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EVALUATION OF RESULTS OF ARTHROSCOPIC BANKART REPAIR IN TRAUMATIC RECURRENT ANTERIOR SHOULDER INSTABILITY IN ADULT PATIENTS: A 10 YEAR FOLLOW-UP STUDY

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ABSTRACT

Background: Arthroscopic Bankart repair has become the standard of care in the surgical treatment of Bankart's lesion of shoulder. Though long term follow-up studies on Arthroscopic Bankart repair are coming up at various parts of the world, there is still shortage of such studies in the Indian sub-continent.

Method: A total of 59 patients with post-traumatic recurrent anterior dislocation of shoulder was operated arthroscopically with suture anchors at a well reputed teaching hospital in eastern India. Of the initial cohort 30 patients could be followed up for 10 years (mean 133 months) and included in the study. The were evaluated by Rowe score, Constant-Murley shoulder outcome score and UCLA shoulder score at 6 months, 1 year, 3 years, 5 years and at the end of the follow up period.

Results: Incidence of recurrence of instability was 3%. The mean pre-operative Rowe score increased post-operatively at 6 months to 71.83 (median 75, SD=18.17) and to 80.17 (median 75, SD=11.78) at the end of follow up period ($p<0.001$). The final results according to Rowe score were fair in 6 (20%) patients, good in 10 (33.3%) patients and excellent in the remaining 14 (46.6%). The mean Constant-Murley score increased post-operatively at 6 months to 68.2 (median 72, SD=11.9) and to 75.83 (median 79, SD=12.12) at the end of follow-up period ($p<0.001$). The final results according to Constant-Murley score were poor in 7 patients (23.3%), fair in 8 patients (26.6%), good in 12 (40%) patients and excellent in the remaining 3 (10%). The mean University of California and Los Angeles score increased post-operatively at 6 months to 29.3 (median 30, SD=3.87) and to 30.27 (median 31, SD=3.67) at the end of follow-up period ($p<0.001$). The final results according to UCLA rating were fair/poor in 4 patients (13.3%) and good/excellent in 26 (86.6%). Patient satisfaction, quantified by the visual analogue scale, which pre-operatively had a median value of 6 increased to 8 post-operatively

Conclusion: Arthroscopic Bankart repair is a successful surgery to address recurrent anterior instability of shoulder in well indicated cases, with encouraging long term results. There is scope for more such long-term follow up studies to understand the incidence of late complications like rotator cuff degeneration and arthritis.

Keywords: Shoulder Arthroscopy, Bankart Lesion, Arthroscopic Bankart Repair, Long Term Outcome.

INTRODUCTION

Recurrent anterior dislocation of shoulder is a condition to known to human beings since pre-historic times, as evidenced in the Edwin-Smith papyrus (3000-2500 BC).[1] In 1861 Flower[2] described the anatomic and pathologic changes found in 41 traumatically dislocated shoulders. He was the first on record to note a "groove" which lay "usually between the articular head and the greater tuberosity". In 1880 Eve,[3] and in 1882 Hill and Sachs [4], along with others, were the first to accurately describe this defect in the postero-lateral aspect of the head of humerus in cases of traumatic dislocation of shoulder, better known today as the Hill-Sach's lesion. As early as in the thirteenth century, Roger of Palermo taught that the lesion in an acute dislocation was a capsular rupture that led to a defect that is responsible for subsequent dislocations. Bankart revived the concept in 1960s and claimed that the essential lesion was detachment of the labrum and capsule from the anterior glenoid as a result of forward translation of the humeral head (referred to by subsequent authors as the *Bankart lesion*).[5] Various techniques have been described at different points of time to address this condition. Starting from tightening and to some degree realigning the subscapularis tendon and partially eliminating external rotations, which were the goals of the Magnuson–Stack.[6,7-11] and the Putti–Platt[12] procedures, and passing through the inception of Du-Toit and Eyre-Brook's[13,14] capsulorrhaphy techniques, and of course the Bristow[15] procedure which transferred the tip of the coracoid process with its muscle attachments to create a musculotendinous sling across the anteroinferior glenohumeral joint, today we have entered into the era of arthroscopic repair of anterior shoulder instability. Arthroscopy allows a unique combination of maximal surgical visualization with minimal soft tissue trauma that has revolutionized many common orthopaedic procedures including shoulder. It has already replaced the more conventional open surgeries and has become the main stay of shoulder instability correction. Though there is no dearth of follow up studies on arthroscopic Bankart repair, quality long term follow-up series is somewhat lacking especially from the Indian subcontinent.

AIMS AND OBJECTIVES

The purpose of this study was to evaluate the surgical outcomes of arthroscopic repair of recurrent anterior glenohumeral instabilities with use of suture anchors in a series of patients who were followed for a mean time period of 133 months after surgery.

MATERIALS AND METHODS

This study was initially carried out at the Department of Orthopaedic Surgery in a prominent teaching hospital in the eastern part of India.

During the period of 20 months between January 2013 and August 2014, a total of 59 cases of arthroscopic repair of Bankart's lesion in recurrent anterior dislocation of shoulder of traumatic aetiology were done in one unit of the department, which forms the core of the study design. The patients were enlisted for follow up. Follow up was done at 6 months, 1year, 3 years, 5 years and 10 years. Out of the 59 people enlisted, a total of 30 cases could be contacted 10 years after their initial surgery. Only those 30 cases have been included in this study.

All the cases of traumatic instability of shoulder who attended the outpatient department of the Department of Orthopaedic Surgery were screened according to a pre-defined protocol.

The inclusion criteria laid down were

1. Age more than 20 years.
2. Clear-cut history of traumatic shoulder dislocation (at least two or more episodes).
3. MRI showing labral pathology with or without bony involvement not exceeding 13.5% glenoid bone loss

Moribund patients/patients meeting the above criteria but with polytrauma or associated head/chest/abdomen injuries or those with terminal diseases were excluded in this stage only.

The other exclusion criteria were

Initial instability event (no previous history of dislocation). Those patients underwent only manipulation under anaesthesia and closed/open reduction. They did not undergo MRI of the shoulder as per protocol.

1. The so-called 'off-track' type Hill-Sachs lesion.
2. Glenoid bone loss greater than 13.5% of the total area
3. Older patients with shoulder dislocation without any clear history of trauma (presumably due to multi-directional capsular laxity)
4. Patients refusing to participate in the study or those who did not give consent for surgery.
5. Patients lost to follow up at any point of time between 2013 to 2014.

Patients who were included in the study group were subjected to detailed history taking and physical examination. Each patient underwent X-ray of the shoulder (AP and axillary lateral view) and MRI study of the shoulder. CT scan Was not a part of the routine investigation protocol. It was undertaken in presence of glenoidal bone loss bone in order to accurately estimate the size of the lesion.

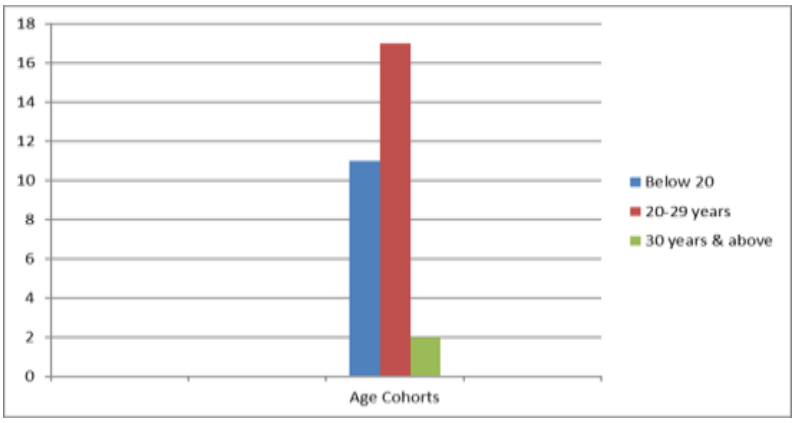
Once the subjects were fit for anaesthesia, they were taken for arthroscopic Bankart repair under general anaesthesia. Patients were placed in lateral position with the affected side up with the arm abducted by means of the suspension device. A thorough diagnostic arthroscopy of the joint was done in every single case. We routinely made three working portals, the posterior, anterior and the antero-superior. Number of suture anchors used depended upon the extent of the tear, but usually 3 such anchors were used preferably at 1,3 and 5 o'clock positions. Post-operatively, a soft pillow sling was given to support the arm in 15 degrees of abduction. The elbow was positioned anterior to the coronal plane of the shoulder with the arm internally rotated. Ice-compress was applied to decrease post-operative pain and swelling. I.V. antibiotic (cefuroxime) was run for 48 hours at twice daily regimen. The wound was inspected at 48 hours. In the absence of any complications, patient was discharged on the third post-operative day and asked to come back after 10 days for stitch removal with a plain X-ray of the operated shoulder, AP and lateral view, to document the position of humeral head.

Active range-of-motion exercises of the fingers, wrist, and elbow, as well as deltoid muscle isometric exercises, were started the morning after the operation and continued at home for 2 weeks. Patients were allowed to remove the sling for active elevation and external rotation exercises twice daily but wear the sling at all other times. We allowed active elevation as tolerated. Patients were instructed to limit external rotation to 20 degrees at week 2, 40 degrees at week 4, and 60 degrees at week 6. The sling was worn for 6 weeks, after which it was removed and the patient was encouraged to begin active range-of-motion (without restrictions), strengthening, and neuromuscular exercises. Patients continued range-of-motion and strengthening exercises for 1 year.

RESULT

The present study is a longitudinal analysis of results of arthroscopic Bankart repair in a series of 30 patients(30 shoulders), conducted at a prominent teaching hospital in eastern India within a time period of 20 months, between January 2013 and August 2014. Average follow-up period is 133 months. All the patients were operated by the same set of surgeons. The patients were called for follow up after discharge at 6 months, 1 year, 3 years, 5 years and at the end of the follow up period. Out of total 59 patient's cohort at the beginning, only 30 could be followed up till the ends of the follow-up

period in 2024. Rest were lost to follow up. Only those patients who were available for evaluation at the end of the study were included in this study.



Graph 1: Age distribution of subjects

Of the 30 patients 29 were male and 1 female. The average age was 23.1 (median 23, range 17-39 years).

The mean age at first dislocation was 21.26 years (median 18.5 years). One patient had epilepsy and another hypertension as significant medical comorbidities. 18 out of 30 patients (60%) had pathology on the right shoulder while 12 (40%) had on the left shoulder. Aetiology was twisting injury in 8 cases (26.6%), transmitted trauma in 16 (53%), direct blow to the shoulder in 5 (16.6%) and epileptic fit in the remaining patient.

Nature of Injury	**Cases**
Twisting injury	8
Transmitted trauma	16
Direct below	5
Epileptic fit	3
Table 1: Mechanism of injury causing first dislocation	

Immobilization time after the first dislocation was 'no immobilization' in 3 patients (10%), less than 3 weeks in 18 (60%), more than 3 weeks in 9 (30%)

Methods of fixation forllowing closed manipulation	**No. of cases**
No fixation at all	2
Collar and cuff sling <1 week	6
Collar and cuff sling 1-3 weeks	2
Collar and cuff sling >3 weeks	1
Immobilization to trunk less than 3 weeks	10
Immobilization to trunk for 3 weeks or more	8
Failed closed manipulation, open manipulation was done	1
Table 2: Initial treatment received after first dislocation	

Apprehension test was positive pre-operatively in all patients. None of the patients had any neuro-vascular complication before or after surgery. The operative time was less than one hour in 3 (10%) patients, one to two hours in 15 (50%) patients and more than two hours in 12 (40%) patients.

Time of surgery	< 1 Hour	1-2 Hours	>2 Hours
	3	15	12
Table 3: Duration of surgery			

Post-operative complications were noted in 3 patients in the form of superficial wound infection, all of whom had surgery time more than two hours. Two of them responded to empirically given oral antibiotic for an extended period of time (2 weeks against standard 5 days) while one needed surgical incision and drainage. Normal surgery to discharge interval was 3 days, but was prolonged to two weeks or more for those with post-operative complications.

Incidence of re-dislocation was 1 (3%), in an epileptic patient during a seizure episode 16 months after surgery. He was treated conservatively henceforth but his available clinical data till 16 months of follow up has been used here. Apprehension test became positive again in 2 (6%) patients in the post-operative period, but no laxity could be demonstrated by clinical examination till end of follow-up period. Post operative loss of movement was evident after surgery. Forward elevation in internal rotation (palm down, along sagittal plane) decreased from mean value of 144.33 degrees (SD=28.9) pre-operatively to 131.67 degrees (SD=26.5) post-operative ($p<0.018$). Internal rotation decreased from mean pre-operative value of 66.67 degrees (SD=8.84) to post-operative value of 60.67 degrees (SD=10.48) $p<0.001$. External rotation decreased from a mean pre-operative value of 31.67 degrees (SD=12.88) to a post-operative value of 21 degrees (SD=11.55) $p<0.00$.

The mean pre-operative Rowe score which was pre-operatively 22 (median 25, SD=10.22) increased post-operatively at 6 months to 71.83 (median 75, SD=18.17) and to 80.17 (median 75, SD=11.78) at the end of follow up period ($p<0.001$). The final results according to Rowe score were fair in 6 (20%) patients, good in 10 (33.3%) patients and excellent in the remaining 14 (46.6%).

Sl no	Rowe Shoulder score(pre-op)	Rowe Shoulder Score (post op 6months)	Rowe shoulder score (post op 1 year)	Rowe shoulder score (post op 3 years	Rowe Shoulder Score (post op-final)
1	25	90	90	90	90
2	10	65	75	75	75
3	40	90	90	90	90
4	15	40	60	60	60
5	15	75	75	90	90
6	40	75	75	75	75
7	25	90	95	95	95
8	10	65	70	75	75
9	15	75	75	90	90
10	10	75	90	90	90
11	15	60	60	65	65
12	10	10	40	60	60
13	25	75	90	90	90
14	25	90	90	95	95
15	25	40	40	60	60
16	40	95	95	95	95
17	25	75	75	90	90
18	25	75	75	75	75
19	10	65	65	75	75
20	25	75	90	90	90
21	10	60	75	75	75
22	25	75	75	75	75
23	15	65	75	75	75
24	40	95	95	95	95
25	15	65	65	65	65
26	25	75	75	75	75
27	40	90	90	90	90
28	25	75	75	75	75
29	25	90	90	90	90
30	10	65	65	65	65

Table 4:Rowe score for shoulder at pre and post operative follow up

The mean Constant-Murley score which was pre-operatively 41 (median 39, SD=8.2) increased post-operatively at 6 months to 68.2 (median 72, SD=11.9) and to 75.83 (median 79, SD=12.12) at the end

of follow-up period (p<0.001). The final results according to Constant-Murley score were poor in 7 patients (23.3%), fair in 8 patients (26.6%), good in 12 (40%) patients and excellent in the remaining 3 (10%).

Sl no	Constant-Murley score (pre-op)	Constant-Murley score (6 months)	Constant-Murley score (post op 5 years)	Constant-Murley score (final)
1	42	72	82	86
2	38	60	65	67
3	57	84	84	86
4	32	57	65	71
5	37	76	79	82
6	47	67	71	72
7	59	84	87	87
8	26	55	60	65
9	35	72	84	84
10	38	68	77	85
11	32	41	45	51
12	38	39	47	49
13	57	72	82	83
14	44	76	90	90
15	39	60	60	52
16	47	79	90	92
17	41	80	84	84
18	36	72	75	77
19	37	55	72	80
20	41	72	78	82
21	36	68	78	78
22	45	70	71	71
23	39	57	60	76
24	47	75	84	90
25	33	60	60	60
26	40	73	73	73
27	57	84	84	84
28	39	78	78	78
29	41	83	83	83
30	30	57	57	57

Table 5:Constant-Murley score at pre and post operative follow up

The mean University of California and Los Angeles score which was pre-operatively 14.1 (median 14.5, SD=3.0) increased post-operatively at 6 months to 29.3 (median 30, SD=3.87) and to 30.27 (median 31, SD=3.67) at the end of follow-up period (p<0.001). The final results according to UCLA rating were fair/poor in 4 patients (13.3%) and good/excellent in 26 (86.6%).

Sl no	UCLA score (pre-op)	UCLA score (6 months)	UCLA score at 3 years post op	UCLA score (final)
1	16	32	33	33
2	10	27	28	29
3	19	33	33	33
4	11	23	24	25
5	14	30	31	31
6	18	32	32	33
7	13	33	35	35
8	10	27	28	30
9	11	29	30	31
10	9	28	29	30
11	12	24	26	27
12	12	23	23	24
13	15	30	31	31
14	17	33	32	33

15	17	25	25	26
16	17	35	35	35
17	16	31	31	31
18	14	30	30	31
19	8	28	29	29
20	15	32	33	33
21	12	29	31	31
22	16	31	32	33
23	15	28	28	28
24	18	35	35	35
25	14	18	18	18
26	16	29	29	29
27	19	33	33	33
28	14	30	30	30
29	15	33	33	33
30	10	28	28	28

Table 6:UCLA shoulder score at pre and post operative follow up

Patient satisfaction, quantified by the visual analogue scale, which pre-operatively had a median value of 6 increased to 8 post-operatively.

Sl no	**Pain-activity-satisfaction based on VAS(6 months)**	**Pain-activity-satisfaction based on VAS(final)**
1	8	9
2	6	6
3	8	9
4	6	7
5	8	9
6	8	9
7	6	9
8	2	5
9	5	6
10	7	8
11	6	8
12	1	4
13	6	9
14	8	9
15	5	8
16	8	9
17	8	9
18	6	8
19	6	8
20	6	9
21	6	7
22	5	8
23	5	8
24	8	9
25	8	8
26	8	8
27	9	9
28	5	5
29	9	9
30	5	5

Table 7:VAS score showing patient satisfaction with operative outcome

Evaluation of arthroscopic Bankart repair in traumatic recurrent anterior shoulder instability in adults.

Software used

- Statistica version 6 [Tulsa, Oklahoma: StatSoft Inc., 2001]
- GraphPad Prism version 5 [San Diego, California: GraphPad Software Inc., 2007]

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Descriptive statistics of numerical variables – Whole cohort [n = 30]

	Valid N	Mean	Median	Minimum	Maximum	Lower Quartile	Upper Quartile	Std.De
Age	30	23.10	23.00	17.000	39.00	19.00	26.00	5.162
	0.942							
TimeFU_m	30	13.33	14.00	6.000	20.00	10.00	17.00	4.596
	0.839							
Elev_Pre	30	144.33	150.00	90.000	180.00	120.00	170.00	28.969
	5.289							
Elev_Post	30	131.67	130.00	70.000	170.00	120.00	150.00	26.533
	4.844							
IntRot_Pre	30	66.67	70.00	50.000	80.00	60.00	70.00	8.841
	1.614							
IntRot_Post	30	60.67	60.00	40.000	80.00	50.00	70.00	10.483
	1.914							
ExtRot_Pre	30	31.67	30.00	0.000	50.00	30.00	40.00	12.888
	2.353							
ExtRot_Post	30	21.00	20.00	0.000	40.00	20.00	30.00	11.552
	2.109							
ScRowe_B	30	22.00	25.00	10.000	40.00	15.00	25.00	10.222
	1.866							
ScRowe_FU	30	71.83	75.00	10.000	95.00	65.00	90.00	18.170
	3.317							
ScRowe_E	30	80.17	75.00	60.000	95.00	75.00	90.00	11.780
	2.151							
ScConMur_B	30	41.00	39.00	26.000	59.00	36.00	45.00	8.213
	1.499							
ScConMur_FU	30	68.20	72.00	39.000	84.00	60.00	76.00	11.900
	2.173							
ScConMur_E	30	75.83	79.00	49.000	92.00	71.00	84.00	12.120
	2.213							
ScUCLA_B	30	14.10	14.50	8.000	19.00	12.00	16.00	3.044
	0.556							
ScUCLA_FU	30	29.30	30.00	18.000	35.00	28.00	32.00	3.870
	0.707							
ScUCLA_E	30	30.27	31.00	18.000	35.00	29.00	33.00	3.676
	0.671							
SatVAS_FU	30	6.40	6.00	1.000	9.00	5.00	8.00	1.868
	0.341							
SatVAS_E	30	7.80	8.00	4.000	9.00	7.00	9.00	1.495
	0.273							

Table 8:Statistical distribution of outcome

Comparison of Pre and Post-operative status – Wilcoxon's matched pairs signed rank test

	Valid N	T	Z	p-level
SatVAS_FU & SatVAS_E	**30**	**0.00**	**4.19726**	**0.000**

Comparison of scores over time – Repeated measures ANOVA followed by Tukey's test a post h test if ANOVA returns *p* value < 0.05

Rowe Scores

Repeated measures ANOVA
No. of datasets 3 F value 398.34 p < 0.001

Tukey's Multiple Comparison Test	Mean Diff.	q	Summary	95% CI of diff
ScRowe_B vs. ScRowe_FU	-49.833	31.621	< 0.001	-55.197 to -44.470
ScRowe_B vs. ScRowe_E	-58.167	36.908	< 0.001	-63.530 to -52.803
ScRowe_FU vs. ScRowe_E	-8.3333	5.2877	< 0.01	-13.697 to -2.9698

Constant-Murley Scores

Repeated measures ANOVA
No. of datasets 3 F value 251.50 p < 0.001

Tukey's Multiple Comparison Test	Mean Diff.	q	Summary	95% CI of diff
ScConMur_B vs. ScConMur_FU	-27.200	23.542	< 0.001	-31.132 to -23.268
ScConMur_B vs. ScConMur_E	-34.833	30.149	< 0.001	-38.765 to -30.901
ScConMur_FU vs. ScConMur_E	-7.6333	6.6069	< 0.001	-11.565 to -3.7013

UCLA Scores

Repeated measures ANOVA
No. of datasets 3 F value 560.36 p < 0.001

Tukey's Multiple Comparison Test	Mean Diff.	q	Summary	95% CI of diff
ScUCLA_B vs. ScUCLA_FU	-15.200	39.681	< 0.001	-16.504 to -13.896
ScUCLA_B vs. ScUCLA_E	-16.167	42.205	< 0.001	-17.470 to -14.863
ScUCLA_FU vs. ScUCLA_E	-0.96667	2.5236	ns	-2.2703 to 0.33698

Table 9: Statistical analysis of results

Figure 1

Figure 2

Figure 3

DISCUSSIONS

Anterior gleno-humeral instability is the commonest form of post-traumatic instability of the shoulder.[16,17] Recurrence is a well-known association of this pathology. Rowe and Zarins[18] reported a rate of 95.6% traumatic origin to anterior dislocation in their study that included 500 patients. In this study 29 out of 30 patients had a traumatic aetiology (97%) while the lone exception had his dislocation during an attack of epilepsy. Aetiology was twisting injury in 8 cases (26.6%), transmitted trauma in 16 (53%), direct blow to the shoulder in 5 (16.6%) and epileptic fit in the remaining patient. Regarding age distribution at the time of first dislocation, Yong GR et al[19] found one hundred and sixty-four shoulders (67%) were younger than 20 years at the time of the first dislocation out of two hundred and thirty-eight (246 shoulders) who participated the study. In our study the mean age at first dislocation is 21.26 years (median 18.5 years). The mean age at surgery was 25 years. In our study the mean age at surgery was 23 (range 17-39 years). According to Yong et al, there were 24 women (10%) and 214 male, while in our study we had 1 female (3%) and 29 male. The age-sex distribution points towards an increased incidence among young males, probably reflecting their increased participation in outdoor and sports activities. But it will be imprudent to calculate demographic data and incidence rates from the present study given the small sample population size (n=30).

Bankart lesion is traditionally the main reason responsible for anteroinferior shoulder instability, hence requires surgical treatment, which is essentially re-fixation of the torn labrum to the bony glenoid mostly with suture anchors, often followed by capsulorrhaphy. This can be done by open method or arthroscopically. While open method has been the time-tested workhorse, arthroscopy is rapidly gaining pace as it is less invasive, has less post-operative soft tissue complications and allows a greater range of post-operative movement. The main complications of arthroscopic Bankart repair are re-dislocation and loss of arm movement (although much less compared to open methods). In the early days of arthroscopy the recurrence rate was higher compared to open methods, but now better techniques and sounder patient selection have put them at par in this regard.[20] According to Cole et al[21] in a retrospective study comparing arthroscopic and open methods reluxation rate was 24% in arthroscopic group and 18% in open group. Gartsman et al. performed arthroscopic Bankart repair, capsular plication, and if necessary thermal capsulorrhaphy in 53 patients with anteroinferior shoulder instability. After two years follow-up good and excellent results were 92% and 7.5% of them had recurrence.[22]. Mishra and Fanton reported a failure rate of 7% with arthroscopic Bankart repair combined with thermal treatment.[23]. Similarly, Ide et al reported a 7% failure rate after performing arthroscopic Bankart repair in a young, athletic group of patients.[24]. After two years follow up Westerheide et al., stated 85 mean Rowe score and 7% redislocation rate in 71 shoulders of 67 patients, who underwent arthroscopic Bankart repair.[25] Sedeek et al. reached at a 92 .5% successful rate after arthroscopic treatment of 40 shoulders.[26] On the other hand in a retrospective study comparing open versus arthroscopic treatment Lützner et al found a tendency towards more frequently and earlier recurrence of instability.[27]

In a case series of 84 patients (mean age 26 years) with Bankart lesions treated with arthroscopic repair using suture anchors and followed up for a minimum of 2 years (mean 46 months), Dominic S. Carreira et al[28] found 7 patients (10%) experienced recurrent instability after repair. 4 patients had dislocations and 3 experienced recurrent subluxations. In another study by Voos JE in 2010[29] involving 83 patients (mean age 33 years) who underwent arthroscopic Bankart repair with suture anchors and was followed up for an average of 33 months, thirteen patients (18%) suffered a recurrence after surgery. Seven patients (10%) had a subsequent dislocation and 6 (8%) a subluxation event or apprehension. Six of the 13 had a traumatic event that resulted in recurrent episodes of instability. Revision surgery was needed for 2 patients (3%) for instability and 2 for postoperative shoulder stiffness. Kim et al published his study on South Korean patients in 2000[30] on eighty-nine shoulders in 88 patients with traumatic unilateral anterior shoulder instability. Of the 89 shoulders, 30 shoulders (30 patients) underwent open Bankart repair and 59 shoulders (58 patients) underwent arthroscopic Bankart repair. Two patients (6.7%) in the open repair group and 2 (3.4%) in the arthroscopic repair group had experienced at least 1 episode of redislocation after the surgery. One

patient (3.3%) in the open repair group and 4 (6.8%) in the arthroscopic repair group demonstrated mild apprehension. The overall residual instability was 10% in the open repair group and 10.2% in the arthroscopic repair group. Residual instability occurred more frequently in patients with fewer anchors. . In another study by the same author.[31] the rate of postoperative recurrence of instability was 4% (one dislocation, two subluxations, and four positive results on the anterior apprehension test). 3 of the 4 patients had to undergo revision surgery. Fabbriciani et al[32] reported no recurrence rate in their open vs. Arthroscopic comparative study with 60 patients in either group, and similarly Mishra et al[33] in a study involving 50 shoulders in Indian population, reported no re-dislocation. In our study, incidence of re-dislocation after surgery was 1 (3%), in an epileptic patient during a seizure episode 16 months after surgery. He was treated conservatively henceforth and the results of his initial surgery have been taken into account. Apprehension test became positive again in 2 (6%) patients in the post-operative period, but no laxity could be demonstrated by clinical examination till end of follow-up period.

Satisfactory range of motion, especially external rotation that allows proper functioning during activities of daily living, is considered more important than just stability alone. So range of motion must be protected while treating shoulder instability. Studies have shown a good range of motion achieved after arthroscopic repair than those achieved after open repair. In a prospective study by Karlsson et. al. comparing arthroscopic and open methods, after a mean duration of 28 months, external rotation was 80° in open group and 90° in arthroscopic group postoperatively.[34] Archiero et al.[35] reported a decreasing external rotation rate of 3°, Gartsman et al[36] reported 5°, Snyder et al.[37] reported 5°, and Kim et al. [31] reported 4° in their series. In Indian population, Mishra et al[33] reported the mean pre- and postoperative range of external rotation was 80.38° and 75.18°, respectively. Eighty-six percent patients had stability compared with the normal sided shoulder and were able to return to sports. In a study involving Turkish population[20], the mean post-operative active external rotation was 45 degrees, which decreased post-operatively to 40 degrees respectively ($p<0.05$). 37 (90.2% 0 patients were satisfied with the result. The patient with the poor result developed redislocation postoperatively seventh month due to epileptic seizure. Post operative loss of movement was evident after surgery in our series as well. Forward elevation in internal rotation (palm down, along sagittal plane) decreased from mean value of 144.33 degrees (SD=28.9) pre-operatively to 131.67 degrees (SD=26.5) post-operative ($p<0.018$). Internal rotation decreased from mean pre-operative value of 66.67 degrees (SD=8.84) to post-operative value of 60.67 degrees (SD=10.48) $p<0.001$. External rotation decreased from a mean pre-operative value of 31.67 degrees (SD=12.88) to a post-operative value of 21 degrees (SD=11.55) $p<0.00$.

In a case series of 84 patients (mean age 26 years) with Bankart lesions treated with arthroscopic repair using suture anchors and followed up for a minimum of 2 years (mean 46 months), Dominic S. Carreira et al[28] the mean Rowe score was 88 out of 100 points, with 90% excellent or good results. Gerard WW et al[38] in a more recent study (2011), where he performed Arthroscopic Bankart repair with bio-absorbable suture with anchor on 79 shoulders in 74 patients from 2004-08, reported data from the UCLA scale which showed a Pre and Post Operative Mean of 20.2 ± 5.0 and 32.4 ± 4.6 respectively ($p < 0.0001$). 34 had excellent post-operative scores, 35 had good scores, 1 had fair score and 3 had poor scores. Kim et al published his study on South Korean patients in 2000[30]. Eighty-nine shoulders in 88 patients with traumatic unilateral anterior shoulder instability were evaluated using Rowe and University of California Los Angeles scores, recurrence, return to activity, and range of motion by an independent examiner at an average of 39 months after either an arthroscopic or open Bankart repair using suture anchors. Of the 89 shoulders, 30 shoulders (30 patients) underwent open Bankart repair and 59 shoulders (58 patients) underwent arthroscopic Bankart repair. Twenty-six shoulders (86.6%) in the open repair group showed excellent or good results, and 54 (91.5%) shoulders in the arthroscopic repair group showed excellent or good results. The arthroscopic group revealed slightly higher scores in the Rowe ($P = .041$) and UCLA scores ($P = .026$). In another study by the same author[31], he evaluated the results of arthroscopic Bankart repair with use of suture anchors and non-absorbable sutures in 167 patients (mean age 25 years) with traumatic recurrent

anterior instability of the shoulder. Mean time of follow up was for 44 months. All shoulder scores improved after surgery ($p < 0.001$). According to the Rowe scale, 130 patients (78%) had an excellent score; twenty-nine (17%), a good score; six (4%), a fair score; and two (1%), a poor score. In another open versus arthroscopic study by Fabbriciani et al[32] involving 60 patients divided into two identical groups undergoing open and arthroscopic repair with metallic suture anchors carrying non-absorbable braided sutures and followed up for 2 years. The only significant difference seen between the 2 groups was for range of motion evaluation with the Constant score. The mean value for group 1 (39.6±0.8) was significantly greater (P= .017) than that for group 2 (37.8± 2.0). In a study performed on Indian population in 2012, Amit Mishra, Pulak Sharma and Deepak Chaudhary (performed at VMMC and Safdarjung Hospital, New Delhi, India) [33] reported report the clinical outcome of arthroscopic repair of Bankart lesion in 50 patients. Average age was 26.83 years and mean period of follow up was 27 months. Thirty six patients (72.0%) had excellent results, whereas seven patients (14.0%) had good results. In a study performed on Turkish population[20], 41 patients (mean age 24.4) underwent arthroscopic Bankart repair with knotless anchors for posttraumatic recurrent anterior glenohumeral instability. Postoperatively the mean follow up was 29.8 months (range to 6 to 62 months). According to Rowe score, the results were excellent in 31 patients (75.7%), good in 6 patients (14.6%), fair in 3 patients (7.3%) and poor in 1 (2.4%) patients. The mean preoperative Rowe score was 20.1, which increased postoperatively 89.1. Preoperative mean Constant scale was 64.2 and 87.6 postoperatively. In our series, the mean pre-operative Rowe score which was pre-operatively 22 (median 25, SD=10.22) increased post-operatively at 6 months to 71.83 (median 75, SD=18.17) and to 80.17 (median 75, SD=11.78) at the end of follow up period ($p<0.001$). The final results according to Rowe score were fair in 6 (20%) patients, good in 10 (33.3%) patients and excellent in the remaining 14 (46.6%). The mean Constant-Murley score which was pre-operatively 41 (median 39, SD=8.2) increased post-operatively at 6 months to 68.2 (median 72, SD=11.9) and to 75.83 (median 79, SD=12.12) at the end of follow-up period ($p<0.001$). The final results according to Constant-Murley score were poor in 7 patients (23.3%), fair in 8 patients (26.6%), and good in 12 (40%) patients and excellent in the remaining 3 (10%). The mean University of California and Los Angeles score which was pre-operatively 14.1 (median 14.5, SD=3.0) increased post-operatively at 6 months to 29.3 (median 30, SD=3.87) and to 30.27 (median 31, SD=3.67) at the end of follow-up period ($p<0.001$). The final results according to UCLA rating were fair/poor in 4 patients (13.3%) and good/excellent in 26 (86.6%). Patient satisfaction, quantified by the visual analogue scale, which pre-operatively had a median value of 6 increased to 8 post-operatively.

Study	**Re-dislocation rate**	**Mean Rowe score**	**Mean UCLA score**	**Good+Excellent Result (Rowe score**
Cole et al [21]	24%			
Gartsman et al [22]	7.50%			92%
Mishra and Fanton[23]	7%			
Ide et al [24]	7%			
Westerhide et al [25]	7%	85		
Seedek et al [26]				92.50%
Carriera et al [28]	10%	88		90%
Voos JE et al [29]	18%			
Kim et al [30]				91.50%
Kim et al [31]	4%			95%
Fabricianni et al[32]	0%			
Mishra et al [33]	0%			86%
Gerard et al [38]			32.4±4.6	90%
Omer et al [20]		89.1		90%
Present study	**3%**	**80.17**	**30.27**	**80%**

Table 10: Comparative analysis between the studies including the present study

CONCLUSION

In conclusion, this study shows arthroscopic Bankart repair with suture anchors for recurrent anterior glenohumeral in

stability is a useful and successful procedure. We evaluated our patients after surgery both in objective and subjective terms. The objective shoulder scores, Rowe, Constant-Murley and UCLA, were mostly in the range of fair to excellent and at par with the studies conducted by other authors in different parts of the world. We hope this study will address the paucity of long term follow up studies on arthroscopic Bankart repair with suture anchor. There is definitely scope of more such studies in future, especially to emphasize the correlation between Bankart repair and rotator cuff degeneration and arthritis.

BIBLIOGRAPHY

[1] Vargas A, López M, Lillo C, Vargas MJ. El papiro de Edwin Smith y su trascendencia médica y odontológica [The Edwin Smith papyrus in the history of medicine]. Rev Med Chil 2012;140(10):1357-62.
[2] Flower WH. On pathologic changes produced in the shoulder joint by traumatic dislocation. Trans Path Soc London 1861;12:179-200.
[3] Eve FS: A case of subcoracoid dislocation of the humerus with the formation of an indentation on the posterior surface of the head. Medico-Chirurg Trans Soc London 1880;63:317-21.
[4] Hill HA, Sachs MD: The grooved defect of the humeral head. A frequently unrecognized complication of dislocations of the shoulder joint. Radiology 1940;35:690-700.
[5] Bankart ASB: Recurrent or habitual dislocation of the shoulder joint. Br Med J 1923;2:1132-1133.
[6] Rao JP, Francis AM, Hurley J, et al: Treatment of recurrent anterior dislocation of the shoulder by duToit staple capsulorrhaphy. Results of long-term follow-up study. Clin Orthop Relat Res 1986;(204):169-76.
[7] Karadimas J, Rentis G, Varouchas G: Repair of recurrent anterior dislocation of the shoulder using transfer of the subscapularis tendon. J Bone Joint Surg Am 1980;62:1147-9.
[8] Magnuson PB: Treatment of recurrent dislocation of the shoulder. Surg Clin North Am 1945;25:14-20.
[9] Magnuson PB, Stack JK: Bilateral habitual dislocation of the shoulder in twins, a familial tendency. JAMA 1940;144:2103.
[10] Magnuson PB, Stack JK: Recurrent dislocation of the shoulder. JAMA 1943;123:889-92.
[11] Miller LS, Donahue JR, Good RP, Staerk AJ: The Magnuson–Stack procedure for treatment of recurrent glenohumeral dislocation. Am J Sports Med 1984;12:133-7.
[12] Quigley TB, Freedman PA. Recurrent dislocation of the shoulder. Am J Surg 1974;128:595-9.
[13] DuToit GT, Roux D. Recurrent dislocation of the shoulder. A 24 year study of the Johannesburg stapling operation. J Bone Joint Surg Am 1956;38:1-12.
[14] Sisk TD, Boyd HB: Management of recurrent anterior dislocation of the shoulder. DuToit-type or staple capsulorrhaphy. Clin Orthop Relat Res 1974;(103):150-6.
[15] Helfet AJ: Coracoid transplantation for recurring dislocation of the shoulder. J Bone Joint Surg Br 1958;40:198-202.
[16] Baker CL, Uribe JW, Whitman C. Arthroscopic evaluation of acute initial anterior shoulder dislocations. Am J Sports Med 1990;18(1):25-8.
[17] Liu SH, Henry MH. Anterior shoulder instability. Current review. Clin Orthop Relat Res 1996;(323):327-37.
[18] Rowe CR, Zarins B. Recurrent transient subluxation of the shoulder. J Bone Joint Surg Am 1981;63(6):863-72.
[19] Rhee YG, Cho NS, Cho SH. Traumatic anterior dislocation of the shoulder: factors affecting the progress of the traumatic anterior dislocation. Clin Orthop Surg 2009;1(4):188-93.

[20] Ömer Faruk Erkoçak, Mustafa Yel: The Functional Results of Arthroscopic Bankart Repair with Knotless Anchors for Anterior Glenohumeral Instability. Eur J Gen Med 2010;7(2):179-86.
[21] Cole BJ, L'Insalata J, Irrgang J, Warner JJ. Comparison of arthroscopic and open anterior shoulder stabilization. A two to six-year follow-up study. J Bone Joint Surg Am. 2000;82(8):1108-14.
[22] Gartsman GM, Roddey TS, Hammerman SM. Arthroscopic treatment of anterior-inferior glenohumeral instability. Two to five-year follow-up. J Bone Joint Surg Am 2000;82-A(7):991-1003.
[23] Mishra DK, Fanton GS. Two-years outcome of arthroscopic Bankart repair and electrothermal-assisted capsulorrhaphy for recurrent traumatic anterior shoulder instability. Arthroscopy 2001;17:844-9.
[24] Ide J, Maeda S, Takagi K. Arthroscopic Bankart repair using suture anchors in athletes: patient selection and postoperative sports activity. Am J Sports Med 2004;32:1899-905.
[25] Westerheide KJ, Dopirak RM, Snyder SJ. Arthroscopic anterior stabilization and posterior capsular plication for anterior glenohumeral instability: A report of 71 cases. Arthroscopy 2006;22:539-547.
[26] Sedeek S M, Tey I K, tan A H C. Arthroscopic bankart repair for traumatic anterior shoulder instability with the use of suture anchors. Singapore Med J 2008;49(9):676-81.
[27] Lützner J, Krummenauer F, Lübke J, Kirschner S, Günther KP, Bottesi M. Functional outcome after open and arthroscopic bankart repair for traumatic shoulder instability. Eur J Med Res 2009;14(1):18-24.
[28] Dominic S. Carreira, Augustus D. Mazzocca, Jeremy Oryhon, Frederick M. Brown, Jennifer K. Hayden and Anthony A. Romeo: A Prospective Outcome Evaluation of Arthroscopic Bankart Repairs: Minimum 2-Year Follow-up, Am. J. Sports Med 2006;34:771.
[29] Voos JE, Livermore RW, Feeley BT, Altchek DW, Williams RJ, Warren RF, et al Prospective evaluation of arthroscopic bankart repairs for anterior instability, Am J Sports Med 2010 Feb;38(2):302-7.
[30] Seung-Ho Kim, Kwon-Ick Ha, Sang-Hyun Kim: Bankart repair in traumatic anterior shoulder instability, open versus arthroscopic technique. J Arthroscopy 2002;18(7):755-63.
[31] Kim SH, Ha KI, Cho YB, Ryu BD, Oh I. Arthroscopic Anterior Stabilization of the Shoulder, two to Six-Year Follow-up. J Bone Joint Surg Am 2003;85(8):1511-8.
[32] Fabbriciani C, Milano G, Demontis A, Fadda S, Ziranu F, Mulas PD. Arthroscopic Versus Open Treatment of Bankart Lesion of the Shoulder: A Prospective Randomized Study. Arthroscopy: The Journal of Arthroscopic and Related Surgery 2004;(5):456-62.
[33] Mishra A, Sharma P, Chaudhary D. Analysis of the functional results of arthroscopic Bankart repair in posttraumatic recurrent anterior dislocations of shoulder. Indian J Orthopaedics 2012;46(6):668-74.
[34] Karlsson J, PhD, Magnusson L, Ejerhed L, et al. Comparison of Open and Arthroscopic Stabilization for Recurrent Shoulder Dislocation in Patients with a Bankart Lesion. Am J Sports Med 2001;29(5):538
[35] Arciero RA, Toylor DC, Synder RJ. Arthroscopic bioabsorbable tack stabilization of initial anterior shoulder dislocations: a preliminary report. Arthroscopy 1995;2:410-17
[36] Gartsman GM, Roddey TS, Hammerman SM. Arthroscopic treatment of anterior-inferior glenohumeral instability. Two to five-year follow-up. J Bone Joint Surg Am 2000;82A(7):991-1003.
[37] Snyder SJ, Banas MP, Belzer JP. Arthroscopic treatment of anterior shoulder instability using threaded suture anchors and nonabsorbable suture. Instr Course Lect 1996;45:71-81.
[38] Ee GW, Mohamed S, Tan AH. Long term results of arthroscopic Bankart repair for traumatic anterior shoulder instability. J Orthop Surg Res 2011;6:28.