

**FUNCTIONAL OUTCOME ANALYSIS OF MANAGEMENT OF
MODIFIED BRISTOW'S REPAIR IN PATIENTS WITH
RECURRENT SHOULDER DISLOCATION**

Dissertation submitted to



In partial fulfilment of the requirements for

M.S. DEGREE-BRANCH II

ORTHOPAEDIC SURGERY

**MADRAS MEDICAL COLLEGE
INSTITUTE OF ORTHOPAEDICS AND TRAUMATOLOGY
RAJIVGANDHI GOVERNMENT GENERAL HOSPITAL
THE TAMILNADU DR.M.G.R.MEDICAL UNIVERSITY
CHENNAI-TAMILNADU**

APRIL – 2013

CERTIFICATE

This is to certify that this dissertation titled “ **FUNCTIONAL OUTCOME ANALYSIS OF MANAGEMENT OF MODIFIED BRISTOW’S REPAIR IN PATIENTS WITH RECURRENT ANTERIOR SHOULDER DISLOCATION**” is a bonafide record of work done by **DR. DINESH.C** during the period of his Post graduate study from May 2010 to April 2013 under guidance and supervision in the **INSTITUTE OF ORTHOPAEDICS AND TRAUMATOLOGY**, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai-600003, in partial fulfillment of the requirement for **M.S.ORTHOPAEDIC SURGERY** degree Examination of The Tamilnadu Dr. M.G.R. Medical University to be held in April 2013.

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DECLARATION

I declare that the dissertation entitled “ FUNCTIONAL OUTCOME ANALYSIS OF MANAGEMENT OF MODIFIED BRISTOW’S REPAIR IN PATIENTS WITH RECURRENT ANTERIOR SHOULDER DISLOCATION” submitted by me for the degree of M.S is the record work carried out by me during the period of June 2010 to October 2012 under the guidance of Prof. M.R.Rajasekar M.S.Ortho, D. Ortho., Director of Orthopaedics, Institute of Orthopaedics and traumatology, Madras Medical College, Chennai. This dissertation is submitted to the Tamilnadu Dr.M.G.R. Medical University, Chennai, in partial fulfilment of the University regulations for the award of degree of M.S.ORTHOAEDICS (BRANCH-II) examination to be held in April 2013.

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CONTENTS

S.NO	TITLE	PAGE NO
1	INTRODUCTION	1
2	AIM AND OBJECTIVE	3
3	HISTORICAL PERSPECTIVE AND REVIEW OF LITERATURE	4
4	ANATOMY	9
5	CLASSIFICATION	16
6	IMAGING	17
7	METHODS OF TREATMENT	19
8	SURGICAL PROCEDURE	22
9	MATERIALS AND METHODS	32
10	RESULTS	35
11	CASE ILLUSTRATIONS	55
12	DISCUSSION	64
13	CONCLUSION	74
	BIBLIOGRAPHY	
	MASTER CHART	

INTRODUCTION :

The shoulder (gleno-humeral) joint is the one joint with maximum mobility and thus resulting in increased chances of instability which commonly occur in the young individuals . The incidence of recurrent glenohumeral instability is 16 per 100 000 per year ³ with a majority of them are of anterior type.

In recurrent anterior glenohumeral instability, there is no role for conservative management as there is no spontaneous recovery ¹⁰, unless some surgical intervention is carried out to stop the recurrence cycle to bring out cure for the patient and reduce the apprehension of dislocation so that the patient is free from restricting himself from his routine daily activities.

With subsequent episodes of dislocation, humeral head, capsule ,glenohumeral ligaments, and the labrum undergoes progressive alterations. Most of the patients presents with traumatic history. Many operative procedures are in current practice for the management of recurrent anterior glenohumeral instability. Now they are more focussed in open anterior repairs with various techniques.

There is continuous evolution in the management of recurrent anterior shoulder dislocation. There is a drastic improvement in employing arthroscopic procedures ¹¹ for the same in our era but there are specific pathologies which cannot be addressed adequately and hence open procedures which are reliable and time tested will be a good option. It is the preferred line of approach in many situations, especially when there is soft tissue and bone loss and particularly in revision cases.

Though Bankart's repair ³ is the most commonly done procedure in cases with anterior dislocation, it is quite obvious that it could not be useful in patients with bony lesion of the glenoid, already operated cases, with large Hill-Sach's pathology and those with evidence of absent or attenuated antero- inferior glenohumeral ligament.

Modified Bristow's repair ¹⁰ stabilises the shoulder by compensating for the osseous and soft tissue loss with soft tissue or bony checkerein that prevents excess translation and improves overall stability.

After understanding the pathophysiology ⁵ and the importance of bone loss in glenoid, bone block transfer has emerged as a upcoming surgery in selected patients.

Good results were obtained in short term and medium term follow up but, follow up on a long term basis is still lacking ⁵.

AIM AND OBJECTIVE:

The aim of the study is to analyse the functional outcome of patients treated with modified Bristow's repair in recurrent anterior shoulder dislocation in Institute of Orthopaedics and Traumatology, Government General Hospital Chennai from May 2010 to September 2012.

HISTORICAL PERSPECTIVE :

Bristow procedure	First reported by Helfet in 1958, named this procedure after his mentor W.Rowley Bristow of South Africa	Distal portion of coracoid sutured to scapular neck anteriorly through vertically split subscapularis
Modified Bristow procedure	<p>Modifications described by T.B.McMurray</p> <p>Reported by Mead & Sweeney</p> <p>Modified by May 1970</p> <p>Modified by Bonnin</p> <p>Modified by Torg</p>	<p>Coracoid process with the conjoined tendon is fixed to glenoid rim with screw anteroinferiorly through transversely split subscapularis</p> <p>Subscapularis is split vertically from the lesser tuberosity to gain access to the joint</p> <p>Subscapularis is split at its musculotendinous junction</p> <p>Graft passed over superior border of subscapularis</p>

	<p>Latarjet in 1954 , modified by Helfet</p> <p>Same as modified Bristow procedure</p> <p>Collins and Wilde1973</p> <p>Lombardo et al 1976</p>	<p>Instead larger coracoid process is used</p>
Putti – Platt procedure	<p>In 1948, described by Osmond-clark</p> <p>Used by Platt(England) & Putti(Italy)</p>	<p>Subscapularis is double breasted</p>
Eden – Hybbinette procedure	<p>1918-Eden</p> <p>1932-Hybbinette</p> <p>Modified by Lavik</p>	<p>Tricortical iliac crest graft inserted into anterior glenoid rim</p>
Oudard procedure	<p>1942</p>	<p>Coracoid process with tibial grafts were used</p>
Trilat procedure	<p>Trilat and Leelere-Chalvet</p>	<p>Coracoid is osteotomised at its base and then the coracoid is displaced downwards and held with pins or screws</p>

Gallie procedure	Gallie and LeMesurier- 1927	Used autogenous fascia lata
Nicola procedure	1929	Long head of biceps tendon was used
Saha procedure	1969	Latissimus dorsi transfer
Boytchev procedure	1951 Modified by Conforty Followed by Ha'Eri	Osteotomised Coracoid process is transferred through subscapularis back to its anatomical position
Magnuson – Stack procedure		Transfer of subscapularis

Literature review :

The surgical procedures for recurrent glenohumeral dislocation of anterior type includes non-anatomic and anatomic repairs ¹¹ .

Former aims at attaching the torn glenoid labrum to its original position thereby achieving the proper tension in the shoulder complex.

e.g : **Bankart repair - Rowe, Inferior capsular shift procedure- Neer**

At present, combined procedures were preferred, and an assessment of the capsular tension is made intraoperatively . It is well known that recurrent anterior glenohumeral instability could not occur with an isolated Bankart lesion and the capsule must be definitely injured in addition to that. ¹¹ .

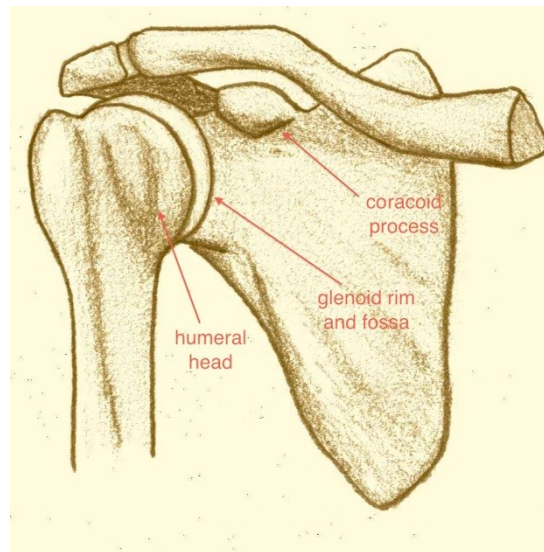
The latter aims at stabilising the shoulder girdle by compensating for the capsular and labral tears with or without bony injury with bony/soft tissue structures checkerein which prevents the excessive anterior drawing of humeral head thereby stabilising the joint ¹¹ .

e.g : **Bristow and Latarjet, Magnuson-Stack - De- Palma and Putti-Platt**

The outcome with non-anatomic repairs was very good, but it was not done frequently as a primary procedure owing to the complications, like recurrence, restricted range of motion and early osteoarthritis. Revision surgery can be difficult due to altered anatomy. Experienced surgeons obtain excellent results with these procedures when performed meticulously in selected patients with absolute indications.

These procedures aim at reinforcing the stable shoulder joint with the static mechanism of the transferred coracoid process and conjoined tendon. By reconstructing the glenoid depth and width with the bone block, the modified Bristow's procedure improves the arc of motion and the transferred conjoined tendon takes over the function of inferior glenohumeral ligament in preventing dislocation when the arm is subjected to position of dislocation.

SURGICAL ANATOMY OF SHOULDER(GLENOHUMERAL) JOINT :

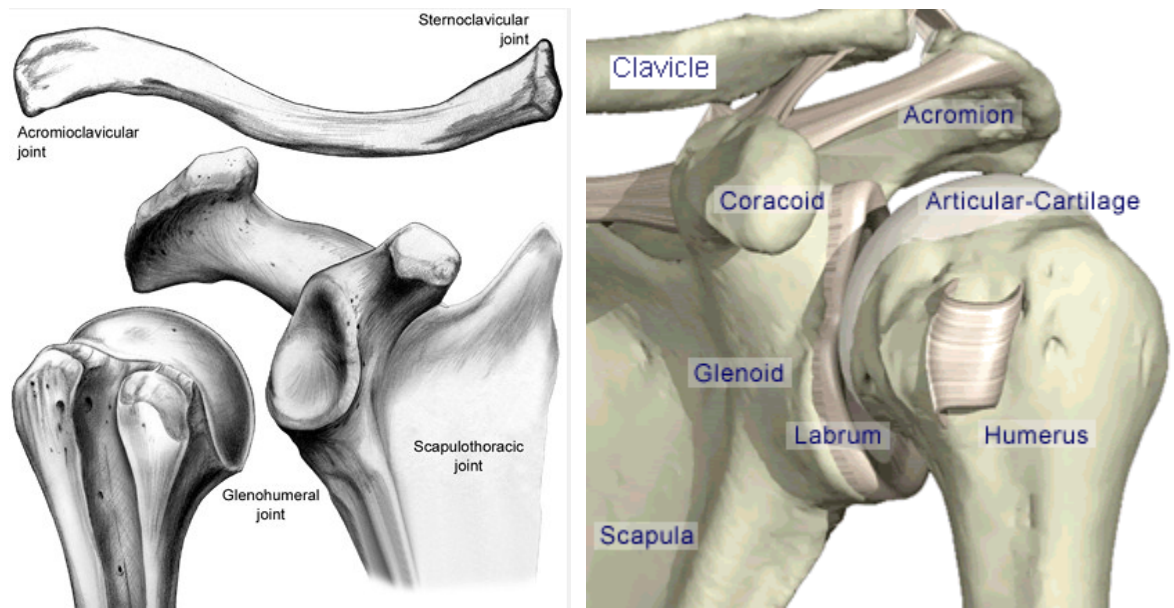


The joint is prone for dislocation because of varied reasons – shallow glenoid cavity, disproportionate size of head of humerus and lax articular capsule causing joint instability. The muscles around shoulder joint support the strength of the joint.

Stability depends upon

- 1) articular surfaces of head of humerus & glenoid cavity
- 2) loose articular capsule
- 3) tension provided by the muscles around shoulder joint

At rest, glenoid faces anterolaterally parallel to the axis of scapular rotation. Movements of shoulder is accompanied by the movement of shoulder girdle.



There are two variants namely static and dynamic restraints which ultimately stabilises the shoulder joint.

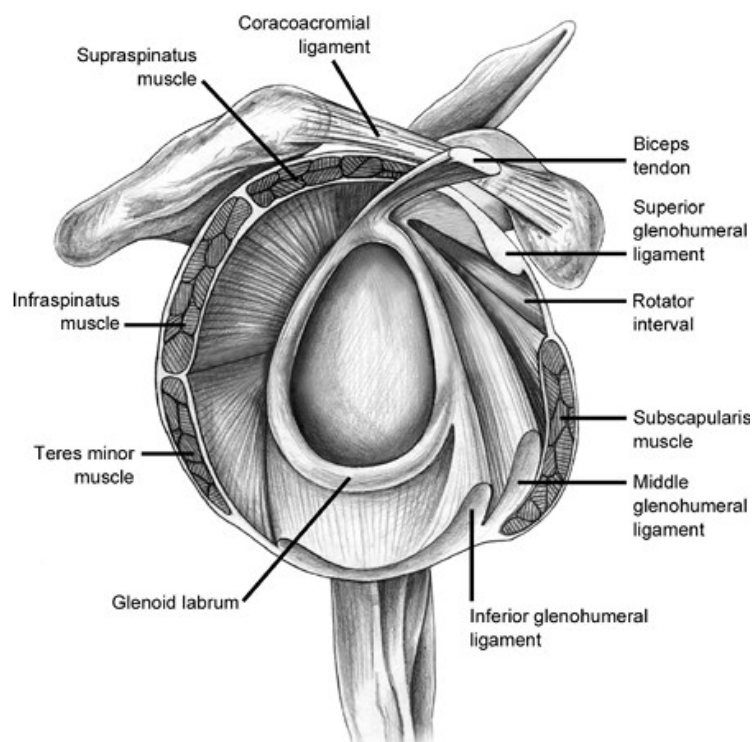
<u>Dynamic stabilisers:</u>	<u>Static stabilisers:</u>
<ul style="list-style-type: none"> ➤ Rotator cuff muscles(main – lower subscapularis) ➤ Pectoralis major ➤ Latissimus dorsi ➤ Biceps ➤ Periscapualr musculature 	<ul style="list-style-type: none"> ➤ Articular surface of glenoid ➤ Glenoidal labrum ➤ Negative intraarticular pressure ➤ Capsular-ligamentous structures

Capsule and the surrounding ligaments become lax during the mid-range of shoulder motion, whereas they confer stability at the terminal range of movements.

When the restraints(bony, dynamic , soft tissue) become deficient in their functions, instability ensues leading to anterior translation of head of humerus.

After episodes of instability, rehabilitation aims on improving the dynamic restraints.

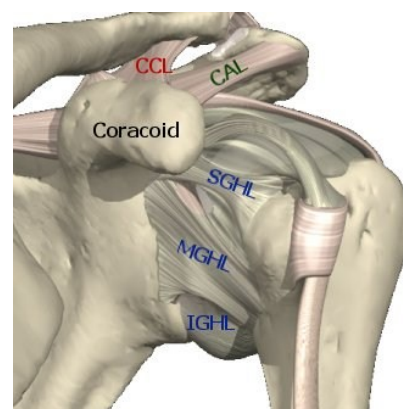
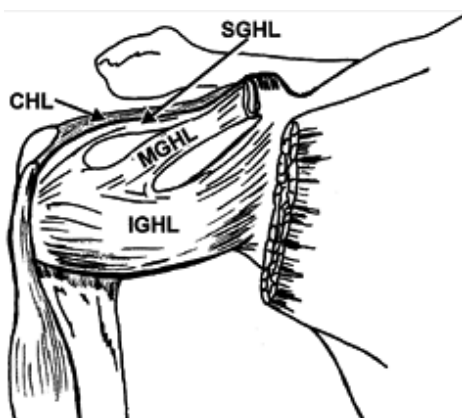
Surgery improves the static restraints.



The pear shaped glenoid has inferior surface diameter larger than that of superior surface. The articular surface is nearly flat and it doesn't help in stability. The main factor contributing to stability is labrum which acts as chock-block by increasing the depth of socket to 50 % by converting the flat articular surface into a concave surface.



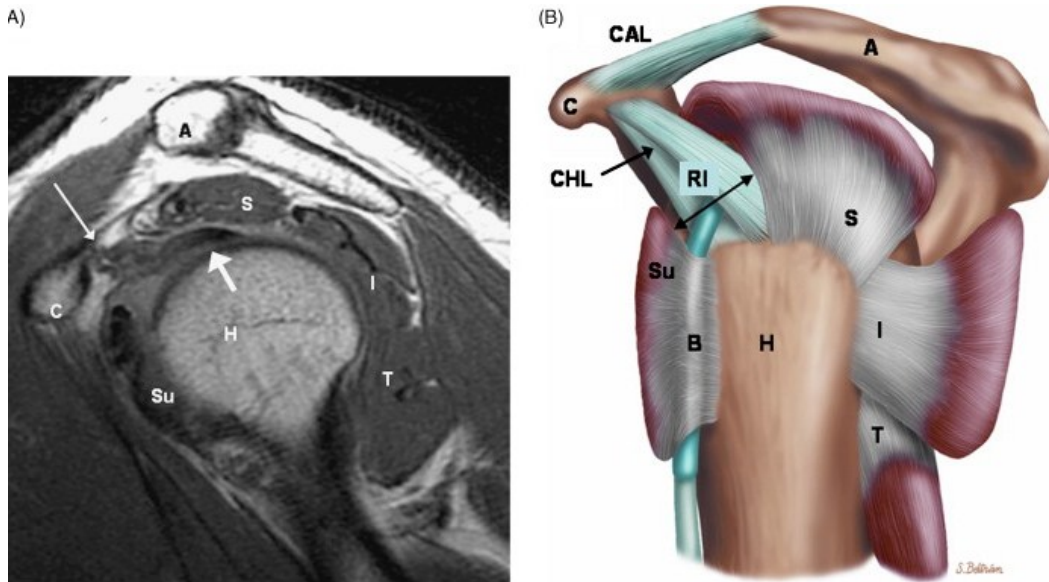
GLENOHUMERAL LIGAMENTS :



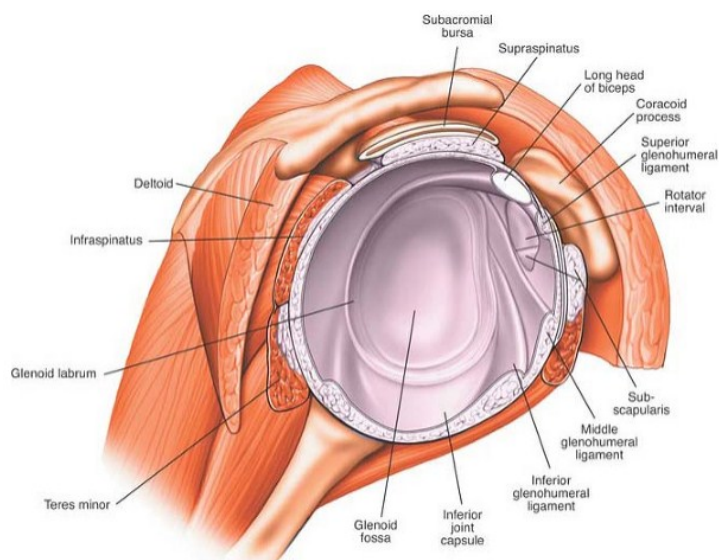
	ORIGIN	INSERTION	FUNCTION
Superior gleno - humeral ligament (SGHL)	Antero - superior aspect of glenoid	Anterior aspect of head of humerus, superior to lesser tuberosity	Primary restraint to inferior translation
MGHL	Supra-glenoid tubercle, Anterosuperior labrum, sometimes scapular neck	Inferior aspect of lesser tuberosity along with tendon of subscapularis	Restrains primarily the external rotation when shoulder is abducted
IGHL Anterior and posterior band	Antero – inferior labrum	Inferior part of lesser tubercle	Prime stabiliser against anterior and posterior translation and prevents excessive external rotation
Coraco-humeral ligament	Lateral part of coracoid process	Greater and lesser tubercle	Prevents external rotation and inferior subluxation when the arm is kept adducted

When the arm is externally rotated and abducted it is the anterior band of IGHL which acts as a main restraint o anterior translation of humeral head.

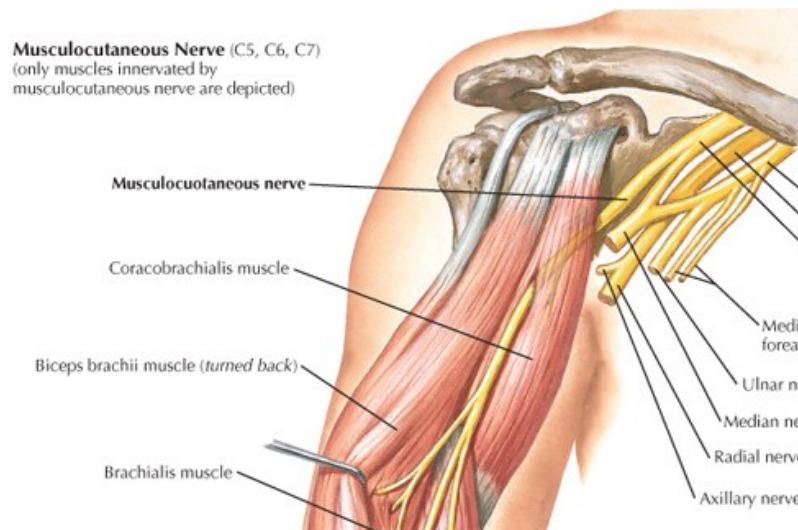
Rotator cuff muscles:



It includes supraspinatus, subscapularis, infraspinatus and teres minor. They act as dynamic restraints as well as static restraints of shoulder joint as their tendons get imbricated with the capsule thereby contributing to stability.



ANATOMY OF MUSCULOCUTANEOUS NERVE:



The musculocutaneous nerve arises from the medial cord of brachial plexus.

It supplies coracobrachialis, short head of biceps, medial half of brachioradialis.

From the coracoid process for about 5 -8 cm distally, it pierces the coracobrachialis on its medial end and hence the dissection plane must not go beyond 5 cm inferiorly from the tip of coracoid process. Injury to the nerve can affect the flexion of elbow joint.

CLASSIFICATION:

Frequency : Acute / Recurrent / Chronic

Cause : Trauma / Atraumatic event / Microtrauma /
Congenital / Neuromuscular condition

Direction : Anterior / Posterior / Inferior / Multidirectional

Degree : Dislocation / Subluxation

MATSEN'S CLASSIFICATION:

TUBS: Trauma
Unidirectional
Bankart
Surgery

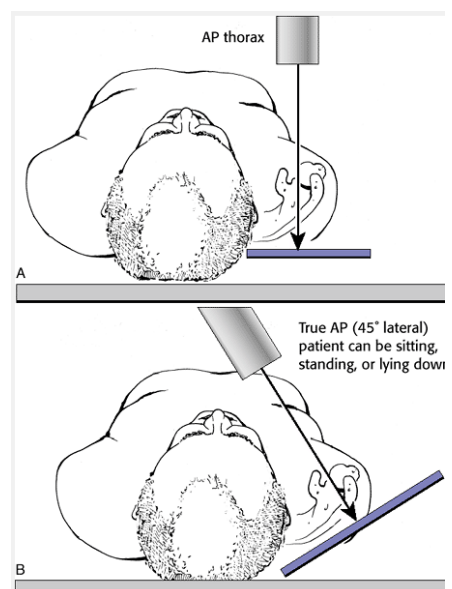
AMBRII: Atraumatic
Multidirectional
Bilateral
Rehabilitation
Inferior capsular shift

TREATMENT PROTOCOL:

A detailed history regarding name, age, sex, date of first episode of dislocation, age at the time of first episode, mechanism of injury, number of recurrences, residential address, occupational status were recorded.

IMAGING:

TRUE ANTEROPOSTERIOR VIEW:

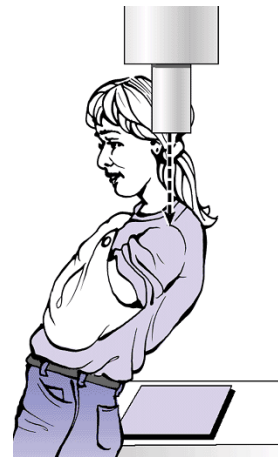


Perpendicular to the plane of scapula, beam is kept.

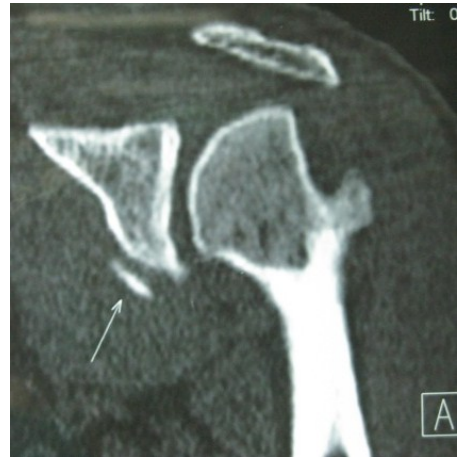
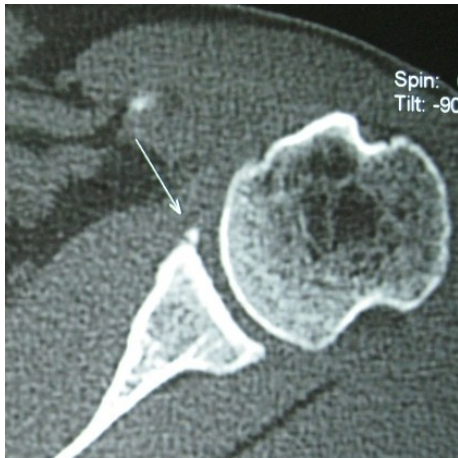
STRYKER NOTCH VIEW - demonstrates HILL-SACH'S LESION



AXILLARY VIEW reveals BONY BANKART'S LESION



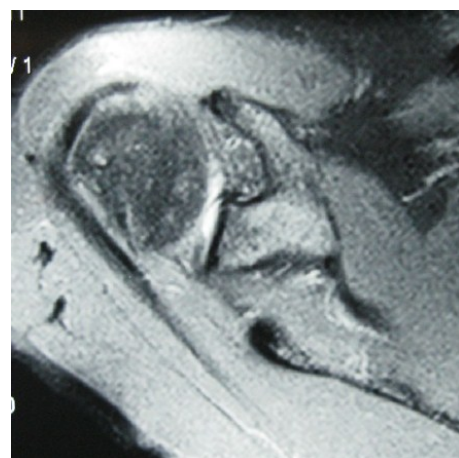
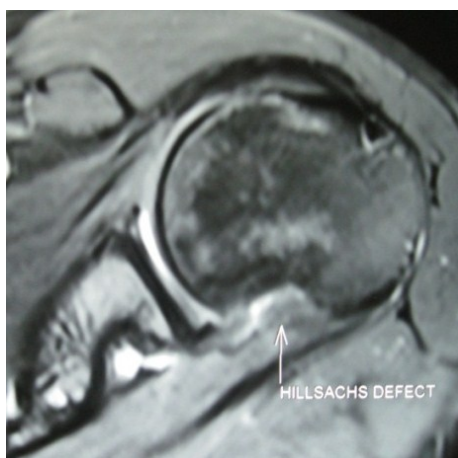
CT-SHOULDER WITH 3-D RECONSTRUCTION – bony Bankart’s lesion



Investigation of choice – assess extent and the size of the bony lesions.

Provides bony details and identify defects which were under appreciated previously.

MRI SHOULDER



TREATMENT OPTIONS AVAILABLE:

1. Open surgeries with bony /soft tissue augmentations
2. Arthroscopic procedures

Why Bristow's ?

1. Creation of a bone buttress at rim of anterior glenoid prevents disruption of gleno-humeral joint articulations.
2. Devising a dynamic checkrein of conjoined tendon to reinforce the capsule of the shoulder joint to stabilise it.

PREOPERATIVE EVALUATION :

Patients were selected after appropriate radiographs, CT and MRI scans and taken up for surgery. We used shoulder instability severity index ¹³ to assess our patients

0 – 3 : Soft tissue procedure

3 – 6 : Bristow –Latarjet procedure

6-10 : Bristow –Latarjet procedure

SHOULDER INSTABILITY SEVERITY INDEX (SISI)

(BALG AND BOILEAU):

Prognostic factors	Points
AGE AT SURGERY	
<20 years	2
>20 years	0
DEGREE OF SPORT PARTICIPATION	
Competitive	2
Recreational or none	0
TYPE OF SPORT	
Contact or overhead	1
None	0
SHOULDER HYPERLAXITY	
Shoulder hyperlaxity	1
Normal	0
HILL SACH'S ON AP RADIOGRAPH	
Visible in external rotation	2
Not visible in external rotation	0
GLENOID LOSS OF CONTOUR ON AP RADIOGRAPH	
Loss of contour	2
No lesion	0
POINTS	10

SURGICAL PROCEDURE :

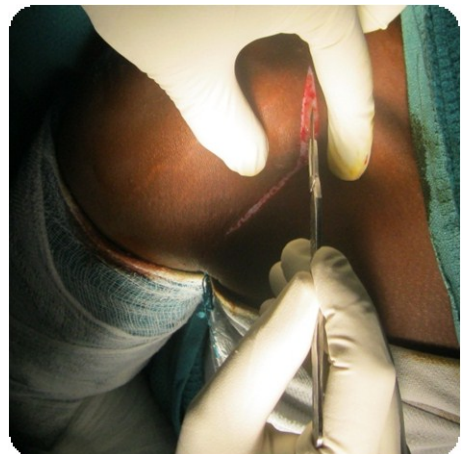
Anaesthesia : General anaesthesia

Position : Supine- Beach-chair position with sandbag underneath

Approach : Anterior Delto-Pectoral approach

STEP 1:

A straight skin incision is made starting from the coracoid process to the level of anterior axillary fold along the deltopectoral groove.



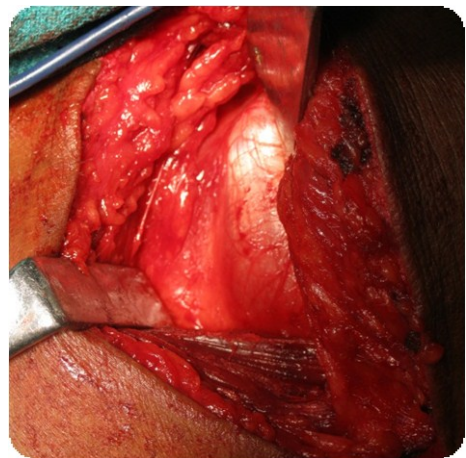
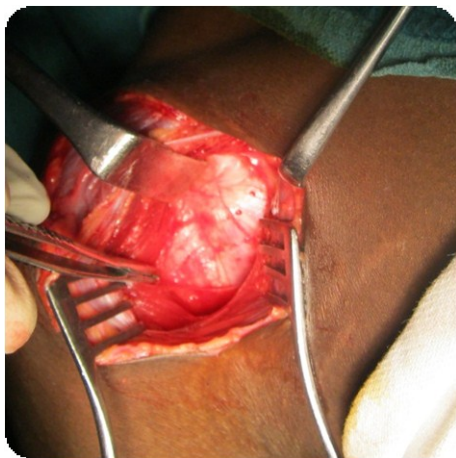
STEP 2:

The fascia overlying the pectoralis major and deltoid is revealed. The cephalic vein lies in the deltopectoral groove which is identified by the presence of fatty streak. Pectoralis major is retracted medially and the cephalic vein is retracted laterally along with the deltoid muscle.



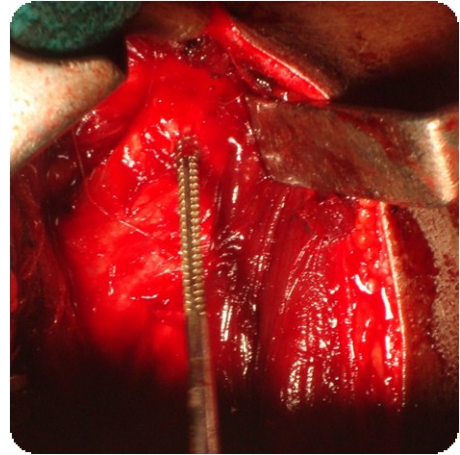
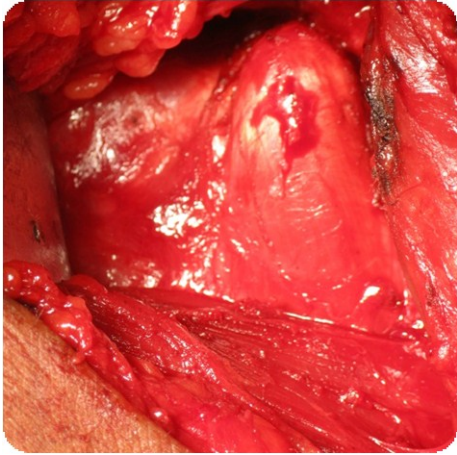
STEP 3:

Clavipectoral fascia is revealed then, which is incised to reveal the conjoined tendon.



STEP 4:

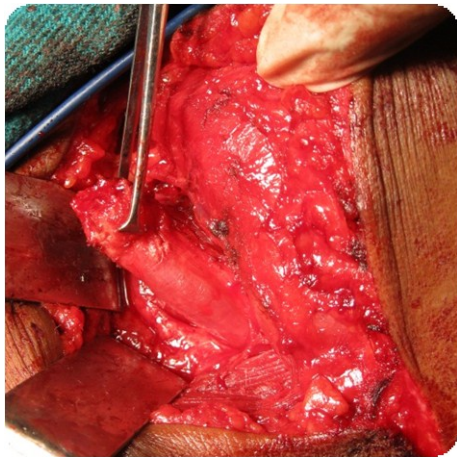
The coracoid process is predrilled with 2.5mm drill bit and tapped, before osteotomising it from its base 1.5 cm proximal to its tip, leaving the insertion of pectoralis minor undisturbed.



STEP 5:

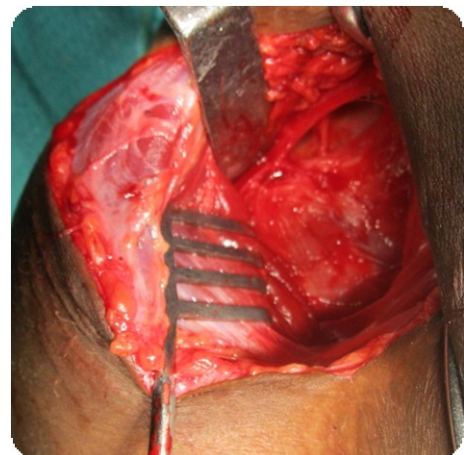
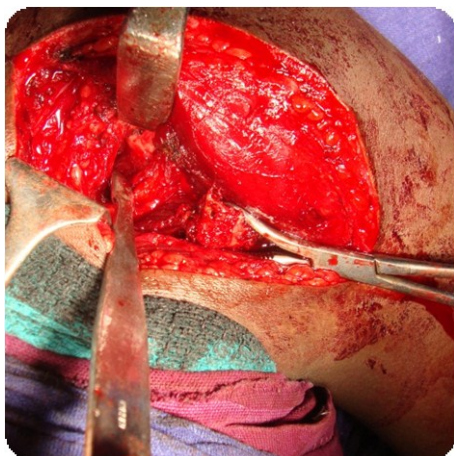
When the arm is abducted, the neurovascular structures in the axillary sheath become tight and bring them close to the tip of the coracoid process and the operative site. Therefore, the arm is always kept adducted while operating around the processus coracoideus.

The coracoid along with the conjoint tendon is retracted medially after dividing the fascia on the lateral side of the coracobrachialis, which is the safer side, as the musculocutaneous nerve enters the coracobrachialis on its medial side. Too much downward retraction is avoided to prevent neurapraxia of the musculocutaneous nerve.



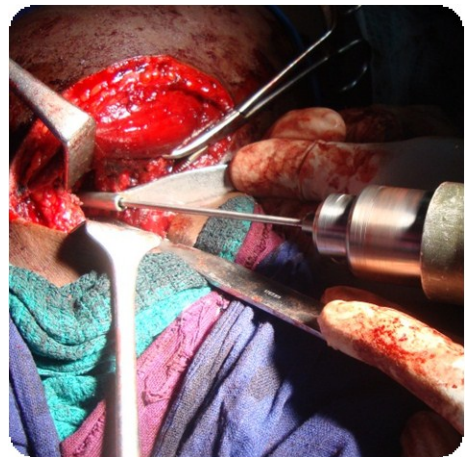
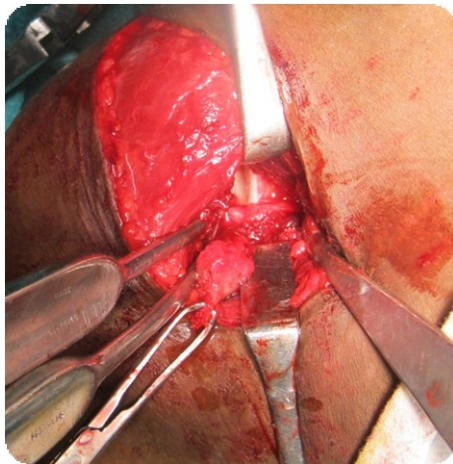
STEP 6:

Transversely running subscapularis revealed beneath the conjoined tendon and its inferior border is identified by the presence of leash of vessels. It is split horizontally in line with its fibres at the junction of middle-lower third with the arm kept in a position of external rotation.



STEP 7:

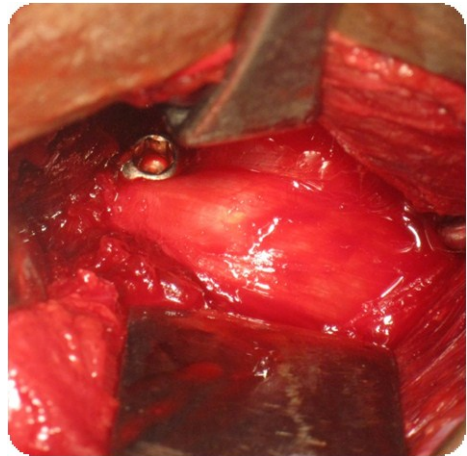
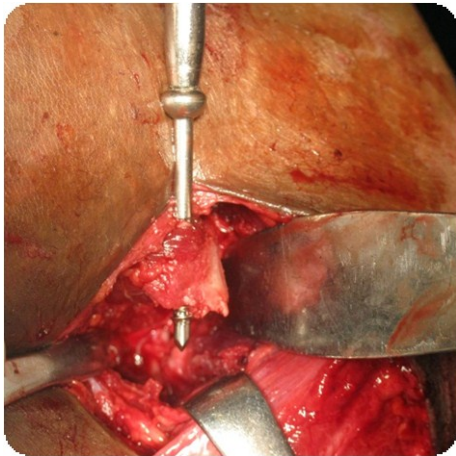
Capsule is revealed anteriorly which is then incised longitudinally to reveal the anteroinferior aspect of glenoid. Glenoid bed is prepared for fusion of the transferred coracoid by removing the cartilage and its periosteum.



The anteroinferior aspect of glenoid is drilled with 2.5 mm drill bit subequatorially and within 1 cm from the glenoid rim in an anteroposterior direction to receive the coracoid with its conjoined tendon.

STEP 8:

A 4mm cancellous screw or 4.5 malleolar screw is inserted into the osteotomised coracoid which is then inserted into the anteroinferior aspect of glenoid rim.



POSTOPERATIVE PROTOCOL:

Immediate postoperative period:

Immobilised in a Shoulder immobiliser, with the arm against the body

Drain removal on 2nd postoperative day

Intravenous antibiotics for 5 days

PHASE-1 : First 2 weeks- Shoulder immobiliser

PHASE-2 : Sling for 2-4 weeks. Codman's Pendulum exercises started.

Active flexion and abduction range of motion exercises.

Neither active nor passive extension is allowed.

External rotation limited to 10 to 15* only

PHASE-3 : 5-6 weeks- flexion and abduction to 90*, extension to 45*.

Isotonic exercises

PHASE-4 : 7-8 weeks- active external rotation exercises

Isometric exercises

PHASE-5 : Return to activity by 12-16 weeks

Non contact sports after 3 months

FOLLOW UP:

All the cases were done according to modified Bristow's procedure. Periodic radiographics were requested to note any change in the position of the transferred coracoid or the screw.

Patients are evaluated by true AP, Axillary and Scapular lateral Y-view rays that were taken at 1, 3, 6, 12, 18, and 24 months post-operatively, and either yearly or 2 years thereafter.

None had been lost to follow-up.

The functional outcome was measured with the use of ROWE score.

Minimum follow up period – 6 months.

Maximum follow up period – 2 yrs.

The mean follow up was 15 months.

ROWE SCORING:

FUNCTION	(/50 points)
No limitation in sports and work	50
No limitation in work, mild limitation in sports	35
Mild limitation in work and work above head	20
Marked limitation and pain	0
PAIN	(/10 points)
None	10
Mild	5
Severe	0
STABILITY	(/30 points)
No apprehension, recurrence, or subluxation	30
Apprehension when placing arm in certain positions	15
Subluxation (not requiring reduction)	10
Apprehension test positive or notion of instability	0
MOBILITY	(/10 points)
Normal mobility	10
<25% loss of normal Ext. rotation, Int, Rot, and elevation	5
>25% loss of normal ER, IR, and elevation	0
TOTAL	(/100 points)
EXCELLENT : 90 to 100 points	
GOOD : 75 to 89 points	
FAIR : 51 to 74 points	
POOR : < 50 points	

MATERIALS AND METHODS:

STUDY DESIGN:

The study was approved by the Ethical Committee of the Hospital, and informed consent was obtained from the patients.

STUDY GROUP:

Total number of 30 cases who got admitted in between March 2010 to October 2012 in Rajiv Gandhi govt. general hospital Chennai, were taken for the study.

All the cases were operated and followed with ROWE scoring.

All the patients had a positive apprehension test and experienced at least two episodes of dislocation.

Data collected from the patients:

1. Mechanism of injury
2. Age at the time of first episode of traumatic dislocation
3. Number of recurrences
4. Dominant extremity

Inclusion criteria:

1. Large or engaging Hill-Sach's lesion
2. Glenoid bone loss > 25%
3. Bony bankart's lesion
4. Shoulder instability severity index > 3
5. Other failed procedures

Exclusion criteria:

1. Less than 3 anterior dislocation
2. Multidirectional / Posterior instability
3. Bilateral dislocation
4. Patients with voluntary dislocation
5. Athletes involved in throwing sports

EVALUATION:

The following objectives were taken into account for the evaluation of our study.

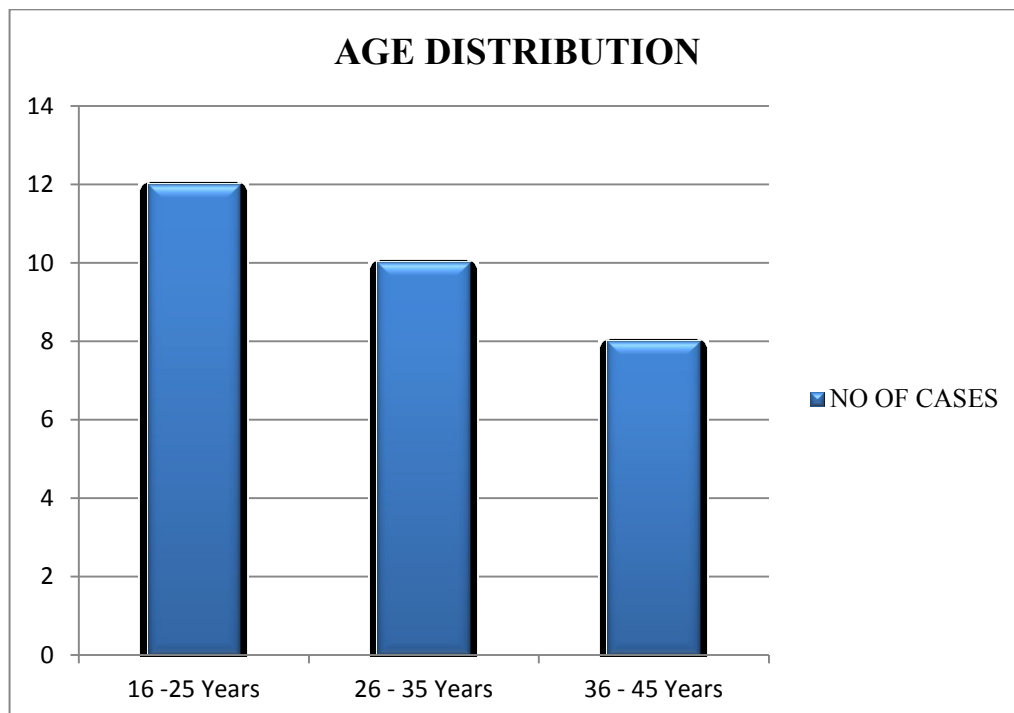
AGE AND SEX DISTRIBUTION
MECHANISM OF INJURY
DOMINANT SIDE
SUBJECTIVE OUTCOME
RADIOLOGICAL OUTCOME
FUNCTIONAL OUTCOME

RESULTS:

AGE AND SEX DISTRIBUTION:

In the series, twelve cases (40%) were in between the age group of 16-25 yrs, ten cases (33%) were in 26-35 yrs, eight cases (27%) were in 36-45 yrs

Recurrence rate was inversely proportional to the age of the patient at the time of initial dislocation and the severity of the injury



Age Distribution	Cases
16-25 years	12
26-35 years	10
36-45 years	8

Most of the patients in the study presented with episodes of recurrent dislocations within two years of initial dislocation as evidenced by the following table and most of the primary instabilities occurred before the age of 25 years.

Age in years at the time of first dislocation	≤ 25 years	26 – 35 years	36 - 45 years
	15 cases	11 cases	4 cases

15 patients (50%) were affected before the age of 25 years.

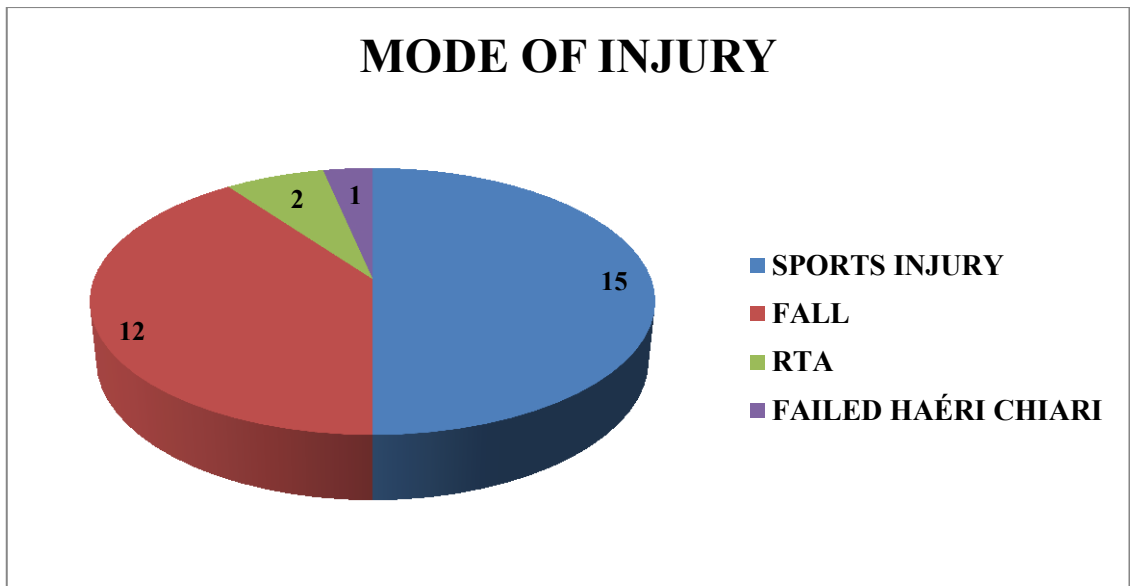
Duration	≤ 2 years	$> 2 - 5$ years	$> 5 - 10$ years
Interval between initial dislocation and first episode of recurrence	27 cases	3 cases	-
Interval between initial dislocation and procedure	13 cases	12 cases	5 cases

The duration for surgery from the date of first dislocation ranged from 12 months to 10 years.

Mean age of the patients at the time of surgery was 28 years, with a range from 18 to 45 years.

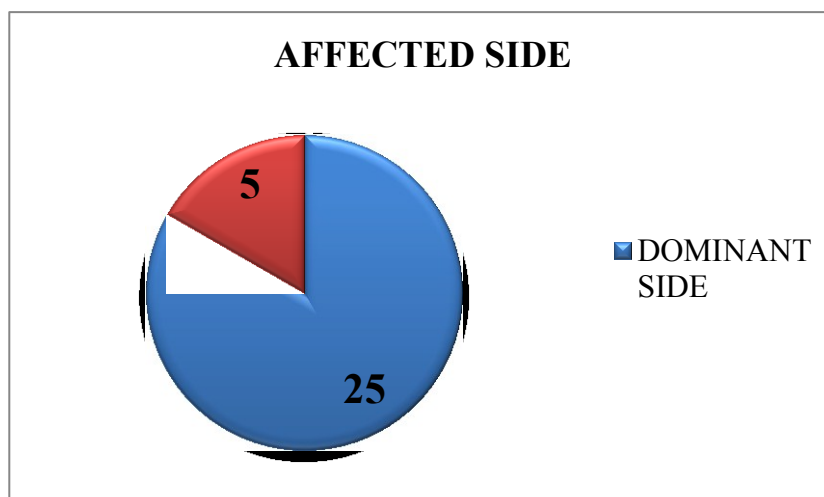
All 30 patients were male which explains its male preponderance.

History of sports injuries predominate our study



15 of the patients injured their shoulders while playing sports(recreational activities). 12 of the patients were injured in unspecified falls . 2 of the patients presented with alleged history of motor vehicle accident and one patient was a case of failed Ha-Eri-Chiari procedure

Most commonly affected side was right shoulder which was the dominant side. 25 procedures were done on the dominant extremity and 5 on the non-dominant extremity



SUBJECTIVE OUTCOME:

From the view of stability, patients have been evaluated of their shoulder function and classified into stable, subluxated and dislocated.

	Cases	EXCELLENT	GOOD	FAIR	POOR
STABLE	29 (96.6%)	25	4	-	-
SUBLUXATED	1 (3.4%)	-	-	1	-
REDISLOCATED	-	-	-	-	-

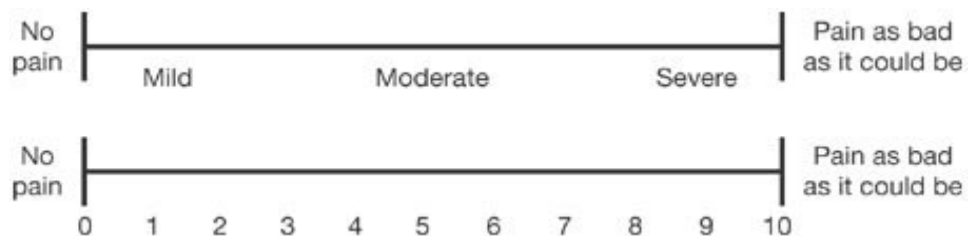
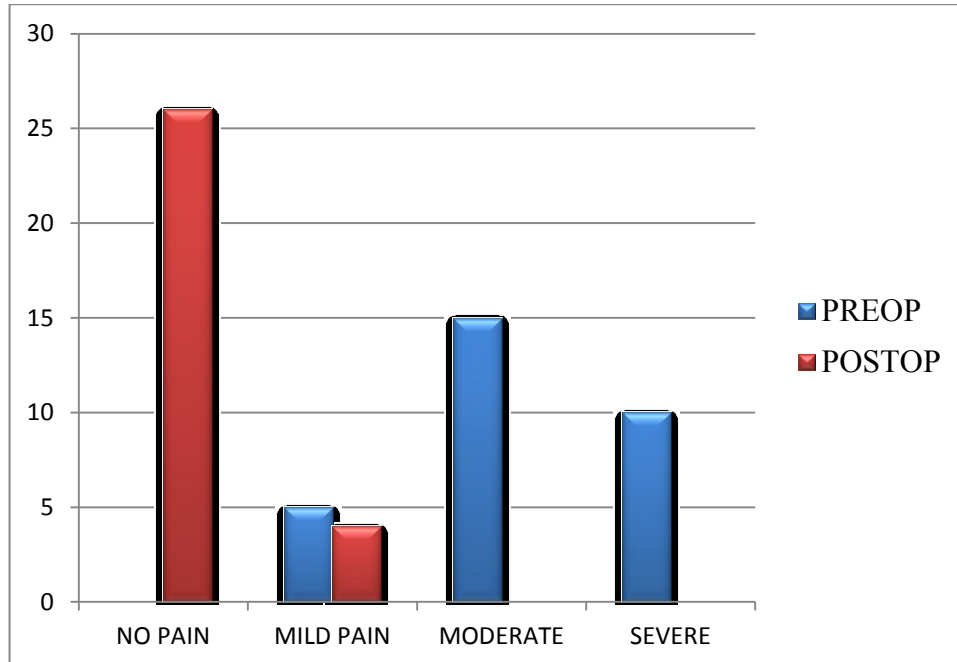
84 % of our patients had excellent satisfactory outcome. 13 % had good outcome according to our study.

FUNCTIONAL OUTCOME:

1. Patients range of movements were assessed postoperatively at regular intervals.
2. Apprehension test and sulcus sign were used to assess the stability of the shoulder.
3. Activities of daily living was assessed.
4. Severity of pain was assessed with VAP scale

Using these four criterias, ROWE scoring(objective outcome) was used to assess the overall stability and function of the shoulder postoperatively.

VISUAL ANALOG SCORE PREOP AND POSTOP



We measured the scale in terms as mild, moderate and severe because most of our patients were illiterate. Out of thirty shoulders that underwent modified Bristow's procedure, 26 cases showed significant improvement with decrease in pain and 4 cases had mild pain on strenuous activities.

APPREHENSION TEST	PREOP	POSTOP
Positive	30	2
Negative	-	28

Preoperatively all the patients were screened for anterior apprehension test with arm abducted and externally rotated. All the thirty patients presented with positive anterior apprehension test. They were taken up for surgery after counselling them and explaining the every possibilities following surgery.

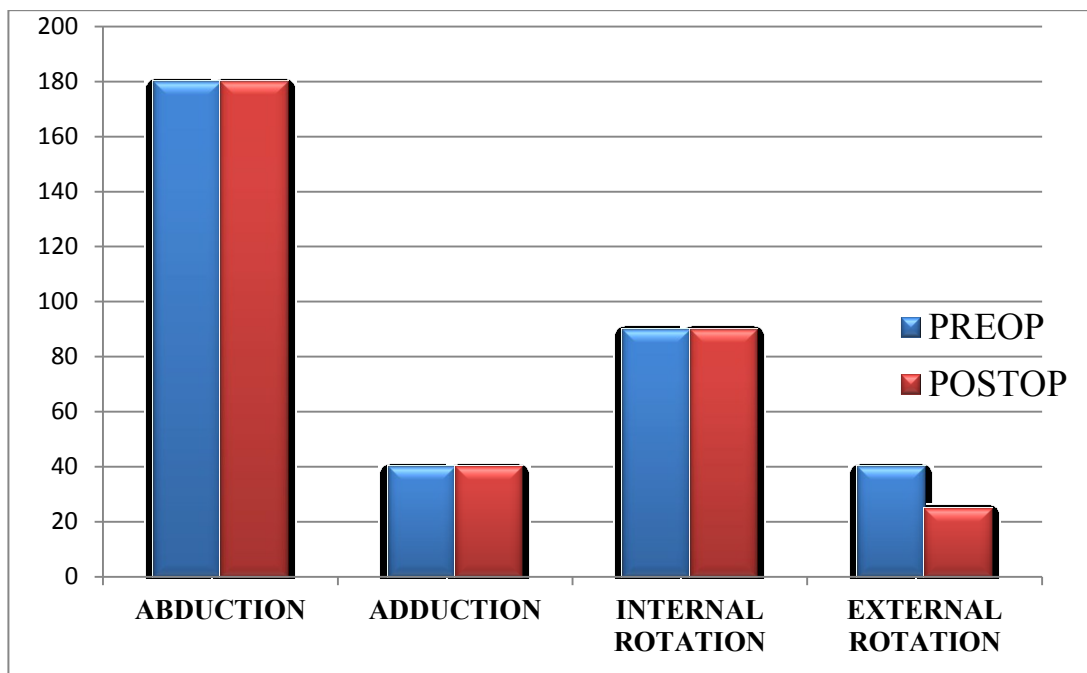
Postoperatively at three months follow up , twenty eight out of thirty patients had no apprehension for dislocation whereas 2 patients showed positive anterior apprehension test.

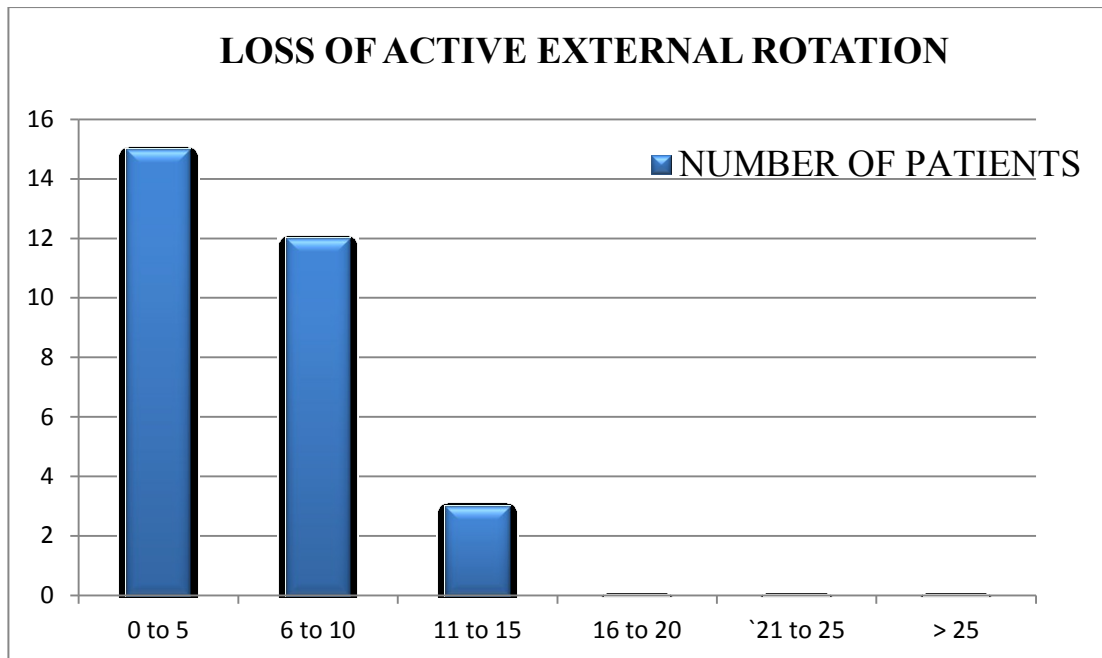
Average number of recurrences : 28 episodes (range : 15 – 50)

RANGE OF MOTION:

Postoperatively range of movements was good except for slight decrease in external rotation when compared to the normal side, however it was not clinically relevant as it would not interfere with activities of daily living.

Abduction, adduction and internal rotation were the same for the both operated shoulder and the uninvolved shoulder.





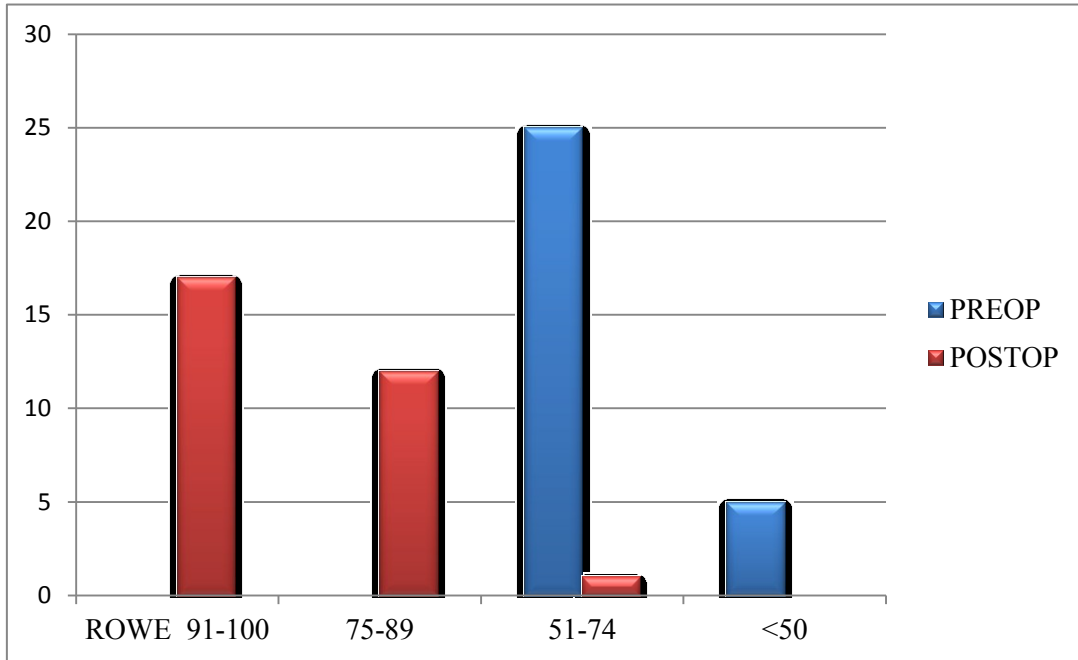
In our scenario, there was no vital loss of vary of motion particularly on external rotation in all probability as a result of we tend to protect the subscapularis throughout the procedure.

All our patients were subjected to vigorous rehabilitation to improve the muscle strength, and to regain full range of movements as much as possible.

Some of them were illiterate, so they didn't attend rehabilitation properly and these are the patients who presented late with restricted range of motion particularly external rotation when compared to the sound side.

Most of them presented with loss upto 10° (range : 5°-15°).

OBJECTIVE SCORING:



ROWE score improved from 43.75 preoperatively to 88.25 postoperatively.

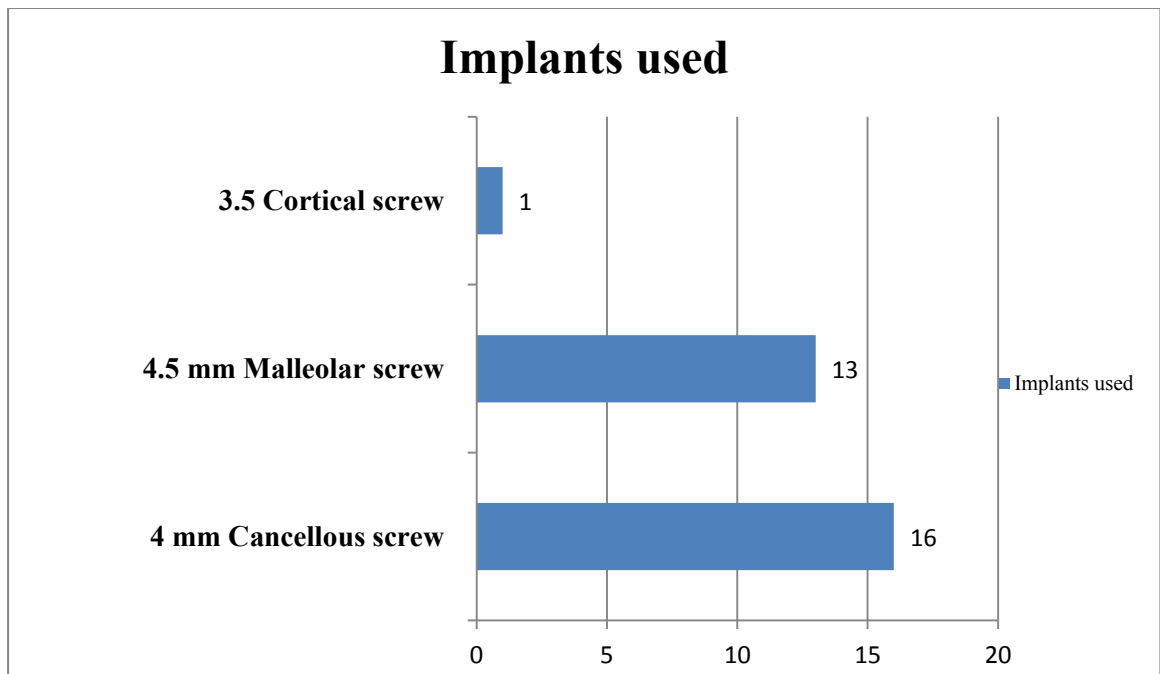
ROWE SCORING			
EXCELLENT	GOOD	FAIR	POOR
17 (57%)	12(40%)	1(3%)	-

57 % of our patients had excellent functional outcome. 40 % had good outcome following our procedures.

RADIGRAPHIC OUTCOME: (AP, Axillary view, Scapular Y view)

We assessed the following in our study

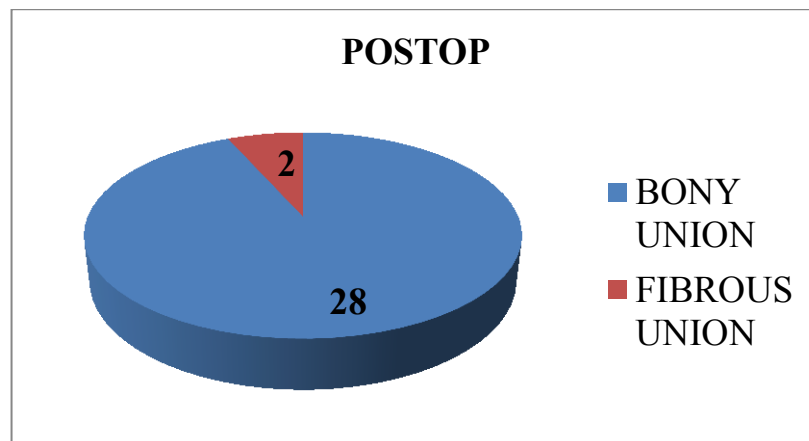
1. Fusion of the transplant – pseudoarthrosis, osteolysis of bone block, migration
2. Screw position – in relation to joint space
– in relation to the equator of glenoid
3. Degenerative arthritic changes



We used 4 mm cancellous screws in 16 cases, 4.5 mm malleolar screws in 13 cases and 3.5 cortical screw in 1 case.

HEALING AND MIGRATION OF THE TRANSPLANT:

28 cases went on with good bony union as there was no radiolucent zone, whereas two cases presented with fibrous union, but stable screws as there was lucent zone between the screw and scapular neck but not more than 5 mm.



RELATIONSHIP OF SUBLUXATION AND REDISLOCATION TO POSITION OF THE TRANSFERRED SCREW

	Distance from rim (longitude)		Relationship to equator(altitude)		
	0-9 mm	> 10 mm	Below	At	Above
Total no. of shoulders	29	1	28	1	1
Redislocations	0	0	0	0	0
Subluxations	0	0	0	0	1

Distance of the transplant from the glenoid rim:

The prevalence of shoulder subluxation or redislocation was significantly greater in the cases where the transplant was too medial (10 mm and more) than among those cases with transplants closer to the rim(< 10 mm).

Of 30 shoulders, 1 case the screw position was too medial.

Position of the transplant in relation to the equator of glenoid:

The position of the transferred screw in relation to the equator determines the outcome of stability. Ideally it should be placed in the subequatorial position.

Of twenty cases, one case in which the screw was placed above the equator presented with subluxation and in the other case, the transplant was at the level of equator.

Factors affecting healing and stability of the transplant:

1. Length of the screw and engagement on the posterior cortex of glenoid
2. Coracoid fracture at the time of surgery
3. Postoperative immobilisation - duration

4 mm cancellous or 4.5 malleolar screw was used commonly in our study with lengths ranging from 35 mm - 45 mm.

In 2 shoulders, the screw did not engage the posterior aspect of glenoid.

One case of coracoid process fracture occurred in our study , which was managed without complications.

Average duration for immobilisation in the postoperative period was a minimum of 3 weeks.

Evidence for arthrosis was evaluated with Samilson – Prieto grading⁶

based on exostoses of inferior humeral head and glenoid.

Mild (I)	Inferior humeral / glenoid exostoses < 3mm with normal joint space
Moderate (II)	Exostoses 3-7 mm, slight glenohumeral irregularity
Severe (III)	Exostoses > 7 mm, glenohumeral joint narrowing and sclerosis

There was no evidence of arthropathy in our study.

DURATION OF FOLLOW UP:

All the patients were followed at 1, 3, 6, 12, 18, and 24 months post-operatively, and either yearly or 2 years thereafter.

None had been lost to follow-up.

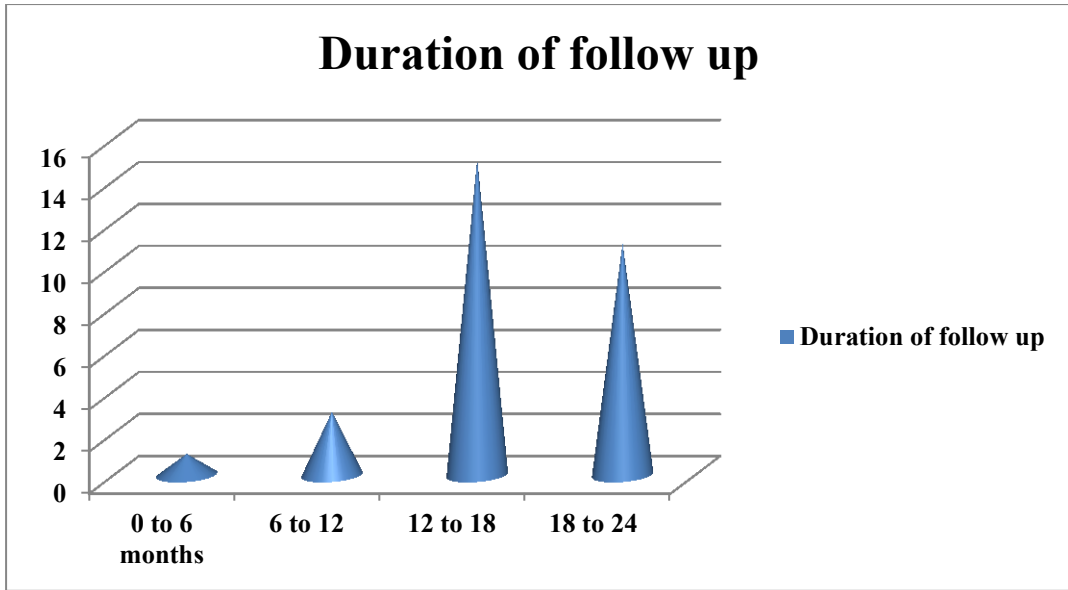
Minimum follow up period – 6 months. Maximum follow up period – 2 yrs.

The mean follow up was 15 months.

Postoperative CT scans were taken to evaluate

1. Union of transferred coracoid with neck
2. e/o glenohumeral arthritic changes/exostoses
3. osteolysis of bone block

Axial cuts – screw position in relation to joint space

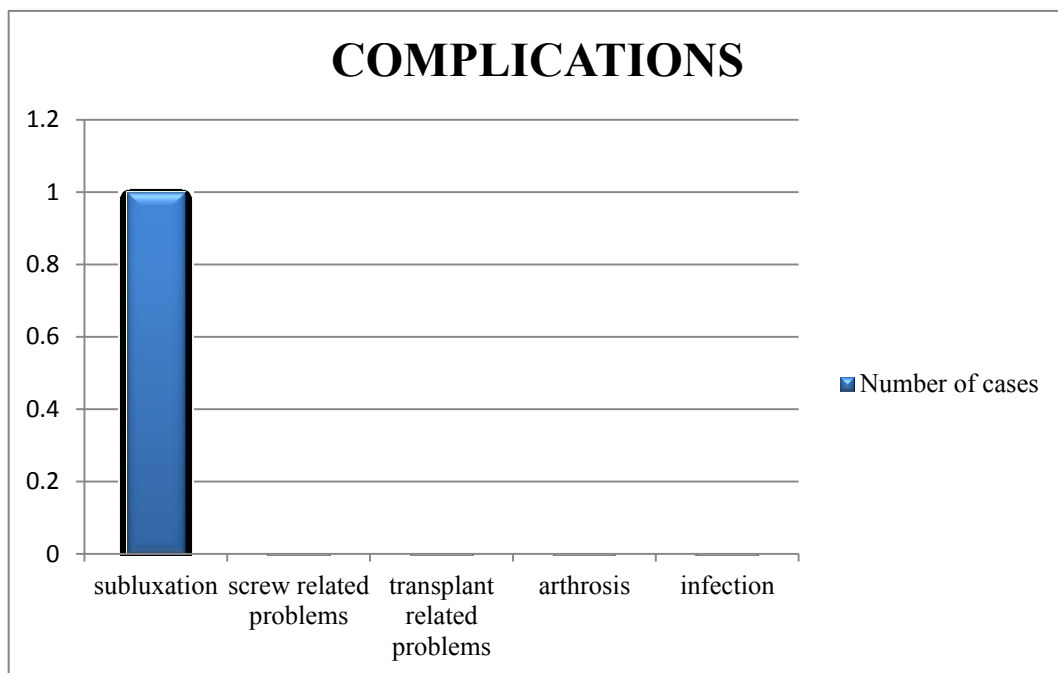


COMPLICATIONS :

Subluxation	1
Screw related problems	-
Transplant related problems	-
Arthrosis	-
Infection	-

Only one case presented with subluxation and is solely related to the misplaced screw position as the position of the transferred tip of coracoid process along with the conjoined tendon is above the equator of glenoid

We took axillary view to assess the union between coracoid tip and anteroinferior glenoid neck.



There was no complications related neither to the implant used nor the transferred coracoid process.

There was no screw migration in our study.

DATA ON THE PATIENTS

Number of patients	30
Cause for dislocation (no.)	Sports injury - 15 Fall - 12 Trauma related - 2 Failed Ha-Eri-Chiari - 1
Age group affected	18-45 years
Affected side	Dominant : 25 Non-dominant : 5
Number of recurrent dislocations (avg)	28
Duration of surgery (mins)	74 (54-110)
Screw commonly used	4 mm Cancellous screw
Screw length (mm)	30 – 45 mm
Engaging Hill Sachs lesion	30 cases
Associated bony Bank arts lesion	11 cases

CASE ILLUSTRATION :

PATIENT 1:

Name :MANIGANDAN

Age/Sex: 26/M

Occupation: Auto driver

DOA: 08-11-2010

DOS:24-11-2010

DOD: 27-11-2010

Diagnosis : RECURRENT SHOULDER DISLOCATION LEFT SIDE

Complaints: Recurrent episodes of shoulder dislocation

Mode Of Injury: While playing kabadi

Treatment History: No previous treatment

Clinical Examination: Apprehension test positive

Associated Injuries: Nil

Investigations: X-ray True AP view, CT, MRI – Hill Sach’s lesion

Surgical Procedure: Modified Bristow’s repair

Implant used: 4 mm cancellous screw

Post-operative x rays: Position satisfactory

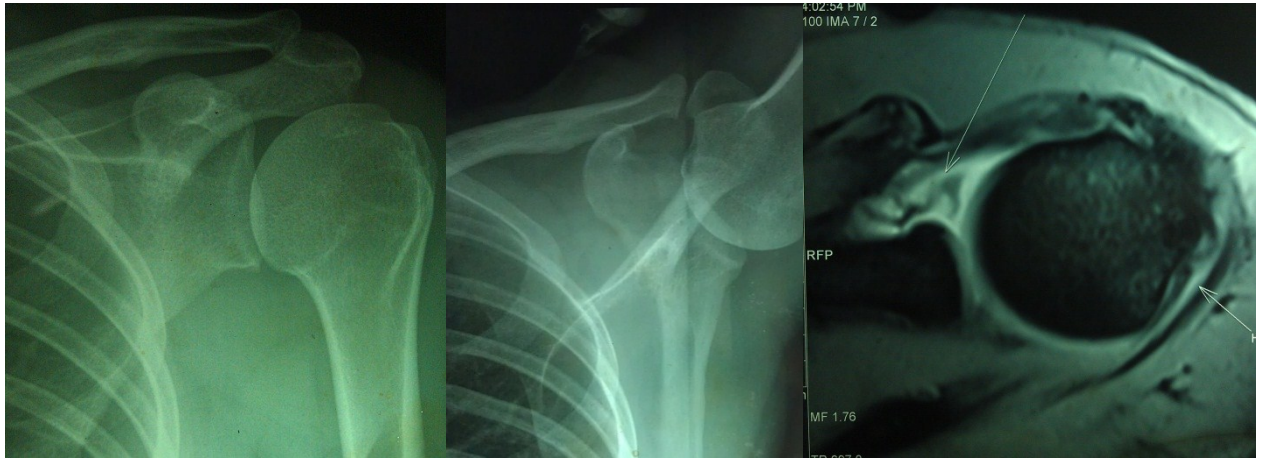
Complications: Nil

Follow Up: 1, 3 ,6, 12 weeks, 12 months and 24 months

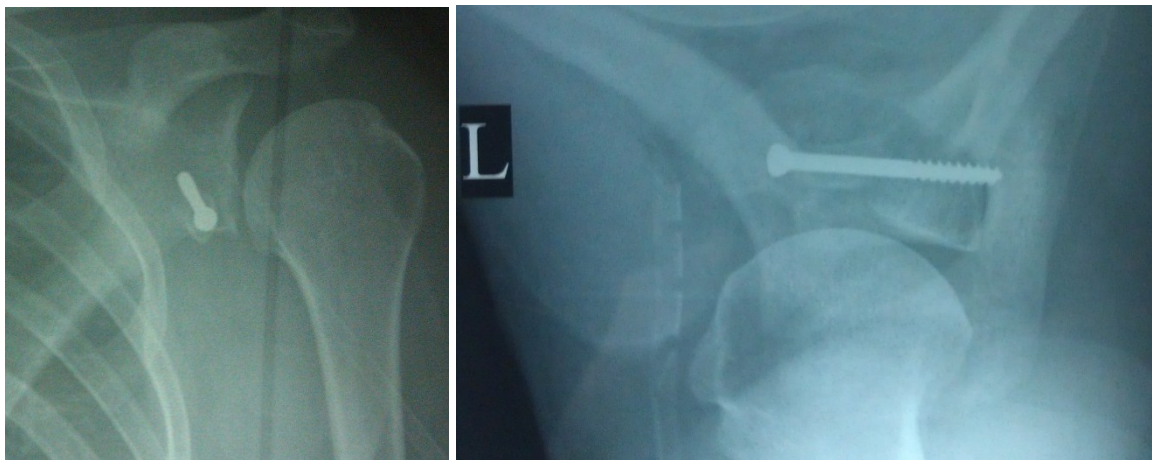
	PREOP	POSTOP
ROWE SCORE	25	95

LOSS OF EXTERNAL ROTATION 10°

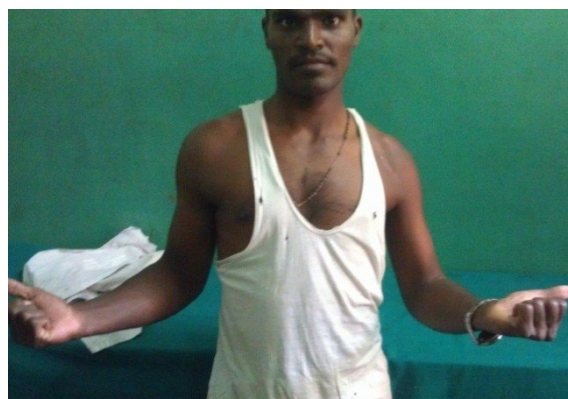
PREOP:



POSTOP:



AT 2 YEARS FOLLOW UP:



PATIENT 2:

Name : ASHOK

Age/Sex: 24/M

Occupation: Mason

DOA: 04-01-2012

DOS: 09-01-2012

DOD: 16-01-2012

Diagnosis : RECURRENT SHOULDER DISLOCATION LEFT SIDE

Complaints: Recurrent episodes of shoulder dislocation

Mode Of Injury: Fall

Treatment History: No previous treatment

Clinical Examination: Apprehension test positive

Associated Injuries: Nil

Investigations: X-ray True AP view, CT, MRI – bony Bankarts and Hill sachs

Surgical Procedure: Modified Bristow's repair

Implant used: 4.5 mm malleolar screw

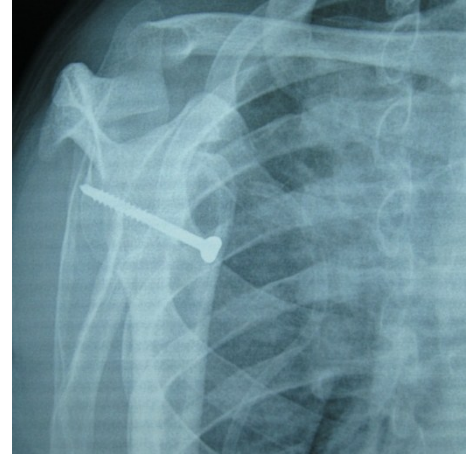
Post-operative x rays: Position satisfactory

Complications: Nil

Follow Up: 1, 3 ,6, 12 weeks, 12 months and 24 months

	PREOP	POSTOP
ROWE SCORE	50	80

NO LOSS OF EXTERNAL ROTATION



AT 1 YEAR FOLLOW UP



PATIENT 3:

Name : HARIKRISHNAN

Age/Sex: 39/M

Occupation: Press printer

DOA: 12-09-2011

DOS: 28-09-2011

DOD: 6-10-2011

Diagnosis : RECURRENT SHOULDER DISLOCATION right side

Complaints: Recurrent episodes of shoulder dislocation

Mode Of Injury: fall from height

Treatment History: No previous treatment

Clinical Examination: Apprehension test positive

Associated Injuries: Nil

Investigations: X-ray True AP view, CT, MRI

Surgical Procedure: Modified Bristow's repair

Implant used: 4 mm cancellous screw

Post-operative x rays: Position satisfactory

Complications: Nil

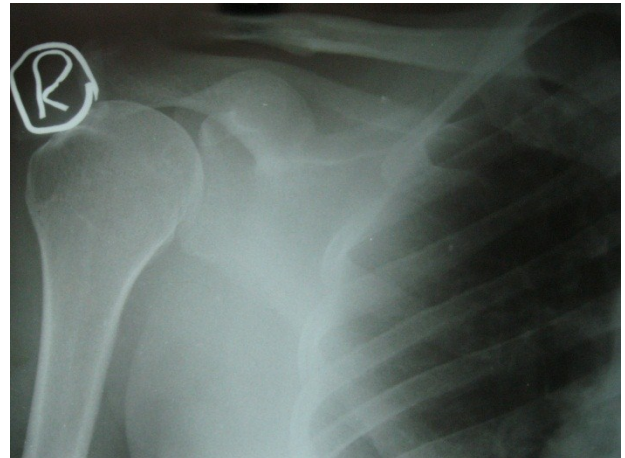
Follow Up: 1, 3 ,6, 12 weeks, 12 months and 24 months

	PREOP	POSTOP
ROWE SCORE	50	95

NO LOSS OF EXTERNAL ROTATION



True AP view- immediate postop



Scapular Y view



At I year follow up



PATIENT 4:

Name : DIVAKAR

Age/Sex: 26/M

Occupation: Labourer

DOA: 04-01-2012

DOS: 20-01-2012

DOD: 03-02-2012

Diagnosis : RECURRENT SHOULDER DISLOCATION right side

Complaints: Recurrent episodes of shoulder dislocation

Mode Of Injury: fall from height

Treatment History: No previous treatment

Clinical Examination: Apprehension test positive

Associated Injuries: Nil

Investigations: X-ray True AP view, CT, MRI

Surgical Procedure: Modified Bristow's repair

Implant used: 4 mm cancellous screw

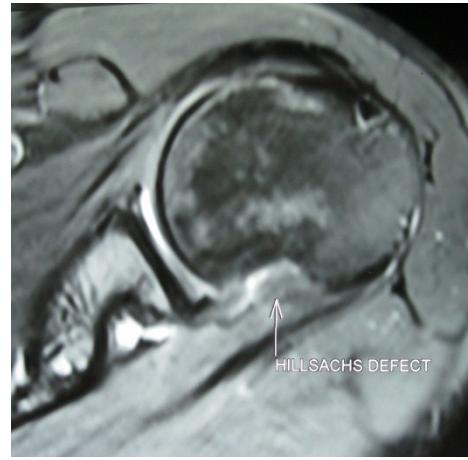
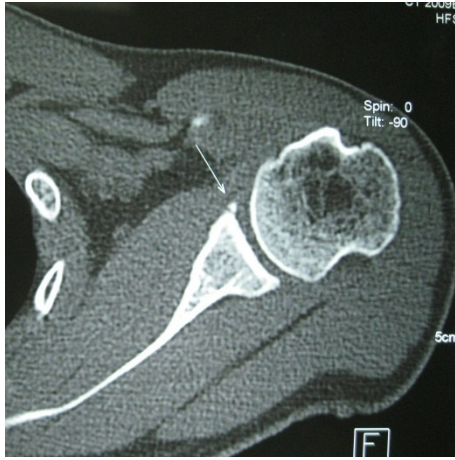
Post-operative x rays: Position satisfactory

Complications: Nil

Follow Up: 1, 3 ,6, 12 weeks, 12 months and 24 months

	PREOP	POSTOP
ROWE SCORE	50	80

NO LOSS OF EXTERNAL ROTATION



Follow up at 6 months



Complications :

One case presented with an episode of subluxation ,as the screw was placed above the equator, which was managed conservatively and the patient is asymptomatic.



In one case the screw position was too medial, but presented with no features of recurrence and he is on follow up for further evaluation.



DISCUSSION :

Numerous open surgeries have been used since ages for the management of recurrent shoulder dislocations of anterior type.

May – Helfet, in 1958¹ introduced the modification in Bristow’s procedure, which was similar to the procedure that was described by Latarjet and hence it is also known as Bristow Latarjet procedure.

Compared to other surgeries, with careful selection of the patients, modified Bristow’s repair gives excellent results on a long term basis, as evidenced by our study.

1. Creates bony buttress at rim of (anterior and inferior)glenoid , improves the arc of motion, thereby the circumference of the humeral head doesn’t come beyond the rim thereby preventing disruption of gleno-humeral joint articulations when the arm is abducted and rotated externally.
2. Dynamic sling effect of conjoined-tendon takes over the function of the most important stabiliser, inferior gleno-humeral ligament to reinforce it in abducted arm thereby preventing the translation of head of humerus anteriorly.

Mean age at the time of first dislocation was 28 years in our study and most(40%) of them were in the age group of 16 – 25 years . The first episode occurred after a history of significant trauma, before the age of 25 years.

All the affected patients were male(100%) which is well evidenced by other studies. In 83 % of the cases, the dominant side is involved, which in our study was right shoulder(25 patients). Number of episodes of recurrent dislocation prior to surgery averaged 28 times(range 15 -50).

And the most common mechanism of violence was due to recreational/sports injury(50%), followed by unspecified falls(40%) and motor vehicle accident (7%) and a case of failed Ha-Eri-chiari procedure(3%).

The screw position was taken into consideration, which in our study 93% of cases were placed in the ideal position which explains the good outcome postoperatively.

As per the set up in our hospital, the aim of our study was to prevent the recurrence. Our patients had no recurrence, which was far better with good results when compared to other similar studies.

In our study the following three factors were taken into account to obtain good results postoperatively :

1. The screw should be placed ideally in the subequatorial region over the anteroinferior aspect of glenoid and it should be within 5-10 mm from the rim(joint space) of glenoid after freshening the ends of exposed anteroinferior neck of glenoid to achieve firm osseous union to prevent recurrence.
2. Adequate postoperative immobilisation was given to our patients for a period of 3 weeks to promote healing at the junction between transplant and the neck of glenoid. All patients were treated with the same protocol as suggested in various literatures.
3. The 4mm cancellous screws were used most(54%), in our study, and the aim was to engage the posterior aspect of glenoid, and we achieved it in 28 cases(90%). 4.5 mm malleolar screws(44%) were used in eight cases.

We analysed the following criterias in our study to conclude our results.

1. Objective outcome(Rowe score)
2. Subjective outcome
3. Radiological outcome

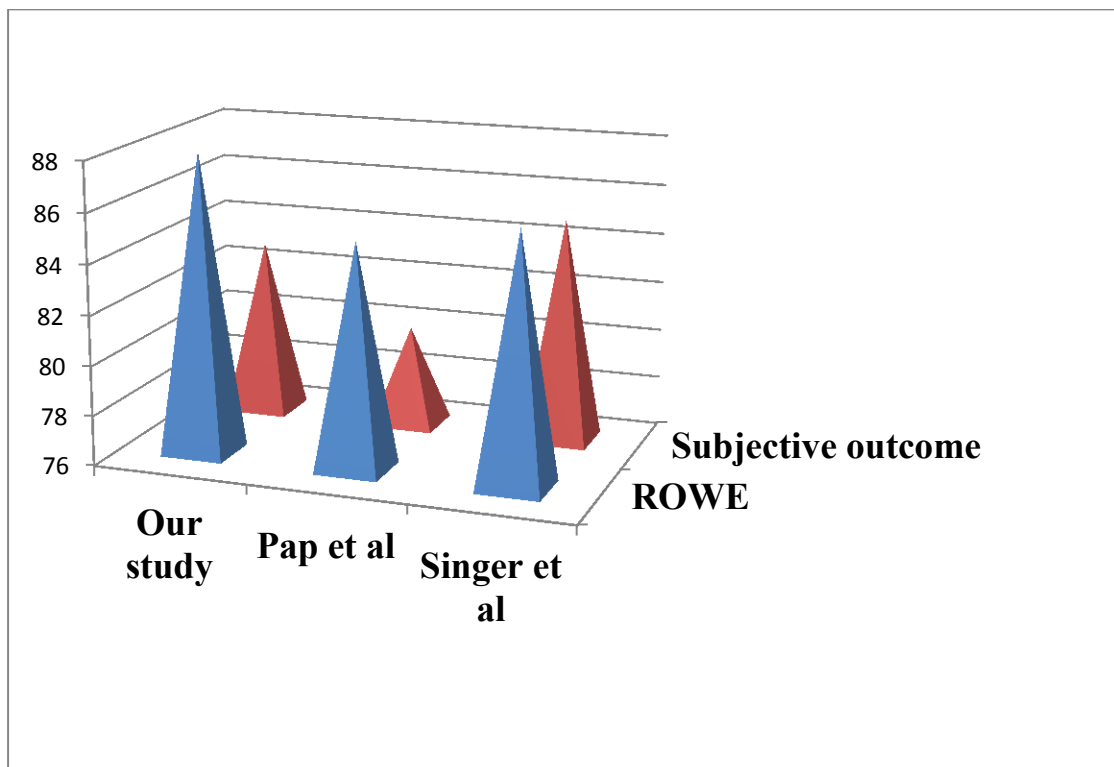
For the entire study, 1/30 presented with subluxation, whereas no other case presented with any complications.

ROWE SCORING	EXCELLENT	GOOD	FAIR	POOR
Our study	60 %	35 %	5 %	-
Singer et al	36 %	57 %	7 %	1 %
Pap et al	45 %	39 %	6 %	10 %

ROWE score improved from 43.75 preoperatively to 88.25 postoperatively with an improvement of additional 44.5 points and 60% of them presented with excellent scores postoperatively.

Study	Recurrence rate
Our study	3 %
Allain et al	5 %
Hoveliuss et al	6 %
Levigne et al	5.7 %

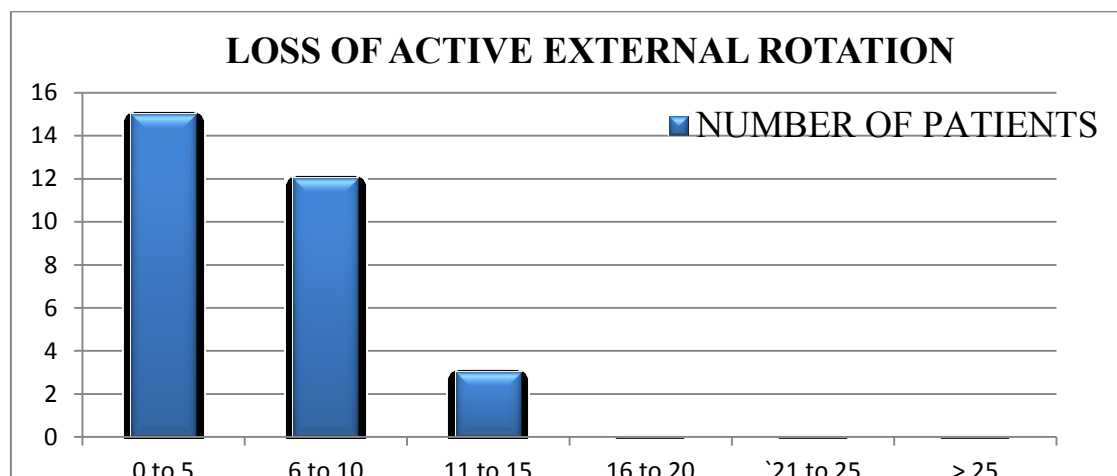
On subjective evaluation, the patients were classified as stable, subluxated, or redislocated and most of them came with excellent scores (83%) when compared with other studies like Pap et al(85%) and Singer et al(90%), as evidenced below.



Main factor affecting the outcome of our procedure was decrease in external rotation postoperatively.

Our patients had good postoperative range of motion in all the planes like abduction, adduction, internal rotation, forward flexion, extension except for some decrease in external rotation when compared to the sound side.

As the (ADL) activities of daily living was not disturbed with some loss of external rotation, it did not affect the outcome significantly in our study.



Most of them presented with loss upto 10 degrees of external rotation.

Study	Loss of external rotation
Our study	10 %
Levigne	6 %
Torg et al	23 %

Radiographic outcomes of 30 patients :

Samilson-Prieto grading – no evidence of arthropathy in all 30 cases.

Transplant outcome – 28 cases with bony union; 2 cases with fibrous union, as evidenced by the presence of radiolucent zone.

No evidence of screw migration in our study.

Too medial placement of a screw can lead to recurrence later and if the screw is placed above the equator it will lead to subluxation later

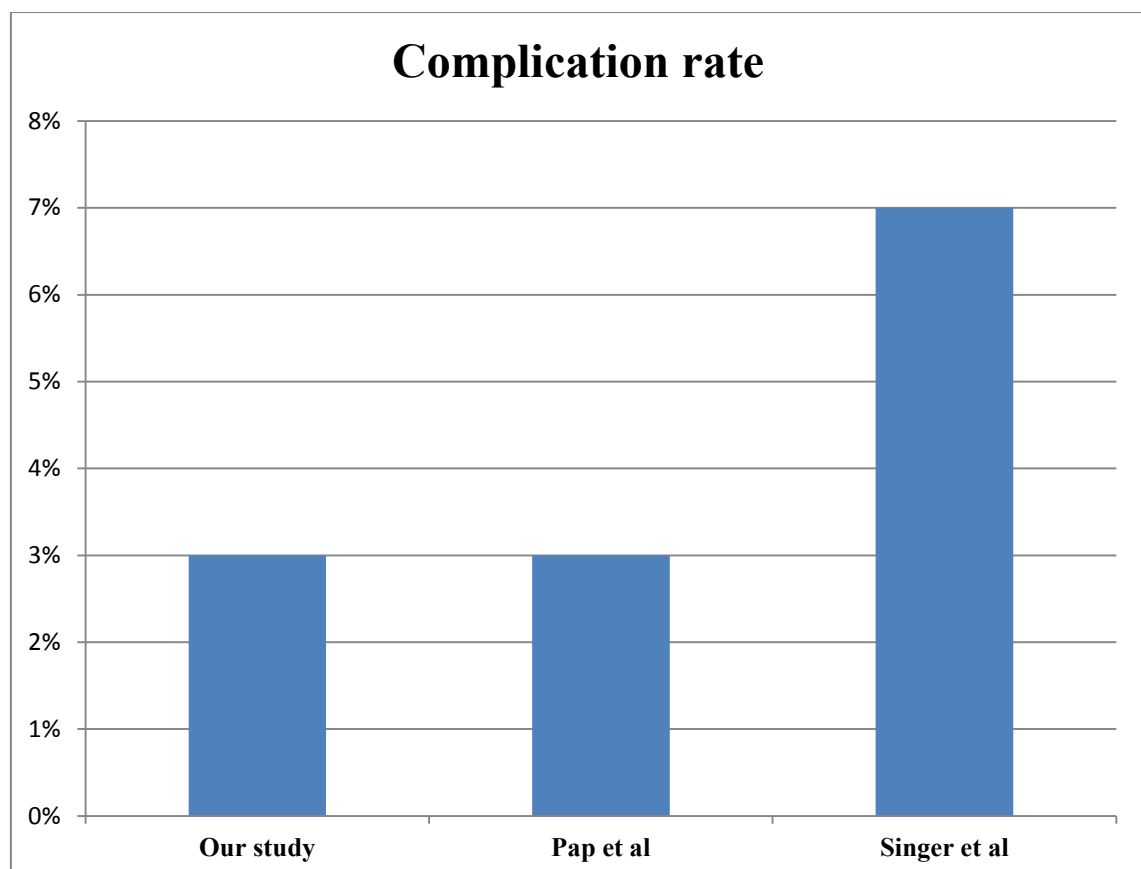
In our study 29 cases were in the subequatorial position of which one screw is too distant from the glenoid rim (10mm) and in case, the screw is above the equator.

Our study	94 % ideal position 3% above the equator 3 % too medial
Allain et al	53 % too lateral 5 % too medial
Hoveliuss et al	36 % above the equator 6 % too medial

Complications :

One case of subluxation was reported in our study, which was insignificant when comparable to other studies as evidenced below and it was due to the malpositioned screw, which was placed well above the equator.

Not a single case presented with infection in our study which was due to the facilities available in our tertiary care centre and effective management.



STUDY	COMPLICATION RATE
Our study	3 %
Pap et al	3 %
Singer et al	7 %

Our study reported with lesser complications(3%) in terms of recurrence, arthrosis, infections, transplant related problems and the results were comparable to other studies - Singer et al (7 %) and Pap et al(3 %).

There was no injury to musculocutaneous nerve and muscle strength improved postoperatively following rehabilitation.

SURGICAL OUTCOMES:

COMPARISION OF SIMILAR STUDIES IN THE LITERATURE

Criteria	<i>Our study</i>	<i>Pap et al.</i>	<i>Singer et al.</i>
No.of patients	30	31	14
Mean Age(years)	28 yrs	26 yrs	28 yrs
Average Follow up	15 months	31 months	246 months
Major mode of injury	Sports injury	Sports injury	Sports injury
Bony union	93 % (28 cases)	52 % (15 cases)	70 % (10 cases)
Complication rate: REDISLOCATION RATE	0%	3%	0 %
SUBLUXATION RATE	3%	0%	7 %
Loss of external rotation	10°	15°	12°
ROWE	88.25 %	85 %	86 %
Satisfactory rate	Good	Good	Good

93 % of the patients in our study returned to the preinjury status.

CONCLUSION :

The aim of the study is to prevent the recurrence in patients with recurrent shoulder dislocation treated with modified Bristow's repair .

Shoulder dislocation is commoner in young active males, involved in sports related activities³.

Proper selection of the patients for our procedure with proper history, physical examination, radiographs, computed tomograms and MRI is mandatory.

Good results were obtained when the transferred coracoid after osteotomising it from its base along with the conjoined tendon, heals onto the anteroinferior glenoid¹.

Intraoperatively, utmost care should be taken in not fracturing the coracoid process¹, as it may significantly affects the outcome.

The screw position should be less than 10 mm from the anterior glenoid rim(joint space in true AP view) ¹and in the subequatorial position(altitude).

The screw must be of adequate length and should get bicortical purchase in the neck of glenoid¹.

Too medial a screw will lead to recurrence⁶, whereas too lateral a screw can lead to arthritis on a long term basis thereby restricting range of motion.

Though it is a non-anatomic repair, good results can be produced with improved functional and subjective outcome³.

The operating surgeon must be well versed ³ with this procedure.

Lastly the satisfactory levels of the patient and the functional results do not necessarily correlate always with the radiographic evidences like screw loosening, osseous or fibrous union³.

SL.N o	Name Age/Sex	Occupat ion	Involved Side	Mode of Injury	Implant Used	Complic ations	Follow - Up (Mont hs)	Outcome			Screw Position
								Subje -ctive	Objective (ROWE)		
									Pre op	Post op	
1	Latif 30/m	Labourer	Left	Sports	4mm Cancellous	Nil	19	Excellent	25	80	Satisfactory
2	Asokan 32/m	Driver	Right	RTA	4.5mm Malleolar	Nil	14	Good	50	80	Satisfactory
3	Kandhasamy 22/m	Student	Right	Fall	4.5mm Malleolar	Nil	22	Excellent	50	95	Satisfactory
4	Arumugam 34/m	Mason	Right	Fall	4mm Cancellous	Nil	24	Good	50	80	Satisfactory
5	Gopal 28/m	Driver	Right	RTA	4.5mm Malleolar	Nil	16	Excellent	50	95	Satisfactory
6	Manivannan 38/m	Labourer	Right	Fall	4mm Cancellous	Nil	15	Good	50	95	Satisfactory
7	Kumar 24/m	Student	Right	Fall	4mm Cancellous	Nil	14	Excellent	50	80	Satisfactory
8	Ramu 36/m	Farmer	Right	Fall	4.5mm Malleolar	Nil	17	Excellent	50	95	Satisfactory
9	Muthusamy 30/m	Labourer	Right	Fall	4mm Cancellous	Nil	19	Excellent	50	95	Satisfactory
10	Ganapathy 24/m	Student	Right	Sports	4mm Cancellous	Nil	10	Good	25	80	Satisfactory

11	Manikandan	Auto driver	Left	Sports	3.5mm cortical	Nil	24	Excellent	25	95	Satisfactory
12	Ashok	Mason	Left	Sports	4mm Cancellous	Nil	12	Excellent	50	80	Satisfactory
13	Purushothaman	Mason	Right	Fall	4.5mm Malleolar	Nil	10	Excellent	50	80	Satisfactory
14	Dravidamani 18/m	Student	Right	Sports	4mm cancellous	Nil	18	Excellent	50	95	Satisfactory
15	Ganahmoorthy 22/m	Labourer	Right	Sports	4mm Cancellous	Subluxation	20	Fair	50	65	Subeutorial
16	Harikrishnan 39/m	Press Printer	Right	Fall	4mm cancellous	Nil	14	Excellent	50	95	Satisfactory
17	Mahesh 31/m	Tailor	Right	Fall	4mm cancellous	Nil	12	Excellent	50	95	Satisfactory
18	Vijaiipaul 23/m	Student	Right	Sports	4mm Cancellous	Nil	8	Excellent	50	95	Satisfactory
19	Sundar 32/m	Farmer	Right	Fall	4.5 Malleolar	Nil	15	Excellent	25	95	Satisfactory
20	Vivek 20/m	Student	Right	Sports	4.5 malleolar	Nil	13	Excellent	50	80	Satisfactory

21	Kumar 45/m	Farmer	Right	Failed Procedure	4.5mm Malleolar	Nil	22	Excellent	25	80	Satisfactory
22	Bharath 24/m	Student	Right	Sports	4mm Cancellous	Nil	15	Excellent	50	95	Satisfactory
23	Chinnayan 40/m	Farmer	Right	Fall	4mm Cancellous	Nil	18	Excellent	50	95	Satisfactory
24	Divakar	Labourer	Right	Fall	4.5mm Malleolar	Nil	20	Excellent	25	80	Satisfactory
25	Saravanan 18/m	Student	Right	Sports	4.5mm Malleolar	Nil	17	Excellent	50	95	Satisfactory
26	Sridhar 36/m	Farmer	Left	Fall	4mm Cancellous	Nil	14	Excellent	50	95	Satisfactory
27	Rampurasath 18/m	Student	Right	Sports	4mm Cancellous	Nil	19	Excellent	25	95	Satisfactory
28	Subramani 36/m	labourer	Right	Fall	4mm Cancellous	Nil	16	Excellent	50	80	Satisfactory
29	Kannappan 37/m	Labourer	Left	Fall	4.5mm Malleolar	Nil	18	Excellent	25	95	Satisfactory
30	Suresh 20/m	Student	Right	Sports	4mm Cancellous	Nil	14	Excellent	50	95	Satisfactory

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AGE/SEX :

OCCUPATION:

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Contact Number:

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DOD :

DOS :

DIAGNOSIS :

COMPLAINTS :

MODE OF INJURY :

TREATMENT HISTORY :

CLINICAL EXAMINATION :

X RAY :

IMPLANTS USED :

POSTOP X RAY :

COMPLICATIONS :

FOLLOW UP :

1 st WEEK POSTOP :

3 WEEKS POSTOP :

6 WEEKS POSTOP :

3 MONTHS POSTOP :

ROWE SCORING :

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INSTITUTIONAL ETHICS COMMITTEE
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CERTIFICATE OF APPROVAL

To
Dr. C. Dinesh
PG in MS Orthopaedics
Madras Medical College
Chennai -3

Dear Dr. C. Dinesh

The Institutional Ethics committee of Madras Medical College, reviewed and discussed your application for approval of the proposal entitled "A study on functional outcome of Modified Bristow's repair in patients with recurrent shoulder dislocation" No.23072012.

The following members of Ethics Committee were present in the meeting held on 24.07.2012 conducted at Madras Medical College, Chennai -3.

- | | |
|--|---------------------|
| 1. Dr. S.K. Rajan. M.D.,FRCP.,DSc | -- Chairperson |
| 2. Prof. Pregna B. Dolia MD
Vice Prinicipal, Madras Medical College, Chennai-3
Director , Inst. of Biochemistry, MMC, Ch-3 | -- Member Secretary |
| 3. Prof. Kalaiselvi MD
Prof of Pharmacology ,MMC, Ch-3 | -- Member |
| 4. Prof. C. Rajendiran, MD
Director , Inst. of Internal Medicine, MMC, Ch-3 | -- Member |
| 5. Prof. MD Ali M.D,. D.M.,
Prof & HOD, Dept. of MGE, MMC, Ch-3 | -- Member |
| 6. Prof. S. Deivanayagam MS
Prof of Surgery, MMC, Ch-3 | -- Member |
| 7. Thiru. S. Govindsamy. BABL | -- Lawyer |
| 8. Tmt. Arnold Soulina MA MSW | -- Social Scientist |

We approve the proposal to be conducted in its presented form.

Sd/ Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information / informed consent and asks to be provided a copy of the final report.


Member Secretary, Ethics Committee



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FUNCTIONAL OUTCOME ANALYSIS OF MANAGEMENT OF MODIFIED BRISTOW'S REPAIR IN PATIENTS WITH RECURRENT SHOULDER DISLOCATION Dissertation submitted to In partial fulfilment of the requirements for M.S. DEGREE-BRANCH II ORTHOPAEDIC SURGERY MADRAS MEDICAL COLLEGE INSTITUTE OF ORTHOPAEDICS AND TRAUMATOLOGY RAJIVGANDHI GOVERNMENT GENERAL HOSPITAL THE TAMILNADU DR.M.G.R.MEDICAL UNIVERSITY CHENNAI-TAMILNADU APRIL – 2013 1 INTRODUCTION : The shoulder (gleno-humeral) joint is the one joint with maximum mobility and thus resulting in increased chances of instability which commonly occur in the young individuals . The incidence of recurrent glenohumeral instability is 16 per 100 000 per year 3 with a...

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RECURRENT SHOULDER DISLOCATION**

Dissertation submitted to



In partial fulfilment of the requirements for

**M.S. DEGREE-BRANCH II
ORTHOPAEDIC SURGERY**

**MADRAS MEDICAL COLLEGE
INSTITUTE OF ORTHOPAEDICS AND TRAUMATOLOGY
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