

# Surgery for atraumatic anterior-inferior shoulder instability

## A modified capsular shift evaluated in 20 patients followed for 3 years

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We operated on 20 patients with nontraumatic anterior or anterior-inferior shoulder instability by a modified capsular shift with longitudinal incision of the capsule medially and a bony fixation of the inferior flap to the glenoid and labrum in the 1-3 o'clock position. All patients had tried physiotherapy for a minimum of 1 year. The mean age at the time of sur-

gery was 26 (15-55) years. The mean follow-up was 38 (30-54) months. All patients were examined by an independent observer. The average Rowe score increased to 91 points from 25 preoperatively. 15/20 had little, if any, limitation in sports activities. After 3 years, 1 patient suffered recurrent subluxations and another had a redislocation.

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Nontraumatic recurrent instability of the shoulder is a complex problem. Neer and Foster (1980) were the first to describe multidirectional instability (MDI) or hypermobility of the shoulder because of an excessive looseness of the inferior capsule. They proposed the inferior capsular shift as the best operation.

Since then, several authors have tried to clarify the etiology of MDI. Cofield and Irving (1987) and Gerber (1994) pointed out that patients with MDI often have multidirectional hypermobility but only one direction in which instability occurs. Foster (1983), Norris (1985) and Harryman et al. (1992a) have noted that the clue for the diagnosis of MDI is a positive "sulcus sign", as a sign of increased inferior translation.

Physiotherapy may be sufficient in some patients with multidirectional instability or multidirectional hyperlaxity and a unidirectional symptomatic instability (Burkhead and Rockwood 1992).

We evaluated our results of operative treatment in patients who had no benefit from physical therapy.

### Patients and methods

During 1992-1994 we operated on 20 patients (17 women) with nontraumatic shoulder instability. The average age was 26 (15-55) years, and in 18 patients the dominant side was involved. No patient had been operated on before.

All patients showed multidirectional hyperlaxity having excessive translation in more than one direction, the most severe instability being anterior-inferior. For the diagnosis of anterior and posterior hyperlaxity, the anterior and posterior drawer tests were used. For the determination of inferior laxity of the capsulo-ligamentous complex, the sulcus sign was used. This was positive in all patients who had a distance of more than 1 cm between the inferior margin of the acromion and the humeral head when a downward traction force was applied to an adducted arm. All patients had a positive anterior apprehension test. Preoperatively, 16 patients had recurrent dislocations and 4 recurrent subluxations in the anterior-inferior direction. 11 patients reported more than 20 dislocations. In all patients, reposition was spontaneous. Patients with insurance or psychological problems were excluded from surgery. No patient had suffered enough trauma to cause shoulder instability. None of the patients performed competitive overhead sports or excessive overhead work.

Preoperatively, every patient completed a program of intensive physiotherapy, including specific resistance-strengthening exercises for a minimum of 12 months.

The mean follow-up was 38 (30-54) months. All evaluations were performed by an independent observer, according to the Rowe score (Rowe et al. 1978) with 70% objective data (Stability 50; ROM 20) and 30% subjective data (Function 30). A stan-

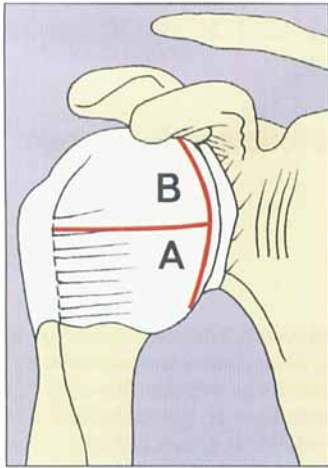


Figure 1. Medially based T for the capsular shift.

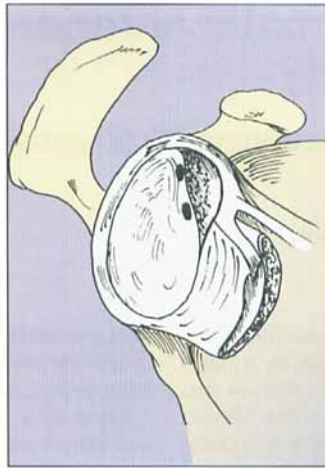


Figure 2. Decortication of the glenoid in 1-3 o'clock position.

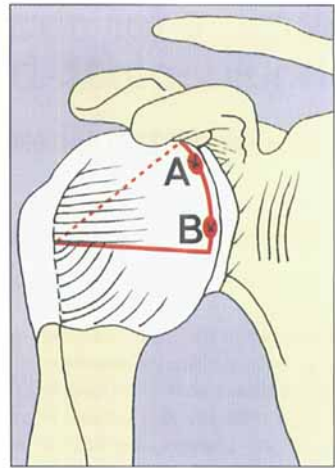


Figure 3. Bony fixation of the inferior capsular flap.

standardized reexamination was carried out in every patient 6 weeks, 3 months, 6 months, 12 months and then at yearly intervals after the operation. 1 patient was lost to follow-up 6 months postoperatively.

### Operative technique

Arthroscopy of the glenohumeral joint was performed in all patients to evaluate the intraarticular findings and to detect possible lesions of the anterior or anterior-superior labrum. Patients with a Hill-Sachs defect or a Bankart lesion were excluded from the study. After arthroscopy, open surgery was carried out.

With the aim of performing a bony refixation and an anatomical reconstruction of the anterior capsuloligamentous complex with respect to the physiological course of the medial glenohumeral ligament and the anterior band of the inferior glenohumeral ligament, we modified the operative technique. The longitudinal incision of the capsule was positioned medially and anteriorly to the labrum, without touching the labrum (Figure 1). Then the anterior-superior labrum was dissected from the glenoid in the 1-3 o'clock position and the bone was decorticated by an air-drill. In 2 cases with a little sublabral hole, this area only needed to be decorticated (Figure 2). Next, the labrum within the shifted inferior part of the capsule could be refixed with 2 bone-anchors. In this way, the shifted capsule was fixed with the same sutures on top of the labrum (Figure 3). While shifting, the arm was positioned at 20 degrees of external rotation and 20 degrees of abduction. The rotator-cuff interval was closed in every case.

All shoulders were immobilized in a sling for 6 weeks. Overhead sports were avoided for 3 months and contact sports for 1 year.

### Results

3 years after the operation, 17 of 19 patients had excellent and 2 had poor results according to the Rowe score (Figure 5). The average preoperative Rowe score was 25 (SD 13) including 3.5 points for stability, 4.5 points for function and 17 points for range of motion. 3 years postoperatively, the mean score was 91 points. This score included 45 points for stability, 27 for function and 19 for range of motion.

Both range of motion and function as well as the total Rowe score improved during follow-up. However, after 1 year postoperatively, the scores remained stable.

1 patient had recurrent subluxations after 1 year. The apprehension test was positive. Another patient had a dislocation of the operated shoulder 18 months postoperatively, without trauma.

15 patients felt little, if any, limitation in their sports activities. None of them performed competitive overhead sports. 2 patients reduced their sports activities and the patient who had a redislocation stopped all kinds of sports. The patient with recurrent subluxations postoperatively did not use the arm preoperatively either in sports or professionally. Only 1 patient could not keep her profession as a cashier in a supermarket because of recurrent instability.

### Discussion

Since Neer and Foster's (1980) classical paper, the standard surgical procedure for MDI—or rather instability with a nontraumatic onset—has been the inferior capsular shift. Nevertheless, Neer and Foster



Figure 4. Postoperatively with 2 bone-anchors.

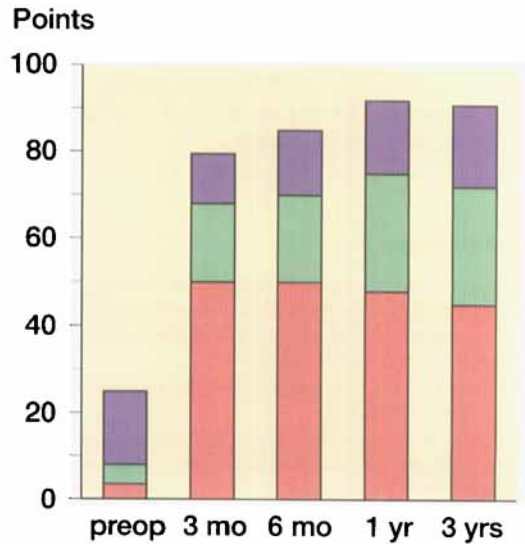


Figure 5. Rowe score including stability (red), function (green) and range of motion (blue).

(1980) pointed out that the initial therapy of MDI should be nonoperative.

Several authors have shown with dynamic electromyographic studies an imbalance of muscular control of shoulder function in patients with instability especially with MDI (Ozaki 1989, Kronberg et al. 1991, Itoi et al. 1992, Steinbeck et al. 1994). In 1992, Burkhead and Rockwood suggested a specific muscle-strengthening exercise program for the treatment of shoulder instability. Four fifths of the patients with nontraumatic instability experienced stability after such a program, unlike patients with a traumatic onset of instability.

For patients with MDI, who failed to respond to nonoperative treatment, Neer and Foster (1980) suggested inferior capsular shift. In cases with anterior-inferior MDI, Altcheck et al. (1991) combined a modified inferior shift with a Bankart procedure. He noted that throwing-athletes were unable to throw a ball as fast as before the operation. Furthermore, 7 of 42 shoulders had posterior hypermobility or instability postoperatively. Cooper and Brems (1992) reported a recurrence rate of 11%. They concluded that the inferior capsular shift is a satisfactory procedure and that symptomatic redislocations generally occur during the early postoperative period the first 2 years after surgery. Hawkins et al. (1987) reported unsatisfactory results in more than one third of their patients after 2-5 years of follow-up. They stated that the surgical outcome in patients with MDI deteriorates with time.

Multiple operative modifications for MDI, including soft tissue and bony variations, have been reported (Bateman 1972, Nobuhara and Ikeda 1984, Ovesen and Nielsen 1985, Helmig et al. 1990, Harryman et al. 1992b, Warner et al. 1992, Warner et al. 1993).

Warner et al. (1992) have demonstrated that inferior humeral translation is restrained by the anterior-superior capsule and ligaments with the arm in adduction, and by the inferior capsule and ligaments with the arm in abduction. As early as 1980 Neer and Foster emphasized that in patients with MDI the capsule volume should be reduced on all sides at surgery. We modified the way to achieve this aim for patients with multidirectional hyperlaxity and recurrent anterior inferior dislocation of the shoulder according to Altcheck et al. (1991). Unlike Altcheck et al., we performed this modification for patients with nontraumatic shoulder instability without any labral lesion. In our opinion, the medial longitudinal incision of the capsule allows preservation of the anatomical course of the glenohumeral ligaments and a bony fixation of the inferior capsular flap. The labrum was dissected only in its superior part to permit refixation together with the shifted capsule. Furthermore, we believe that the revision of the rotator cuff interval is obligatory. This modification of the capsular shift eliminates laxity in the rotator cuff interval, anterior-superior and anterior-inferior capsule. Postoperative immobilization for 6 weeks seems to be accepted by all authors.

Our own results with a modified procedure, similar to the method described by Altcheck et al. (1991), in

20 shoulders with 1 case of recurrent subluxation and 1 case of redislocation after 3 years of follow-up are encouraging. Unlike Altcheck et al. (1991), patients who showed any kind of labral lesion on arthroscopy were excluded from this study.

## References

- Altcheck D W, Warren R F, Skyhar M J, Ortiz G. T-plasty modification of the Bankart procedure for multidirectional instability of the anterior and inferior types. *J Bone Joint Surg (Am)* 1991; 73: 105-12.
- Bateman J E. The shoulder and neck. W B Saunders, Philadelphia 1972: 411-3.
- Burkhead W Z, Rockwood C A. Treatment of instability of the shoulder with an exercise program. *J Bone Joint Surg (Am)* 1992; 74: 890-6.
- Cofield R H, Irving J F. Evaluation and classification of shoulder instability: with special reference to examination under anesthesia. *Clin Orthop* 1987; 223: 32-43.
- Cooper R A, Brems J J. The inferior capsular shift procedure for multidirectional instability of the shoulder. *J Bone Joint Surg (Am)* 1992; 74: 1516-21.
- Foster C R. Multidirectional instability of the shoulder in the athlete. *Clin Sports Med* 1983; 168: 124-7.
- Gerber C. Physical diagnosis of shoulder instability. In: Proceedings of the Seventh Annual Panther Sports Medicine Symposium: The unstable shoulder—An International Consensus, Pittsburgh, Pennsylvania, April 14-16, 1994: 17-8.
- Harryman D T, Sidles J A, Harris S L, Matsen F A. Laxity of the normal glenohumeral joint: a quantitative in vivo assessment. *J Shoulder Elbow Surg* 1992a; 1: 66-76.
- Harryman D T, Sidles J A, Harris S L, Matsen F A. The role of the rotator interval capsule in passive motion and stability of the shoulder. *J Bone Joint Surg (Am)* 1992b; 74: 53-66.
- Hawkins R J, Kunkel S S, Nayak N K. Inferior capsular shift for multi-directional instability of the shoulder: 2-5 years follow-up. *Orthop Trans* 1987; 15: 765.
- Helmig P, Sojberg J O, Kjarsgard-Anderson P, Nielsen S, Ovesen J. Distal humeral migration as a component of multidirectional shoulder instability: an anatomical study in autopsy specimens. *Clin Orthop* 1990; 252: 139-42.
- Itoi E, Motzkin N E, Morrey B F, An K N. Scapular inclination and inferior instability of the shoulder. *J Shoulder Elbow Surg* 1992; 1: 131-9.
- Kronberg M, Broström L A, Nemeth G. Differences in shoulder muscle activity between patients with general joint laxity and normal controls. *Clin Orthop* 1991; 269: 181-92.
- Neer C S, Foster C R. Inferior capsular shift for involuntary inferior and multidirectional instability of the shoulder. *J Bone Joint Surg (Am)* 1980; 62: 897-908.
- Nobuhara K, Ikeda H. Glenoid osteotomy for loose shoulder. In: Surgery of the shoulder. (Eds. Bateman J E, Welsh R P). Mosby, St Louis 1984: 100-3.
- Norris T R. Diagnostic techniques for shoulder instability. AAOS, Chicago 1985: 239-57. (AAOS Instructional Course Lectures, Volume 34).
- Ovesen J, Nielsen S. Experimental distal subluxation in the glenohumeral joint. *Arch Orthop Trauma Surg* 1985; 104: 78-81.
- Ozaki J. Glenohumeral movements of the involuntary inferior and multidirectional instability. *Clin Orthop* 1989; 238: 107-11.
- Rowe C R, Patel D, Southmayd W W. The Bankart procedure. *J Bone Joint Surg (Am)* 1978; 60: 1-16.
- Steinbeck J, Halm H, Wesener-Roth, Jerosch J. Elektromyographische, dynamische Untersuchungen an gesunden und an instabilen Schultern. *Orthopädische Praxis* 1994; 5: 291-4.
- Warner J J P, Deng X H, Warren R F, Torzilli P A. Static capsuloligamentous restraints to superior-inferior translation of the glenohumeral joint. *Am J Sports Med* 1992; 20: 675-84.
- Warner J J P, Caborn D N M, Berger D, Fu F H. Dynamic capsuloligamentous anatomy of the glenohumeral joint. *J Shoulder Elbow Surg* 1993; 2: 115-33.