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ORIGINAL ARTICLE

Arthroscopic plication for multidirectional instability: 50 patients with a minimum of 2 years of follow-up

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Background: Treatment of patients who have not improved after physiotherapy for multidirectional instability (MDI) remains challenging, with no agreed best practice. The purpose of this study was to ascertain whether arthroscopic plication is safe and effective for these patients.

Methods: Fifty consecutive patients who had not improved after at least 6 months of specialized shoulder physiotherapy for symptomatic MDI and no labral lesion at arthroscopy underwent arthroscopic plication between 2006 and 2013. Outcome measures were preoperative and postoperative Oxford Instability Scores (OIS), recurrence of instability, return to work and sport, surgical complications, and patient satisfaction.

Results: The study comprised 32 male and 18 female patients, with a mean age of 26 years (range, 16-46 years). Complete OISs were available in 43 of 50 patients, and 41 patients had good or excellent postoperative OIS. The mean OIS was 16.2 preoperatively compared with 42.5 postoperatively ($P < .001$). There was no difference in OIS improvement between male and female patients ($P = .962$) or in those aged younger than 25 years vs. older than 25 years ($P = .789$). Patients with Beighton scores of 4 to 9 showed smaller OIS improvement ($P = .030$) and were less likely to achieve excellent postoperative OISs ($P = .010$). There were 2 patients with recurrent instability. All patients successfully returned to work, and 45 of 50 patients returned to the same level of sport. Surgical complications were shoulder stiffness in 1 patient that resolved with physiotherapy and 1 superficial wound infection that was successfully treated with flucloxacillin. Forty-seven of 50 patients were satisfied.

Conclusion: Arthroscopic plication is a safe and effective treatment for MDI in patients without labral lesions who have not improved after 6 months of specialized shoulder physiotherapy.

Level of evidence: Level IV; Case Series; Treatment Study

Keywords: Multidirectional; instability; plication; arthroscopic; shoulder; dislocation; atraumatic; surgery

Our hospital protocol did not require Institutional Review Board or Hospital Ethics Committee approval because none of the patients in the study were individually identifiable.

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Treatment of atraumatic shoulder multidirectional instability (MDI) remains a challenge. Distinguishing between shoulder laxity and shoulder instability is important. Laxity is physiologic and multidirectional. Instability, however, is pathologic and may be monodirectional, bidirectional, or tridirectional. Instability is usually anteroinferior or posterior;

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therefore, patients with multidirectional laxity may have monodirectional instability.

MDI often affects young people who play sport or perform repetitive overhead activities. MDI was first described by Neer and Foster[22] as instability occurring in 2 or more directions. Thomas and Matsen[28] described the mnemonic AMBRI –*A*traumatic, *M*ultidirectional, *B*ilateral, treated with *R*ehabilitation and if needing surgery with *I*nferior capsular shift—to describe this subset of patients. Reported etiologic factors include muscle imbalance, congenital hyperlaxity, repetitive microtrauma, and anatomic factors such as reduced glenoid depth.[4,5,10,12,16,17,23,31]

The mainstay of treatment is physiotherapy, which typically includes scapular stabilizer, cuff, deltoid, and proprioceptive exercises.[32,34] The success of physiotherapy varies widely in the literature, with some authors reporting good or excellent results in 80% of patients[3] and others reporting good or excellent results in only 35% of patients.[20] A recent meta-analysis[17] reported that, overall, 21% of patients undergoing physiotherapy for MDI subsequently required surgical intervention.

Multiple surgical options have been described. Current evidence favors open capsular shift and arthroscopic plication.[4,12,17] Arthroscopic thermal shrinkage and laser-assisted capsulorrhaphy are not recommended because of their poor outcomes and high rates of complications.[4,6,12,17] Arthroscopic plication can produce as much volume reduction as open capsular shift,[27] and each 1 cm of plication produces a 10% volume reduction.[25] Meta-analysis reports that recurrent dislocation occurs in 7.5% of open capsular shift operations and in 7.8% of arthroscopic plication operations.[17] There is no evidence to support either of these 2 techniques as being better than the other; however, the advantages of arthroscopic surgery include limited scarring, less pain, avoidance of subscapularis tendon damage, and a trend toward higher return to sport.[1,4,10,12] It has also been argued that analysis of only the more recent studies might favor arthroscopic treatment owing to an anticipated improvement after the learning curve in arthroscopic surgery.[33]

Results of traumatic MDI treatment are equivalent to results of traumatic unidirectional treatment.[1] Patients with MDI without trauma or structural lesions are arguably a more difficult subset. Few studies on MDI without labral lesions exist, and treatment of this subset of patients remains a challenge, with unclear best practice. The aim of our study was to ascertain whether arthroscopic plication is a safe and effective treatment for atraumatic MDI in patients without labral lesions who have not improved after a minimum of 6 months of specialized shoulder physiotherapy.

Materials and methods

Our study comprises 50 consecutive patients with atraumatic symptomatic MDI who did not improve after a specialized shoulder physiotherapy program of at least 6 months' duration. Physiotherapy included cuff, deltoid, and scapulothoracic strengthening as well as core stability and proprioceptive training. The range of physiotherapy duration preoperatively was from 6 months to 5 years. All patients had symptomatic subluxations or dislocations that reduced spontaneously. No patients required hospital reduction of a dislocated shoulder. All patients had shoulder laxity as evidenced by a sulcus sign and external rotation of at least 90° with the arm by the side of the body. All patients had positive apprehension tests and positive examination under anesthesia drawer tests in 2 or more directions. Exclusions were patients with labral lesions or superior labrum anteroposterior lesions seen at arthroscopy, voluntary dislocators, and patients aged younger than 16 years. No abnormalities were seen in the shoulder radiographs of all patients. Most patients also had magnetic resonance arthrograms, and no structural labral abnormalities or lesions were reported.

This was a single-surgeon series (B.V.), with all operations occurring between 2006 and 2013. All patients had a general anesthetic and an interscalene block. We used the lateral position with the arm in approximately 70° of abduction and 10° of forwards flexion. Diagnostic arthroscopy was performed to ensure that no structural lesions were present and that the patient could be appropriately treated by plication.

Our technique is an arthroscopic anteroinferior capsular plication and is demonstrated by arthroscopic photographs in Fig. 1. We do not use suture anchors because there is no torn capsule or labrum to repair. We use a No. 1 polydioxanone suture to purse string the anteroinferior capsule to the labrum. One limb of the purse string is through capsulolabral tissue at 5 o'clock. The other limb brings the middle glenohumeral ligament toward the labrum at 3 o'clock. The knot is tied intra-articularly. The aim of the purse string is purely to reduce the capsular volume and thereby allow improved proprioception to aid the patient's rehabilitation.

After the purse string is completed, the patient is assessed for drive-through. Those with persistent drive-through despite plication (5 of 50 patients) also had a rotator interval closure, which was performed using a single superior-to-inferior stitch of the rotator interval capsule with the knot tied extra-articularly. Owing to our concern about reducing range of motion with rotator interval closure, we did not perform interval closure on patients without persistent drive-through.

All patients were given a polysling to wear postoperatively for comfort, as required, for a maximum of 3 weeks. Pendular exercises were commenced on day 1. External rotation was avoided for 2 weeks. All patients received further specialized shoulder physiotherapy. Strengthening exercises were commenced under physiotherapy supervision at 4 to 6 weeks postoperatively. Forced stretching was avoided completely, and no sport was allowed until patients had regained a good range of motion. This usually occurred at about 3 months postoperatively, although external rotation sometimes took longer. Providing that the range of movement was satisfactory, noncontact sport was allowed at 3 months and contact sport at 6 months. Postoperative follow-up occurred in the outpatient clinic at 6 weeks, 3 months, 6 months, and then every 6 months until discharge. All patients were monitored for a minimum of 2 years postoperatively, with a mean follow-up of 5 years and 1 month (range, 2-8 years).

Primary outcome measures were preoperative and postoperative Oxford Instability Scores (OIS), which were collected