

Case Report

Late Disengagement of a Knotless Anchor

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Abstract: The knotless anchor is a new type of suture anchor that eliminates the need to perform arthroscopic knots, thus facilitating the performance of arthroscopic shoulder surgery. We report our experience in the use of this type of anchor in arthroscopic Bankart repair and discuss a complication related to using this type of fixation device. **Key Words:** Arthroscopy—Complication—Knotless anchor—Shoulder.

The use of suture anchors revolutionized the techniques of soft tissue reattachment and signaled the beginning of a new era in arthroscopic surgery of the shoulder. Despite the extensive use of anchors in open as well as in arthroscopic surgery, reports of complications in using them are not commonly found in the literature.¹⁻⁵ The complications from hardware dislodgement and migration may be relatively innocent or can be followed by unpleasant or even fatal outcomes. Once an anchor-related complication occurs, it can be a frustrating situation for the surgeon, mandating immediate, effective treatment. The appearance of anchors of new designs and the increasing frequency of surgeries in which anchors are used will also increase the frequency of the reported complications. The effectiveness of an arthroscopic Bankart reconstruction presupposes the successful completion of arthroscopic knots. However, tying arthroscopic knots is a technically demanding procedure. To avoid this procedure, a knotless anchor (Mitek, Norwood, MA) was recently introduced.⁶

We describe a complication related to the use of a knotless anchor. To our knowledge, this is the first reported complication with this type of suture anchor.

CASE REPORT

Between October 2000 and March 2001, 34 knotless anchors have been inserted in 12 patients to treat anterior shoulder instability. The average age of patients at surgery was 25.2 years (range, 18 to 34 years). All patients had chronic traumatic anterior instability and were examined preoperatively under anaesthesia. Only patients with a Bankart lesion and without significant capsular damage were stabilized arthroscopically. Patients who failed to meet these criteria were treated with open shoulder reconstruction.

Most patients received 3 knotless anchors. The average follow-up was 11 months. The mean preoperative Rowe score was 52 points (standard deviation [SD] was 16) and the mean postoperative score was 94 (SD, 11). The difference between these scores is statistically significant ($P < .001$). As of July 2002, no recurrence of shoulder dislocation had occurred. During the insertion of the anchor in 4 cases, the connection between the anchor and the insertor bent, necessitating the use of a new anchor. The tensioning of the capsule was satisfactory in all cases. Only 1 serious complication occurred.

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A 28-year-old man presented for treatment because of chronic traumatic anterior shoulder instability. He reported more than 20 episodes of dislocation. The time lapsed since the first dislocation, which occurred during a basketball game, was 34 months. The patient subsequently underwent an arthroscopic Bankart reconstruction. A distinct Bankart lesion was verified arthroscopically and was reattached using 3 anchors: 1 mini Revo anchor (Linvatec, Largo, FL) at the 2 o'clock position and 2 metallic knotless anchors (Mitek) placed at the 3 o'clock and 5 o'clock positions. The restoration of the capsular tension seemed adequate. In the immediate postoperative radiograph, the anchors appeared to be in good position (Fig 1A).

The shoulder was immobilized postoperatively with an Ultrasling for 4 weeks. During this period, external rotation was restricted to 0° and was gradually increased during the following 4 weeks. Forward flexion was limited to 90° during the first 4 weeks and was gradually increased thereafter. Strengthening of the rotators in mid positions was initiated 6 weeks postoperatively. Gradual return to sports was allowed 3 months postoperatively. Within 4 months, the range of shoulder motion and the strength of the shoulder girdle muscles were restored to almost normal. In a routine radiographic examination 4 months postoperatively, the middle anchor was noted to be out of position (Fig 1B). The patient did not report any subjective symptoms. However, the decision was made to remove the dislodged anchor. During the second arthroscopy, the labrum was found to have healed and a Bankart lesion was not detected. The dislodged anchor was still attached to its sutures, which held it to the anterior labrum (Fig 2). This anchor was the 28th that had been inserted by the department.

The sutures were cut, and the anchor was removed (Fig 3). One of the anchor's arches was found to be broken. A full-thickness defect in the articular cartilage in the anterior part of the humeral head, 2 × 2 cm in diameter and corresponding to the anchor, was also discovered and debrided (Fig 4). The postoperative course was uneventful.

DISCUSSION

Surgical reattachment of the detached anterior shoulder labrum restores the distorted biomechanical efficiency of the shoulder.⁷ In the early 1990s, the most common complication of suture anchor use noted was higher recurrence rates than are found with transosseous stabilization.^{8,9} When the indications are

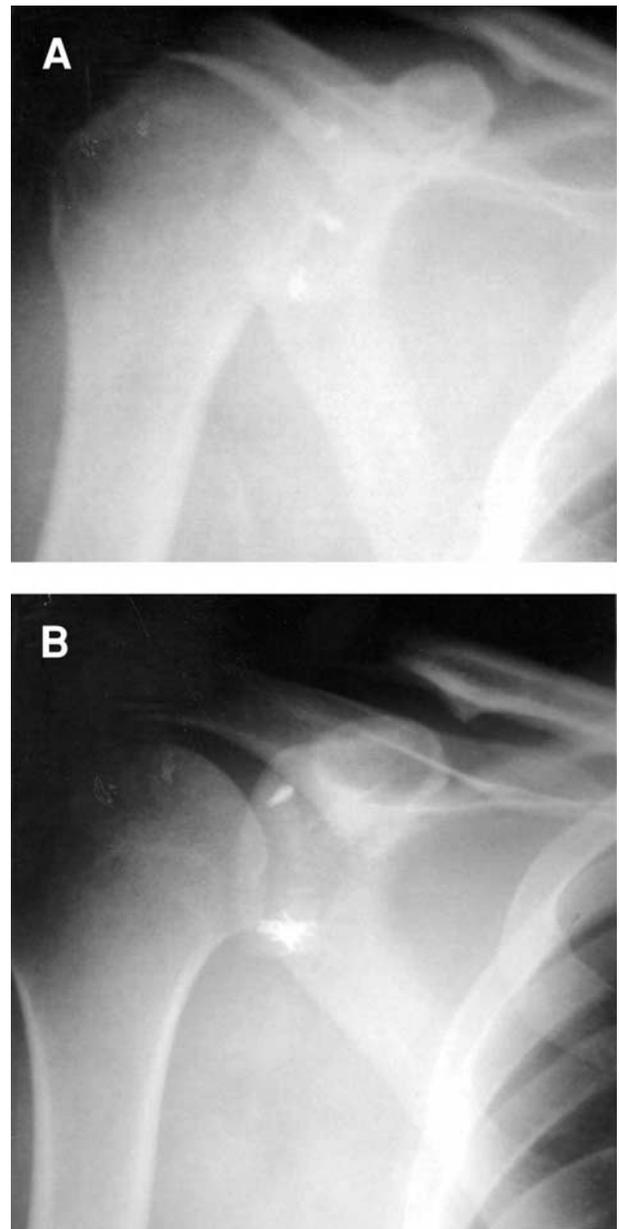


FIGURE 1. (A) Immediate postoperative and (B) 4-month postoperative radiographs. The knotless anchor in the center is out of position. The upper anchor is a Mitek mini Revo anchor.

followed appropriately, arthroscopic Bankart repair using suture anchors has a high success rate, comparable to the rate with open procedures. However, complications can arise from the use of suture anchors, including misplacement, loosening, disengagement, migration, osteolysis around bioabsorbable anchors, and anchor breakage.^{10,11} One case of infection

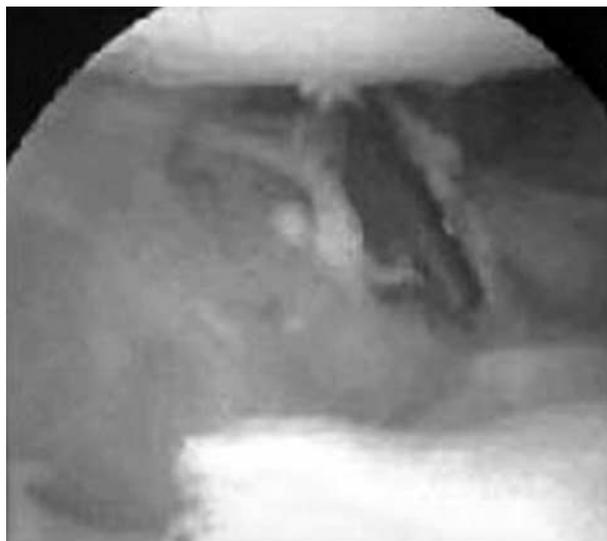


FIGURE 2. Arthroscopic view of the detached anchor. The sutures keep the anchor attached to the anterior labrum.

around the metallic suture anchors after open Bankart repair, necessitating their removal, was reported.¹²

Arthroscopic repairs are technically demanding, requiring the ability to tie arthroscopic knots. Recently, a metallic suture anchor that does not require knots was introduced (Mitek). The length of the anchor is 10.8 mm and the span of the arcs is 7.5 mm. The pullout strength of this anchor is 60 lb. The anchor is inserted into a predrilled hole 2.9 mm × 17.8 mm. A double strand of No. 1 Ethibond suture (Ethicon,

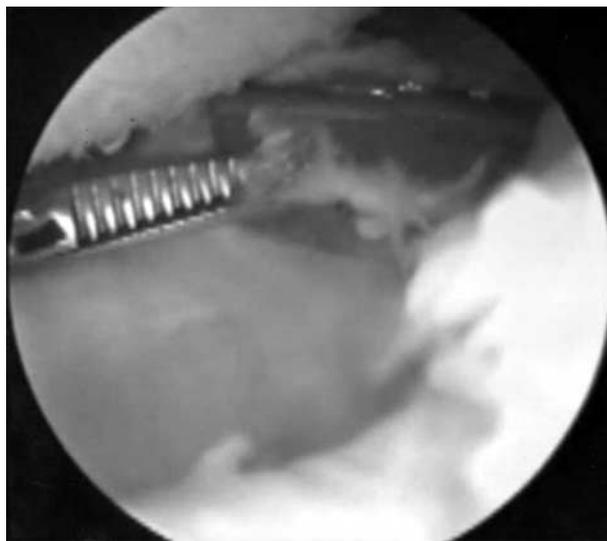


FIGURE 3. The anchor has been removed arthroscopically.

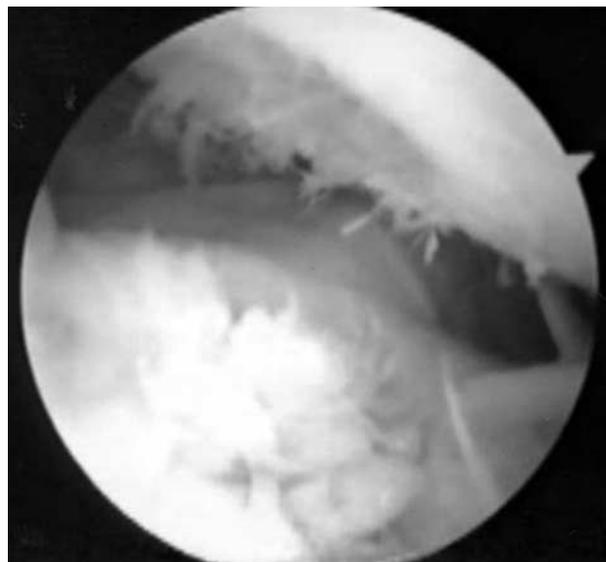


FIGURE 4. The full-thickness defect of the articular cartilage caused by the anchor is seen.

Somerville, NJ) is used, which increases the strength of the fixation. A bioabsorbable knotless anchor has also been introduced.

To our knowledge, no large clinical studies describing the use of these anchors have been reported, and we found no reports discussing the advantages and disadvantages of this type of anchor. In our case the arc in the acute angle of insertion was broken, probably because of cyclic loading and fatigue. There was no significant divergence between the angle of drilling and the angle of insertion; had there been, it would not be possible to insert the anchor without applying excessive force, which was not required in this case. When the videotape of the primary surgery was reviewed, we noted that the angle of anchor insertion did not seem to differ from the angle between the drill bit and the glenoid. The arc may have been deformed during the insertion procedure; however, when the strength of the repair was tested intraoperatively, the anchor had not changed its position.

Repairs of the avulsed inferior glenohumeral ligament that fail usually do so because of soft tissue failure or suture breakage, and not because of anchor pullout. However, the initial strength of the suture anchor is only one factor in determining the adequacy of the labrum repair.¹³ The pullout strengths of metallic and absorbable anchors are greater than the soft tissue and suture strengths. Most anchors fail in tensile testing at the suture or at the knot at the interface between suture and soft tissue.¹⁴ This is the main

reason why there are not many reports of anchor dislodgement in the literature.

Conversely, some devices, such as the bioabsorbable staple, commonly fail because of pullout from the bone or staple breakage.¹⁵ In addition, the ultimate failure strengths of sutures and staples in a canine model was significantly lower for both than the ultimate strength of the intact labrum-bone complex.¹⁶ The knotless anchor shortens the surgery time, is relatively simple to use, and has sufficient mechanical properties; however, strict adherence to the manufacturers' instructions must be followed.¹⁷

The surgeon must suspect intra-articular or interarticular anchor migration in patients who present with mechanical symptoms and pain or a grinding sensation at any time postoperatively. In our case, the anchor migration was asymptomatic, despite the articular cartilage damage, probably because it was detected early. Shoulder joint signs and symptoms can present long after the surgery, when severe articular cartilage damage has occurred. Bioabsorbable anchors are more difficult to detect because they are invisible with standard radiologic imaging. The early recognition of loose or malpositioned anchors in or about the glenohumeral joint must be recognized and treated as soon as possible.

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