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ORIGINAL STUDY

Open repair of Bankart lesions using suture anchors in hard workers

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The surgical techniques applied to recurrent anterior dislocation of the shoulder, especially in hard working patients, must reconstruct a stable shoulder joint with a good range of motion, which will not redislocate, so the patients can return to their hard-working duties. The aim of this study was to evaluate the results of open Bankart repairs with suture anchors, in high-demand sportsmen and hard workers with recurrent anterior shoulder dislocation.

Thirty shoulders of 29 patients were included in the study. All patients were active hard workers. A modified deltopectoral incision was used and Mitek GII Suture Anchors were implanted with 7-10 mm intervals into the bone-cartilage zone of the glenoid rim.

Average follow-up time was 30 months (range, 22-38). Postoperative results were analysed according to the Rowe Scoring System. We obtained good and excellent results in 93.3% of cases.

The open Bankart repair using suture anchors appeared in this study as a reliable technique for hard workers or physically high-demand patients.

Keywords : recurrent dislocation ; shoulder ; Bankart lesion ; open repair ; suture anchors.

INTRODUCTION

Recurrent anterior dislocation of the shoulder (RADS) in high-demand sportsmen and hard workers is a serious problem. Several pathologic conditions like Bankart lesions, Hill Sachs lesions or glenoid rim fractures may be associated with RADS and they play an important role in the pathogenesis of recurrence (*9*). The Bankart lesion consists in avulsion of the capsulolabral structures from the glenoid rim and scapular neck (*1, 21, 24*). According to Rowe, it is present in 85% of patients treated for recurrent anterior instability (*28*). The various surgical procedures using different surgical materials and techniques all aim to restore normal anatomy (*1, 9, 12, 14, 29, 31*).

Surgical treatment aims at restoring the continuity of the anterior capsule by reattaching it to the glenoid rim. The open Bankart repair procedure, popularised by Rowe, is the technique most commonly used for this purpose (*28*). Recently, suture anchors have been used increasingly in Bankart repairs (*3, 8, 16, 17, 24, 35*), and arthroscopic repair of Bankart lesions using suture anchors has been

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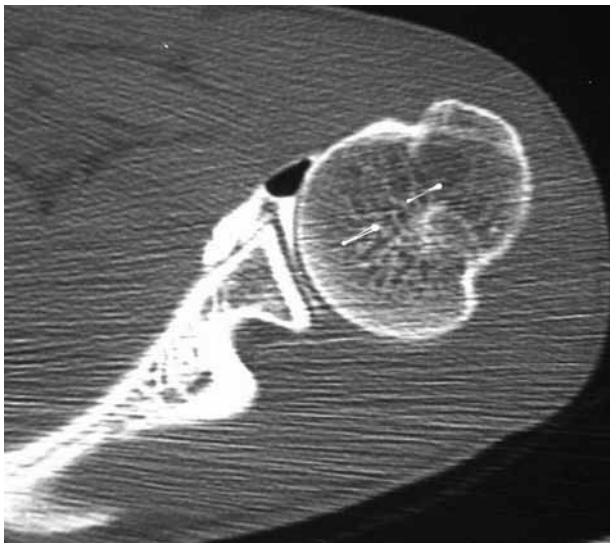

Fig. 1. — Preoperative double contrast CT arthrogram of right shoulder joint shows anterior labral defect and small Hill-Sachs lesion.

reported to be a reliable method (*1, 11, 14, 19, 34, 35, 39*). However arthroscopic repair has been found to have a high rate of recurrence in high-demand sportsmen (*1, 35*). In these patients as well as in hard workers, the traditional open Bankart repair has been recommended.

The aim of this study was to evaluate the results of open Bankart repairs using suture anchors, in hard workers (military personnel) with anterior recurrent shoulder dislocation.

MATERIALS AND METHODS

Thirty shoulders of 29 patients were included in the study ; all of them had presented at least five episodes of anterior dislocation of the shoulder . All were active hard workers (military personnel). The inclusion criteria were unidirectional anterior instability, absence of bony Bankart lesions and presence of a positive apprehension sign. Twenty of the shoulders were on the dominant side. The lesion was bilateral in one patient. The average age of the patients was 22 years (range, 20 to 30). The average age at the first shoulder dislocation was 19.7 years (range, 15-28).

The Bankart lesion was demonstrated with double contrast CT arthrography (fig 1). In CT arthrography we also evaluated the presence of a Hill Sachs lesion and if found, its size was recorded. Lesions of small (less than 20% of the articular surface) or moderate (between 20-40% of the articular surface) size were included into the study.

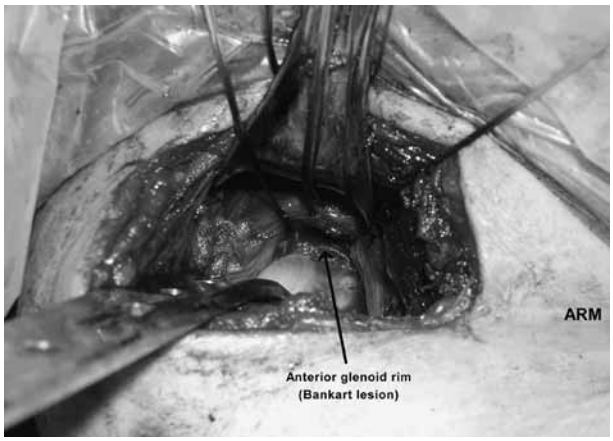

Fig. 2. — The suture anchors with attached non-absorbable sutures were placed in the glenoid rim.

Surgical Technique

A modified deltopectoral incision was used ; the conjoined tendon was not detached. The subscapularis tendon was incised vertically at one centimeter from its insertion to allow for subsequent repair The capsule was exposed and the shoulder was externally rotated. The localisation of the Bankart lesion was noted, and its size was measured. The structure of the capsule was evaluated, looking for any abnormalities. The capsule was opened longitudinally, 1 cm lateral to the glenoid labrum. The axillary nerve and the anterior humeral circumflex artery were protected. Mitek GII Suture Anchors were implanted with 7-10 mm intervals into the bone-cartilage transition zone of the glenoid rim (fig 2). After suturing all of the anchors the ropes of the anchors were ligated one by one in the extracapsular region. The capsule was thus attached to the glenoid, following which the capsular incision was repaired without plication. The amount of tension on the sutures during shoulder rotation was checked and recorded for postoperative rehabilitation planning. At least 2 sutures were used and 5 sutures were used for the largest defect (fig 3).

Postoperative results were analyzed according to the Rowe Scoring System (*28*). The scoring is done over one hundred points, with 50 points for stability, 30 points for function and 20 points for motion. Results are considered poor between 0 and 50 points, fair between 51 and

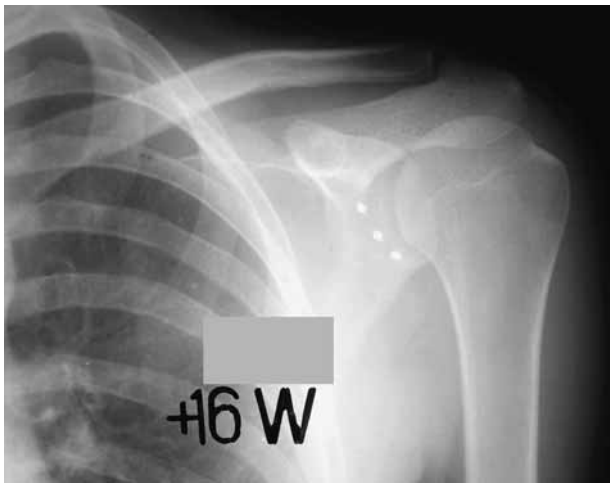

Fig. 3. — Anteroposterior shoulder radiograph. We used 3 suture anchors for a 3 cm Bankart lesion, at 1 cm distance from each other.

75, good between 76 and 90, and excellent between 91 and 100 points (*25, 28*).

Postoperative period

During the first week the patients wore an arm sling in neutral position. During the second and third week, the arm sling was used at night. The "Wilk and Andrews anterior capsulo-labral reconstruction rehabilitation program" was followed (*in 13*) (table I).

RESULTS

Average follow-up time was 30 months (range, 22-38). The average hospitalisation time was 3 days.

The age, dominant side, age at first dislocation, size of the Bankart lesion, number of anchors used and the Rowe score are shown in table II.

We obtained good and excellent results in 93.3% of cases (fig 4 A-D).

In our series we observed small (less than 20% of the articular surface) and moderate (between 20-40%) Hill Sachs lesions in 24 (80%) patients and a Bufford Complex type Bankart lesion in one patient (3.3%).

All of the patients returned to their daily life activities after the third month from the operation. They returned to their military hard duties at the sixth month from the operation. Only two patients with fair results were shifted from active duties to office work.

Table I. — Anterior Capsulolabral Reconstruction Rehabilitation Protocol (Open Procedure) - Wilk and Andrews (*in 13*)

Phase 1-Immediate Motion Phase (0-7 weeks)		Phase 2-Intermediate phase (8-14 weeks)	
0-2 weeks	• Fit sling for comfort for 1 week	8-10 weeks	• Progress to full ROM
	• Use immobilizµation brace for 4 weeks during sleep only		• Perform isokinetic strengthening exercises
	• Gentle active-assisted ROM exercises with T-bar		• Progress all strengthening exercises
	• Perform rope and pulley exercises		• Perform scapular strengthening exercises
	• Perform ROM exercises for hand and elbow	10-14 weeks	• Continue all flexibility exercises, self capsular stretches
	• Initiate isometrics		• Upper body ergometer 90 degrees abduction
3-4 weeks	• Perform active-assisted ROM exercises with T-bar		• Use diagonal pattern (manual resistance)
	• Begin light isotonic for shoulder musculature	Phase 3-Advanced stage (4-6 months)	
	• Begin scapular strengthening exercises		• Continue all flexibility exercises
5-6 weeks	• Progress all active-assisted ROM with T-bar		• Perform isokinetics
			•Perform plyometric exercises
	• Upper body ergometer arm at 90 degrees abduction	Phase 4-Return to Activity(6-9 months)	
	• Use diagonal patterns, manual resistance		• Continue all strengthening exercises
	• Progress all strengthening exercises		• Continue all stretching exercises

Table II. — Patients Demographics

Case	Side	Age	AFD	ND	THSL	SBL (cm)	NA	PRS
1	D	25	19	10	-	2	2	65
2	ND	24	22	100↓	Small	1.5	2	70
3	D	22	20	20	Moderate	2	2	85
4	D	20	15	15	Small	1.5	2	100
5	D	28	18	100↓	Small	3	3	95
6	D	20	19	5	Small	1.5	2	95
7	ND	20	19	5	Small	3	3	95
8	D	26	22	5	Small	3	3	95
9	ND	20	19	5	-	2	2	100
10	D	20	18	5	Moderate	2	2	85
11	D	20	17	10	-	2	2	100
12	ND	20	18	7	Small	3	3	95
13	D	21	19	6	Moderate	2	2	95
14	ND	22	21	10	Small	3	3	95
15	D	20	19	20	Moderate	5	3	80
16	ND	22	20	5	Moderate	3	3	80
17	ND	21	19	5	-	4	3	95
18	D	21	18	5	Small	4	4	95
19	D	26	24	5	Moderate	3	2	90
20	D	21	19	5	Small	3	3	95
21	D	20	18	5	-	2	2	80
22	D	20	19	7	Small	2	2	100
23	ND	21	19	10	Moderate	1.5	2	100
24	D	26	24	15	Moderate	4	4	90
25	D	20	18	100↓	-	4	4	95
26	ND	21	19	100↓	Moderate	4	4	85
27	ND	21	8	100↓	Moderate	4	4	85
28	D	30	28	20	Small	3	4	95
29	D	21	19	100↓	Moderate	5	5	95
30	D	28	19	15	Small	3	3	100

D : Dominant, ND : Non-Dominant, SBL : Size of Bankart lesion.
PRS : Postoperative Rowe score, THSL : Type of Hill-Sachs Lesion.
AFD : Age at First Dislocation, Small : Less than 20% articular surface.
ND : Number of Dislocations, Moderate : Between 20-40% articular surface.
NA : Number of Anchors used.

DISCUSSION

The surgical techniques which are applied to the RADS cases especially in hard working patients must reconstruct a stable and fully mobile shoulder joint that will not re-dislocate, so the patients can return to their hardworking duties. In order to achieve this goal, the surgical technique must reconstruct the capsule at its original anatomic site to permit an early rehabilitation program. The use of suture anchors has improved the outcome of surgical repair of the Bankart lesions by reducing the redislocation rate to minimum levels and allowing for an effective rehabilitation program.

Many surgical repair methods and materials have been used for the management of the Bankart lesion to date (*9, 10, 12, 18, 29*). The purpose of all these techniques is first to prevent redislocation. Preserving the range of motion comes second. While the older methods are criticized for their redislocation rates, the suture anchor technique has been criticized for reducing the range of motion (*9, 10, 12, 18, 29*).

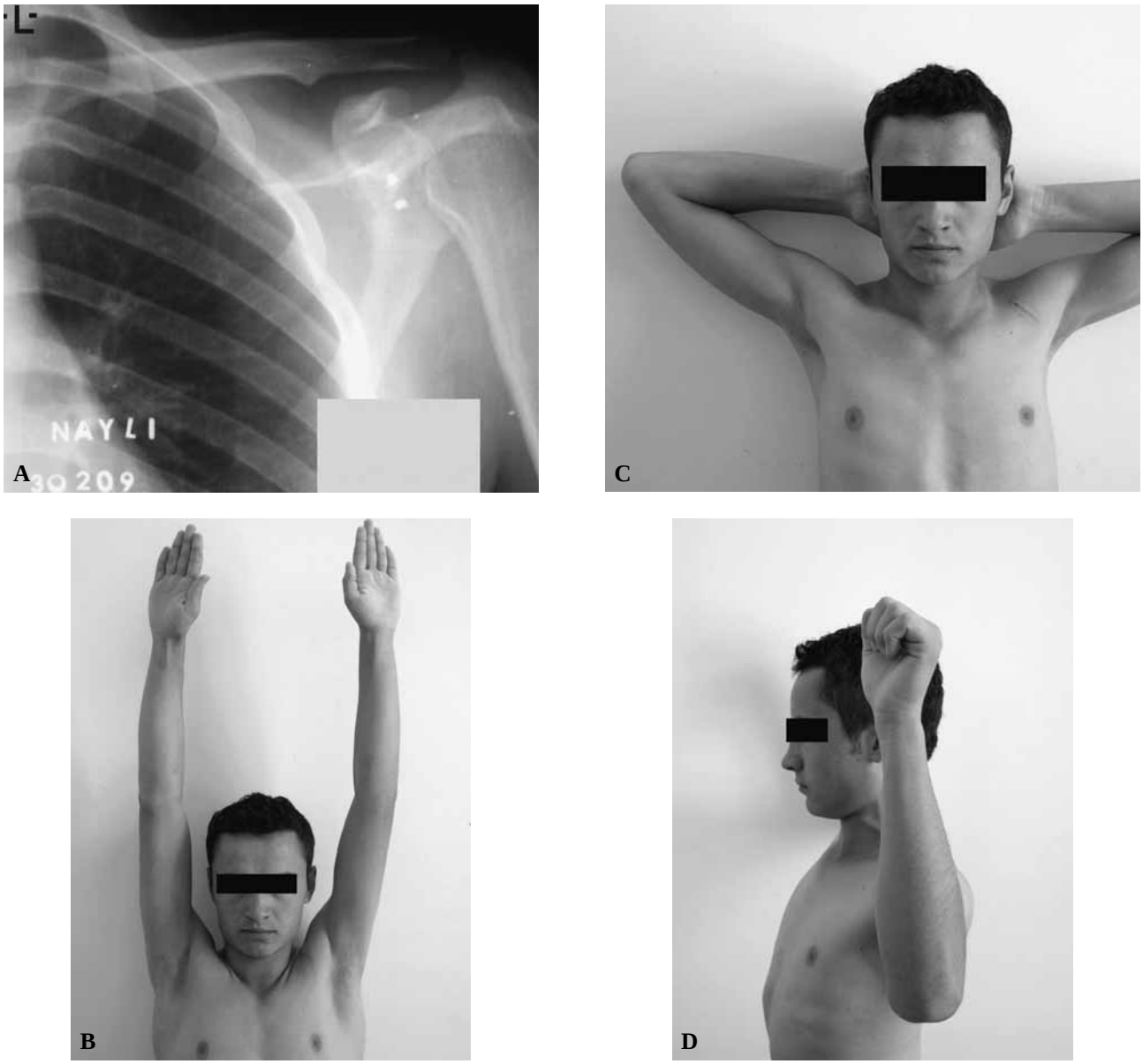

Fig. 4. — This 20-year old patient was operated 12 weeks previously. A) Anteroposterior shoulder radiograph showing two glenoid suture anchors ; B, C, D) The patient had no pain and has full use of the upper extremity.

The suture anchors appeared to us as the most suitable material for reattaching the capsule to its original anatomic site (*37*). We have chosen Mitek GII suture anchors because their implantation is easy. They are also strong enough to withstand mechanical stresses, as shown in experimental studies (*2, 27, 39*). Using suture anchors avoids the complications which may be related with capsule shrinkage, osteotomy of the coracoid, coracoid transfer, staple implantation, bone wedges or osteotomy of the glenoid (*12, 29, 31*).

Double contrast CT arthrography was done in all cases, as it has an important role in pre-operative planning, localising and characterising the lesion (*4, 20, 21, 25, 32*).

We also performed the open Bankart repair exposure which was popularized by Rowe (*28, 29*), but we did not need to osteotomize the coracoid, and a satisfactory exposure was achieved by retracting the conjoint tendon medially. One important point about this technique was freshening the glenoid margin by making multiple holes with a small awl and thin Kirschner wires after the lesion was recognized. This reportedly accelerates healing of the tissue (*19, 28*).

We obtained good and excellent results in 93.3% of our series. In the literature, successful results were reportedly achieved in more than 90% of cases with open Bankart repair (*3, 16, 17, 28, 30*). The classical problem of the open Bankart repair has been the limitation of external rotation by 5 to 20° when the shoulder is at 90° abduction (*3, 6, 8, 15-17, 35*). The limitation of external rotation is a major problem especially in sportsmen (*8*). There are two possible reasons for this limitation of external rotation : the surgical technique and inadequate postoperative rehabilitation (*9*). By using suture anchors, the limitation of external rotation caused by surgical technique is decreased since the anatomic and stable reconstruction is achieved by the suture anchors. Orthopaedic surgeon and physiotherapist must keep in contact in the postoperative rehabilitation period. Especially the safe range of motion zone which was recorded intraoperatively should be reported to the physiotherapist.

The redislocation rate in the series managed by open Bankart repair varies between 0% and 10% (*3, 8, 12, 17, 21, 24, 28*), and the recurrences took place within 18 to 24 months after the operation (*8, 14, 34*). In our series we did not observe any redislocation in 30 months of follow-up time.

Arthroscopic repair techniques have become increasingly popular in the last years (*1, 14, 19, 22, 34, 35, 39*). Although good results have been reported with arthroscopic repair techniques (*1, 7, 14*), there are significant disadvantages to these techniques. Only selected patients can be managed by arthroscopic repair . Arthroscopic repair is more difficult than open repair and should therefore be performed only by well experienced surgeons (*19, 22, 39*). If it is found during arthroscopic surgery that the labrum is frayed or ruptured, the glenohumeral ligaments are of poor quality or the lesion has a bony fragment of the glenoid rim that can not be managed by an arthroscopic repair procedure, they should be repaired with an open Bankart procedure (*35*). Besides the redislocation rates of the arthroscopic repair techniques are between 16-32% (*14, 19, 35*).

A Hill-Sachs lesion was present in 37-80 % of the cases of recurrent dislocations in several studies (*4, 23, 28, 32, 33, 38*). In our series there were 24 (80%) small and moderate Hill-Sachs lesions observed but none of the lesions caused any postoperative instability, which retrospectively justifies our decision not to treat them specifically.

The Bufford complex is characterized by absence of the antero-superior labrum and cordlike thickening of the middle glenohumeral ligament (*5, 26, 36*). A 1.5% incidence has been reported by Stoller (*36*) for the Bufford complex ; it was 3.3% in our series.

CONCLUSION

The open Bankart repair using suture anchors appeared in this study as a reliable technique for high-demand patients who need strong upper extremities, with stable shoulder joints with a good range of motion.

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