



Modified double-row technique for arthroscopic Bankart repair : Surgical technique and preliminary results

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Fixation by a double-row technique is a new concept in arthroscopic capsulolabral reconstruction for anterior shoulder instability. We report here a modified double-row arthroscopic Bankart repair technique. The capsulolabral complex is stabilised by sutures placed in a V-shaped manner. The sutures are fixed to the glenoid by suture anchors, thereby eliminating the necessity to tie or relay sutures under the scope. Compared with the conventional single-row repair method, our method has an advantage in that the complex is attached to the glenoid over a larger area. This procedure was performed on 28 shoulders in 25 patients. The operation time was shortened by almost 30% from that with the conventional procedure, and no complications were encountered in these patients. No recurrence of dislocation or subluxation was noted in 19 joints followed for 24 months or longer.

Keywords : recurrent dislocation of the shoulder ; Bankart repair ; arthroscopic technique ; double row repair.

ation of the Bankart lesion, thanks to the larger area for reattachment (9). However, this procedure is technically demanding, and may prolong the surgical time. We present a double-row technique procedure using suture anchors, which eliminates the need to relay sutures arthroscopically, and thereby significantly simplifies the procedure. Early results with this procedure are promising.

TECHNIQUE

After induction of general anaesthesia, the patient was placed in the beach-chair position. We used standard portals (posterior for visualisation, anterosuperior, and anteroinferior) and standard arthroscopic instruments.

First, the anterior Bankart lesion was assessed, and the capsulolabral complex was repositioned

INTRODUCTION

Arthroscopic Bankart repair has now become a viable option of treatment for anterior instability of the shoulder joint (4). Advances in the surgical technique have largely contributed to the widespread use of the procedure and the improvement in results. In particular, the recent introduction of the double-row technique has enabled more stable fix-

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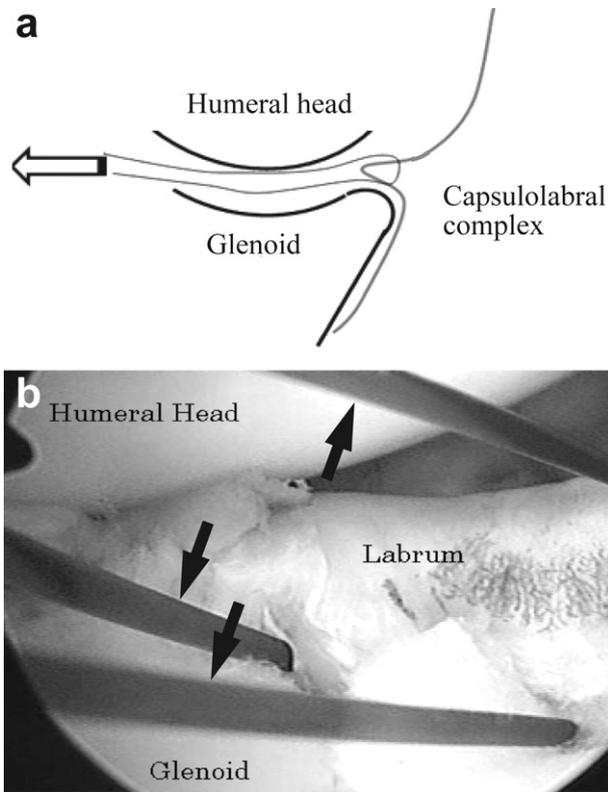


Fig. 1. — (a) Schematic representation of the capsulolabral complex reduced to the site of re-attachment by an antero-superiorly pulling traction suture. (b) Arthroscopic view of the capsulolabral complex in a reduced position. Two traction sutures are used in this patient.

following a modified Boileau *et al* technique (1). The damaged capsulolabral complex was detached from the glenoid neck down to the 6 o'clock position. Soft tissues covering the anterior part of the glenoid neck were completely removed and the underlying bony surface was exposed. Using a high-speed bur, a light decortication was performed on the glenoid margin and the medial wall. One or two No. 2 non-absorbable monofilament sutures (Ethibond, Ethicon, Somerville, NJ, USA) were then passed through the capsulolabral complex at the 5 o'clock position. The thread was retrieved through the anterosuperior cannula and the ends were placed outside the joint. Pulling these threads in an anterior-superior direction anatomically reduced the capsulolabral complex, and this position was maintained until final fixation (Fig. 1).

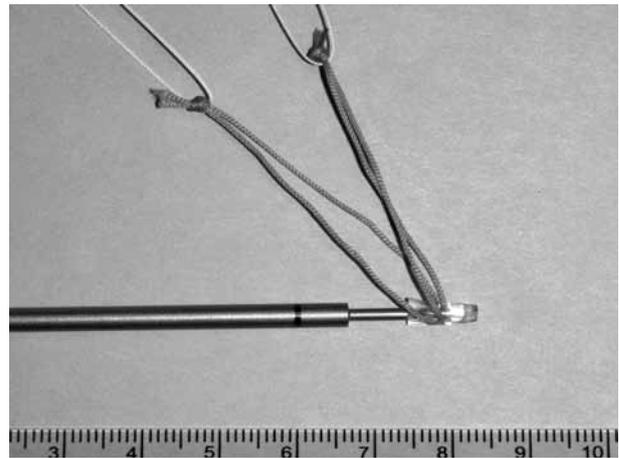


Fig. 2. — Photograph showing a Panalok anchor attached with two double-looped Ethibond sutures.

A Mitek drilling guide (DePuy Mitek, Raynham, MA, USA) was inserted into the joint, and a drill hole was made on the glenoid neck at the 5 o'clock position approximately 10 mm medial to the articular surface, parallel to the joint surface. Two looped No. 2 Ethibond sutures were attached to a PANALOK® loop anchor (DePuy Mitek) (Fig. 2), which was inserted into the prepared drill hole after penetrating the capsulolabral complex (Fig. 3).

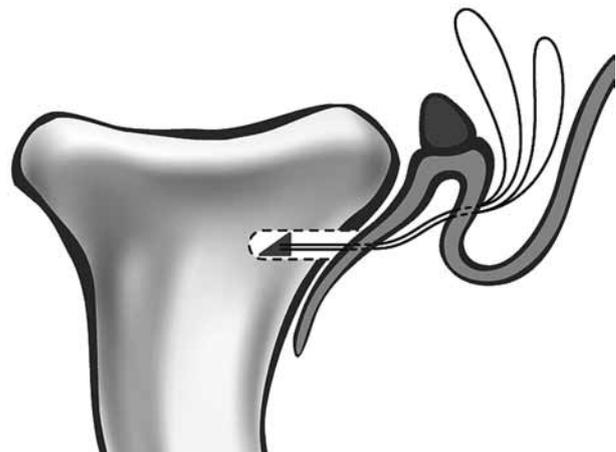


Fig. 3. — Schematic representation of a transverse section of a left shoulder showing the placement of the first suture anchor at the glenoid neck. Although not shown, the capsulolabral complex is held at the reduced position by the traction suture during the placement of the double-looped sutures.

A drill bit and a Mitek drilling guide used to make the drill hole were used again here to make the Panalok anchor and sutures pass through the complex. The complex was penetrated twice ; first at a few millimetres above (lateral to) the labrum, and then at the drill hole prepared on the glenoid neck. The first penetration site above the labrum was eventually fixed at the drill hole, and this made for tightening of the loose joint capsule. The amount of tightening was 4-8 mm in our series of patients. Next, the free ends of the looped Ethibonds were secured to the glenoid. For this, two drill holes were made on the articular surface 5-8 mm apart, 2-3 mm posterior to the anterior margin of the joint surface, and the free ends of the looped sutures were pulled into the joint cavity and fixed, respectively, by placing two BIOKNOTLESS® suture anchors (DePuy Mitek) into those holes (Fig. 4). The tension of the looped sutures was individually adjusted by the depth of insertion of the suture anchors, in order to reduce the capsulolabral complex optimally. Thus, the capsulolabral complex was fixed to the glenoid by two looped sutures placed in a V-shaped manner. These steps were repeated until the entire

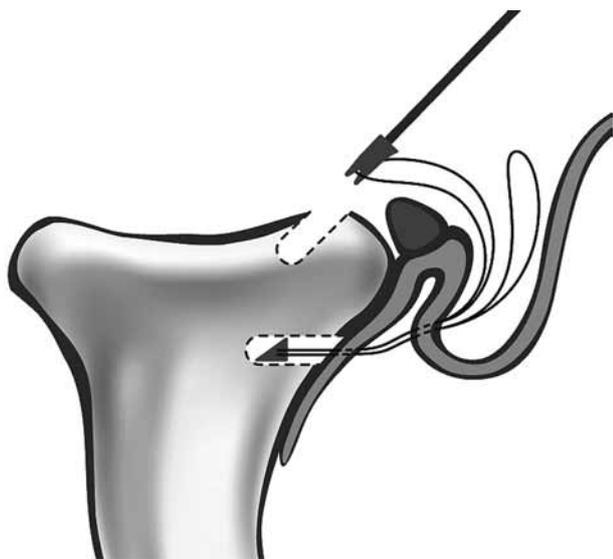


Fig. 4. — Schematic representation of the insertion of the second suture anchor to fix a looped suture. The end of the other looped suture will be fixed by another suture anchor. Although not shown, the capsulolabral complex is held at the reduced position by the traction suture during the fixation of the double-looped sutures.

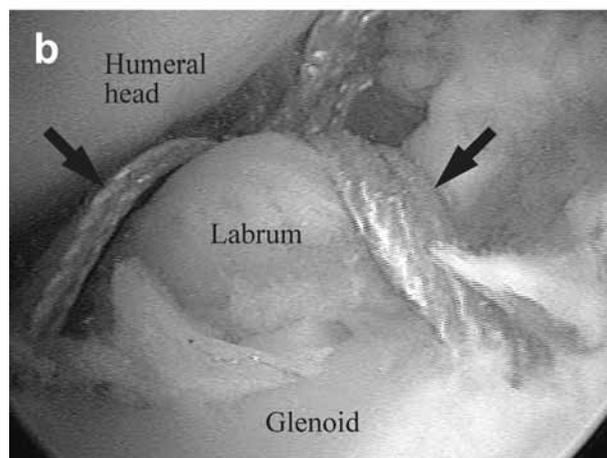
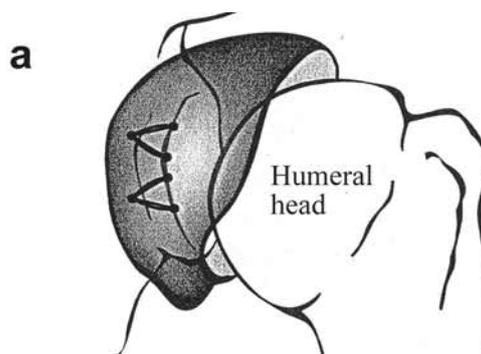


Fig. 5. — (a) Drawing of an anterior view of a left shoulder showing a stabilised capsulolabral complex by two neck anchors with double-looped sutures ending in four glenoid anchors. (b) Arthroscopic view from the posterior portal showing a capsulolabral complex stabilised by double-looped sutures. Arrows indicate two double-looped sutures attached to the same Panalok anchor. Traction sutures were already removed.

capsulolabral complex was secured to the glenoid. In most joints, two or three sets of the suture anchor-looped suture complexes were used for stabilisation (Fig. 5). Finally, the traction suture was removed after confirming firm attachment of the complex.

Postoperatively, the shoulder joint was immobilized for 3 weeks in an adducted and internally rotated position with a shoulder brace (Easy-On Arm Sling, Donjoy, Vista, CA, USA). Three weeks after surgery, gentle pendulum exercises and progressive active-assisted forward elevation were initiated, which was followed by cuff strengthening exercises at 9 months. External rotation was strictly

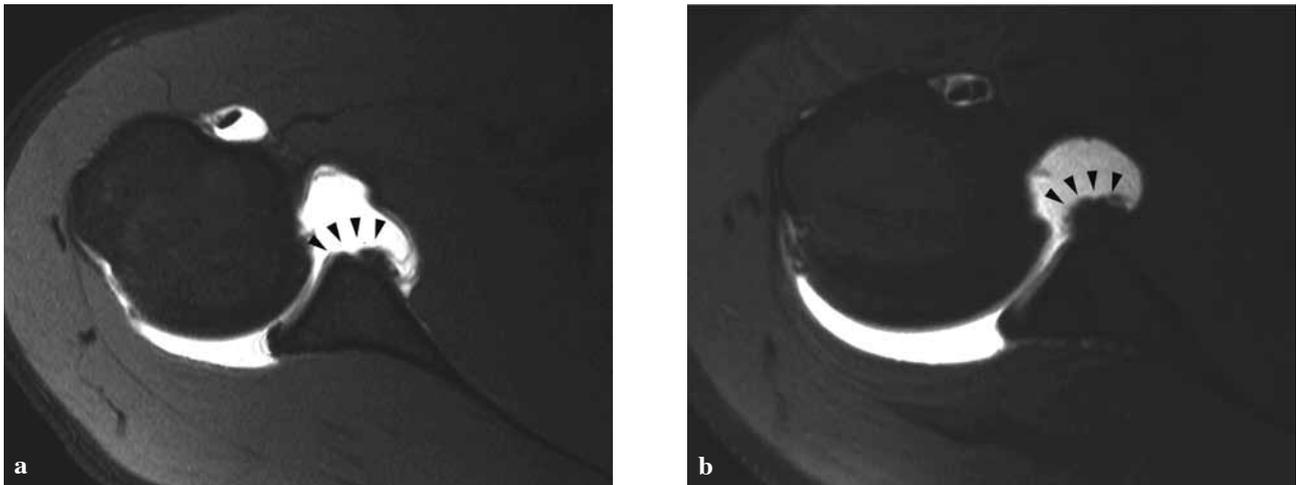


Fig. 6. — (a) MR arthrography before surgery showing a detached capsulolabral complex (arrowheads). (b) MR arthrography of the same shoulder obtained 5 months after surgery indicating anatomical reconstruction of the anterior labral buttress (arrowheads).

prohibited until 12 weeks. Return to sports was allowed 5 months or even later, after confirming successful attachment of the capsulolabral complex to the glenoid by MR arthrography, which was obtained routinely 4-5 months after surgery.

PRELIMINARY RESULTS

To date, we have performed this modified double-row procedure on 28 shoulder joints in 25 patients with recurrent anterior shoulder dislocation. No intraoperative and postoperative complications were experienced, and the mean time of surgery was shortened by 29.4% (from 95 minutes to 67 minutes) as compared to the conventional single-row technique by a single surgeon (HI).

Of these, 19 joints in 18 patients have been followed for more than 24 months. There were 12 males and 6 females, and their mean age was 24.9 years (range, 17 to 30 years). Instability was associated with athletic activities in all patients, and at 24 months follow-up, all of them had returned to their original sport activities. Recurrence of dislocation or subluxation of the involved shoulder was not experienced in any of those shoulders. Twenty-four months after surgery, the average difference in the range of external rotation of the shoulder joint was 6° (range 2° to 12°). The Japan Shoulder Society Score for shoulder instability improved significant-

ly from an average 8 before surgery to an average 90 after surgery. The mean Rowe score increased dramatically from 20.8 to 82 postoperatively.

Illustrative case report

A 19-year-old collegiate American football player presented with a 3-year history of recurrent subluxation of his left shoulder following an episode of anterior dislocation of the shoulder. Physical examination confirmed that the affected shoulder maintained a full range of motion and strength. The anterior apprehension test and the relocation test were positive. Radiographs indicated no bony injuries. Preoperative MR arthrography showed that the anterior capsule and labrum were detached widely and displaced medially from the anterior edge of the glenoid (Fig. 6A).

At surgery, examination under general anaesthesia revealed that the shoulder had a grade 3 anteroinferior instability. At arthroscopy the anterior labrum was found detached from the glenoid from the 6- to the 10-o'clock position. The labrum was stabilised arthroscopically by our modified double-row technique. The recovery of the patient was uneventful. MR arthrography 5 months after surgery showed complete reattachment of the detached labrum (Fig. 6B). After confirming this, he was allowed to return to his original sports

activity at 6 months. At 18 months follow-up, he had resumed the preoperative activity level, and was completely satisfied with the result of the surgery.

DISCUSSION

Despite its wide application, there is still concern about the result of arthroscopic Bankart repair. Although satisfactory results have been reported (5,12), several studies pointed to higher recurrence rates with the procedure (2,4,6,10). This problem could be related to incomplete preparation of the glenoid and deficient stabilisation of the detached capsulolabral complex to the glenoid. In arthroscopic repair techniques, the capsulolabral complex is most often fixed to the glenoid by the single-row procedure (4). However, the anatomical structure of the capsulolabral complex may not be restored by this procedure. For example, the height of the capsulolabral buttress immediately after the single-row repair may change with the arm position (8), suggesting a potential drawback with the conventional method of fixation.

This problem with arthroscopic Bankart repair could be solved by the introduction of the double-row technique. This method of fixation has already been employed in arthroscopic rotator cuff repair, and previous studies have shown that the method could be clinically and biomechanically superior to the single-row procedure (13,14). Therefore, it is reasonable to expect that the result of arthroscopic Bankart repair would be improved by the use of the double-row technique. In fact, preliminary results of this procedure are promising (9,11).

Technical difficulty is a problem with the double-row technique. In the original method by Lafosse *et al* (9), it is not easy to place medial suture anchors properly at the anterior glenoid neck. In their method, the capsulolabrum has to be grasped by sutures repeatedly, and the sutures have to be knotted several times. These processes could also be laborious and may take considerable time to complete.

Our modified method has several advantages over the original method. First, in our procedure, the detached capsulolabral complex could be stabilised to the most suitable position with ease, because the complex is already reduced to that

position when suture anchors are inserted. In the original method, in contrast, the complex is reduced when the sutures are tied under the scope, so the labrum might not be fixed at the best position. Second, fixation of the complex could be more stable with our method. In the original double-row method, the capsulolabral complex is anchored to the glenoid only at points where sutures are placed. With our method, the complex is attached to the glenoid over a larger area by sutures placed in a V-shaped manner. This V-shaped arrangement of the sutures may also enable more even distribution of the contact force between the attached complex and the glenoid. Third, our procedure does not require arthroscopic tying or relaying of sutures, which could significantly simplify the procedure. Fourth and finally, our method can be done with regular surgical instruments, with no need for special devices.

Limitation of external rotation is one of the major problems with the surgery for anterior shoulder instability (3,7). In the current series of patients, the average amount of limitation in external rotation was 6°, which was almost equal to that of the patients treated by the conventional single-row technique. Since the labrum could be attached more stably by our modified method, it might be possible to shorten the period of postoperative immobilisation. We are expecting that this change may minimize the loss of external rotation, without impairing the result.

Since the initial result was so encouraging, we are now treating an increasing number of patients with our modified procedure. Hopefully, their results will further demonstrate the advantages of this new technique for anterior shoulder instability.

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