

## THE OPERATIVE TREATMENT OF RECURRENT, ANTERIOR DISLOCATION OF THE SHOULDER

*A Review of 151 Operations*

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Recurrent anterior dislocation of the shoulder occurs most often as a sequel to an injury.

Rowe (1963 a) has reported that in 500 cases of primary dislocation of the shoulder, this was found to be of traumatic origin in 94 per cent of the cases, whereas in the remaining 6 per cent the most important cause was anatomic variations in the shoulder joint and its surroundings. In practice, the problems of treatment hardly differ between these groups of patients when it is a question of choice of method of operation for recurrent dislocation, even though the prognosis for the atraumatic dislocation is reported to be less favourable with regard to the incidence of recurrence (Rowe 1963 b).

During the period 1950-1966, three different techniques of operation have been employed in the Orthopaedic Hospital in Copenhagen for the treatment of anterior dislocation of the shoulder. The aim of the present study is to compare the results of treatment and, if possible, to select one of the methods as being the most advantageous.

### P A T H O L O G Y

It is unlikely that a single etiology exists for the first incident of dislocation (Moseley 1963). The structure of the shoulder joint together with the fact that the second dislocation commonly occurs within a few months of the primary incident and in connection with a more trivial trauma, have led to the assumption that the first dislocation is due either to the detachment of a capsular ligament or to the expansion of a preformed pouch, into which the head of the humerus can be dislocated. A traumatic compression of the anterior rim of the cavity has also been mentioned as a decisive cause of the redislocations (Willner 1964). As described by Hermodsson (1934) and Moseley (1963), osseous lesions are often found, both as avulsions from the

anterior rim of the cavity and in the form of a posterolateral notch in the humeral head—the so-called “caput-en-hachette”. This compression fracture is assumed to occur during the initial trauma, the head of the humerus taking up a position on the rim of the cavity. The significance of this is that it is supposed to lead to the subsequent dislocations, as the bone notch is trapped and locked by the rim of the cavity when the head glides forward during external rotation. The defect is best represented on roentgenograms taken in special projections, with the humerus rotated internally between 50° and 80°.

According to Bankart (1938), on the first traumatic dislocation there is detachment of ligament with the formation of a pocket on the anterior margin of the glenoid cavity. The subsequent dislocation is then stated to take place as a result of inadequate healing of this defect.

Reeves (1969) has examined acute dislocation of the shoulder both clinically and experimentally, and describes the typical arthrographic findings. Thomassen (1944) has published a monograph on recurrent dislocation of the shoulder.

#### MATERIAL AND METHODS

##### *Methods of Operation*

In the *Eden-Hybbinette* method (Hybbinette 1932, Hindmarsh et al. 1967) an attempt is made to create a mechanical hindrance to the dislocation of the head of the humerus by placing a bone block on the anterior aspect of the neck of the scapula, the shoulder joint either being opened or left unopened.

In the *Putti-Platt* method, described by Osmond-Clarke (1948), the aim is to hinder re-dislocation, both by closing any pouch which may be present on the anterior aspect of the joint and by reducing the external rotation of the humerus, so that a notch lesion cannot catch on the anterior rim of the cavity during a combined upward, backward and external rotation movement. Postoperative treatment consists of a double wrap-around sling for 3 weeks. Rotary movements are not permitted until 6 weeks after the operation.

The aim of *Bankart's* method is to close the anterior defect in the capsule by sutures after boring holes in the anterior rim of the glenoid cavity, the anterior pocket of the capsule having been scarified, or by fastening the labrum with metal staples (Agerholm-Christensen 1949). The post-operative treatment is the same as in the *Putti-Platt operation* (Bankart 1938).

##### *Material*

In the Orthopaedic Hospital in Copenhagen, during the period 1950 to 1966, an operation for recurrent anterior dislocation of the shoulder was carried out in 151 cases in 145 patients.

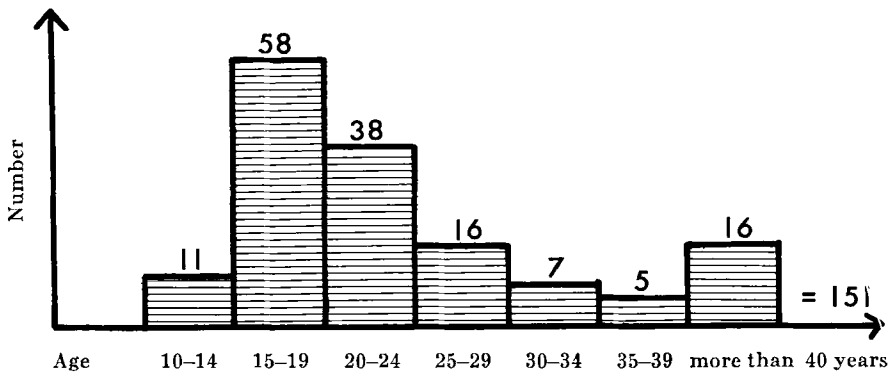


Figure 1. Age at first dislocation.

In 26 cases, no definite trauma was suggested by the history. In spite of this, signs of traumatic lesion were found in all these cases in the form of a hatchet-head lesion or a pocket, either at operation or on the roentgenograms before the operation.

A female/male ratio was found of 1/2. About equally many patients were operated on the dominant as on the non-dominant side. Five per cent of the patients in the material were epileptics.

Figure 1 shows the age of the patients on first dislocation, 2/3 of the incidents occurring before the age of 25 years. The mean age on first dislocation was the same in women and men, 25 years. The mean age on operation was almost the same in the 3 operations, 32 years.

During the period 1950-1957, 22 operations were carried out in Departments I and III by the modified *Hybbinette* method. The post-operative treatment consisted of a plaster bandage, mainly a thoraco-brachial bandage followed by an abduction splint. The patient was immobilized for 4-10 weeks, after which physiotherapy was started.

The operation by the *Putti-Platt* method was used in Department III after 1954

Table 1. Complications of the operation.

Hybbinette 22 cases	1	post-operative dystrophy
	1	sterno-clavicular dislocation
Putti-Platt 36 cases	1	superficial infection of the wound
	1	affection of the radial nerve
	1	affection of the musculocutaneous nerve
	1	suture needle left in the joint
Bankart 93 cases	1	superficial infection of the wound
	1	ligature of the musculocutaneous nerve
	1	affection of the radial nerve
	6	cases with discomfort and complications in connection with metal staples.

and in Department I after 1957, a total of 36 cases. Post-operative treatment consisted of a double wrap-around sling for 2-6 weeks, followed by physiotherapy.

*Bankart's* operation has been the method of choice in Department II during the entire period of investigation, using Agerholm-Christensen's modification. The operation was employed in 93 cases, and post-operatively the double wrap-around sling has been worn for 2-6 weeks, followed by physiotherapy.

Table 1 shows the operative and post-operative complications. Following *Hybbinette's* operation, there was 1 case of post-operative dystrophy and 1 case of dislocation of the sterno-clavicular joint on the side operated on, during the period of bandaging. In the *Putti-Platt* operation, there was 1 case of lesion of the n. musculocutaneous and 1 case of transient lesion of the n. radialis. In 1 case there was delayed healing of the wound on account of infection, and in 1 case a broken needle had to be left in the joint without any subsequent subjective discomfort. In the *Bankert* operation there was 1 case in which the n. musculocutaneous was compressed in a ligature, and in 1 case there was transient lesion of the n. radialis. In 1 case there was superficial infection of the wound. In 5 cases, discomfort in the shoulder following operation led to the inserted staples being removed. At the time of follow-up examination, one more patient was listed for readmission because of slight discomfort and a break found in the metal staple.

#### FOLLOW-UP EXAMINATION

Table 2 shows that of the 151 shoulders, 120 were followed up (80 per cent). In the case of 11 shoulders, a follow-up could not be carried out, as the patients had left the country for abroad or Greenland, while 5 patients with 5 shoulders operated on had died during the period of observation, and 15 shoulders could not be followed up as the patients could not be traced. All the patients followed up were examined at an interval longer than 2 years after the operation.

Of the shoulders examined, 15 had been operated on by *Hybbinette's* method, 28 by *Putti-Platt's* method, and 77 by *Bankart's* method. Six of the patients who were followed up had undergone operation in both shoulders, the same procedure being employed on both sides. The ratio female/male is also 1/2 in the material followed up. The period of ob-

Table 2. Follow-up examination.

	No. of shoulders	Shoulders followed-up No. (%)	Mean period of observation (months)	Sick leave (weeks)
Hybbinette	22	15 (73)	131	12½
Putti-Platt	36	28 (78)	90	6½
Bankart	93	77 (82)	94	9½
Total	151	120 (80)	-	-

Table 3. Follow-up results.

	No.	Mobility normal No. (%)	Mean reduc- tion of ex- ternal rotation in degrees	Cases of recurrences No. (%)
Hybbinette	15	10 (65)	5-10	3 (20)
Putti-Platt	28	3 (10)	15-20	0
Bankart	77	22 (28)	15-20	5 (6½)
Total	120			

servation is seen from the table, as well as the average post-operative period of incapacity.

Table 3 shows that following the *Hybbinette*, *Putti-Platt* and *Bankart* operations, the shoulder mobility was completely normal in 65, 10 and 25 per cent respectively, of the shoulders examined. The mean reduction in external rotation, in the same order, was found to be 5-10°, 15-20°, and 15-20°, respectively. Limitations in the other movements were few and small. Visible atrophy of the shoulder region and upper arm was present in 8 cases, 4 after the *Putti-Platt* operation, 3 after *Bankart's* operation and 1 after *Hybbinette's* operation.

Persistent disturbances of sensation were found on follow-up examination in 3 cases, in 1 case after a lesion of the n. musculocutaneus, and 2 where there was hypaesthesia corresponding to the superficial branch of the n. radialis.

*Relapses* were found after 8 operations, 3 *ad modum Hybbinette* and 5 *ad modum Bankart*, in 4 women and 4 men. This corresponds to a relapse incidence of 20 and 6.5 per cent, respectively.

On follow-up examination, 10 of the patients complained of a feeling of fatigue in the operated shoulder, 14 had rheumatic pain and periodic agitation in the shoulder, 2 reported tenderness on the anterior aspect of the shoulder, and 1 claimed that the pre-operative external rotation was missing, while 1 patient complained of prickling paraesthesias in the region of the n. ulnaris. One patient with a bilateral *Bankart* operation now has discomfort from a loose fragment in one shoulder joint.

Among the patients who were followed up, one woman had had to change her job because of the shoulder affection (and the abuse of alcohol), while among the men there were 3 who reported changing their job after the operation.

Sixteen patients among 17 men in the military call-up age were rejected after a successful operation on the grounds of risk of recur-

rence. One patient who had not been rejected did his 24 months' military service without difficulty, but developed recurrence of the dislocation on discharge.

#### DISCUSSION

The aim of this investigation has been to try to determine the most suitable among the three methods of operation employed on the basis of a comparison of post-operative complications, duration of sick leave, incidence of recurrence and final mobility.

The number of *complications* during and after the operations is more or less the same with all 3 methods (Table 1), but in 5 cases it was necessary to re-operate following the *Bankart* operation to remove broken metal staples. As this complication depends on the method of operation alone, a reasonable alternative must be to stitch the capsule to the rim of the cavity after making bore holes.

One of the disadvantages in the modification of *Hybbinette's* operation employed is the long post-operative period of immobilisation in thoraco-brachial plaster, also reflected in the very long average period of sick leave (Table 2). Reeves (1969) has shown experimentally that the elastic tissue in the capsular apparatus requires a long period of regeneration following a dislocation, often more than 4 weeks. In spite of the longer period of immobilisation following the modified *Hybbinette* operation, most cases of recurrence have nevertheless been in this group. It therefore does not appear as if a post-operative period of treatment longer than the 6 weeks hinders the recurrence. The modification by Alvik (1951), where the bone transplant is wedged in at the rim of the cavity (glenoid plasty) with an immobilisation time of 6 weeks, has not been employed, but presumably it may reduce the incidence of recurrence (Said et al. 1969).

The majority of *relapses* occur in the course of the first 6 months after the operation (Reeves 1969). In evaluating the cases of recurrence found, we therefore consider that with some reservation it is possible to ignore the fact that in the 3 methods the time of observation is not the same, but somewhat longer in the case of patients operated on by *Hybbinette's method* (Table 2). In the case of the 15 patients operated on by *Hybbinette's method* who were followed up, there were 3 recurrences, corresponding to 20 per cent. In a material from Århus, Øster (1969) found 18 per cent recurrences among 75 shoulders operated on by the same technique. The recurrences found

in the present material occurred within the first 2 years after the operation. As only the results of the methods are being compared here, it is considered that a discussion on the cause of the recurrences may be omitted. Among the patients followed up after *Bankart's* operation, 5 cases of recurrence were found. One of the patients developed a redislocation shortly after a metal staple was removed from the shoulder because of local discomfort and a break found in the metal. After the *Putti-Platt* operation, no recurrences were found among 28 patients at the time of the follow-up examination.

In recurrent anterior dislocation of the shoulder, it is usually possible to demonstrate a compression fracture of the head of the humerus on the roentgenogram. In two of the methods of operation employed, *Bankart* and *Putti-Platt*, a low incidence of recurrence has been demonstrated, and in both these groups the follow-up has shown a *reduction in the mobility*, with limitation of external rotation (Table 3). Should a posterior notch be found in the head of the humerus, the limitation of the external rotation must be regarded as of practical value, as in this way the notch is hindered from catching on the anterior rim of the cavity during external rotation. Closing any pouch present on the anterior aspect of the joint must also be regarded as an important procedure. This is the primary aim in the method of *Bankart*, but at the same time the method achieves an anterior tightening of the capsule and musculature. *Putti-Platt* aims primarily at hindering external rotation. Only 10 per cent of those followed up showed normal shoulder mobility after this method, compared to 28 per cent after a *Bankart* operation.

We would need a larger number operated on by the *Putti-Platt* method than the figure in the present study if a statistical analysis were to be made on whether inhibition of rotation or scarification was of greater significance as a factor hindering recurrence.

In *Müller's* method (Weber 1970), inhibition of rotation is achieved by osteotomy of the humerus.

#### CONCLUSION

Recurrent anterior dislocation of the shoulder is a lesion which responds well to treatment. Among the methods of operation used in the present material, both the *Putti-Platt* operation and the *Bankart* operation have been found to give a low incidence of recurrence. A further advantage of the *Putti-Platt* method is the shorter subsequent

duration of invalidity and the fact that in this operation no metallic foreign bodies are left.

#### S U M M A R Y

Of a material of 151 cases of recurrent anterior dislocation of the shoulder operated on at the Orthopaedic Hospital in Copenhagen during the period 1950–1966, a total of 120 cases were followed up. Three methods of operation were employed: a modified *Hybbinette*, *Putti-Platt* and a modified *Bankart*. There was no patient selection.

All cases were followed up more than 2 years after the operation. There were 3 recurrences among the 15 patients operated on by *Hybbinette's* method and 5 recurrences among the 77 patients operated on by *Bankart's* method. None of the 28 patients operated on by the *Putti-Platt* method had had a recurrence at the time of the follow-up examination. Normal shoulder mobility was found in 65 per cent of the cases after the *Hybbinette* operation, in 10 per cent after the *Putti-Platt* operation, and in 28 per cent after the *Bankart* operation.

It is concluded that the essential feature of the operational method of choice would be that it involves a limitation of external rotation and a closing of the anterior pouch in the capsular apparatus. These two requirements are satisfied both by the *Putti-Platt* and by the *Bankart* operation. Following the *Bankart* operation, it was necessary in 5 cases to remove broken metal staples on account of local discomfort.

On the above basis, therefore, the *Putti-Platt* operation must be considered the normal method of choice.

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