

# Arthroscopic Bankart Repair Using Knotless or BioKnotless Suture Anchors: 2- to 7-Year Results

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**Purpose:** This study was performed to evaluate the results of arthroscopic Bankart repair, by use of Knotless or BioKnotless suture anchors (DePuy Mitek, Raynham, MA), for traumatic anterior shoulder instability. **Methods:** We performed a retrospective evaluation of 73 consecutive patients with traumatic anterior instability of the shoulder treated with arthroscopic Bankart repair by use of metallic Knotless or BioKnotless suture anchors. No additional capsular plication, thermal modification, or interval closure was performed in any patient. The senior author performed all procedures. Independent examiners performed physical examinations. Self-assessment questionnaire evaluations were completed, and preoperative and postoperative American Shoulder and Elbow Surgeons and Rowe scores are reported. **Results:** Results at a minimum of 2 years' follow-up (range, 2 to 7 years) are reported for 72 patients (57 male and 15 female patients) available for follow-up evaluation. One patient was lost to follow-up. Of the patients, 5 (6.9%) had post-repair instability (3 dislocations and 2 subluxations). The mean postoperative loss of external rotation, at 90° of abduction, was 1°. All patients who had postoperative instability were aged 22 years or younger. The post-repair instability rate in this age group was 13.5% (5/37). No failures occurred in patients aged over 22 years. Of the post-repair dislocations, 3 (7.5%) were in patients involved in contact or collision sports. All 5 failures occurred early, within 2 years of the index surgery. Revision arthroscopic repairs via Knotless or BioKnotless suture anchors were performed in 3 of 4 patients, and a Latarjet procedure was also performed in the fourth patient. The fifth patient refused further intervention. All of the revision shoulders remained stable at the latest follow-up, 3 of which had at least 2 years of follow-up. **Conclusions:** Arthroscopic Bankart repair via Knotless or BioKnotless suture anchors showed a recurrence rate of 6.9%. Using Knotless or BioKnotless suture anchors provides satisfactory results with a low recurrence rate, minimal loss of motion, and reliable functional return, even in contact and collision athletes. **Level of Evidence:** Level IV, therapeutic case series. **Key Words:** Knotless suture anchor—Arthroscopic Bankart repair.

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Many open and arthroscopic techniques have been described for the treatment of recurrent anterior instability of the glenohumeral joint. The Bankart repair restores stability by reattaching the avulsed anterior inferior glenohumeral ligament (AIGHL) complex to the glenoid neck.<sup>1,2</sup> The reported rates of recurrent instability after open Bankart repair or capsular shift procedures range from 2% to 10%.<sup>3-10</sup> Muscular retraction in large individuals, creation of suture holes in the anterior glenoid rim, and appropriate capsule tensioning can make these procedures challenging. Suture anchors have been developed as an alternative to glenoid drill holes.<sup>11-13</sup>

Arthroscopic Bankart repair procedures have been developed in an effort to restore stability to the shoul-

der while avoiding some of the morbidity associated with the open repair.<sup>14</sup> Some of the poor results of arthroscopic repairs are attributed to labral repair performed without adequately addressing capsular laxity.<sup>15-18</sup> In addition, the fixation methods used in early arthroscopic repairs (tacks, staples, transglenoid sutures) did not achieve anatomic repair and were different than commonly described open repair fixation methods (suture anchors, osseous tunnels), resulting in recurrence rates ranging from 7.3% to 44%.<sup>15,19-37</sup> More recent arthroscopic repair studies describe the use of suture anchors with arthroscopic knot-tying.<sup>6,12,13,38-42</sup> An arthroscopic suture anchor repair has the appeal of using a method of fixation that is identical to that used in an open repair. However, the quality, consistency, and technical challenges associated with arthroscopic knots are concerning.<sup>43,44</sup>

A suture anchor that does not require arthroscopic knot-tying has previously been described.<sup>45,46</sup> The purpose of this article is to report the results, with a minimum of 2 years' follow-up, in patients with traumatic anterior shoulder instability treated with arthroscopic Bankart repair via DePuy Mitek Knotless and BioKnotless suture anchors (DePuy Mitek, Raynham, MA). Our hypothesis is that the results will be comparable to those of open and arthroscopic Bankart repairs.

## METHODS

From March 1998 to February 2003, 73 patients underwent arthroscopic Bankart repairs. For the purpose of this study, we prospectively collected and retrospectively evaluated the data from these 73 patients with traumatic anterior instability of the shoulder treated with arthroscopic Bankart repair via Knotless or BioKnotless suture anchors. One patient was lost to follow-up, leaving 72 patients available for evaluation for this study. The senior author performed all procedures. All surgeries were performed on an outpatient basis.

All patients who were included in this study reported a history of a traumatic event that had caused either an anterior dislocation or subluxation of the shoulder and had recurrent episodes of anterior instability. Dislocation was defined as displacement of the humeral head into a locked position anterior to the glenoid necessitating manual reduction. Subluxation was defined as excessive anterior displacement of the humeral head in which there was spontaneous relocation. Instability was defined as recurrent dislocations or subluxations. Exclusion criteria were as follows:

multidirectional instability, posterior instability, severe glenohumeral degenerative changes, greater tuberosity fracture, humeral avulsion of the glenohumeral ligament, and previous shoulder surgery.

The mean age of the patients at the time of surgery was 26.7 years (range, 15 to 64 years). Of the patients, 37 were aged 22 years or younger. The mean patient age at initial dislocation was 23.6 years (range, 12 to 49 years). There were 57 male and 15 female patients. The mean time between the initial injury and surgery was 57.5 months (range, 1 to 300 months). The dominant shoulder was involved in 40 patients. The mechanism of initial injury was a traumatic dislocation in 45 patients, 12 of whom sustained the dislocation during participation in a contact sport. Twenty-seven patients had an initial traumatic subluxation without dislocation, two of whom sustained the initial subluxation during participation in a contact sport such as football, wrestling, or soccer.<sup>45</sup> A mean of 2.2 preoperative dislocations (range, 1 to 20) occurred in the patients with an initial traumatic dislocation. Metallic Knotless suture anchors were used in the first 45 patients, and BioKnotless suture anchors were used in the subsequent 27 patients. Forty patients were athletes involved in contact or collision sports.

All patients were evaluated preoperatively via a history and physical examination. All patients were evaluated, at a minimum of 2 years postoperatively, by 1 of 3 independent examiners for the purpose of this study. Assessment included observation of active range of motion, measurement of passive range of motion, and strength testing to forward flexion, external rotation, and internal rotation. Anterior and posterior drawer tests and the presence of the sulcus sign were assessed. The apprehension test and Jobe relocation test were performed. We measured range of motion with a goniometer. Anteroposterior, lateral Y, axillary, and acromial radiographs were obtained before the arthroscopic stabilization procedure. Magnetic resonance imaging (MRI) was performed in all patients. The MRI scans ordered by the senior author were always obtained with contrast. Most of the MRI scans with which the patients presented were ordered by their primary physicians without contrast.

Each patient completed a questionnaire, preoperatively and postoperatively, that fulfilled the requirements of the grading system of Rowe et al.<sup>9</sup> and the American Shoulder and Elbow Surgeons (ASES) standardized assessment.<sup>47</sup> Preoperative and postoperative ASES and Rowe scores were recorded. Additional information was obtained regarding the cause of initial dislocation; timing of surgical treatment; sports par-

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