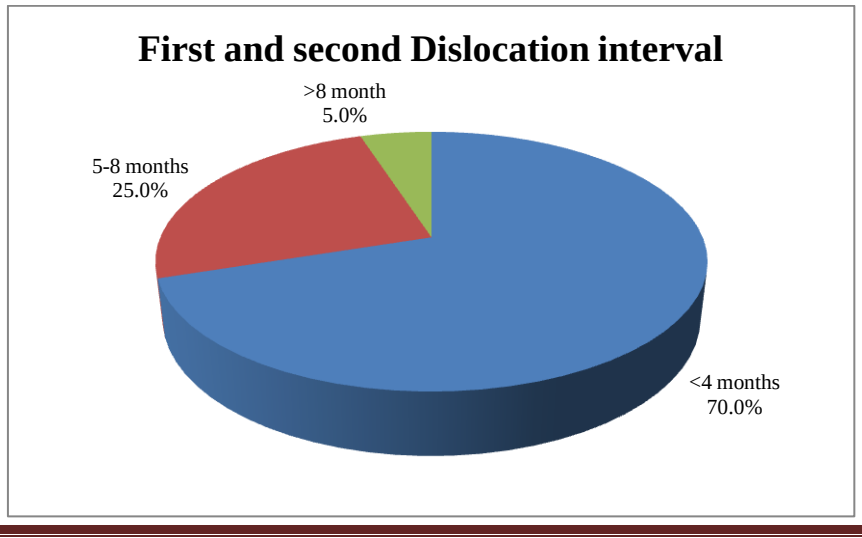
POST REDUCTION TREATMENT	NO. OF CASES	PERCENTAGE
IMMOBILISATION FOR 4 WEEKS	26	65
NO IMMOBILISATION	14	35



Inference: All the cases treated by doctors were immobilized for 4 weeks. However those patient who had immobilization for 2 weeks at least were taken for adequate immobilization andthose who failed for it were taken as "not immobilized"" Recurrentstate is directly proportional to the number of cases dealt without immobilization. Some cases become recurrent inspite of initial immobilization (40% in this series).

Table11 Time Frame between First Dislocation and Second Dislocation

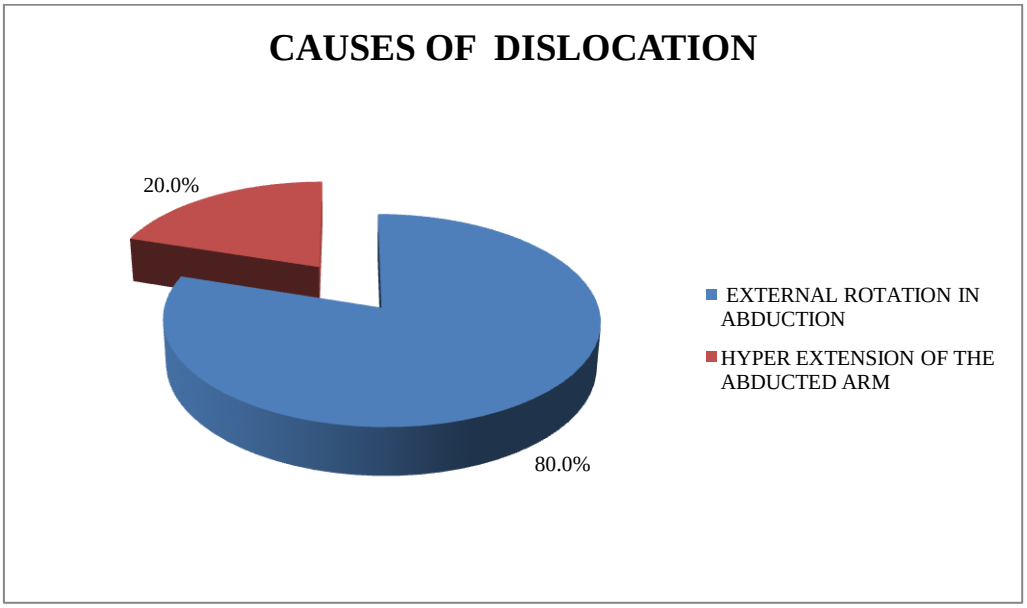
Dislocationinterval	Frequency	Percent
<4 months	28	70.0
5-8 months	10	25.0
>8 month	2	5.0
Total	40	100.0



Inference: In most cases there was recurrent dislocation in first 4 months itself .however, some 14 patients who had adequate immobilization post trauma had late onset recurrence.

Table -12 Causes of Dislocations

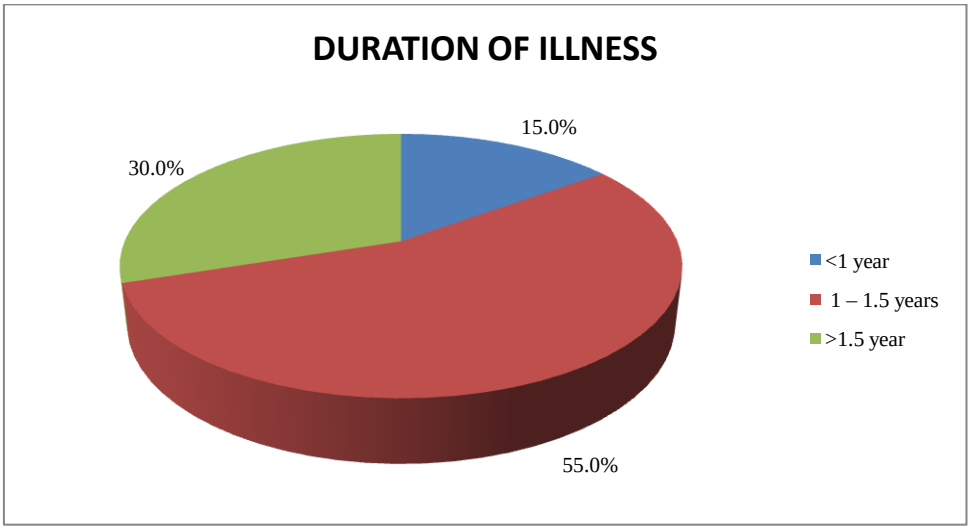
CAUSES OF DISLOCATION	NO. OF CASES	PERCENTAGE
EXTERNAL ROTATION IN ABDUCTION	32	80
HYPER EXTENSION OF THE ABDUCTED ARM	8	20



Inference: External rotation in abduction of the shoulder joint is the commonest cause of dislocations. Dislocations occurred more frequently and with less force than before in subsequent dislocation

Table -13 Time Interval between First Episode Of Dislocation And Surgury

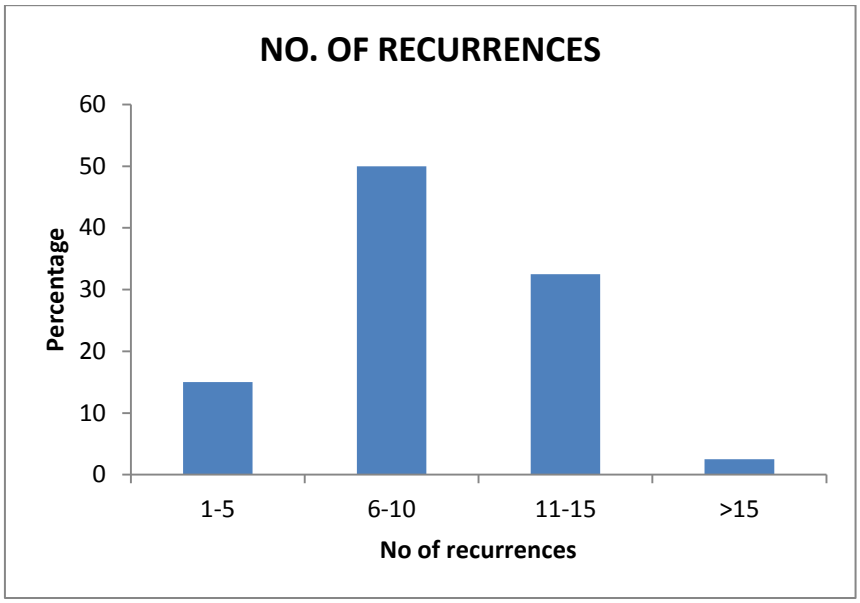
DURATION OF ILLNESS	NO. OF CASES	PERCENTAGE
< 1 YEAR	6	15.0
1 – 1.5 YEARS	22	50.0
> 1.5 YEARS	12	30.0



Inference: Patients attending hospital for early treatment is less. Most of them come for surgical correction after 1 year when most of them have more than 5 dislocations atleast. In our study group there were individuals more than 10 dislocatons

Table -14 Numbers of Recurrences Before Surgery

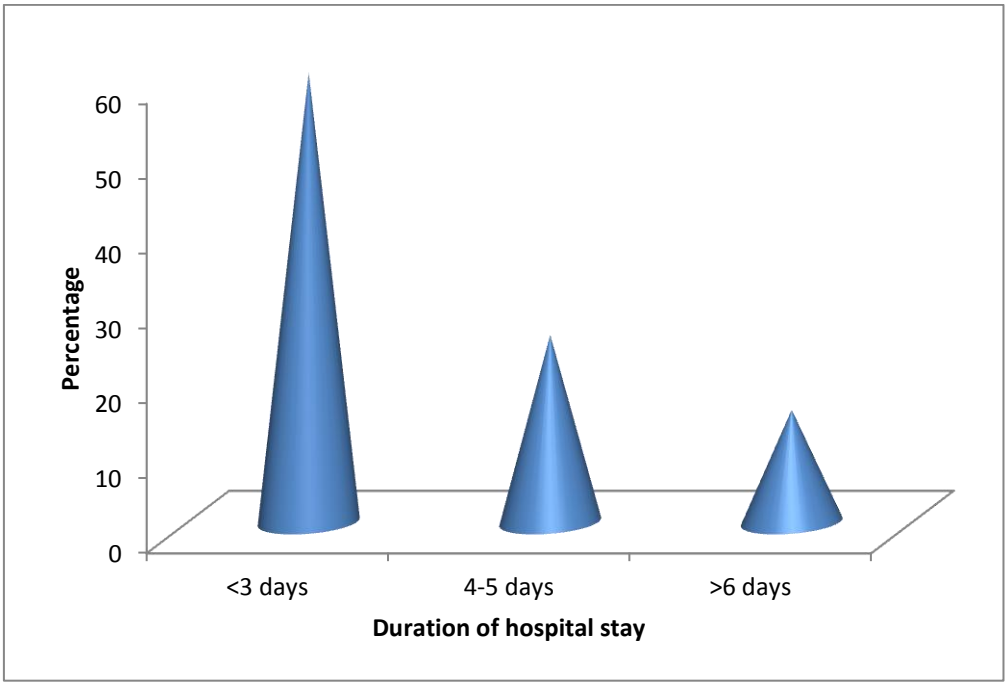
NO. OF RECURRENCES	NO. OF CASES	PERCENTAGE
1-5	6	15.0
6-10	20	50.0
11-15	13	32.5
>15	1	2.5



Inference: The total number of recurrences before surgery is charted above. It indirectly denotes the duration of illness also. A significant correlation exist between number of number of recurrences and functional outcome ($p<0.05$). The prognosis is bad in persons with large number of recurrences. Majority of them have dislocation of 6 -10 before undergoing surgery, however in our study there was an individual who even had more than 15 dislocations

Table 15 Post OP Care Immobilisation Parameters

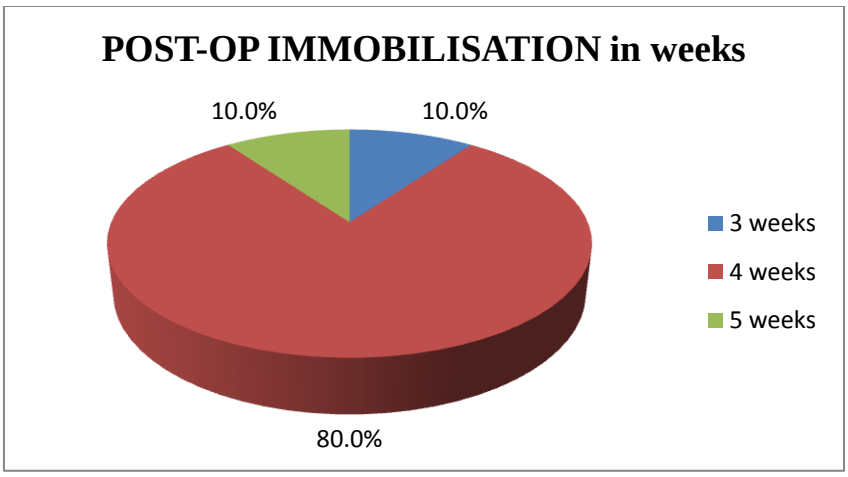
SURGERY AND HOSPITALISATION	Frequency	Percent
3	24	60.0
4	8	20.0
5	2	5.0
7	2	5.0
8	4	10.0
Total	40	100.0



Inference: Majority of the patients had uneventful stay during the post op period and got discharged within 3 days. However there were cases of serous discharge indicating a post op infection in certain patients which included diabetic patients .These patients were started with third generation cephalosporins and salbactum

Table 16 Post OP Immobilisation Parameters

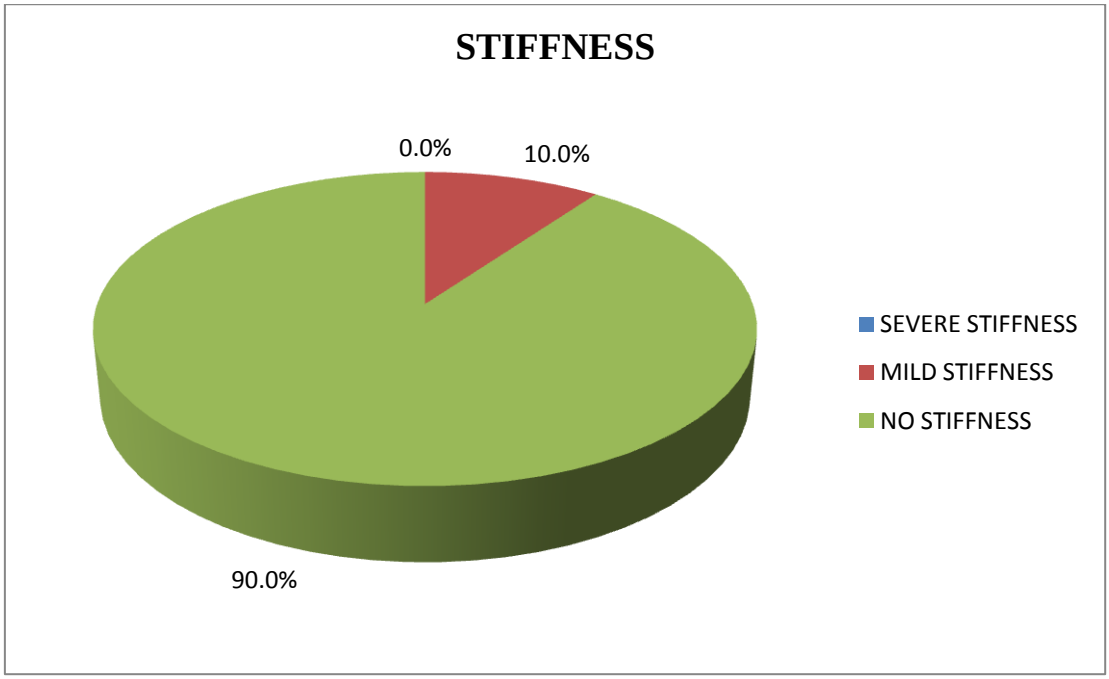
		BRISTOW	BOYTCHEV
3WEEKS		16	16
4 WEEKS		2	3
5 WEEKS		2	1



Inference: Majority of patient had a post op period immobilization of 3 weeks ….in our study around 4 patients were immobilized for 5 weeks post op and they had protracted period of immobilsation owing to the post op infection .

Table -17 Immediate Post Operative Stiffness

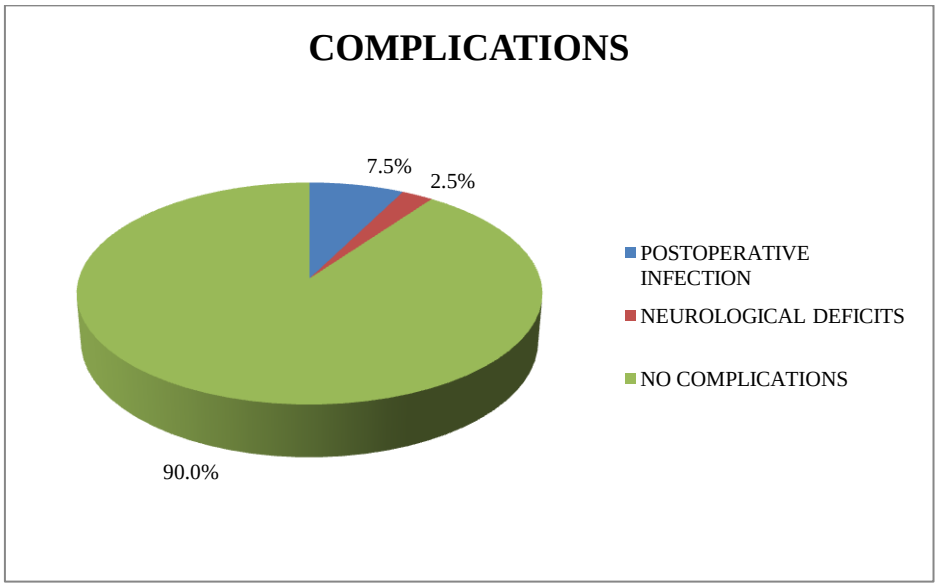
STIFFNESS	NO. OF CASES	PERCENTAGE
SEVERE STIFFNESS	0	0
MILD STIFFNESS	4	10
NO STIFFNESS	36	90



Inference: Only 4 patients had mild stiffness which was treated successfully by active shoulder exercises. There was no case of late stiffness of shoulder in this series.

Table -18 Complications

COMPLICATIONS	NO. OF PERSONS	PERCENTAGE
POSTOPERATIVE INFECTION	3	7.5
NEUROLOGICAL DEFICITS	1	2.5
NO COMPLICATIONS	36	90

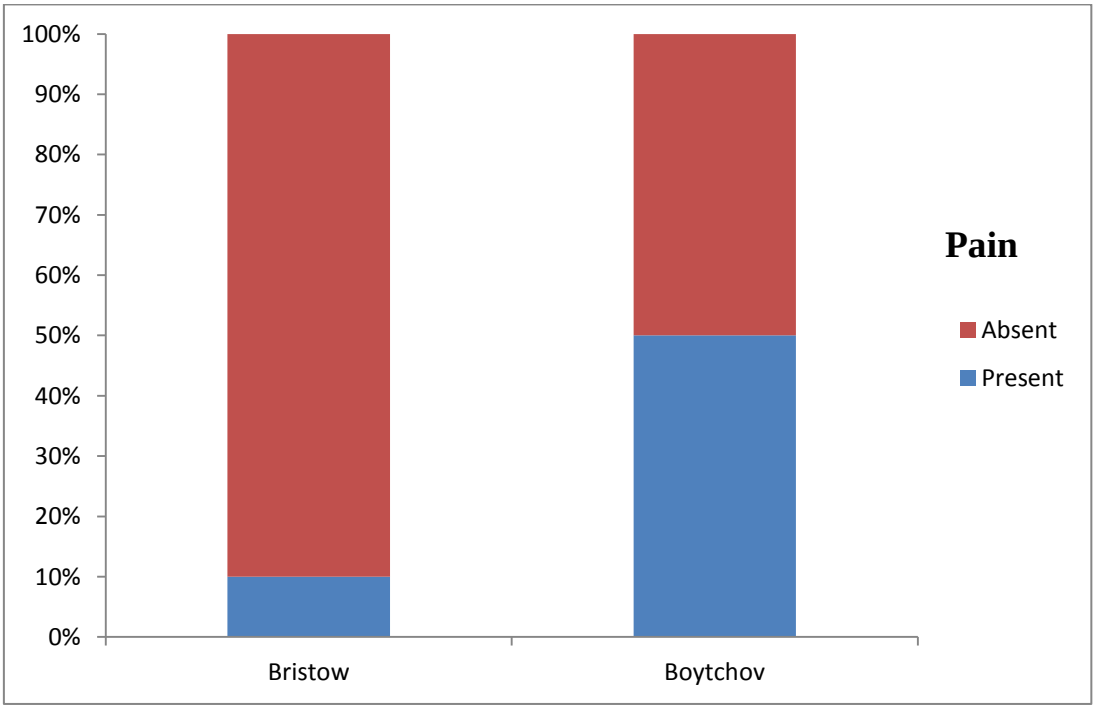


Inference: One patient had a superficial surgical wound infection, which was treated by dressing of the wound and antibiotics. No secondary closure was required and the wound healed within 2 weeks. None of the cases suffered any deep infection or septic arthritis of shoulder. One patient had musculocutaneous nerve palsy, however, the patient recovered within a period Of 6weeks allowing no residual deficits.

Table-19 Pain in Shoulder

	Pain			
	Present		Absent	
	N	%	N	%
Bristow	2	10.0	18	90
Boytchov	10	50.0	10	50

χ^2 =7.619 df=1 p= 0.006

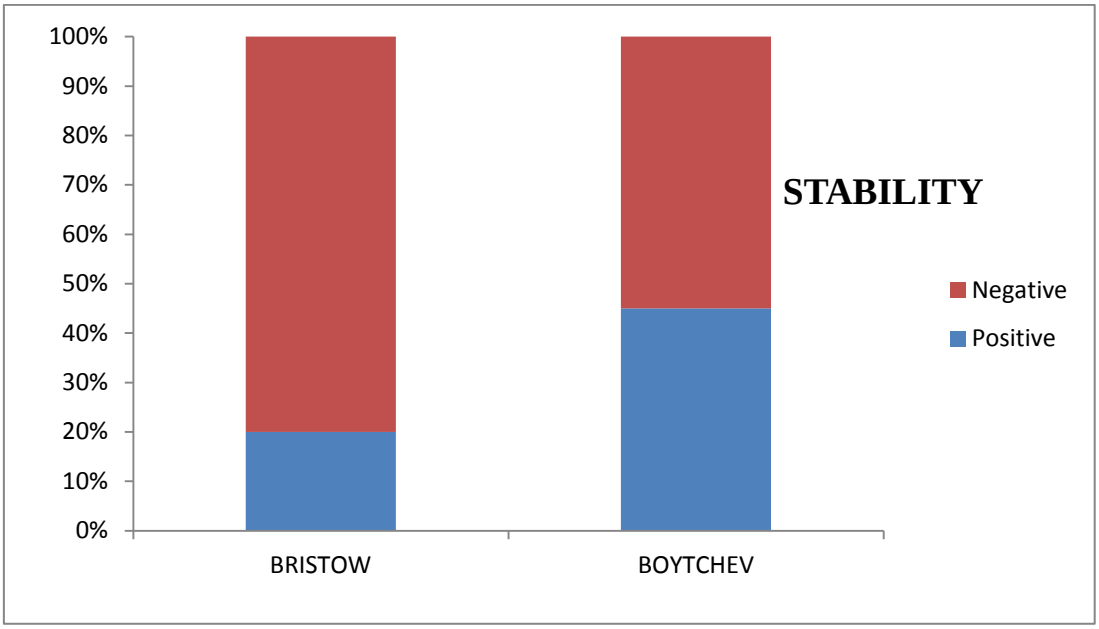


Inference: In Boychotev procedure patient had recurrent shoulder dislocation and following which they have higher degree of pain during ROM compared to bristow. This is statistically significant through P value<0.05

Table -20 Stability of Shoulder

STABILITY	Method				Total	
	BRISTOW		BOYTCHEV			
	N	%	N	%	N	%
Positive	4	20.0	9	45.0	13	32.5
Negative	16	80.0	11	55.0	27	67.5
Total	20	100.0	20	100.0	40	100.0

χ^2 =2.849 df=1 p= 0.091

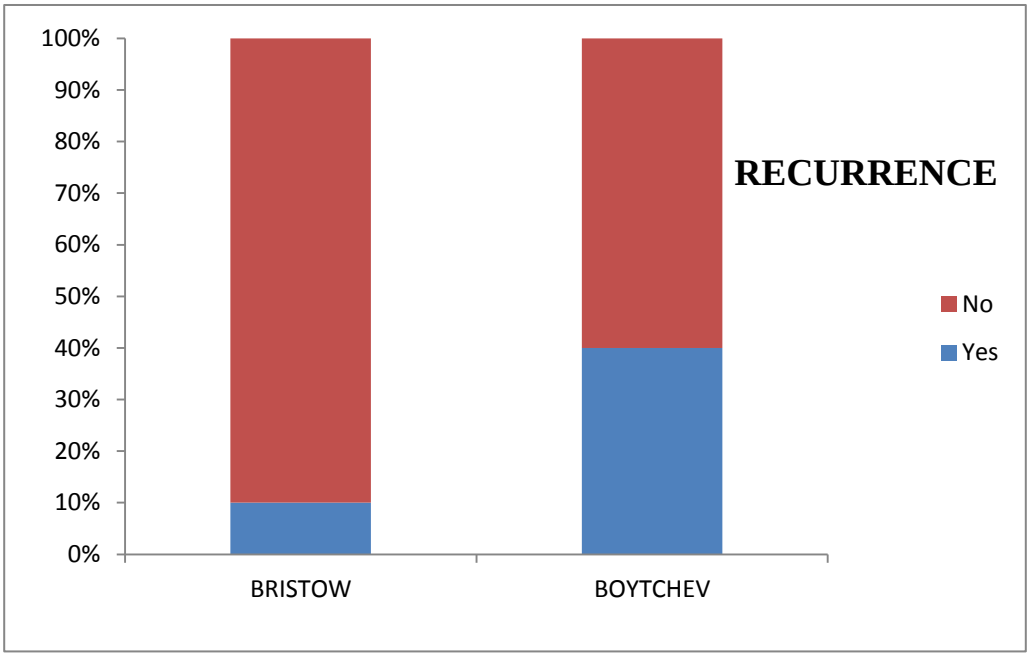


INFERENCE: Post-op shoulder was more stable in Bristow surgery rather than boytchov were most patients had instability and pain. This assessment was based on clinical examination through apprehension test. however this could not be validated through chi square where P value was >0.05

Table 21 Recurrence in Both Study Group:

RECURRENCE	Method				Total	
	BRISTOW		BOYTCHEV			
	N	%	N	%	N	%
Yes	2	10.0	8	40.0	10	25.0
No	18	90.0	12	60.0	30	75.0
Total	20	100.0	20	100.0	40	100.0

χ^2 =4.800 df=1 p= 0.028

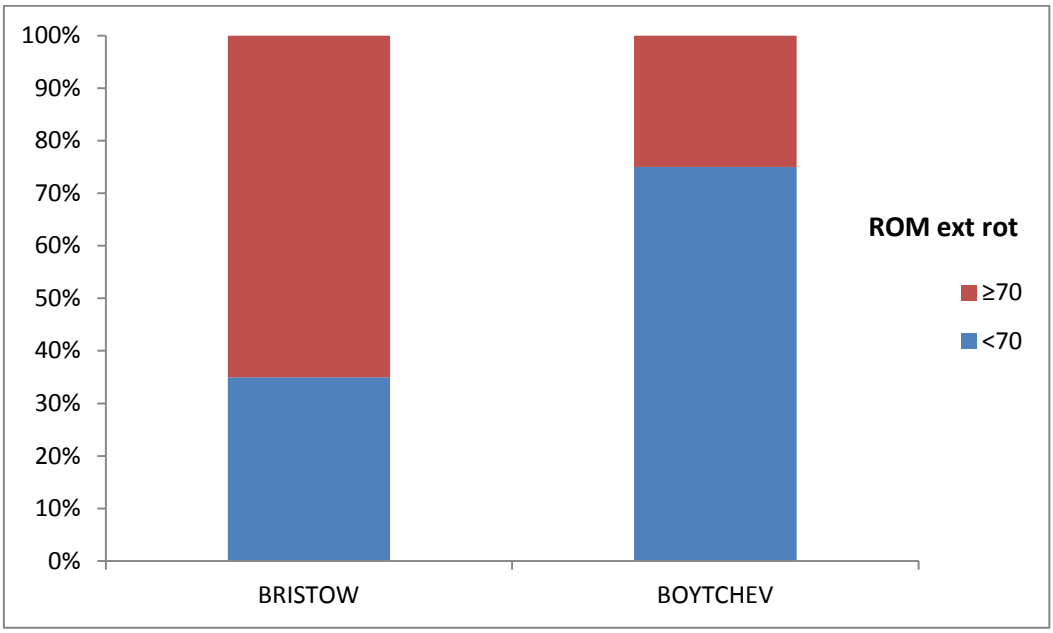


Inference: The patients in the study group ,2 had recurrence of shoulder dislocation after undergoing Bristow surgery, whereas, patients who had Boytchev surgery 8 had recurrence of dislocation .this recurrence pattern was validated statistically with p value <0.05

Table -22 Range of External Rotation

ROM ext rot	Method				Total	
	BRISTOW		BOYTCHEV			
	N	%	N	%	N	%
<70	7	35.0	15	75.0	22	55.0
=>70	13	65.0	5	25.0	18	45.0
Total	20	100.0	20	100.0	40	100.0

χ^2 =6.466 df=1 p= 0.011

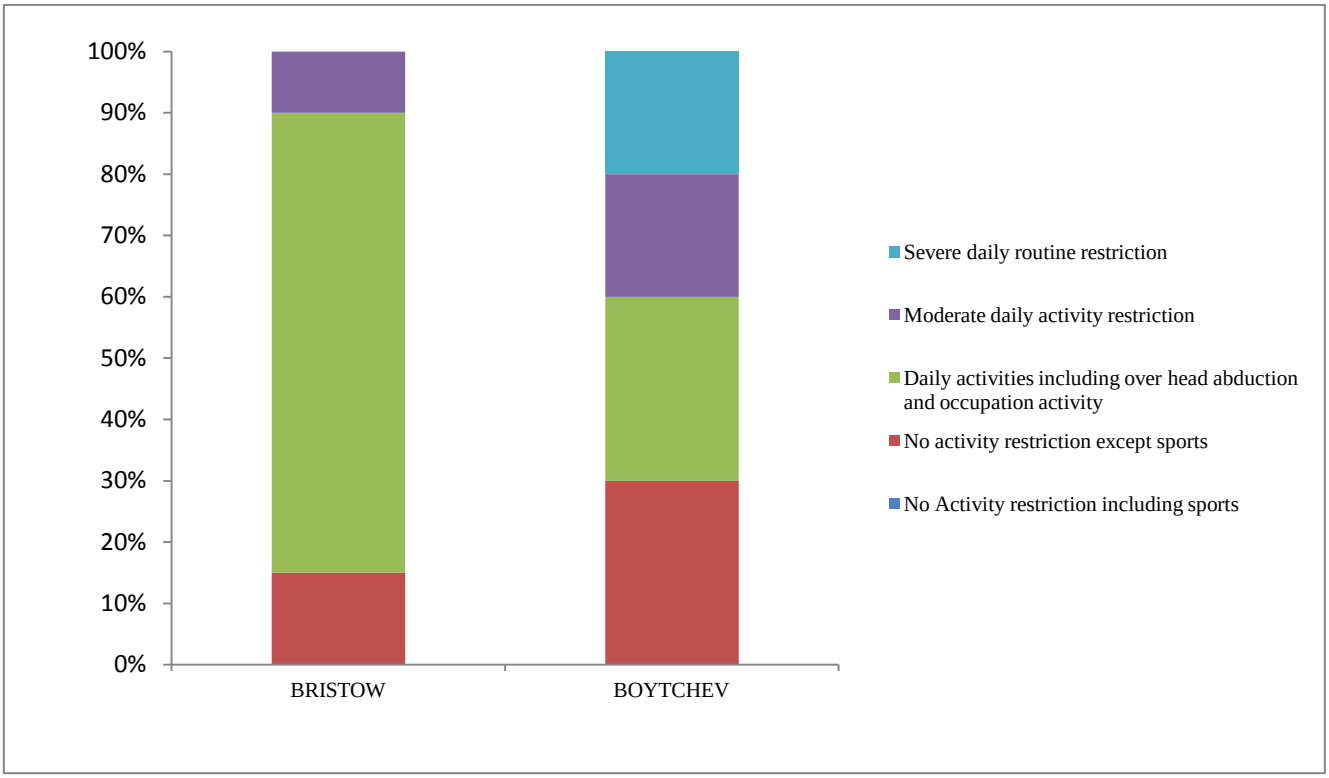


Inference: THE external rotation Is limited in both the procedures with a mean value of 68+/- 2 Degree for Bristow and for Boytchev surgery mean value is 62+/-2 degree.

There is always some loss of external rotation limitation for both the surgeries, however the external rotation seems to be more affected in Boytchev surgery rather than the Bristow group.(statistically significant "p" value =0.011)

Table – 23 Function of Shoulder

Functional	Method				Total	
	BRISTOW		BOYTCHEV			
	N	%	N	%	N	%
No Activity restriction including sports	0	0	0	.0	0	0.0
No activity restriction except sports	3	15.0	6	30.0	9	22.5
Daily activities including over head abduction and occupation activity	15	75.0	6	30.0	21	52.5
Moderate daily activity restriction	2	10.0	4	20.0	6	15.0
Severe daily routine restriction	0	.0	4	20.0	4	10.0
Total	20	100.0	20	100.0	40	100.0

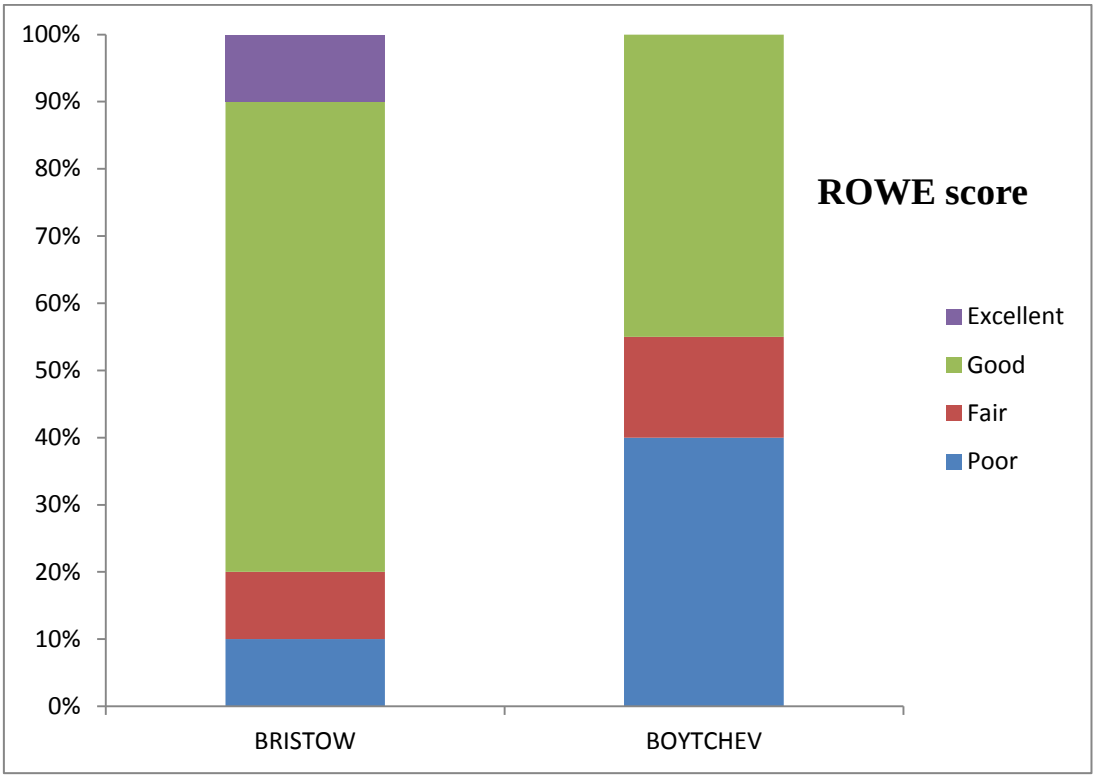


Inference: Bristow Surgery: 15% of persons had no limitation of function except for sports and athletic activities.. 75% had minimal limitation only not affecting their daily routines. Only 10% persons experienced moderate limitation of shoulder function including difficulty in over head abduction. None of them required any change in occupation.

Boytchev Surgery: 33% of persons had no limitation of function except for sports and athletic activities.. 33% had minimal limitation only not affecting their daily routines. Only 20% persons experienced moderate limitation of shoulder function, including difficulty in over head abduction and another 20 % had severe restriction of shoulder movements

Table 24 Tabulating the Parameters in Rowe Scoring System

ROWEscore	Method				Total	
	BRISTOW		BOYTCHEV			
	N	%	N	%	N	%
Poor	2	10.0	8	40.0	10	25.0
Fair	2	10.0	3	15.0	5	12.5
Good	14	70.0	9	45.0	23	57.5
Excellent	2	10.0	0	.0	2	5.0
Total	20	100.0	20	100.0	40	100.0



Statistical Co Relation

ROM ext rot	Method				Total	
	BRISTOW		BOYTCHEV			
	N	%	N	%	N	%
Poor- Fair	4	20.0	11	55.0	15	37.5
Good - Excellent	16	80.0	9	45.0	25	62.5
Total	20	100.0	20	100.0	40	100.0

χ^2 =5.227 df=1 p= 0.022

Inference

Bristow Surgery: The Bristow surgery functional outcome based on Rowe scoring system signify around 2(10%) patient with excellent scoring and majority of the patient in good category comes around 14 in number i.e more than 60 % have good functional outcome. However there are individuals who (10%)have a poor Rowe score.

Boytchev Surgery: The Boytchev surgery functional outcome based on Rowe scoring system signify around 45% patient with good scoring and 15% in fair category but a dismal 40% share to poor Rowe score.

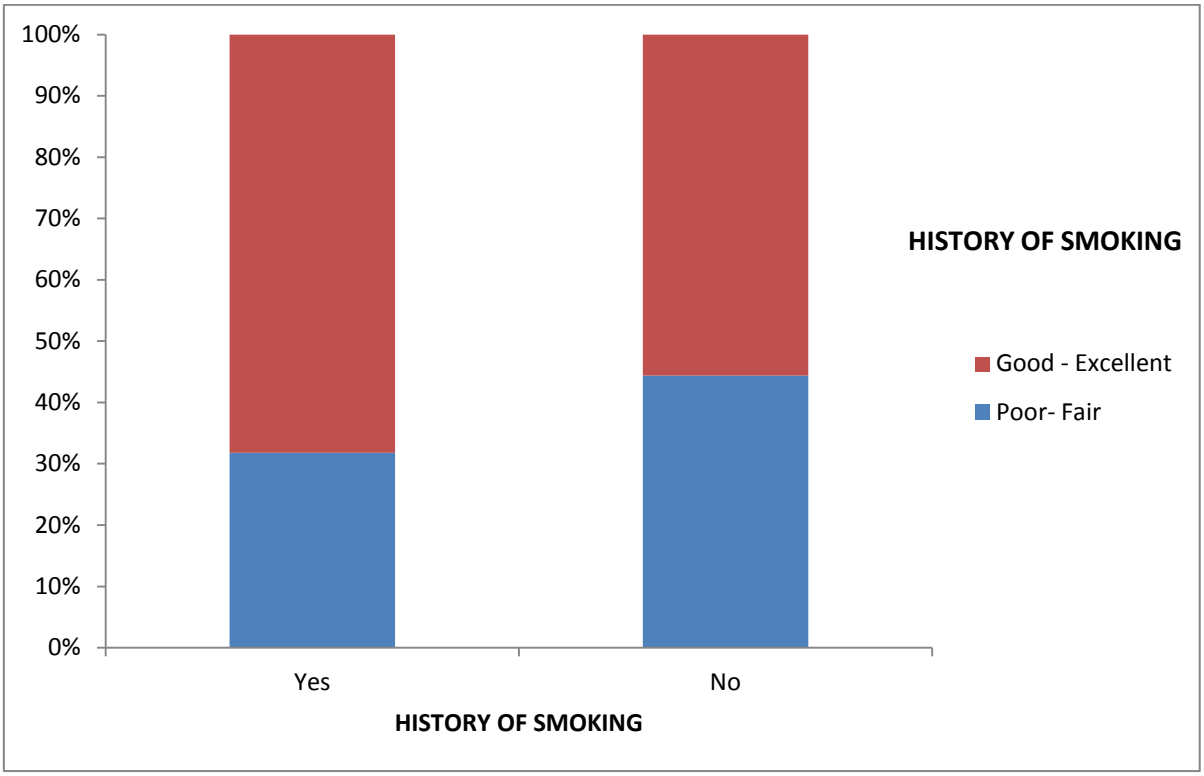
There is a statistical advantage for patients who had Bristow surgery based on their Rowe functional level as compared to the Boytchevsurgery.

Table 25 Functional Assement among Variables

1.Association of Smoking to Functional Outcome - Rowe Score

Row score	HISTORY OF SMOKING				Total	
	Yes		No			
	N	%	N	%	N	%
Poor- Fair	7	31.8	8	44.4	15	37.5
Good - Excellent	15	68.2	10	55.6	25	62.5
Total	22	100.0	18	100.0	40	100.0

χ^2 =0.673 df=1 p= 0.412



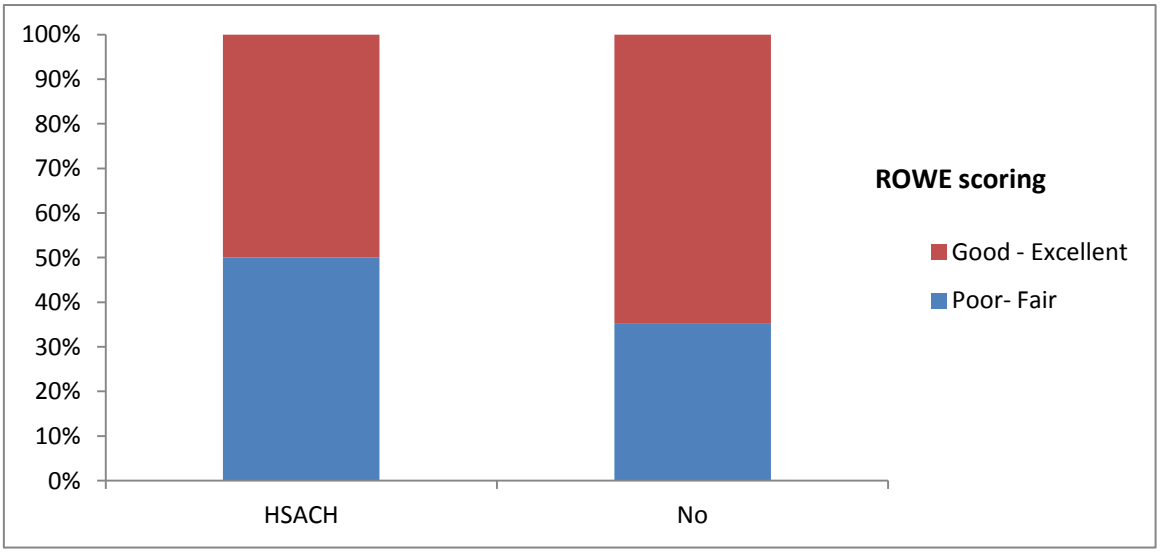
Inference: in my study there is no statistically significant association between the 2 variables indicating no correlation for smoking as a predisposing factor for shoulder dislocation .

Table 26

2 .Association of Hill Sach's Lesion over the Rowe Score

Row score	RADIOLOGY				Total	
	HSACH		No			
	N	%	N	%	N	%
Poor- Fair	3	50.0	12	35.3	15	37.5
Good - Excellent	3	50.0	22	64.7	25	62.5
Total	6	100.0	34	100.0	40	100.0

χ^2 =0.471df=1 p= 0.493

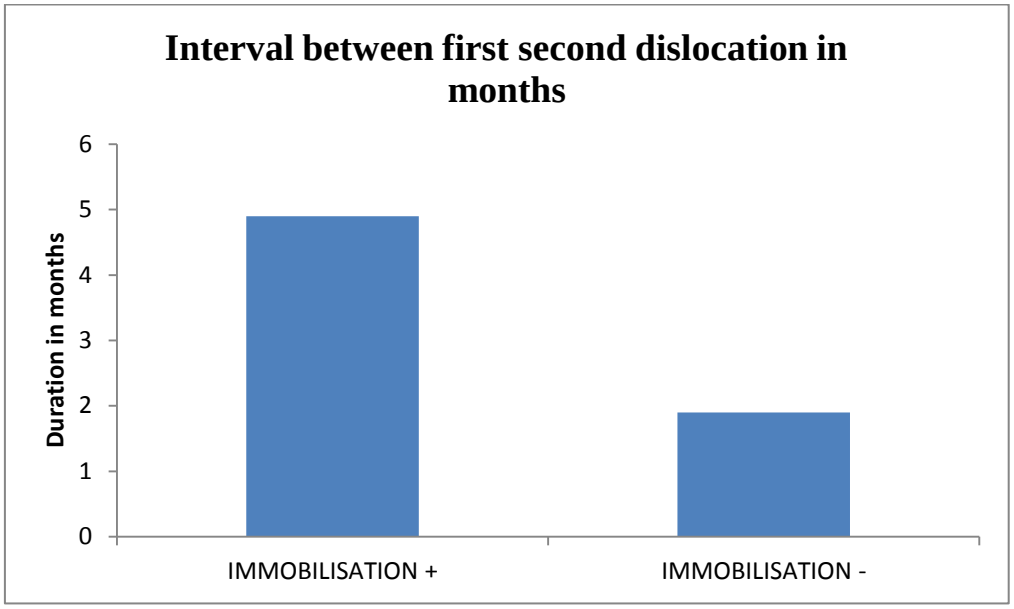


Inference: The patients who had Hill Sach lesion had a fair to good Rowe score and certain patient had recurrence too, but there is no statistically significant correlation between two variables.

Table 27

3 Association between Post Reduction Immobilisation and Dislocation Interval Between First and Second

Post reduction treatment	N	Interval between first second dislocation in months		t	P
		Mean	sd		
IMMOBILISATION +	24	4.9	1.5	7.656	<0.001
IMMOBILISATION -	16	1.9	0.7		

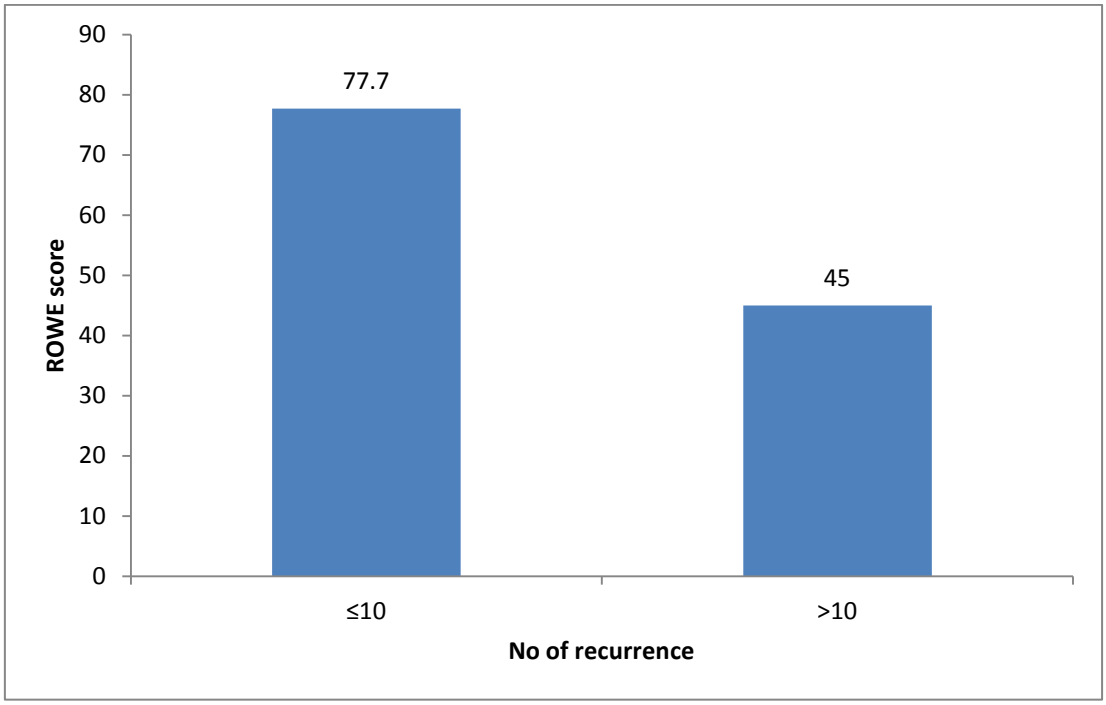


Inference: There is a positive correlation between the two variables involving post reduction immobilsation and dislocation interval .Patients who had immobilsed the shoulder for atleast 2 weeks had developed recurrence of the dislocation at a later time .This correlation is also statistically proved with p value ,0.05

Table 28

4.Association Between Number of Recurrence and Rowe Score

No of recurrence	N	ROWE score		t	P
		Mean	sd		
≤10	26	77.7	9.9	7.907	,0.001
>10	14	45.0	16.3		



Inference: In my study there was a positive correlation with statistical significant p value indicating lesser the dislocation better the Rowe scores.

Table 29

6.Association Between Duration Of Illness And Rowe Score

Duration of illness in years	N	ROWE score		t	p
		Mean	sd		
≤1.5	28	76.6	11.9	8.224	<0.001
>1.5	12	42.1	12.9		

Inference: There is positive correlation between the 2 variables indicating that early surgery before 1.5 years will lead to better Rowe score results .This was further validated through significant p value.

Discussion

In our study, 60% of the cases in this series are between 21 to 30 years of age. Of these majority are below 30 years. There were 6 patients above the age of 40 years. Any type of dislocation of shoulder is uncommon in children and recurrences are infrequently seen before the age of 18.This is apparently due to the stretching of periarticular structures or the joint changes associated with growing age predispose to dislocation and recurrence. However, with advancing years, there is intra articular and periarticular fibrosis, which limits external rotation so that recurrent dislocation is uncommon after the age of 40. It is also apparent that individuals over 40 years of age are less frequently exposed to athletic and occupational trauma, which produces dislocation. These factors seem to counter balance the advancing degenerative changes, which predisposes to recurrence. This was also supported in other publications at Indian journal of orthopaedics which stated that of the 48 candidates in the study group majority were under 30 and mean age was 27+/-2 years.

There were only four females (10%) in this series. This indicates a male predominance. Brav (1955)[15,16,17] in his study population had only one female (2.5%) in his series of 40 patients. Dutoit and Roux (1956)[18] found the percentage 93% males, 7% females in a series of 150 cases. Rowe (1956)[19] found primary dislocations twice as

common in the male as in the female (323 males and 165 females) and the incidence of recurrence approximately twice as great in males as in females (66 percent of males; 30 per cent of females).

The incidence in the published series naturally depends on the type of Population from which the cases were drawn. But in the general overall picture, males predominates 4 or 5: 1. It must be emphasized that it is exposure to injury and not sex which predisposes the individual to recurrent dislocation. Less exposure to athletic activities and strenuous muscular activities may be the cause of low female incidence in this series.

It had been suggested that the shoulder with weaker development would be more prone to displacement. The more frequent incidence of recurrent dislocation on the non-dominant side suggests that inferior muscular development and co-ordination may play a part in the aetiology of the condition. In the study of Brav (1955)[15,16,17] recurrence was twice as frequent on the left side as on the right and both of the left handed individuals in this group had right sided dislocations. In the series of Rowe (1978)[14,19]in the right handed patients there was no appreciable difference in the frequency of dislocation on the dominant and non-dominant sides, while in the left handed patients, there was a significantly increased incidence on the non-dominant side.

In this series all the patients were right handed. The right side dislocation is more affected than the left side. This indicates a predilection for dominant side in this series, where as other series shows predilection for non-dominant side.. This concludes that there does not seem to be an important difference in the incidence of dislocations on the right or left side nor does the non-dominant side tend to suffer primary or recurrent dislocation more frequently than the dominant side (Mosely 1961)[20,21]. Complications and re-operations after Bristow shoulder stabilization: Griesser showed that dominant side involvement seems to be more than non dominant (64%)

Bilateral dislocation occurred in 2.4% of the Boston series[22.] Du Toit and Roux (1956)[18]found the incident 5% in a series of 150 cases in South Africa. It was 10% in the study of Moseley and Overgaard (1962)[20,21]. In the series of Brav (1965)[15,16,17]. It was 7 of the 40 patients (17.5). Bilateral involvement is suggestive of an inherent looseness of the joint. Four features predispose to surgical failure are younger age group with heavy manual worker, bilaterally, a positive family history and posterior instability (Morrey and Janes 1976)[23]with Bankart, Hill sachslession. The last three factors suggest an inherent looseness of the joint; therefore care should be taken to elicit such a history before operation and surgical procedures should be planned accordingly.No positive family history was obtained in any patients in this series. In the study of Rowe (1978)[14,19], a positive family history was available in 27% cases. A positive family history is indicative of an inherent weakness of the joint and hence modification of procedure is necessary to prevent a recurrence after surgery. However results seems to be less encouraging since positive history is suggestive of generalized ligamentous laxity owing to collagen defects.

Recurrent dislocation of the shoulder usually noted in stocky, muscular individuals and in those engaging in vigorous athletic activities. In this series majority of patients are muscular, younger age group who involve themselves in vigorous manual work in our study ,majority (90%) were in muscular BMI Scale and 10 % were from overweight category In this study the patients are mostly heavy manual labourers. Dislocations both primary and recurrent occur most frequently in labourers

Of the demographic population, Only 20% of patients had athletic activities. This is less compared to other series. The Boytchev Series study by central institute, Safadarjung hospital had 9 out of 48 individuals with three of the male patients were professional district level football player. Neither generalized joint laxity nor laxity of the shoulder alone was present in any of the

cases in this series. Laxity of the joint indicates an inherent weakness of the joint and hence surgical repair should be modified accordingly.

Majority of the patients had an abduction external rotation injury (90%), this finding do not substantiate Bankart's theory of the mechanism of injury. According to Bankart[1], dislocation caused by abduction external rotation never recurs and initial dislocation produced by a fall either directly on the posterior aspect of the shoulder or on the elbow only recurs. But in this series abduction external rotation is 90% and a directed blow from behind the shoulder is only 10%. This shows that both the so-called non-recurrent and recurrent dislocations of Bankart may produce the same lesions and majority of dislocation the mechanism of dislocation is ÄBDUCTION –EXTERNAL ROTATION."

All the cases were reduced by qualified doctors and those cases were immobilized for a period of 4 weeks. But in spite of adequate immobilisation, the dislocation recurred. Hence the earlier belief that acute dislocation of shoulder which is not immobilsed adequately tend to become recurrent, cannot be accepted"" fully"". In spite of adequate immobilisation, some of the acute dislocations tend to become recurrent as shown in this series. It is still a debated point, however whether immobilization in younger patients in anyway prevents the development of the recurrent state. In our study patients who were immobilized for a period of at least 2-4 weeks majority of them had dislocation pattern of recurrence more than 4 months and it was validated statistically .However there is no rational of hypothesing that animmobilisation of 4 weeks will ""completely"" prevent recurrence. In Mosley's series (1961)[20] 84.6% recurred within one year. In Rowe's series[4] 70.5% recurred within 2 years, 18.7% within 2-5 years, 6% percent from 5-10 years and 4.5% from 10-20 years. However, this time interval is quite varying. In this series, most of the cases (70%) recurred within 6 months.

Dislocation occurred more frequently and less trauma than before in subsequent trauma. Elevation with external rotation of the shoulder was the commonest cause of recurrence. Many patients are aware of the critical range of elevation and rotation beyond which the shoulder dislocate and restricts the activities like throwing and taking part in sports. This apprehension and disuse may lead to some muscle wasting around the shoulder. Reduction of subsequent dislocations is easier in most of the cases. However, in the other group the reduction becomes more difficult. The development of poster lateral notch with its locking on the anterior glenoid rim is frequently responsible for the obstruction for reduction.

Duration of illness is very important as far as the prognosis is concerned. In our study there was always a delay of 1 year from first dislocation to surgery and majority of the patient (28) had opted for surgical management before 1.5 years. Results for patient who had delayed surgery by 2 years (around 12) had a fair and poor Rowe score outcome which was statistically validated. More the duration of illness, more will be the number of dislocations. Each dislocation will produce additional trauma to the head of humerus and glenoid rim. Most authorities would regard it as the result of dislocation and not the cause. However, each recurrence will increase the erosion of glenoid rim and notch on the posterolateral aspect of head of humerus. The osseous lesions in the humeral head and glenoid fossa are permanent. The floor of the notch may smooth over with fibrous tissue with the correction of the recurrent state. Nevertheless, the notch may persist and a villous synovitis develops in the area. Similarly loose body formations continue and in neglected cases with marked traumatic arthritis at the time of operation, the degenerative processes tend to persist. For this reason, surgical correction should be advised before the development of the secondary changes. In our study there was a positive co relation between the duration of illness and the Rowescore, validated with a significant p value ,indicating that earlier the surgical intervention

,lesser the dislocation and in turn less wear and tear process of glenoid labrum

In this series majority of patients reported for surgical correction after 5 dislocation recurrence (50%). 15% had 3-5 recurrence and 33% had more than 11 episodes. A significant correlation exist between the number of recurrences and functional outcome ($p<0.05$). The prognosis is bad in patients with large number of recurrence. They are prone to develop secondary degenerative changes later in their life. The late surgical repair has a bad prognosis, especially for manual laborers since their work will be restricted with pain and stiffness of joint initially, and later by development of osteoarthritic changes. In this series, the follow up is short, hence no osteoarthritic changes could be detected radiologically.

Post operative assessment, 36 off the patients were asymptomatic, however 3 of them had superficial serous discharge, signaling early signs of post op infection. Of the 3 patients, 2 of them had diabeties mellitus. this was treated with prolonged post op admission in wards by 5 days and administering cephalosporins and salbactum. However none of them had an exaggeration of infection or arthritis shoulder.

Physiotherapy after 3 weeks of surgery regains movements of shoulder. .This was characteris-tically proved in the study with 4 individual developing post op stiffness owing to immobilization for a period of 3 weeks .Full power of shoulder can be restored in association with full range of motion by proper technique at operation and postoperative physiotherapy (Moseley 1961)[24]. The subconscious fear of dislocation should be relieved following surgery by repeated reassurance to the patient.

In this series, recurrence has been reported and clinically assessed .There were2 individuals(10%) who had a recurrence out of the 20 individuals operated by Bristow technique, however ,those operated by Boytchev technique had higher incidence of dislocation around 8(40%). These dislocation recurrence were again accompanied by pain and decreased functional ability .Recurrence rate in Bristow: JBJS PUBLICATION griesser et al Complications and re-operations after Bristow-Latarjet shoulder stabilization: a systematic review. Recurrent anterior dislocation and sub luxation rates were 2.9% and 5.8%, respectively. When reported, most dislocations occurred within the first year postoperatively (73%).The Bristow Procedure for Anterior Shoulder Instability 26-Year Outcomes in Naval Academy Midshipmen LCDR David T. Schroder,* documented Overall, recurrent instability occurred in 8 of 52 shoulders (15.4%), with recurrent dislocation in 5 shoulders (9.6%) and recurrent subluxation in 3 shoulders (5.8%).

Recurrence in other boytchev Series

Series	Incidence of recurrence
Adams (1948)[2]	15.5%
Boyd and Hunt (1965)[9]	24.1%
Brav (1955)[11]	27.3%
Morrey and Janes (1963)	22.0%
Rowe and associates (1976)[49]	23.5%

The external rotation Is limited in both the procedures with a mean value of 22+/-2 degree for Bristow and for Boytchev surgery mean value limitation is 25+/-2 degree. There is always some loss of external rotation limitation for both the surgeries, however the external rotation seems to be more affected in Boytchev surgery rather than the Bristow group.(statistically significant “p” value =0.011) In the I.J.O Publication by Garg at al the mean external rotation deficit at 0° of abduction was 18.22°±5.16°by Boytchev

In the functional assessment score of ROWE the value were studied and formulated accordingly, which shows in Bristow surgery candidates 15% of persons had no limitation of function except for sports and atheletic activities.. 75% had minimal limitation only not affecting their daily routines. Only 10% persons experienced moderate limitation of shoulder function including difficulty in over head abduction however, None of them required any change in occupation. In boytchev surgery candidates 33% of persons had no limitation of function except for sports and

atheletic activities.33% had minimal limitation only not affecting their daily routines. Only 20% persons experienced moderate limitation of shoulder function, including difficulty in over head abduction and another 20 % had severe resticition of shoulder movements.

In my study, there is no statistically significant association between the co morbidity factor and Rowe score indicating no correlation for smoking and diabetes as a predisposing factor for shoulder dislocation .There were 22 patients who were predisposed to smoking and there Rowe score statistically yielded "not significant "result. Similarly there were patients in both group who had diabetes, 24 in total, however they too, did not have any statistical significant co relation. But, 2 of the three patients who had post op infection were predisposed to diabetes indicating that it could be a predisposing factor in convalescent period, however not validated statistically.

The Rowe score of both the surgeries yielded statistically significant differences. In the Bristow surgery group, functional outcome based on Rowe score signify around 2(10%) patient with excellent scoring and majority of the patient in good category comes around 14 in number i.e more than 60 % have good functional outcome. however there are individuals who (10%) have a poor Rowescore. On the contrary, the Boytchev surgery functional outcome based on rowe scoring system signify around 45% patient with good scoring and 15% in fair category but a dismal 40% share to poor Rowe score. There is a statistical advantage for patients who had Bristow surgery based on their Rowe functional level as compared to the boytchev surgery. P value <0.05 signify that patients who had undergone Bristow surgery had better outcome than Boytchev patient group based Rowe scoring system. 2006 American Orthopaedic Society for Sports Medicine documentation of results in 58 patients of Bristow had yielded a good-to-excellent outcome in nearly 70% and provided a stable and predictably functional shoulder in the long term in regard to stability.

However , proper evaluation of the success of any surgical procedure for recurrent dislocation of the shoulder must be based on a long-term follow up. A high index of incidence in our study could be because of a moderate (40 patients) sample size and short term study (1 year) in both groups each. A short-term follow up may lead to a distinct underestimation of the failures of treatment. above said studies and their incidence were based on long term. Morrey and Janes (1976)[23] cautioned against a short term follow up study, pointing out that such a report from the Mayo Clinic gave a recurrence rate of 12 per cent in Boytchev series study where as a subsequent report from the same clinic with long term follow up, showed a recurrence rata of 21 per cent.

Conclusion

There is a positive co relation between immobilsation and prolonging duration of recurrence of dislocation (statistically significant P value, 0.05). There is no statistical significant predisposing association between co morbidities (smoking and diabetes mellitus) and shoulder dislocation. However, there is a direct statistical correlation ($p<0.05$) between Occupation involved and shoulder dislocation. A significant correlation exist between number of recurrences before surgery and functional outcome ($p<0.05$). The prognosis is bad in persons with large number of recurrences.

More the dislocation and prolonged duration for illness, lower the rowe scores (validated p value, 0.05) probably due to glenoid tear (Hill sach lessions) and secondary osteoarthritis. The recurrence rate in patient who underwent Boytchev surgery were higher than those in Bristow which was statistically significant.

The most common disadvantage of both procedure was –loss of external rotation There is a terminal loss of 15- 20 degree of external rotation. The mean external rotation limitation in Bristow was lower as compared to that of boytchev. Patients who underwent Bristow surgery have a better statistically significant Rowe score as

compared to the patients who underwent Boytchev. Patients who underwent Bristow surgery had less recurrent dislocation and less pain shoulder as compared to those who underwent Boytchev surgery.

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