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# THE MODIFIED BRISTOW PROCEDURE FOR RECURRENT ANTERIOR DISLOCATION OF THE SHOULDER

*Results and Complications*

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Seventeen out of eighteen patients, who underwent the modified Bristow operation for anterior recurrent dislocation of the shoulder, were followed up after a mean observation time of 52 months. Fourteen patients were satisfied with the result. There were no redislocations. The principal limitation in range of motion was loss of some external rotation. Eight patients had non-union between the bone transplant and the glenoid rim, and four of these had complications related to the screw. Two had loosenings and two had fractures of the screw. Non-union without screw complications appeared not to influence the end result. The reasons for the complications seem to be technical problems concerning fixation and bone union of the coracoid process.

*Key words:* anterior recurrent dislocation; complications; operative treatment; shoulder joint

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The Bristow procedure was initially described in 1958 by Helfet, and later modified by May (1970). One of the modifications was securing the sectioned coracoid process with a bone screw. There are three components in the Bristow operation that can prevent recurrence of the dislocation. The first is that the defective part of the joint is reinforced by the bone block. Secondly full external movement does not entail any danger of redislocation because of the sling effect of the transferred tendons, and the third component is the closure and shortening of the subscapularis (Helfet 1958). Previous reports have emphasized the effectiveness of the operation in preventing redislocation and at the same time maintaining a good range of motion of the shoulder (May 1970, Collins & Wilde 1973, Halley & Olix 1975, Lombardo et al. 1976).

Complications concerning the screw and the coracoid bone block are non-union, resorption of the bone transplant and loosening, fracture and migration of the screw (Artz & Huffer 1972, Lombardo et al. 1976, Rowe 1980). However, the incidence of these complications has been low, and only a few appeared to be of importance for the end result (Artz & Huffer 1972).

The purpose of this study is to present the long-term results of the modified Bristow operation and to draw attention to the considerable risk of complications concerning fixation and bone union of the coracoid process.

## PATIENTS AND METHODS

From March 1971 to September 1980, 18 modified Bristow operations were performed in our department. The etiology of the primary dislocation was traumatic in all patients, and they had all had more than three recurrent dislocations before surgery. None had bilateral

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dislocation of the shoulder. The average age at the time of surgery was 30 years (range 17 to 49 years).

The repair was performed as described by May (1970) with one exception. May used a 1.9 centimeter bone screw, but our screws were either an A–O malleolar compression screw or a cancellous bone screw available in various lengths and thicknesses (diameter) to suit the size of the osteotomized coracoid process and the scapular neck. To secure the fixation in the case of a small bone block a washer was applied on the screw. Postoperatively the shoulders were immobilized in a Velpeau bandage for 4 weeks.

Seventeen patients were re-examined. The follow-up ranged from 7 months to 10 years with a mean of 52 months. Data were collected regarding redislocation, complaints, loss of mobility and loss of function in work and sport. The joint motion was evaluated according to Joint Motion (1965). Radiographs were taken in two projections: anterior-posterior and axillary.

## RESULTS

None of the patients had a redislocation of the shoulder postoperatively. Fourteen out of 17 patients were subjectively satisfied with the result. Fifteen patients returned to work an average of 2 months after surgery, and 11 patients had regained their previous level in sporting activities at the time of the follow-up.

Radiographically bony union between the coracoid process and the anterior side of the glenoid rim was seen in 9 patients. Patients with non-union had an average of 5 millimeters of separation between the bone block and the glenoid rim. Four patients with non-union had complications associated with the screw. The results in relation to union and screw complications are seen in Table 1. Generally the motion of the shoulder in all directions other than external rotation was normal compared with the opposite shoulder. In the absence of screw complications non-union did not appear to influence the end result. Injuries to the bone transplant during surgery were not described in the records, but at the follow-up two of the transplants were split both associated with non-union.

Loosening of the screw with resorption of the bone block occurred in 2 patients. One of them had a large anterior-inferior dislocation of the bone transplant with the short screw lying near the humeral head (Figure 1). The other loose screw was sufficiently long. Both the loose screws were removed because of the complaints (Table 1).

Two patients had fractures of the screw. Both screws were thin (1.8 millimeters), and one of them had migrated into the axilla without injuring the neuro-vascular structures (Figure 2). Neither of the patients had serious discomforts, and the failures were recognized at re-examination. Shortly after the follow-up the migrated part of the screw was removed, and at surgery was found to be situated on the posterior side of musculus pectoralis major.

## DISCUSSION

Previous short-term studies of this procedure report a low rate of recurrence ranging from 0 to 3 per cent (May 1970, Collins & Wilde 1973, Halley & Olix 1975, Lombardo et al. 1976). The present report with a longer time of observation shows no redislocation. The principal limitation

*Table 1. The complaints and the limitation of external rotation seen in relation to union and screw complications*

| | Union | Non-union without screw complications | Loosening of the screw | Fracture of the screw |
|---|---|---|---|---|
| Number of patients | 9 | 4 | 2 | 2 |
| Periodic pain at rest | 0 | 0 | 2 | 0 |
| Periodic pain during activity | 2 | 2 | 2 | 1 |
| Weakness of the extremity | 3 | 1 | 2 | 1 |
| Limitation of external rotation | 5 (average 25 degrees) | 2 (average 30 degrees) | 2 (average 35 degrees) | 1 (40 degrees) |

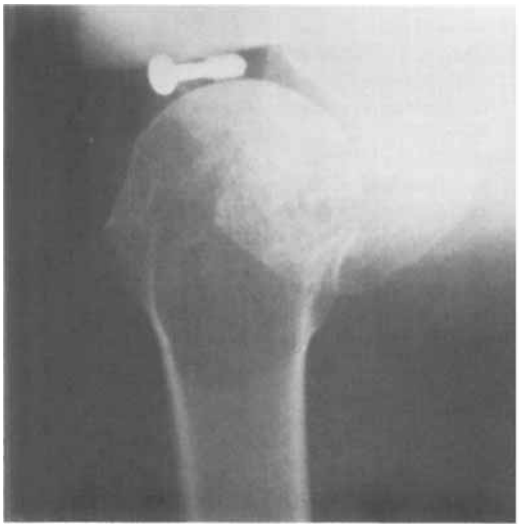

*Figure 1. Radiograph showing separation between the bone block and the glenoid rim 6 months after surgery. Note the short screw and its close proximity to the humeral head.*

*Figure 2. Radiograph showing fracture of the screw with migration 5½ years after surgery. Note the dislocation of the bone block in the anterior, inferior and medial direction, and the small diameter of the screw.*

in range of motion after the operation was loss of some external rotation (Table 1). We could not prove that the mobility of the shoulder was better compared with the results obtained after the Bankart procedure (Rowe & Southmayd 1978), the Eden-Hybbinette method (Lindholm 1974, Øster 1969) or the Putti-Platt method (Hovelius et al. 1979).

In this study only non-unions associated with loosening or fracture of the screw adversely influenced the outcome. It can be assumed that the non-union promoted these complications. Lombardo et al. (1976) reported 6 out of 51 patients with non-union, 3 with migration and one with fracture of the screw. Artz & Huffer (1972) reported one case where displacement of the screw caused a false aneurysm of the axillary artery with subsequent compression of the brachial plexus cords. These reports like the present one show that non-union and screw complications do not appear to increase the rate of redislocation. Loosening and resorption of the bone transplant are also seen after the Eden-Hybbinette method, and a high frequency of redislocation has been described in these cases (Lindholm 1974, Øster 1969).

The modified Bristow operation has among other reasons become popular because it is technically easy, but the high rate of complications in this study are obviously caused by technical failures. The reasons seem to center on poor preparation of the recipient part of the anterior neck of the scapula, and application of an ineffective screw, either one which is too short to establish contact with the posterior cortex of the scapular neck (Figure 1), or one which is too thin to secure the fixation of the bone block during motion of the shoulder (Figure 2). It is our belief also that a small transplant and injuries to it during surgery can adversely affect the result. When the technical problems are known and greater attention is paid to correcting the failures, we assume that it will be possible to improve the results. This report emphasizes the effectiveness of the operation in preventing redislocation and in many cases allowing the patients to return to their original level in sporting activities, but the material is too small to evaluate whether this operation has advantages over other methods.

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