



# Fewer anchors achieves successful arthroscopic shoulder stabilization surgery: 114 patients with 4 years of follow-up

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**Background:** The shoulder is the most frequently dislocated joint, with an incidence of 10 to 20 per 100,000 each year. The optimum number of anchors to use in arthroscopic stabilization is a topic of growing interest; most surgeons use 3. Our stabilization technique is to commonly use only a single suture anchor to purse-string the capsulolabral tissue up and toward the glenoid. This study aimed to ascertain whether successful stabilization can be achieved with fewer than 3 anchors.

**Methods:** Our study comprised 114 consecutive patients with anterior instability and a Bankart lesion undergoing arthroscopic stabilization with 4 years of follow-up. Outcome was measured by Oxford Instability Score (OIS) and recurrence of instability or dislocation. Patient demographics were 86.8% male, 13.2% female, mean age of 31 years, 76.3% Hill-Sachs lesions, 13.2% bony Bankart lesions, 13.2% glenoid defects, and 9.6% SLAP lesions. The majority of patients, 71 patients (62.3%), received only 1 anchor; 40 patients (35.1%) received 2 anchors, and 3 patients (2.6%) had 3 anchors.

**Results:** The mean OIS was 44.3 preoperatively and 17.3 postoperatively ( $P < .0001$ ). There was no difference in OIS improvement between the patients who received a single anchor and those who received 2 or 3 anchors ( $P > .05$ ). Even with minor bony Bankart lesions and glenoid defects, a single suture anchor can be sufficient. Our failure rate of 6.1% is comparable with that of other published series.

**Conclusion:** Successful shoulder stabilization can be achieved with fewer than 3 anchors, and a single anchor is usually sufficient.

**Level of evidence:** Level III, Retrospective Cohort, Treatment Study.

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**Keywords:** Shoulder; dislocation; stabilization; instability; anchor; arthroscopic

The shoulder is the most frequently dislocated joint, with an incidence of 10 to 20 per 100,000 each year.<sup>9</sup> Arthroscopic stabilization techniques have become increasingly popular.

UK National Health Service ethics approval is not required for this work.

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Data from the American Board of Orthopaedic Surgery demonstrated that 71% of Bankart repairs were performed arthroscopically from 2003 to 2005, rising to 88% in 2006 to 2008.<sup>14</sup> Recent evidence also supports the efficacy of arthroscopic stabilization. A meta-analysis,<sup>7</sup> including more than 3000 operations, reports that arthroscopic shoulder stabilization surgery with anchors or bioabsorbable tacks has a rate of failure similar to that of open stabilization after 2 years.

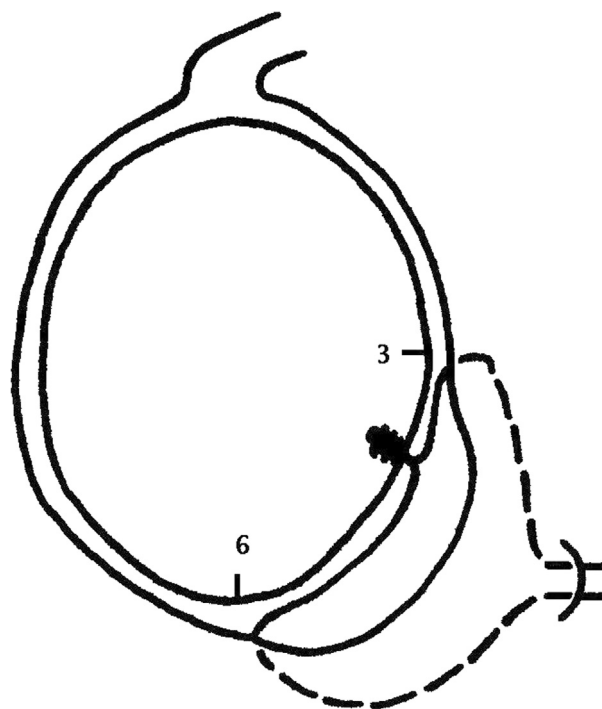
The optimum number of anchors to use in arthroscopic stabilization is a topic of growing interest. The most commonly used number of anchors, as reported by the literature, is 3. A paper by Boileau et al<sup>2</sup> recommended that 4 suture anchors be used because, in their experience, patients with 3 or fewer anchors were at greater risk for recurrence of instability. Similarly, van der Linde et al<sup>23</sup> reported higher recurrence rates with fewer than 3 anchors. Although there are no biomechanical studies evaluating the effectiveness of a single-anchor technique, there are clinical reports of successful results being achieved with fewer than 3 anchors. For example, Levy et al<sup>10</sup> reported success with use of a single purse-string suture anchor in a series of 36 patients treated arthroscopically. In addition, a study from the Copeland group by Massoud et al<sup>12</sup> described a technique for open shoulder stabilization with use of a vertical-apical suture rather than any anchors or tacks. This study aimed to ascertain whether successful stabilization can be achieved with fewer than 3 anchors.

## Materials and methods

The study comprised 114 consecutive patients. Inclusion criteria were all patients with anterior instability and a Bankart lesion undergoing arthroscopic stabilization. Patients with bony glenoid defects >20% were excluded from the study and treated with a Latarjet procedure. All patients were followed up for a minimum of 4 years postoperatively. The Oxford Instability Score (OIS) was collected prospectively. All other data were collected retrospectively by use of patient case notes, x-ray analysis, and a Bluesprier (Bluesprier UK, Droitwich, Worcestershire, UK) computer database of operation records. Demographic data collected included the patient's age and sex and the presence or absence of a bony Bankart lesion, glenoid defect, and SLAP (superior labral anterior-posterior) lesion. Outcome was measured by prospective evaluation of the OIS, which was collected both before and after surgery in the outpatient clinic, and also by recurrence of instability or dislocation. Failure was defined either as a failure of the OIS to improve by 10 points after surgery or by postoperative dislocation.

All operations were performed by the same surgeon (B.V.) between 2005 and 2008. Our stabilization technique is to commonly use only a single suture anchor placed at 4 o'clock. One suture limb of the anchor is placed at 6 o'clock and the other suture limb at 3 o'clock. Positioning of the anchor is illustrated diagrammatically in Figure 1. The anchor is then used to snug the capsulolabral tissue onto a well-prepared glenoid. The most vital step is the anteroinferior release of the displaced labrum and preparation of the glenoid face, followed by the repair of the labrum to create a bumper anteroinferiorly. We use hand-held rasps and no power instruments to prepare the anterior face of the glenoid, which helps preserve bone stock.

This technique, which purse-strings the capsulolabral tissue up and toward the glenoid, is usually done adequately with only 1 anchor. The purse-string allows reduction in the volume of redundant capsule and eliminates drive-through. If this is achieved with a single anchor, we do not use any more anchors. The patient's age and activity level do not influence our choice of the required number of anchors. However, if the capsulolabral tissue



**Figure 1** Diagrammatic representation of anchor positioning for purse-string technique.

has not been adequately snugged down onto the glenoid, we do not hesitate to use 2 or 3 anchors as required. In our experience, associated lesions such as SLAP tears, posterior labral tears, bony Bankart lesions >1 cm, and engaging Hill-Sachs lesions with a depth >5 mm occupying more than 25% of the humeral head increase the likelihood of requiring 2 or 3 anchors. We use the bioabsorbable Lupine anchor with Orthocord (DePuy Orthopaedics Inc, Warsaw, IN, USA), which is ideal because the suture strength allows adequate handling and tension without failure. Some of our early patients were treated with single-loaded anchors, although our more recent preference is for double-loaded anchors as the second suture helps with labrum point fixation at the 3-o'clock position.

Pre-anchor and post-anchor arthroscopic photographs are shown in Figure 2 to demonstrate the use of our technique. To complete the purse-string, both limbs of the anchor are passed, thereby creating an increased surface area of labrum that is directly opposed to the glenoid. The resulting increased volume of labrum is evident in the photograph and creates a physical bumper or tissue barrier to help prevent dislocation. Figure 3 is an arthroscopic photograph of a simple knot without purse-stringing for comparison. In Figure 3, a single limb has been passed, providing point fixation only.

Postoperatively, all patients were placed into a polysling in internal rotation. Pendulum exercises were commenced from day 1. At 3 weeks, a physiotherapy appointment was made, and passive range of movement exercises were commenced. Exercises against resistance and overhead activities were introduced in the sixth postoperative week. Noncontact sports were allowed from 2 months and contact sports from 6 months.

Statistical analysis was performed by the 2-tailed Student *t* test. Comparisons between the group of patients treated with 1 anchor

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