

## Use of the suture anchor in modified open Bankart reconstruction

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**Summary.** *This study describes the 2-year follow-up of Bankart reconstruction in 44 patients with post-traumatic recurrent anterior instability of the shoulder, using suture anchors and reinforcing the repair with a subscapularis overlap. Forty-three of 44 patients (98%) regained normal stability. One recurrent dislocation occurred. The mean loss of external rotation was 15°. The functional results according to the Rowe scoring system were excellent in 30 cases, good in 13 cases, and poor in 1 case. The suture anchors were found to simplify the procedure.*

**Résumé.** *Cet étude présente les résultats avec un recul de 2 ans de l'opération de Bankart sur 44 patients avec instabilité antérieure posttraumatique récidivante de l'épaule utilisant sutures ancrées et fortifiant la réparation avec une suture en paletot du sous-scapulaire. Quarante-et-trois sur 44 patients (98%) retournaient à la stabilité normale. Nous eûmes une reluxation. La limitation moyenne de la rotation externe fut 15°. Les résultats fonctionnels selon l'échelle de Rowe furent excellents dans 30 cas, bons dans 13 cas et mauvais dans 1 cas. Nous avons trouvé que les sutures ancrées simplifient l'opération.*

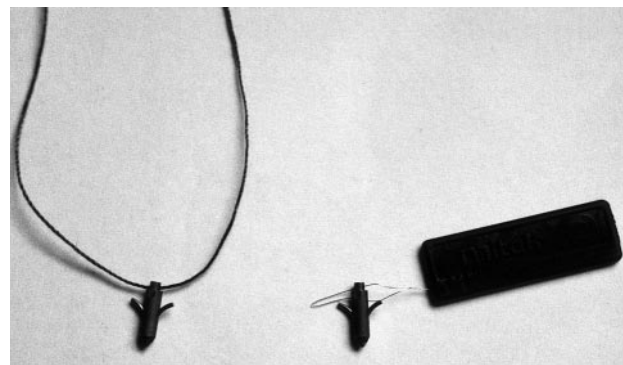
### Introduction

Reattachment of the capsule and glenoid labrum to the glenoid lip is the goal of the Bankart repair [12]. The Putti-Platt operation tightens the subscapularis tendon and therefore decreases external rotation.

The Bankart reconstruction has a high success rate and minimal loss of motion [13, 14], but is technically difficult due to the necessity of curved drill holes in the glenoid rim. Some surgeons have modified Bankart's original technique by developing special awls [13, 14], osteotomes [15], pull-out sutures [10], staples [1, 9] or screws [19] to facilitate the repair.

Suture anchors have been used as a means of reattaching the capsulolabral complex to the glenoid rim [3, 8, 11]. The suture anchor is a small metallic titanium implant with two components: a titanium body and a nitinol (nickel-titanium) arc (Fig. 1). A suture is attached to the device through a drill hole in the body of the anchor. The nitinol arc is straight when it is inserted and recovers its curved shape within the cancellous bone.

The purpose of this study is to report the results of this procedure in the treatment of the recurrent anterior dislocation of the shoulder.



**Fig. 1.** Mitek suture anchor

## Patients and methods

From 1993 to 1995, 44 patients with unilateral recurrent anterior glenohumeral instability underwent modified Bankart reconstruction with the use of the first-generation Mitek suture anchor (Mitek Surgical Products, Norwood, MA) at the Miguel Servet Hospital. Physical examination of all patients before surgery showed a markedly positive apprehension test in 90° abduction and external rotation. No patient had any evidence of multidirectional or posterior instability.

All patients have been followed postoperatively for 24 months or more (range: 24 to 48 months; mean: 30 months), with frequent clinical examinations for range of motion, stability and function, using the Bankart rating scale of Rowe et al. [13]. In this, an asymptomatic shoulder scores 100 points, with points being deducted for loss of function, loss of motion, or instability. Fifty percent of the score is based on stability, and any recurrence of subluxation or dislocation results in a fair or poor score.

There were 37 males and 7 females, with an age range from 17 to 64 years and a mean age of 25 years.

### *Surgical technique*

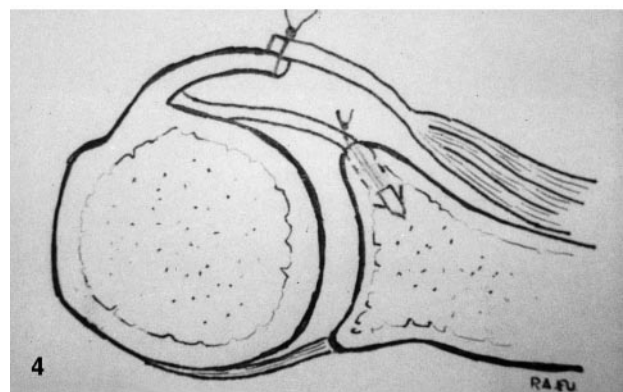
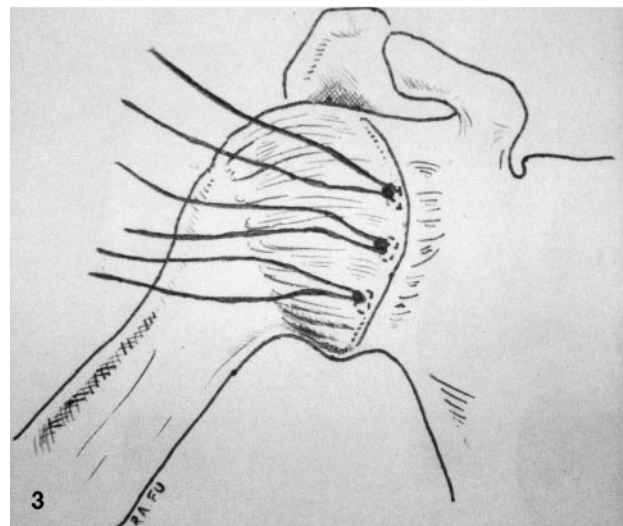
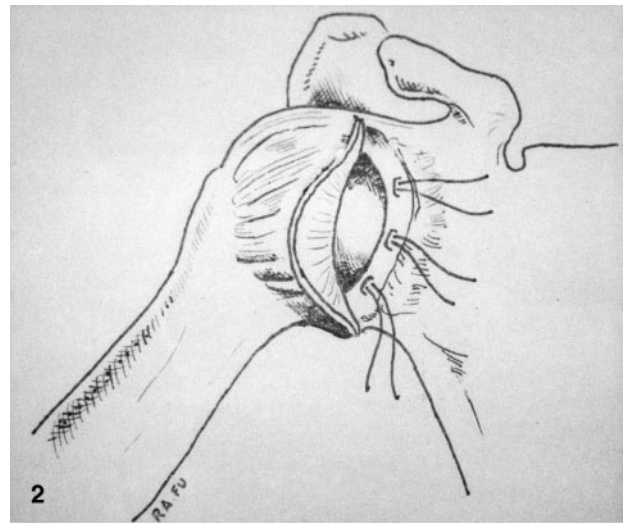
Through the deltopectoral interval, after the subscapularis muscle was divided in the transverse plane and the conjoint tendon retracted medially, the joint capsule was opened in the vertical plane approximately 5 mm lateral to the glenoid rim, with the arm in maximal external rotation. In patients with anterior capsulolabral complex avulsion the Bankart reconstruction was performed using the suture anchor. In patients in which the capsulolabral complex was firmly attached to the glenoid, an inferior capsular shift procedure was carried out, and the suture anchors were not used. These patients were not included on this study.

Three (40 cases) to four (4 cases) 2,7-mm holes were drilled in the anterior glenoid rim just off the articular surface after freshening the bone to a bleeding surface. The number of drill holes depended on the size of the Bankart lesion. Special emphasis was put on making the most caudal drill hole as distal as possible. These holes were 20 mm deep, angled 30° away from the joint surface in order not to damage the articular cartilage. After the anterior aspect of the glenoid rim had been roughened to facilitate soft tissue healing, the suture anchors, with attached nonabsorbable sutures, were placed in each hole (Fig. 2). As the suture was retracted, the anchor arc was engaged in the cancellous bone. The lateral part of the joint was attached to the glenoid rim, using the sutures from the suture anchors (Fig. 3), and the medial part of the capsule was sutured over the lateral capsule, using the same sutures. The subscapularis muscle was resutured with overlap, thus reinforcing the repair and adding a Putti-Platt effect (Fig. 4).

Postoperatively, the shoulder was immobilized with a sling in internal rotation for 3 weeks. Thereafter, the rehabilitation programme was started, with pendulum and wall-climbing exercises avoiding external rotation. At 6 weeks after operation, external rotation exercises and progressive resistive strengthening exercises were begun. A return to athletic activity was allowed at 4 months for noncollision sports and at 6 months for contact sports.

## Results

There were no intraoperative complications as a result of this technique, except for one loose anchor incorrectly placed not engaging in the cancellous bone (Fig. 5). Radiographic follow-up showed no change

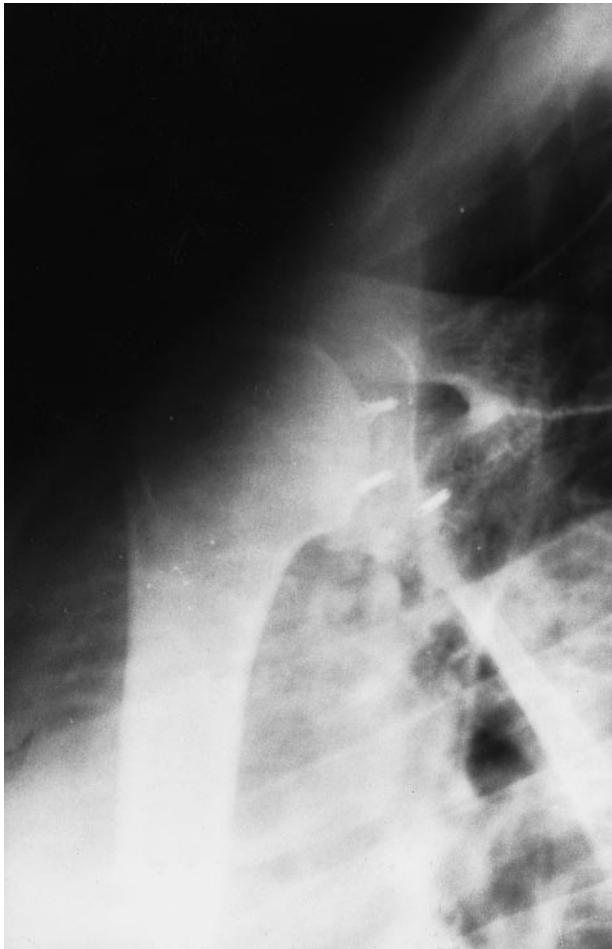


**Fig. 2.** The suture anchors with attached non-absorbable sutures were placed in each drill hole

**Fig. 3.** Reattachment of the joint capsule using the sutures from the suture anchors

**Fig. 4.** Cross-sectional view of the shoulder joint demonstrating capsule reattachment and subscapularis overlap

in the position of the suture anchors. There were no postoperative complications such as infection, migration of the suture anchors, or nerve paralysis. One patient had a recurrent dislocation without fresh trauma.



**Fig. 5.** Loose anteroinferior anchor incorrectly placed

**Table 1.** Range of motion obtained

Range of motion	Patients
Forward elevation	
normal	41
10° lost	3
Internal rotation	
normal	39
5–10° lost	5
External rotation	
normal	1
5° lost	1
10° lost	19
15° lost	5
20° lost	10
25° lost	5
30° lost	3

He had an anteroinferior anchor in a wrong position. At the follow-up examination, 43 of 44 shoulders were classified as stable. None of these patients had a positive apprehension test at follow-up.

Range of motion measurements (Table 1) included internal rotation, forward elevation, and external rotation at the side and in 90° of abduction.

**Table 2.** Functional result

Function	Patients
No limitation	32
Mild limitation	11
Marked limitation	1

**Table 3.** Pain related to sports or hard work

Pain	Patients
No pain	39
Mild pain	5
Severe pain	0

Functional assessment (Table 2) according to the scale of Rowe et al was: no limitation in work or sports in 32 cases, mild limitation in 11 cases, and marked limitation in 1. The 11 patients with some functional limitation had more than 15° reduction of external rotation. The patient with important limitation was the one whose shoulder had recurrent dislocation.

The final parameter assessed was pain related to sports or hard workout (Table 3). Thirty-nine of 44 patients had no pain. However, not all of these patients were able to resume previous sports activities, in spite of normal shoulder stability. Thirty-two returned to their previous sports activities and did not feel any limitation of the operated shoulder. Seven patients chose not to return to collision sports but resumed normal life and light sports. Five patients experienced mild pain and did not return to sports activities. No patient had severe disabling pain. The overall results according to the Rowe were excellent in 30 cases (68,2%), good in 13 cases (29,5%) and poor in 1 case (2,3%).

## Discussion

The Bankart operation has a failure rate of 2–10% [5, 13]. The use of suture anchors makes this operation easier. Richmond et al. [11] presented a preliminary report on the use of suture anchors for Bankart reconstruction in 17 patients with a minimum 1-year follow-up. Ninety-four percent had good to excellent results. Levine and coworkers [8] reported their results with the use of suture anchors in open Bankart reconstruction in 32 patients with a minimum 2-year follow-up. Ninety-three percent of patients were rated good to excellent.

Karlsson et al. [6] described 50 patients using suture anchors to repair capsulolabral complex. The success rate was 86%. All these authors performed the Bankart procedure without an overlap of the subscapularis muscle. We have added a subscapular overlap suture, performing thus a Putti-Platt-Bankart procedure.

The Putti-Platt operation produces a loss of external rotation averaged between 12° and 19° [7]. Recurrent instability occurred in 20% of cases [3]. Hawkins and Angelo [4] presented a series of ten patients who developed osteoarthritis at an average of 15 years after Putti-Platt repair. Collins et al. [2] reviewed 58 Putti-Platt and 48 Putti-Platt-Bankart procedures, showing a redislocation rate of 11%, residual pain in 20% of the patients, and an average restriction of external rotation of 20°. We have found that when the restriction of external rotation is greater than 15°, there is sometimes a functional limitation; and always, when is greater than 20°. Levine et al. [8] reported that external rotation was limited by 5° to 10° in 52% of their patients. Karlsson et al. [6] found that external rotation was reduced by 15° or more in 18% of their cases. These authors did not practice a subscapularis overlap.

Various arthroscopic devices and techniques have been developed, and procedures using suture anchors [18] and biodegradable tacks [16, 17] have been described. The overall success rate of arthroscopic shoulder stabilization, however, is still not as consistent as the results after standard open Bankart reconstruction, with a recurrence rate between 0 and 44%.

## References

1. Boyd HB, Hunt HL (1965) Recurrent dislocation of the shoulder, the staple capsulorrhaphy. *J Bone Joint Surg [Am]* 47: 1514–1520
2. Collins KA, Capito C, Cross M (1986) The use of the Putti-Platt procedure in the treatment of recurrent anterior dislocations, with special reference to the young athlete. *Am J Sports Med* 14: 380–382
3. Fredriksson AS, Tegner Y (1991) Results of the Putti-Platt operation for recurrent anterior dislocation of the shoulder. *Int Orthop* 15: 185–188
4. Hawkins RJ, Angelo R (1990) Glenohumeral osteoarthritis: a late complication of the Putti-Platt repair. *J Bone Joint Surg [Am]* 72:1193–1197
5. Hovelius L, Thorling J, Fredin H (1979) Recurrent anterior dislocation of the shoulder: results after the Bankart and Putti-Platt operations. *J Bone Joint Surg [Am]* 61:566–569
6. Karlsson J, Järvholm U, Swärd L, Lansinger O (1995). Repair of Bankart lesions with a suture anchor in recurrent dislocation of the shoulder. *Scand J Med Sci Sports* 5: 170–174
7. Leach RE, Corbett M, Schepsis A, Stockel J (1982) Results of a modified Putti-Platt operation for recurrent shoulder dislocation and subluxations. *Clin Orthop* 164: 20–25
8. Levine WN, Richmond JC, Donaldson WR (1994) Use of the suture anchor in open Bankart reconstruction. *Am J Sports Med* 22: 723–726
9. Matthews LS, Vetter WL, Oweida SJ et al. (1988) Arthroscopic staple capsulorrhaphy for recurrent anterior shoulder instability. *Arthroscopy* 4: 106–111
10. Reider B, Inglis AE (1982) The Bankart procedure modified by the use of prolene pull-out sutures. *J Bone Joint Surg [Am]* 64: 628–629
11. Richmond JC, Donaldson WR, Fu F, Harner CD (1991) Modification of the Bankart reconstruction with a suture anchor. *Am J Sports Med* 19: 343–346
12. Rockwood CA, Green DP, Bucholz RW, Heckman JD (1996) *Fractures in adults*. Lippincott-Raven, Philadelphia New York
13. Rowe CR, Patel D, Southmayd WW (1978) The Bankart procedure, a long-term end-result study. *J Bone Joint Surg [Am]* 60: 1–16
14. Rowe CR, Zarins B (1981) Recurrent transient subluxation of the shoulder. *J Bone Joint Surg [Am]* 63: 863–872
15. Schwartz DJ (1968) The Bankart shoulder repair made easier. *Clin Orthop* 56: 69–72
16. Speer KP, Warren RF (1993) Arthroscopic shoulder stabilization. a role for biodegradable materials. *Clin Orthop* 291: 67–74
17. Speer KP, Warren RF, Pagnani M, Warner JJP (1996) An arthroscopic technique for anterior stabilization of the shoulder with a bioabsorbable tack. *J Bone Joint Surg [Am]* 78: 1801–1807
18. Wolf EM (1988) Arthroscopic anterior shoulder capsulorrhaphy. *Tech Orthop* 3: 66–73
19. Zuckerman JD, Matsen FA (1984) Complications about the glenohumeral joint related to the use of screws and staples. *J Bone Joint Surg [Am]* 66: 175–180