Outcome of Arthroscopic Stabilization of Anterior Shoulder Instability using All-Suture Anchor Technique

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ABSTRACT

Objective: To determine the functional outcome of arthroscopic shoulder stabilization of anterior shoulder instability using all-suture anchors.

Methods: This descriptive study was conducted in Department of Orthopedics, Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences (PGIMS) Rohtak, India from 9th June 2017 to 31st October 2019.All patients of shoulder instability fulfilling the inclusion criteria were treated with arthroscopic capsule labral repair using all-suture anchors. Post-operatively patients were followed up every two weeks for two months and then monthly for six months and final visit at 15th months follow up. The functional outcome was assessed with Rowe Scoring scale and UCLA(The University of California Los Angeles) scale. Based upon the Rowe score the outcome was rated as excellent(score 100 to 90),Good(89 to 75),Fair(74-51) and poor((50 or less).The UCLA score was rated as excellent/Good(> 27) and Fair/Poor score(< 27 score).Chi-square test was applied and *P* value was calculated for comparing pre and post op Rowe Score and UCLE score and value of < 0.05 was considered significant.

Results: The total number of patients enrolled in our study were 25. The average age of our patients was 23.6 years±5.50 (range 18 to 39 years).Male patients were 23(92%) and female 2(8%).The Rowe score improved from mean preoperative value of 41.8±11.72 to 94.4 ±1.66 post operatively(*P*< 0.05).The UCLA score improved from mean value of 24.56 ± 1.98 preoperatively to 34.68 ± 1.11 postoperatively(*P* < 0.05).As per Rowe score all the subjects had excellent outcome while 23(92%) patients had excellent outcome and 2(8%) good outcome as per UCLA score. None of the patients had recurrent dislocation or instability postoperatively.

Conclusion: Arthroscopic shoulder stabilization using all-suture anchors produced excellent functional outcome without any recurrent instability. It is a nearly scarless, minimally invasive procedure providing robust stability and mobility in selected patients and help patients to return to preinjury level in short span of time.

Key Words: All-suture anchor, arthroscopy, Bankart lesion, Recurrent shoulder dislocation.

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INTRODUCTION

The shoulder joint has the greatest range of motion of all joints in our body but at the cost of decreased stability. It is the most common joint to dislocate and the dislocations can be classified as either traumatic or atraumatic. Traumatic dislocations are related to a specific trauma whereas atraumatic dislocations are related to an underlying pathology which produces generalized ligamentous laxity.[1] The frequency of traumatic shoulder dislocation is 1.7% in general population with male gender and athletes predominantly affected.[2] A variety of treatment options are available for both open and arthroscopic procedures. Although arthroscopic procedures have

gained equivalent results as compared to open techniques, some concerns remain regarding the complications related to anchors like joint damage, anchor migration, cyst formation and loose bodies.[3] But the recently developed all-soft anchors or all-suture anchors which are devoid of any rigid materials are likely to overcome most of these complications, if not all. However due to insufficient studies regarding this anchor, efficacy of this anchor is still not known and there is an inherent doubt in the minds of surgeons regarding its usage. The aim of this study was to assess the functional outcome of capsule-labral repair using all-suture anchors in traumatic anterior shoulder instability.

Our hypothesis was that all-suture anchor produced excellent functional results with minimal complications in majority of our patients with anterior shoulder instability.

METHODS

We conducted this descriptive study in Department of Orthopedics, Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences (PGIMS) Rohtak, India from 9th June 2017 to 31st October, 2019. Inclusion criteria was all adult patients of either gender with traumatic anterior shoulder instability having Bankart lesions and non-engaging Hill Sachs lesions. Atraumatic instability, bilateral shoulder instability, associated rotator cuff tears and patients with recurrence after previous repair were excluded from the study. The study protocols were approved by the hospital Ethical Committee. Informed written consent was obtained from all participants. Complete history was taken from all the patients. Preoperatively clinical tests like apprehension test, relocation sign and sulcus sign were done in all patients. Complete radiographic evaluation was done with Anterio posterior radiograph, Axillary view, Internal rotation view (Grashey view), West point view and Stryker notch views for assessment of Bankart lesion, Hill-Sachs lesion and anterior glenoid rim defects. MRI was done to confirm the findings. The pre-operative Rowe score [4] and UCLA score [5] was calculated by an assistant who was not part of this study team.

Surgical technique

Capsulo-labral repair was performed according to standard arthroscopic procedure. Patients were positioned in lateral decubitus position with 8-10 pounds traction applied to the affected arm to distract the glenohumeral joint. Antero-superior, antero-inferior and posterior portals were made using outside-in technique. Diagnostic arthroscopy was done to assess the integrity of the labrum and glenohumeral ligament. The quality of labrum and capsule was also probed and assessed. After diagnostic arthroscopy, the torn capsulo labral tissue was liberated and elevated from the anterior glenoid neck using an arthroscopic liberator. The antero inferior glenoid neck was freshened using a rasp. Appropriately angled and side specific suture passer was used to take a bite through the capsule-labral tissue segment. Pre drilling over the glenoid was done using a 1.7mm drill bit and subsequently a soft all-suture anchor was inserted. One of the suture limbs were passed through the capsule labral tissue and tightened using sliding Duncan knots. The number of anchors used was dependent on the size of the lesion. Almost all of them required 3 anchors. The anchors were placed at 5:30, 4 and 3 'o clock position on the glenoid clock face. Inferior to superior capsular shift was done by creating a lag between the anchor placement and the bite taken in the capsule labral tissue. Finally, the repaired lesion was probed to check its integrity. Portals were closed using a 2/0 silk suture.

The arm was placed in a universal shoulder immobilizer. The patients were discharged on 2nd or 3rd post-operative day on oral antibiotics for 5 days and appropriate analgesics. The operated shoulder was immobilized for two weeks and only flexion extension of wrist and elbow was allowed. The immobilizer was subsequently intermittently removed at 2-3 weeks depending on patient's comfort and gentle, assisted, passive range of motion (ROM) exercises were started aiming to achieve full passive range of flexion and abduction by 8 weeks. Progressive extension and external rotation were started after 12 weeks. No heavy weight lifting was advised till 12 weeks. Post operatively, all the patients were assessed for ROM of their shoulder joint. Post-operatively patients were followed up every two weeks for two months and then monthly for six months and at final visit at 15th months follow up. Functional outcome was assessed on the basis of scores obtained using ROWE scale UCLA shoulder rating scale. The Row scoring scale[4] has 3 main sections(Stability, Motion, Function).In each section 4 specific questions are asked and rated as excellent(score 100 to 90),Good(89 to 75),Fair(74-51) and poor(50 or less).The UCLA scoring scale[5] has 5 sections(Pain, Active forward flexion, Satisfaction of the patient, Function, Muscle strength) with excellent/Good score(>27) and Fair/Poor score(< 27 score).Excellent and good scores are satisfactory while fair and poor are unsatisfactory. Follow up radiographs were advised to document any radiological complication. The post-

operative shoulder dislocation was defined as radiological disruption of glenohumeral joint reduced by the surgeon. Subjective shoulder instability was defined as persistent subjective complaints of apprehension by the patient and with a clinically positive apprehension test.

The data was analyzed with SPSS (Statistical Package for Social Studies) version 20.0. Frequency and percentages were calculated for qualitative variables while mean and standard deviation for quantitative variables. Chi-square test was applied and *P* value was calculated for comparing pre and post op Rowe Score and UCLA score and value of < 0.05 was considered significant. Data presented in table where necessary.

RESULTS

In our study the total number of patients were 25 with mean age 23.6±7 years (range 18 to 39 years). Majority (92%, n=23) of the patients included in our study were male while female patients were only 2(8%). Right side was involved in 18(72%) patients and left in 7(28%). The aetiology of initial dislocation was sports in 14(56%) patients, fall in 8(32%) and motor vehicle accident in 3(12%) patients. In the included subjects 14(56%) were students, 7(28%) manual labourer,2(8%) farmers and 2(8%) house wives. The average age of our patients at the time of initial dislocation was 21.8± 4.77. The average number of episodes of dislocation before surgery were 14.08±8. The average interval between the initial dislocation and surgery was 18.4± 14.88 months. Bankart lesion was noted in all patients while non-engaging Hill Sachs lesions were detected in 24(96%) patients. The average duration of surgery was 74.9±8.9 minutes. Our follow up period was 12 to 24 months (mean 15 months). A comparison of pre op and post op ROWE score and UCLA score of our patients revealed (table I) a statistically significant improvement ($P < 0.05$). As per Rowe score all the subjects had excellent outcome while 23(92%) patients had excellent outcome and 2(8%) good outcome as per UCLA score. All the patients had good range of shoulder motion. The average external rotation was 78.4° ± 2.78°.

None of the patients had recurrent dislocation or instability postoperatively. No intra-operative or post-operative complications were noted. There was just one case of superficial infection of portal tract managed by oral antibiotics. Majority (92%, n=2) of our patients were reported to returned to their previous levels of activity including sports and manual labour. Only 2(8%) cases refused to return to sports citing fear of repeat trauma. No patient was lost to follow up.

Table I: A comparison of pre op and post op Rowe score and UCLA score.

Values	Rowe Score			UCLA Score		
	Pre op	Post op	*P* value	Pre op	Post op	*P* value
Min	25	90	<0.05	19	31	<0.05
Max	70	95		26	35	
Mean	41.8±11.72	94.4±1.66		24.56± 1.98	34.68±1.11	

DISCUSSION

The current treatment of choice of anterior gelenohumeral instability is repair of the Bankart lesion by reattaching the anterior-inferior labrum and ligament to the glenoid labrum along with reduction of redundant capsule.[6,7] The glenoid labrum contributes 50% to the total depth of glenoid socket and this socket deepening effect of the glenoid labrum greatly enhanced the shoulder stability.[8-10] The bumper effect of labrum is lost due to avulsed or detached labrum making the humeral head more prone to roll off the edge of glenoid causing significant shoulder instability resulting in subluxation or dislocation.[11]This socket deepening bumper effect can be restored by reattaching the labrum onto the articular surface with the help of sutures or suture anchors done either open or arthroscopically.[6,9,11]

In the current study, we have used a novel form of suture anchor known as All-suture anchor. This is different from other anchors as it is composed entirely of suture materials and does not contain any rigid materials. Due to the absence of rigid materials, complications like cartilage damage, migration, loose body formation is avoided. The width of the anchor is considerably decreased, so the pilot hole required to drill in the bone is of smaller diameter as compared to other anchors. The hole drilled in the bone heals itself in a fairly short time. Due to the small pilot hole, more number of anchors can be fixed in the same area of bone.

Previously results of conventional arthroscopic Bankart repair were less satisfactory than open surgery with regard to the recurrence rate.[12] A very high failure rate and hardware related complications have been reported with arthroscopic staple capsulorrhaphy.[13,14] Although variable results have been documented with arthroscopic trans glenoid suture technique,[14-20] the results of our study were excellent and comparable to other authors. In our patients Bankart lesion was noted in all while non-engaging Hill Sachs lesions were detected in 24(96%) patients. Yiannakopoulos[21] investigated 104 patients of post-traumatic anterior shoulder dislocation and found Bankart lesion in 97% and Hill Sachs in 93%.In our study the average Rowe score improved from preoperative value of 41.8±11.72 to 94.4±1.66 post operatively at 15th months follow up(P <0.05).Baber[22] reported Rowe score of 93 at 2 years follow up while Pamar[23] reported Rowe score of 94.16 of his patients at 2 years follow up.The UCLA score of our patients improved from preoperative 24.56± 1.98 to post-operative 34.68±1.11(P <0.05).Palmar[23] documented UCLA score of 33.83 while Oh and Lee[24] reported 33.6 at final follow up.

Gul[25] treated 62 patients with all suture anchors and noted that 91.9% had excellent results. He reported an increase in mean Rowe and Constant scores from 35±7.2 and 65±6.3 pre operatively to 93.6±5.3 and 92±4.3 post operatively respectively. He concluded that arthroscopic treatment of anterior shoulder dislocation with all-suture anchor is a safe and effective treatment option. Willemot et al [26] treated 20 patients of shoulder instability with all-suture anchors and reported post-operative mean Western Ontario Shoulder Instability Index (WOSI) 70.6±20.3,Disabilities of the Arm, Shoulder and Hand(DASH) score 18.9±13.8 and Constant score 89.3±14. Radiologically, 2(10%) patients showed small cyst formation, 3(15%) patients had tunnel widening and 6(30%) patients had bone edema. No recurrent instability was reported. Lee[27] compared 33 patients of Bankart repair with all-suture anchors and 34 with conventional biodegradable anchor and documented no significant difference in functional outcome as assessed with American Shoulder and Elbow Surgeons score. Although tunnel diameter assessed with CT scan was significantly greater in all-suture anchor than conventional anchors, it did not affect the clinical outcome.

Our study had few limitations. Our sample size was small and the design of our study was descriptive. Our follow up period was short. We could not correlate our functional outcome with age of the patient, time of surgery, number of dislocations and number of anchors. We therefore recommend further studies to address all these limitations.

CONCLUSION

Arthroscopic shoulder stabilization using all suture anchors produced excellent functional outcome without any recurrent instability. It is a nearly scarless, minimally invasive procedure providing robust stability and mobility in selected patients and help patients to return to preinjury level in short span of time.

Conflict of Interests: None

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REFERENCES

1. Youm T, Takemoto R, Park BK. Acute management of shoulder dislocations. J Am Acad Orthop Surg. 2014;22:761-771.
2. Hovelius L. Incidence of shoulder dislocation in sweden. Clin Orthop Relat Res. 1982;166:127-131.
3. Kaar TK, Schenck RC, Wirth MA, Rockwood CA. Complications of metallic suture anchors in shoulder surgery: A report of 8 cases. Arthroscopy. 2001;17(1):31-37.
4. Rowe CR, Patel D, Southmayd WW. The Bankart procedure:a long-term end-result study. J Bone Joint Surg Am.1978;60(1):1-16.
5. Ellman H, Kay SP. Arthroscopic subacromial decompression for chronic impingement.Two-to five-year results. J Bone Joint Surg Br. 1991;73:395-398.
6. Kirkley A, Griffin S, Richards C, Miniaci A, Mohtadi N. Prospective randomized clinical trail comparing the effectiveness of immediate arthroscopic stabilization versus immobilization and rehabilitation in first traumatic anterior dislocation of the shoulder. Arthroscopy. 1999;15:507-514.
7. Kiss J, Mersich I, Perlacky GY, Szollas L. The results of the Putti-Plat operation with particular reference to arthritis, pain, and limitation of external rotation. J Shoulder Elbow Surg. 1998;7:495-500.
8. Cooper DE, Arnoczky SP, O'Brien SJ, Warren RF, DiCarlo E, Allen AA. Anatomy histology and vascularity of the glenoid labrum. J Bone and Joint Surgery Am. 1992;74:46-51.
9. Lippit SB, Vandorhooft JE, Harris SL, Sidles JA, Harryman DT, Matsen FA. Glenohumeral stability

from concavity- compression: A quantitative analysis. J Shoulder Elbow Surg.1993;2:27-35.
10. Howell SM, Galinat BJ. The glenoid-labral socket. A constrained articular surface. Clin Orthop Relat Res.1989;243:122-125.
11. Pappas AM, Goss TP, Kleinman PK. Symptomatic shoulder instability due to lesions of the glenoid labrum. Am J Sports Med. 1983;11:279-288.
12. Coughlin L, Rubinovich M, Johansson J, White B, Greenspoon J. Arthroscopic staple capsulorrhaphy for anterior shoulder instability. Am J Sports Med. 1992;20:253-256.
13. Lane JG, Sachs RA, Riehl B. Arthroscopic staple capsulorrhaphy: A long-term follow-up. Arthroscopy.1993;9:190-194.
14. Matthews LS, Vetter WL, Oweida SJ, Spearman J, Helfet DL. Arthroscopic staple capsulorrhaphy for recurrent anterior shoulder instability. Arthroscopy. 1988;4:106-111.
15. Grana WA, Buckley PD, Yates CK. Arthroscopic Bankart suture repair. Am J Sports Med. 1993;21:348-353.
16. Green MR, Christensen KP. Arthroscopic Bankart procedure: Two- to five-year followup with clinical correlation to severity of glenoid labral lesion. Am J Sports Med. 1995;23:276-281.
17. Morgan CD, Bodenstab AB. Arthroscopic Bankart suture repair technique and early results. Arthroscopy. 1987;3:111-122.
18. Pagnani MJ, Warren RF, Altchek DW, Wickiewicz TL, Anderson AF. Arthroscopic shoulder stabilization using trans glenoid sutures. A four-year minimum followup. Am J Sports Med. 1996;24:459-467.
19. Savoie FH, Miller CD, Field LD. Arthroscopic reconstruction of traumatic anterior instability of the shoulder: The Caspari technique. Arthroscopy. 1997;13:201-209.
20. Torchia ME, Caspari RB, Asselmeier MA, Beach WR, Gayari M. Arthroscopic trans glenoid multiple suture repair: 2 to 8 year results in 150 shoulders. Arthroscopy.1997;13:609-619.
21. Yiannakopoulos CK, Mataragas E, Antonogiannakis E. A comparison of the spectrum of intra-articular lesions in acute and chronic anterior shoulder instability. Arthroscopy. 2007;23(9):985–990.
22. Barber FA, Snyder SJ, Abrams JS, Fanelli GC, Savoie FH. Arthroscopic Bankart reconstruction with a bio absorbable anchor. J Shoulder Elb Surg. 2003;12(6):535-538.
23. Parmar RS, Kapoor S, Sharma B. Arthroscopic Bankart repair following traumatic recurrent shoulder dislocation: A prospective review of 30 cases. J Orthop Surg. 2019;27(1):1-7.
24. Oh JH, Lee HK, Kim JY, Kim SH, Gong HS.Clinical and radiologic outcomes of arthroscopic glenoid labrum repair with the Bio Knotless suture anchor. Am J Sports Med. 2009;37(12):2340-2348.
25. Gul O, Okutan AE, Ayas MS. Arthroscopic glenoid labral lesion repair using all-suture anchor for traumatic anterior shoulder instability: Short-term results. Journal of Shoulder and Elbow Surgery.2019;28(10):1991-1997.
26. Willemot L, Elfadalli R, Jaspars KC, Awh MH, Peeters J Jansen N, *et al.* Radiological and clinical outcome of arthroscopic labral repair with all-suture anchors. ActaOrthop Belg. 2016;82:174-178.
27. Lee JH, Park I, Hyun HS,Kim SW, Shin SJ. Comparison of clinical outcomes and CT analysis for tunnel diameter after arthroscopic Bankart repair with the All-suture anchor and the biodegradable suture anchor. Arthrosc J Arthrosc Relat Surg. 2019;35(5):1351-1358.