Arthroscopic instability repairs: are they as good as open?

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We now have a better understanding of the pathoanatomy and biomechanics of shoulder instability. Development of arthroscopic techniques over the last two decades has provided a less invasive and potentially more efficacious means of addressing glenohumeral instability. However, most studies suggest that arthroscopic shoulder stabilizations have yet to match the effectiveness of open surgery. Others have suggested that these two procedures may have comparable results if certain criteria are applied. The authors review the current literature to determine the status of our contemporary surgical approaches. Future directions are suggested and surgical considerations and treatment algorithms are also discussed. Curr Opin Orthop 2001, 12:315–318

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In the past century there has been significant progress in the operative management of shoulder instability; as this new century begins, surgical techniques continue to evolve. Better surgical techniques are a reflection of our greater understanding of the pathoanatomy and biomechanics of the unstable shoulder. There has also been a proliferation of new surgical tools and technologic advancement that facilitate the logistics of surgical intervention and allow the surgeon more options in the operating room. Most of the recent advances have been in the realm of arthroscopic surgical techniques, although the introduction of suture anchors has had a profound effect on open Bankart repairs [1].

Historically, the arthroscopic management of shoulder instability demonstrates a higher failure rate compared with shoulder arthrotomy and open stabilization of the glenohumeral joint [2,3]. The proposed advantages of the arthroscopic approach include: more thorough documentation of intra-articular pathology, the ability to address associated injuries, improved cosmesis, greater postoperative motion, faster recovery, and increased cost effectiveness [2,4]. Disadvantages include: limited ability to address capsular laxity, greater potential for complications inherent to a given technique, greater technical skill requirement and, in general, a higher failure rate.

Ultimately, the results of arthroscopic shoulder stabilization must be compared with those of open stabilization. The success rate of open anterior stabilization is routinely reported to be greater than 90% [5–13]. However, postoperative loss of motion and return to pre-injury level of activity are still significant issues. The unstable shoulder can present with a wide range of pathology; open stabilization gives the surgeon the flexibility to address the spectrum of pathology that may be present at surgery. At this time, most orthopaedic surgeons are more comfortable performing open surgery. The goal of arthroscopic stabilization is to achieve a redislocation rate as good as or better than with open surgery while preserving range of motion and functional ability. To date, there are only a few clinical series that directly compared arthroscopic versus open anterior stabilization in patients with traumatic anterior instability of the shoulder [2,14,15••,16,17]. The purpose of this review is to determine if arthroscopic instability repairs are as good as open instability repairs.

Literature review

One of the first articles to compare arthroscopic with open stabilization was published by Guanche *et al.* in 1996 [16]. They compared open and arthroscopic stabilization in patients with traumatic unidirectional glenohumeral dislocations and associated isolated Bankart lesions. There were 27 patients, 15 of whom elected for arthroscopic Bankart repair using a trans-glenoid suture technique. In the 12 patients who chose open stabilization, the Bankart lesion was repaired with Mitek suture anchors (Mitek, Westwood, MA) in 8 patients and sutures through bony tunnels in 4 patients. A glenoid-based capsular plication was also performed in these patients. They were followed-up at 17 to 42 months after surgery. Patients who had open stabilizations had significantly worse results than those who had arthroscopic repairs in terms of stability, apprehension, forward flexion and overall patient satisfaction. In fact, 5 (33%) of the patients in the arthroscopic group experienced recurrent instability, compared with 1 patient (8%) in the open group. Two of the 5 patients in the arthroscopic group who had recurrent instability required a revision open operation. The authors concluded that open stabilization remained the procedure of choice for patients with "true Bankart lesions."

In 1997, Geiger *et al.* [18] compared patients with anterior instability who were treated with a traditional open Bankart repair [11] and arthroscopic stabilization using the transglenoid suture technique. The 18 patients who had an arthrotomy were followed-up at 34 months; the 16 patients with arthroscopic stabilization were evaluated at 23 months. In the group that had open surgery 83% had good to excellent results with no recurrent dislocation or re-operation. In the second group only 50% had good to excellent results and 7 patients (43%) had recurrent instability. The authors anticipated that at longer follow-up the recurrent instability rate would increase in the arthroscopic group. There was no significant discrepancy in postoperative loss of motion between the open and arthroscopic groups.

Steinbeck and Jerosch [19] reported their experience with arthroscopic transglenoid suture stabilization versus open Bankart repair using suture anchors in patients with traumatic anterior instability of the shoulder. They prospectively evaluated 62 patients with recurrent traumatic anterior instability. All patients had arthroscopic evaluation at the time of surgery. Arthroscopic repair was performed in 30 patients and 32 patients had an open Bankart repair. Criteria for arthroscopic stabilization included an isolated Bankart lesion with "an intact detached labral-ligamentous complex and a non-stretched anterior aspect of the capsule." Eight of the patients in the open group had excessive capsular laxity and required a capsulorrhaphy. The mean follow-up period was 36 months for the arthroscopic group and 40 months for the open group. Ninety percent of the patients in the open group had good to excellent results compared with 80% in the arthroscopic group. One patient (6%) had recurrent instability in the absence of any trauma compared with 4 patients (17%) in the arthroscopic group. Ninety-four percent of the patients in the open group had no limitations in sport activities versus 83% in the arthroscopic group. There was no difference in postoperative loss of motion between these two groups. The authors concluded that the overall results for transglenoid suture stabilizations are inferior to open stabilization.

Boszotta and Helperstorfer [20•] evaluated 72 patients who underwent an arthroscopic transglenoid suture repair after traumatic anterior shoulder dislocation. 67 patients were available for follow-up at a median of 66 months with a minimum of two years follow-up. These patients had an average Carter-Rowe score of 91.3 out of 100 with 85% resuming their pre-injury sports activity level. The authors concluded that compared with conservative treatment with reported recurrence rates between 60% and 90%, arthroscopic treatment can lower recurrence rates significantly. In this series, the recurrence rate was 6.9%.

The articles summarized so far have compared arthroscopic repair using a transglenoid suture technique to open Bankart repair and capsulorrhaphy as indicated. In general, the reported failure rates for arthroscopic surgery are uniformly higher than open surgery. Historically, the failure rate of the transglenoid suture technique has ranged from 0 to 49% [3]. This failure rate may be a reflection of the fact that most of these series had a mixed patient population, with a spectrum of instability patterns. It is not unreasonable to assume that the high failure rates may not only reflect poor patient selection but also the technical limitations of this procedure. Although this technique has the ability to address pathologic capsular laxity, it clearly does not reproduce the open capsular shift operation, hence the higher failure rates. Presumably, better arthroscopic techniques may improve the clinical results.

More recently Field and Savoie [21] published an abstract comparing arthroscopic and open Bankart repair. There were 50 patients in each group and the patients were similar with respect to age, number of dislocations, and duration of symptoms. Permanent suture anchors and intra-articular knot tying was performed in the arthroscopic group. Open Bankart repair with suture anchors was done in the open group. The patients were observed for approximately 30 months in each group. Although postoperative functional recovery and range of motion were similar for both groups, 8% of the patients in the arthroscopic group had recurrent instability. The authors concluded that comparable success rates may be obtained for both groups. This is one of the most inter-

esting studies to compare arthroscopic and open shoulder stabilization. The patients were randomized and the patient population was similar in both groups. The authors also used the same method of fixation in both groups. Unfortunately this publication was only an abstract. The final publication should provide more detailed information.

Recently, Gartsman *et al.*[22••] reported on a group of patients with anterior shoulder instability who were treated exclusively with arthroscopic surgical techniques. They reported better results than previous studies of arthroscopic stabilizations and suggested that arthroscopic procedures can be equivalent to open stabilizations. The authors assert that limitations of arthroscopic stabilizations may be caused by failure to address the multiple lesions that may be present at the time of surgery. In a prospective study, the authors reported on 53 patients who underwent arthroscopic stabilization. The surgical philosophy was to arthroscopically identify and treat all lesions that contribute to glenohumeral instability. The mean age of the patients was 32 years (range 15–58) with a mean follow-up of 33 months (range 26–63). Patients were evaluated pre- and postoperatively using the ASES score, Constant and Murley score, the score of Rowe *et al.*, and the UCLA shoulder score. Forty-nine of the patients had a rating of good to excellent according to the scoring system of Rowe *et al.* Only 4 patients (8%) were considered to have a failure of the index procedure. The authors suggest that their low rates of failure with the arthroscopic stabilization can be attributed to careful surgical technique supplemented by repair of anterior and inferior labral tears and soft-tissue tensioning of the capsule and ligaments with suture and thermal capsulorrhaphy techniques, when appropriate.

Gartsman *et al.* support the concept that multiple lesions are responsible for a given instability pattern. Theoretically, if all these lesions are addressed, the patient should have a stable shoulder. There is an element of subjectivity and individual judgment that is required when making the appropriate decision to perform thermal capsulorraphy and rotator interval closure. Clearly, more refined criteria are required to establish appropriate arthroscopic algorithms. In addition, the authors suggest that a high degree of prerequisite technical skill is necessary to adequately perform the suggested procedures.

Cole *et al.* [17] reported on 63 consecutive patients with recurrent anterior shoulder instability who underwent surgical repair. Patients were selected for open or arthroscopic repair based on clinical findings, examination under anesthesia, and diagnostic arthroscopy at the time of surgery. The authors hypothesized that if the decision to treat with open or arthroscopic surgery is made to address specific pathoanatomy, an equivalent outcome could be expected. The prerequisite for arthroscopic intervention was a discrete Bankart lesion, minimal capsular laxity, no concomitant shoulder pathology, and well-developed capsular tissue and ligaments. Thirty-nine patients underwent arthroscopic stabilization with a bioabsorble transfixation device. Patients with capsular rupture, thin capsular tissue, and without discrete ligaments were chosen for open anteroinferior capsular shift procedure. Twenty-four patients underwent an open selective capsular shift. Subsequently, patients were evaluated by completing the American Shoulder and Elbow Surgeons Questionnaire, the SF-36, and the scoring system of Rowe. There were no statistically significant differences between the two groups at mean follow-up of 54 months. Patient satisfaction was 84% in the arthroscopic group compared with 91% in the group that had open surgery. The authors concluded that if patient selection is based on specific pathologic findings at the time of surgery, open and arthroscopic stabilization procedures can have equivalent successful outcomes.

Although the authors' results support their hypothesis, the obvious deficiencies in this study includes the lack of randomization and the absence of a homogenous population to compare both approaches. They also used a bioabsorbable fixation device that has relatively low fixation strength and limited ability to shift the capsule.

Ejerhed *et al.* [23] retrospectively reviewed 18 consecutive patients with recurrent, unidirectional, posttraumatic shoulder instability in which a standardized open Bankart repair using absorbable suture anchors was performed. The aim of the study is to evaluate clinical and radiographic outcomes with the use of a bioabsorbable implant. At a mean follow-up of thirty-one months, there were no redislocations. Rowe and Constant mean scores were 86 and 89, respectively. Furthermore, radiographic assessment of the shoulders revealed that minor or moderate degeneration was present in 56% of patients preoperatively, 83% of the patients at 7 months, and 89% of the patients at 33 months. Moreover, 44% of the patients showed an increase in degenerative changes between the preoperative period and the 33-month follow-up period. Clinically, 94% of the patients reported stable shoulders postoperatively. Visible drill holes or drill holes with cystic changes were seen in 10 of 18 patients at 7 months of follow-up and 8 of 18 patients at 33 months of follow-up. The drill holes and cystic changes did not appear to heal on subsequent radiographs. There was no correlation between degenerative changes and the presence of cystic changes on radiographs. Cyst formation did not affect shoulder function. The authors concluded that it is too early to determine if bioabsorbable implants should be used in the shoulder. Moreover, the authors felt this reaction in the bone was significant.

Discussion

Based on the published reports to date it would seem that, in general, the open anterior stabilization has a more predictable success rate, lower incidence of redislocation, and less potential for complication, when compared with the arthroscopic approach. However in the carefully chosen patient, (*ie*, unidirectional instability, discrete Bankart lesion, well-developed anterior glenohumeral ligaments and minimal capsular stretch) the results of the two approaches may be comparable. In fact, as arthroscopic techniques continue to be refined, this may be the preferred approach in this type of patient when factors such as ease of surgery, cost effectiveness, and cosmesis are considered. The use of suture anchors and the development of techniques to arthroscopically dissect the joint capsule have the potential to expand the indications of arthroscopy to patients in whom significant capsular laxity is a component of the instability pattern. As surgeons become more facile with these techniques, their comfort level with the arthroscopic instability surgery will increase.

The open procedure has also evolved. Based on the information gleaned from cadaveric biomechanical studies, we can appreciate the importance of tensioning different portions of the capsule in different arm positions [24]. This understanding has resulted in stable shoulders with greater postoperative range of motion. The open procedure still offers tremendous versatility to address the spectrum of pathology that can be seen in patients with instability of the shoulder. It may be the procedure of choice in high-risk patients, such as contact athletes.

Our current approach is similar to that of Cole *et al.* [17], where the decision to choose an arthroscopic or open approach is based not only on the patient's expectation but primarily on the pathology found at the time of surgery. With this approach, all patients having instability shoulder surgery are routinely arthroscoped and the decision to perform either approach is based on the pathology present at the time of arthroscopy.

Generally speaking, arthroscopic stabilization may not yet be as reliable as the open procedure, but clearly it has the potential to be. The obvious advantages of arthroscopy will continue to push the development of the arthroscopic techniques and in the correct patient, the results can mirror those of open surgery.

References and recommended reading

Papers of particular interest, published within the annual period of review, have been highlighted as:

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- •• Of outstanding interest

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This was an excellent prospective study in which the authors examined open versus arthroscopic surgical procedures. When the decision to treat with open or arthroscopic surgery is made to address specific pathoanatomy determined at the time of surgery, the authors contend that comparable results of the two procedures could be obtained. Surgical criteria and technical pitfalls are discussed.

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This article presents a pure population of arthroscopic anteroinferior shoulder stabilizations, in which the surgeon addressed all lesions that contribute to glenohumeral instability at the time of surgery. The authors reported better results than previous studies and suggested that arthroscopic procedures can be equivalent to open procedures when the multiple lesions that may be present at the time of surgery are identified and addressed.

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