THE MAGNUSON–STACK OPERATION FOR
RECURRENT ANTERIOR DISLOCATION OF THE SHOULDER

A REVIEW OF 38 CASES

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The modified Magnuson–Stack procedure of lateral and distal transfer of the insertion of the subscapularis muscle was used in 38 consecutive patients with recurrent anterior dislocation of the shoulder, all of whom have been followed-up for a minimum of three years. There was only one failure; the other 37 patients had an excellent or satisfactory result with an adequate range of movement. Bankart and Hill–Sachs lesions were not a constant finding but subscapularis laxity was detected in almost every case, an observation that helps to confirm its central role as a cause of recurrence.

Many operations have been described for the treatment of recurrent anterior dislocation of the shoulder. Most were designed to repair the lesion considered by the originator to be responsible for recurrence, but there is no general agreement on the primary factor or combination of factors. Three lesions, however, are usually thought to contribute: damage or detachment of the glenoid labrum (Bankart 1938), a posterolateral defect in the head of the humerus (Hill and Sachs 1940) and post-traumatic laxity of the subscapularis (Moseley and Øvergaard 1962; Jens 1964; DePalma, Cooke and Prabhakar 1967; Symeonides 1972).

Of the many operations which have been described in the past, relatively few have stood the test of time and are still in use with or without modification. These procedures include: repair of the glenoid labrum (Bankart 1938), the Patti–Platt operation for repair of the anterior capsule and shortening of the subscapularis (Osmond–Clarke 1948), lateral transfer of the subscapularis tendon (Magnuson and Stack 1943) and transfer of the coracoid process to the neck of the scapula – the Bristow operation described by Helfet (1958). Published series of each of these four operations report almost equally satisfactory results, so the Magnuson–Stack procedure as modified by DePalma et al. (1967) was selected as being the simplest method of providing tight dynamic support for the front of the joint. The results of 38 consecutive operations for recurrent anterior dislocation of the shoulder by lateral and distal transfer of the subscapularis muscle are presented. There was only one recurrence and little or no loss of lateral rotation of the shoulder.

PATIENTS AND METHODS

Since 1970 the modified Magnuson–Stack operation was used for all patients presenting with recurrent anterior dislocation of the shoulder; 38 of these patients have been followed-up for more than three years. They were all men between the ages of 18 and 27 years; there were 23 right shoulders and 15 left shoulders.

The original dislocation involved an injury in all cases; it had occurred between eight months and three years before presentation. Every patient had had four or more recurrences and had significant disability or a sense of insecurity in normal activities. Radiographic examination included special views to detect Hill–Sachs lesions of the head of the humerus.

Technique of operation. Under general anaesthesia the range of lateral rotation of both shoulders is first assessed. Then a deltoid-splitting incision is made lateral to the coracoid process. It is rarely necessary to detach any of the deltoid origin. Subscapularis is located and its main part elevated by incisions near its upper and lower margins; its insertion is detached, taking a small wedge of bone (Fig. 1) and the capsulomuscular flap so defined is dissected medially to allow inspection of the glenoid. The shoulder is then rotated medially and the subscapularis insertion is transplanted under reasonable tension across the bicipital groove to the humerus about 1 cm below the greater tuberosity, the bony wedge being placed in a shallow gutter and fixed by one or two staples.
Complications. Two patients had a deep haematoma but both settled satisfactorily. Three cases of superficial wound infection also resolved well. Eleven patients complained of transitory pain at the greater tuberosity during the first few months after operation, but in all of them this gradually disappeared. There were no deep infections or other serious complications.

Grading. Results were graded by the classification of Karadimas, Rent and Varouchas (1980).

Excellent – no shoulder pain, less than 10° limitation of lateral rotation, with normal muscle power and no instability or other complaint. Of our 38 patients, 25 (68%) came into this category, six of whom (15%) had a full range of movement.

Satisfactory – limitation of movement of over 10° in any direction or any pain or feeling of instability. The 12 patients in this category (31.5%) had 10° to 30° loss of lateral rotation or of abduction or both, but all had good power and no other complaints.

Unsatisfactory – those with recurrence after operation. Our single case (2.6%) redislocated during a fight, 18 months after obtaining a satisfactory result with 20° loss of lateral rotation.

DISCUSSION

Magnuson in 1945 emphasised that neither the very loose capsule of the shoulder nor the shallow glenoid could support and maintain the humeral head in the glenoid cavity and that only muscular support, particularly that of the anteriorly placed subscapularis, could maintain the proper relationship between the head of the humerus and the glenoid. DePalma (1963) also attributed stability to the delicate co-ordination of muscles between the trunk, the scapula and the humerus. Injury to the subscapularis, causing elongation and weakness, reduces the anterior dynamic support and allows the opposing forces of other muscles to cause recurrent dislocation. DePalma considered that muscular imbalance was the trigger for recurrence; the other pathological changes were secondary, merely allowing earlier action by the trigger mechanism.

Magnuson and Stack (1943) pointed out that a narrow or weak subscapularis muscle and tendon can slip between the head of the humerus and the glenoid when the shoulder is in an abducted position. This was also emphasised by Symeonides (1972), who found that the subscapularis slid over the head of the humerus when dislocation was produced at operation. Moseley and Övergaard (1962) found some laxity of subscapularis in 25 consecutive cases. DePalma et al. (1967) reported decreased muscle tone in 38 consecutive operations; they also, in several cases, found a defect in the lower margin of subscapularis suggestive of an old partial tear from the bony attachment. Symeonides (1972) found subscapularis laxity in nearly every one of 45 cases, in some of which he obtained histological proof of post-traumatic

RESULTS

Causes of recurrence. A Hill–Sachs lesion was found in 19 of the 38 patients and a partial or complete Bankart lesion in 26, in some of which the anterior margin of the glenoid was rounded and smooth. However, under anaesthesia all 38 patients showed an increase in the range of lateral rotation of the affected shoulder of 5° to 10° compared to the normal side and laxity of the subscapularis was demonstrated in all the 32 cases in which the Symeonides test was used. Only in one case was the muscle narrow and reduced in bulk.

Follow-up. All patients were reviewed frequently until they had regained a stable range of shoulder movement and then every three months for at least three years.
scarring. His experimental study of 180 cadaveric shoulders showed that neither capsulolabral disruption nor a humeral head defect could be responsible for recurrence in the absence of subscapularis lengthening and laxity. He concluded that this latter change is the prime factor in producing instability of the shoulder.

The constant finding, under general anaesthesia, of 5° to 10° increase in range of lateral rotation compared to the normal side in our series was indicative of subscapularis laxity and this was confirmed by the Symeonides test (1972) at operation. In all the 32 cases tested the musculotendinous sling of the subscapularis could easily be lifted away from the front of the glenoid when the undislocated shoulder was abducted and in full lateral rotation – an action which Symeonides found very difficult or impossible in normal shoulders.

Bankart in 1938 described what he considered to be a constant and typical detachment of the glenoid labrum in cases of recurrent shoulder dislocation. This lesion, however, is not constant (Magnuson and Stack 1943; Osmond-Clarke 1948; Rowe 1956; Moseley and Øvergaard 1962; DePalma et al. 1967; Symeonides 1972), and only 26 of our series of 38 showed a Bankart lesion. Moreover, operations such as the Magnuson–Stack procedure (Magnuson 1945) and the simplified Putti–Platt (Symeonides 1972), which do not include repair of the Bankart lesion, have yielded equally successful results.

The posterolateral defect in the humeral head (Hill and Sachs 1940) also is an inconstant finding (Rowe 1956; DePalma and Silberstein 1963; Symeonides 1972) and was found radiographically in only 50% of our patients. Symeonides concluded that this defect increases the instability of the shoulder joint only if the subscapularis is stretched, and that capsular and bony defects are no more than subsidiary factors in recurrence of dislocation.

The Magnuson–Stack procedure tightens the grip of the subscapularis around the head of the humerus and restores the muscular balance around the shoulder (DePalma 1973). Its modification by distal as well as lateral transfer (DePalma et al. 1967) adds further static and dynamic functions by preventing the tendon from slipping over the humeral head during abduction and lateral rotation. It also causes the tendon to pull the head upwards and backwards into the glenoid, opposing the downward and forward pull of other muscles, and, when the arm is elevated, to roll the head of the humerus posteriorly.

The recurrence rate in our series (2.6%) matches that of other reports of the Magnuson procedure or its modification (Moseley 1961; DePalma and Silberstein 1963; Karadimas et al. 1980). Of all cases reported since 1943 there have been 11 recurrences after 179 operations. Most of the recurrences were in the first two years after operation; all our cases have been followed for at least three years.

The expectation of limitation of lateral rotation after the Magnuson–Stack operation has deterred many surgeons from this operation, but our cases and all other reported series have shown that this limitation is temporary; after a few months the range gradually returns to normal or near normal in most patients. Giannestras, quoted by Moseley (1961), stated that of 76 patients at six months, 72.3% had limitation of lateral rotation of less than 10° and only one had lost over 35°. DePalma and Silberstein (1963), reporting 75 cases, had had 78% with full lateral rotation and only 2% with over 30° limitation. Karadimas et al. (1980) had found 87.7% of 154 cases with less than 10° limitation of lateral rotation, and none with more than 30° loss of lateral rotation or abduction. These reported results are slightly better than ours but we found that a 10° to 30° limitation did not hinder normal activities, and that many patients were unaware of it. DePalma (1973) concluded that this objection to the Magnuson–Stack procedure was overemphasised and not valid.

Other operations have an almost equal success rate. Rockwood (1975) estimated that the average rate of recurrence in many different reported series (excluding the Nicola operation) was about 3%. DePalma (1973) attributes the success of the Bankart operation to the restoration of muscle balance which is achieved by bringing the subscapularis close to the neck of the scapula and tightening it. He considers that the success of the Putti–Platt procedure is due to shortening the subscapularis as well as creating a firm anterior capsule by suturing the lateral edge of the cut tendon to the glenoid rim. Symeonides (1972) attributed the success of all operations performed through an anterior approach to the shortening of the subscapularis of about 1.5 cm which follows even simple division and resuture. The Bristow operation leads to scarring and shortening of subscapularis, especially in the modification (May 1970) in which it is transected and plicated. Watson-Jones (1948) reported only one failure after 52 Bankart and Putti–Platt operations, and that was in the only patient whose shoulder was approached from above, leaving the subscapularis undivided. Moreover, it is technically simple and is one of the least complicated of the available operations.

CONCLUSIONS

The Magnuson–Stack operation, modified by distal as well as lateral transfer of the subscapularis insertion, provides good static and dynamic support to the shoulder in cases of recurrent dislocation. It is less complicated than other operations, can be carried out through a limited approach, and yields a high success rate with normal or near normal range of shoulder movement.

The finding of subscapular laxity in almost all our cases both before and during the operation supports the contention that this is a major factor in recurrence which should be corrected by any repair operation.
REFERENCES