THE BONE BLOCK METHOD FOR RECURRENT DISLOCATION OF THE SHOULDER JOINT

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In 1918 Hybbinette, the Swedish surgeon, described a method of preventing recurrent dislocation of the shoulder joint by means of a bone graft fixed in a periosteal pocket at the anterior glenoid rim. At about the same time, Eden of Germany wrote on a similar method. Consequently the method came to be known as the Hybbinette-Eden operation.

Hoping to find the "essential lesion" Hybbinette explored the anterior part of the joint by dividing the subscapular tendon. He depicted his observation as a capsular injury resembling a "Gothic arch" with the denuded glenoid rim or detached labrum at its base, resulting in the formation of a false joint cavity into which the head would dislocate.

Eventually, the method was adopted widely in Scandinavia. Various workers who published papers on the subject (Dahlgren 1936, Langenskiold 1932, Hublin 1946) agreed with Hybbinette's theory of a false joint cavity in the anterior part of the joint.

Operative technique—The Hybbinette-Eden operation is not difficult. A three-inch incision is made along the furrow between the deltoideus and the pectoralis major. The coraco-brachialis muscle is retracted medially and the lesser tuberosity, with the attachment of the subscapularis, is exposed by rotating the arm outwards. The tendon, together with the underlying capsule, is divided about a quarter of an inch from its insertion. The joint is held open with a retractor, and the humerus is pulled backwards and outwards. It is then possible to inspect the glenoid and anterior joint capsule from the inside. A subperiosteal pocket is made with a raspatory at the lower part of the anterior glenoid rim. If there are remnants of the glenoid labrum the pocket is made between the rim and labrum, so that the labrum with attached capsule forms the medial border (Fig. 1a). A graft, measuring about one inch by half an inch according to the size of the pocket, is taken from the iliac crest. The shape of the graft may be seen in the inset of Fig. 1.

The graft is pressed down in the subperiosteal pocket in such a way that the projecting part is lodged on the rim, forming an anterior wall of bone. It is kept in position by remnants of the labrum and the periosteum. Additional fixation is not usually necessary (Fig. 3).

The subscapularis tendon is stitched with mattress sutures, and the wound is closed. The arm is put in a sling for two weeks; the patient is then encouraged to move it, but always avoiding outward rotation. The patient is usually allowed up in two or three days.
and discharged in seven to ten days. We would draw attention to the fact that this method offers a shorter and more agreeable post-operative treatment than other methods now in use.

For the purposes of this paper, sixty cases, selected at random from our total of ninety cases, have been subjected to detailed study.

**Radiographic findings**—All cases were examined radiographically before operation. In each one a typical compression fracture in the posterior part of the head could be seen. In twelve there was a fracture of the glenoid rim forming a small semilunar fragment. In three, the examination was supplemented by arthrography. (For the technique of arthrography of the shoulder joint, the reader is referred to Lindblom and Palmer, 1930.) In none of these cases could abnormalities in the shape of the joint be observed. No capsular ruptures or accessible false joint cavities could be seen, nor was any rupture of the aponeuroses ever found (Fig. 5).

**Pathological findings at operation**—At operation the interest of the surgeon was, of course, concentrated on the anterior glenoid rim and its surroundings. First it should be pointed out, that in no case was it possible to find any false joint cavity or rupture of the capsule large enough to receive the humeral head. It is not easy to estimate the real volume of the capsular cavity by arthroscopy, because even a normal capsule is big enough to receive two humeral heads. For that reason we consider it impossible to make reliable observations by operation as to the volume of the capsular cavity. Arthroscopy is a better method for that purpose.

In twenty-seven cases we found typical detachment of the labrum from the anterior aspect of the glenoid rim (Fig. 2a). This detachment was in most cases located at the inferior part of the rim, thereby determining the situation for the pocket and the graft.

![Fig. 2](image)

Studies of different types of destruction at the anterior glenoid rim:
(a) The most simple lesion—a partly detached labrum;
(b) the detached labrum dislocated into the joint;
(c) the labrum ruptured and the rim worn;
(d) the labrum absent over the whole anterior rim, sloping down towards the neck.

In two cases the labrum was detached from the rim and from the capsule over the whole anterior aspect and dislocated into the joint, crossing the glenoid (Fig. 2b). The situation resembled a bucket-handle lesion of the semilunar cartilage of the knee joint.

In twenty-two cases the labrum was either ruptured with frayed flaps or else quite absent from the lower anterior part of the rim (Figs. 2c and d). In most of these the rim was smooth and rounded, and the bone was bare on the front of the neck of the scapular. It was then difficult to construct a pocket with a medial border strong enough to fix the graft in position.

In five cases there were only small changes on the edge of the labrum and in four cases it was not possible to find any pathological abnormality at all on the anterior rim. In these cases, too, radiographic examination had shown the typical compression fracture of the humeral head.

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RESULTS OF BONE BLOCK OPERATION

Our observations are based on material consisting of ninety operations, about half of which were performed by one of us (Palmer). We have been able to conduct follow-up examinations on sixty patients, eight of them women and fifty-two men. The preponderance of men in our series is due to the fact that part of the material originated in a military hospital. The interval between operation and follow-up varied from one and a half to twelve years.

Complications — Limitation of movement — No serious post-operative complications occurred. The results can be regarded as excellent in fifty-three cases; these patients consider themselves to be completely cured. Forty-two patients have a normal range of movement in the shoulder which was operated upon. Eleven report slight restriction of movement, usually in the form of 10 to 20 degrees limitation in abduction-elevation of the limb, accompanied in a few cases by insignificant limitation of external rotation movement. These patients, most of whom are young men, and many of whom are engaged in heavy manual labour, do not consider themselves handicapped in any way by this restriction. Many patients state that after operation they were able to resume various recreations and sports including football, handball, wrestling, tennis, and gymnastics.

Pain — In connection with the follow-up, most patients spontaneously expressed their great satisfaction with the result. In three cases there was not only slight restriction of movement but also pain on exertion. These symptoms were mild, however; they did not hamper the patients in their work; and the results may still be considered good.

Recurrent dislocation — Four patients (6.7 per cent.) suffered further dislocation after the operation:

Case 1. A man, twenty-three years of age, had thirteen dislocations before operation which was done in 1937. About one year after operation he again injured the right shoulder while playing handball; he had the arm held straight out from his side in an attempt to stop another player from running past him, and as a result it was shoved violently backwards. The shoulder dislocated. The patient was able to reduce the dislocation himself. Since then he has had six dislocations, for two of which he had to seek medical attention.

Case 2. A man, twenty-two years of age, had five dislocations before operation which was done in 1942. At follow-up in November 1946 the patient was free from symptoms and had no recurrence. Two weeks later he informed us that he had fallen downstairs and dislocated the shoulder again. His wife reduced the dislocation. Since then he has had no further recurrence and has been at work as usual.

Case 3. A man, aged twenty years, had four dislocations before the operation which took place in March 1942. In November 1942, while holding a horse by the bridle, the horse tossed its head, jerking the patient’s arm upwards and dislocating the shoulder. After that he had many recurrent dislocations. A second bone block operation was done in October 1943. The old graft could be seen as a small bulge at the lower rim of the glenoid cavity. A new bone graft was inserted adjacent to the old one.

Case 4. A man, eighteen years of age, had four dislocations before the operation which was done in 1944. One year later he fell with the arm abducted. The shoulder dislocated again, and there have been five recurrences since then. A second operation was done in March 1947.

It is questionable whether these four cases should be considered recurrences in the true sense of the word. In all of them the first dislocation after operation was caused by an injury.
which might have caused dislocation in a previously undamaged shoulder joint. Nevertheless, estimation of the violence of injury must inevitably be subjective and unreliable. It is therefore wise to regard all post-operative dislocations as recurrences when comparing the results of different operative methods.

The following Table covers three series of bone block operations performed in Scandinavia:

<table>
<thead>
<tr>
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<th>Number of cases</th>
<th>Recurrences</th>
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<tbody>
<tr>
<td>Dahlgren</td>
<td>38</td>
<td>2</td>
</tr>
<tr>
<td>Hublin</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>Palmer-Widén</td>
<td>60</td>
<td>4</td>
</tr>
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<td><strong>Totals</strong></td>
<td><strong>128</strong></td>
<td><strong>8 - 6.3%</strong></td>
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**DISCUSSION**

As already mentioned, there are usually two pathological findings in recurrent dislocation—a compression fracture of the posterior part of the humeral head, and an injury of varying size and shape on the anterior part of the glenoid. The former is evidently always present, but we want to call attention to the fact that the latter may be slight or entirely absent. In no case was it possible to find a “false joint cavity”; nor was anything of that kind revealed by arthrography in three cases. Gustav Pettersson (1942) studied thirty cases of recurrent dislocation by arthrography without any pathological findings.

![Typical radiograph of recurrent dislocation of the shoulder (Fig. 4) with posterior compression fracture of the humeral head. The same joint shown by arthrography (Fig. 5) displays no false joint cavity or rupture of the capsule. The joint looks normal.](image)

It seems that Hybbinette, and many surgeons with him, interpreted a normal anatomical structure as a pathological condition. The subscapular bursa and the subscapular recess—possibly enlarged—may give the picture of a “Gothic arch” or “false joint cavity,” bordered as it is by the gleno-humeral ligaments. Neither Hybbinette nor any of his followers realised the importance of the second lesion—the compression fracture of the head.
Bankart (1923, 1938) speaks of detachment from the anterior glenoid rim as the essential lesion. We are not sure that it deserves this name. The anterior lesion varies greatly, and it may be entirely lacking, so that it cannot explain the tendency of the head to dislocate. We consider that the mechanism of recurrent dislocation is as follows:

When the arm is more or less elevated, and the humeral head rotates outwards; the compression fracture in the posterior part first faces the glenoid cavity. Normally the cavity and head are entirely congruent in every position and the labrum adheres tightly to the head (Fig. 6a). This gives a certain stability to the joint, which is not to be disregarded. (Aebv (1876) and Johannes Müller (1929) called attention to the significance of atmospheric pressure in the stability of a joint.)

When the compression cavity turns towards the glenoid, the surfaces lose their congruity, the adhering force between head and cavity is lost, and the joint becomes unstable (Fig. 6b). Next, the anterior rim slides into its hollow in the head of the humerus (Fig. 6c). At the same time the head slides forwards, and only strong anterior support would be able to prevent dislocation which in reality is not a dislocation at all, but a subluxation. Parts of the joint surfaces are still in contact (the rim with the hollow), and the head never really dislocates through a capsular rupture or into a false joint cavity, as many seem to believe.

It thus appears that the essential lesion is not the variable anterior destruction of the joint margin but the deformity of the humeral head. Consequently the most logical treatment would be to reconstruct the head by filling in the compression hollow; it is probable that the tendency to dislocation would then disappear. For technical reasons this is not practicable, and we must therefore concentrate on the lesion at the anterior

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**Fig. 6**

Diagrams showing the relationship of the head to the glenoid during outward rotation movement:

(a) The movement begins from the mid-position;
(b) Compression is in front of the glenoid; the articular surfaces have lost normal congruity and the joint is unstable.
(c) The rim of the glenoid slips into the furrow of the humeral head and the joint is subluxated in the typical manner.

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**Fig. 7**

Diagram to show how bone block and reactive tissues round it prevent the head from sliding round the corner in full external rotation of the humerus.
rim. Even if we cannot find damage here, reinforcement of the anterior support to the head will cure the condition.

Hybbinette and Eden proceeded from false premises. They did not realise the importance of the posterior compression hollow in the head, but believed in a false joint cavity into which the head dislocated. Nevertheless, their anterior bone block method is excellent. The graft forms an obstacle which stops the head from sliding forward, thus preventing it from sliding round the corner of the anterior glenoid rim (Fig. 7). Reactive tissue around the graft forms a strong reinforcement of the anterior capsule, making a reliable anterior support for the head.

If, as sometimes happens, the labrum is absent and the worn glenoid rim slopes down towards the neck of the scapula, it is difficult to achieve secure fixation of the graft. For these cases there is probably no reliable method.

SUMMARY

The purpose of this paper is to call attention to the anterior bone block method of Hybbinette-Eden for recurrent dislocation of the shoulder joint.

1. The operative technique is not difficult, and the after-treatment is short and relatively agreeable for the patient.

2. Sixty of our own cases are described, with four recurrences. The recurrences all occurred as the result of real trauma. In a total of 128 Scandinavian cases there were eight recurrences—that is 6.3 per cent.

3. In our opinion, based on the observations of radiography, arthrography, and operation, it is the compression fracture of the head of the humerus which deserves the name "essential lesion." Destruction of the anterior rim of the glenoid may be very slight, or entirely lacking. No false joint cavity or rupture big enough to receive the head of the humerus was ever observed by arthrography or by inspection during operative exploration.

Recurrent dislocation is an intracapsular subluxation, which occurs when the anterior rim of the glenoid slides into the hollow in the humeral head.

REFERENCES