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RECURRENT ANTERIOR DISLOCATION OF THE SHOULDER TREATED BY THE EDEN-HYBINETTE OPERATION

Follow-Up on 78 Cases

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INTRODUCTION

Recurrent anterior dislocation of the shoulder has been treated by many different operations.

With the exception of two cases, treated by the *Bankart* (1938) operation, all patients admitted to the Orthopaedic Hospital, Aarhus, Denmark, have been treated, since 1938, by the method of *Eden* (1918) and *Hybinette* (1932) in the modification of *Magnus* (1932) as described by *Thomasen* (1944).

In an attempt to determine the effectiveness of this method, the material was subjected to an analysis and follow-up.

MATERIAL

From 1938 through 1964 the Eden-Hybinette (E.-H.) operation was performed on one shoulder in 86 patients and on both shoulders in 5 patients, making a total of 96 cases. In 4 the operation was done twice because of recurrence after the first. The analysis is based upon the condition before the first operation.

Of the 96 cases 65 were in males and 31 in females. In 47 cases the right shoulder was affected, in 49 the left. The age at which the first dislocation occurred was in 71 cases under 30 years (74 per cent), in 32 cases under 20 years (33 per cent). Only one patient was under 15 (12 years) at the time of the primary dislocation.

The primary dislocation was sustained in sport, in traffic accidents, or in accidents during work in 27, 21, and 23 cases respectively, while it was due to epileptic seizures and accidents in the patients' homes in 9 cases each, and in 7 cases there had been no known trauma.

Of 11 patients with dislocation of both shoulders 5 were operated upon bilaterally

by the method of E.-H. One patient had an E.-H. operation on one shoulder and a Bankart operation upon the other.

In two patients the primary dislocation of both shoulders had been caused by the same factor. No patient knew of recurrent dislocations in the family.

Table 1 shows the relation between the number of dislocations and the time elapsing from the primary dislocation until operation was performed.

Table 1. Number of dislocations in relation to the time elapsing between the first dislocation and the E.-H. operation.

No. of years between first dislocation and E.-H. operation	No. of dislocations			Total
	1-5	6-15	>15	
<1 year	10	6	6	22
1-4 years	14	15	15	44
5-9 years	2	8	3	13
≥10 years	0	7	10	17
Total	26	36	34	96

In 79 cases (82 per cent) the patients had been concerned about the tendency to shoulder dislocation every day and some even every night.

The duration of immobilization of the shoulder after primary dislocation and reduction had been less than 1 week, 1-3 weeks, and more than 3 weeks in 58, 21, and 5 cases respectively, while in 12 cases the duration is unknown.

The reduction of the primary dislocation had been performed under anaesthesia in 48 cases (50 per cent), without anaesthesia in 42 (44 per cent), while in 6 cases this was unknown. Of the cases reduced under anaesthesia 23 per cent had had re-dislocation more than 15 times before the operation, while of the cases reduced without anaesthesia 50 per cent had had more than 15 further dislocations. In 19 cases of each group either the anterior glenoid rim or the anterior joint capsule was found to be damaged.

Preoperative X-rays are missing in one case. Notes on the pathological findings at operation are lacking in 47 of 96 cases.

89 out of 95 X-rayed shoulders exhibited the characteristic posterior capital notch (94 per cent). In the 6 cases without this sign the primary dislocation had occurred at an age of 15-20 years, and in the same 6 cases the anterior glenoid rim or the anterior capsular structures were found to be damaged. Of the 89 cases with posterior capital notch 46 had at least one of the above-mentioned injuries.

A fracture of the greater tuberosity was found in only one case.

THE OPERATION

The bone graft was taken from the patient's contralateral iliac crest (47 per cent) or formed from homologous bones, most often the patella, stored in the bone bank at -18°C (53 per cent).

In 89 cases the shoulder was immobilized postoperatively in Velpeau's bandage—in 26 cases for 4–5 weeks, in 52 cases for 6 weeks, and in 11 cases for 7–8 weeks. In 7 of the early cases the shoulder was immobilized with the arm in a mitella or Velpeau's bandage for 2–4 weeks, followed by 2–10 weeks in abduction.

Complications to the E.-H. operation occurred in 9 cases. Two developed infection in the iliac wound, one had a non-fatal pulmonary embolus, one a pleural effusion, one ulnar nerve paralysis which improved later, one purulent infection in the shoulder wound, and in two cases the bone grafts got displaced postoperatively. In one of the last-mentioned cases this was corrected by immediate re-operation.

THE FOLLOW-UP

During the period June-October 1965 the author re-examined the patients representing 78 of 96 cases (81 per cent). In 41 cases the patient was examined in his home, in 37 cases at the Orthopaedic Hospital, Aarhus.

Of the 18 non-examined cases the patient was dead in 7, had emigrated or gone abroad in 9, could not be traced in one, and refused to be re-examined in one case. Eight of these cases are known to have had no redislocations. Two are known to have had redislocations. One patient had one redislocation 8 months postoperatively. He later emigrated to New Zealand, and according to relatives he did not suffer further dislocations. Another patient had a redislocation 9 months postoperatively, and after another 4–5 dislocations a new E.-H. operation was performed. He is a sailor, and his relatives do not know of further redislocations after the second operation.

In Table 2 the re-examined cases are grouped according to the length

Table 2. Number of re-examined cases and cases with re-dislocation grouped according to duration of follow-up period.

Duration of follow-up period in years	No. of cases	Cases with re-dislocation	
		No.	%
$\frac{1}{2}$ –4	20	4	20
5–9	22	4	18
10–19	34	5	15
≥ 20	2	1	50
Total	78	14	18

of follow-up. The reason for including cases with a follow-up period as short as 6 months is that 20 per cent of the cases followed for 6 months—5 years had redislocations.

In 14 of the examined cases (18 per cent) redislocations had occurred, but 3 were called subluxations. In 4 cases another E.-H. operation had been performed, and no further dislocations had occurred. In 4 cases there had been redislocations within the last 6 months before the re-examination. One patient suffered daily from a tendency to dislocation, but had not had true dislocations in the last 2 years. This patient is suffering from epilepsy. In the remaining 5 cases the patients did not worry about the operated shoulder in daily life.

The duration of immobilization after the operation was found to have no influence on the frequency of redislocation.

The 14 cases with redislocations are among 51 operated upon by 6 orthopaedic surgeons who had done at least 5 of these operations each, while no redislocations occurred among 27 cases operated upon by 10 orthopaedic surgeons who had done less than 5 of these operations each.

Table 3. Cases of re-dislocation after the E.-H. operation, grouped according to the time elapsing between the operation and the first re-dislocation, degree, number, and cause of re-dislocations. Finally, the number of re-operated cases.

No. of years between operation and re-dis- location	Number of shoulders with		No. of re-dislocations		Causes of re-dislocations		No. of re- operated cases
	Dis- location	Sub- luxation	<5	≥5	Spont.	Traum.	
<1 year	4	1	1	4	5	0	3
1-2 years	3	2	4	1	3	2	1
8-9 years	3	0	3	0	1	2	0
18 years	1	0	1	0	0	1	0
Total	11	3	9	5	9	5	4
	14		14		14		

Table 3 shows that in 10 cases the redislocation occurred within the first 2 years. All 5 cases with dislocation within the first year had not sustained adequate trauma; 4 of these had had more than 5 redislocations, and 3 had reoperations within the observation period, all in contrast to the cases with later occurrence of the first redislocation. In 8 out of 9 spontaneously redislocated cases the dislocation occurred

within the first two years. 7 of the redislocated cases (50 per cent) had had their very first dislocation before the age of 20, but it was in one case only that the primary dislocation had been spontaneous.

Constant or periodical pain in the shoulder was mentioned by all the patients with redislocations, but by only 30 out of 64 without redislocations.

Tenderness anteriorly on the operated shoulder was present in 50 cases (64 per cent), 13 of which had had redislocations. Muscular atrophy of the shoulder was very uncommon. In 45 cases (58 per cent) external rotation of the shoulder was restricted. Nine had redislocated. In 12 cases with restricted external rotation and in 8 cases with normal rotation the mobility was restricted in other, different directions, most often in a lesser degree. Only 2 patients without and 4 with redislocations had difficulties in moving the shoulder sufficiently to touch the back of the head and the lumbar region with the hand. The degree of shoulder mobility was independent of the duration of postoperative immobilization.

Of a total of 37 shoulders X-rayed at follow-up only 7 showed a flattened anterior glenoid rim. Of these, 4 had had redislocations after the operations, all spontaneously. Of 30 X-rayed shoulders without flattened anterior glenoid rim 6 (20 per cent) suffered new dislocations, 3 of these traumatically.

The bone graft was visible on the follow-up X-rays in 19 of 37 cases, in 9 out of 13 with autografts, and in 10 out of 24 with homografts. In most cases only a bean-sized remainder of the bone graft was left, placed beneath and anterior to the scapular neck without contact with it (Figure 1). In a few cases only was the anterior glenoid rim built up with bone graft. When the bone graft disappeared totally, this generally occurred within the first year. Of the X-rayed shoulders with redislocation, 3 with autografts and 1 with homograft exhibited a remainder of the bone graft.

In 25 cases grating was felt in the shoulder joint during movements. X-rays showed degenerative arthritis in 13 cases, in 10 of which the patient was over 50 years old at follow-up. In 10 cases osteoporosis was present.

7 patients had restricted mobility in the cervical spine; in 4 of these patients the trapezius muscle was tender. Three were 70 and 4 were 45-55 years of age at follow-up.

Ten patients had changed their occupation because of weakness in the operated shoulder. Two of these patients had had redislocations.



Figure 1. The bean-sized remainder of the bone graft is located beneath and in front of the scapular neck.

DISCUSSION

The age distribution of the patients at the time of the primary dislocation corresponds to that reported in previous publications (*McLaughlin & McLellan 1967*). The duration of immobilization after the primary dislocation, less than one week in the majority of the cases, may have been inadequate.

94 per cent of the cases in the present study showed a posterior capital notch. This is in keeping with *Hermansson (1934)*. *Palmer & Widen (1948)* give the posterior capital notch the major part of the blame for the recurrences.

The findings of injury to the anterior supporting structures are in conformity with earlier publications (*Hybinette 1932, Lavik 1961*). *Willner (1964)* found a positive correlation between the degree of depression of the edge of the glenoid cavity, the number of dislocations, the ease with which they occurred and with which they were reduced again.

McLaughlin (1960) emphasizes that damage to the gleno-humeral ligaments and formation of an anterior pouch of the joint space make forward displacement of the humeral head possible. Arthrographic studies by *Reeves (1966)* showed constant enlargement of the subscapular bursa and either absence of the glenoid labral outline or an enlarged opening to the subscapular bursa in cases of recurrent dislocation of the shoulder.

The original idea in using a bone graft was to build out the glenoid cavity to prevent forward dislocation of the humeral head (*Eden 1918, Hybinette 1932*). However, it has been substantiated by *Jakobsson (1949)* that a graft on a level with the glenoid rim gives results as good as a graft projecting laterally beyond that level. The fact that the

graft diminishes, and very often disappears, in 1-2 years has further convinced the author that the mission of the graft is rather to form scarification and shrinkage of the capsule than to give simple mechanical support to the joint.

However, the importance of scarification in preventing redislocations might explain the strange fact that none of the present cases operated upon by less experienced surgeons had had redislocations. *Hippocrates* treated recurrent anterior dislocation of the shoulder by inserting red-hot iron anterior to the shoulder joint, apparently to provoke scarification. *Watson Jones* (1948) stresses the importance of operative exposure of the anterior joint structures and subsequent re-suture, stating that the specific repair of labral lesions—which he found in 70 per cent—is of less value in preventing redislocation.

Danis (1966) fills the anterior synovial pouch with iliac grafts introduced directly into the joint through an axillary approach.

In the present material 18 per cent of the re-examined cases have redislocated. This is in agreement with *Eigenthaler* (1950) and *Hedman* (1952), while *Jakobsson* (1949), *Lavik* (1961), and *Schwarzer* (1966) have reported far better results (Table 4). *Jackson Day, MacDonnell & Pedersen* (1966) had no redislocations after 5 years' follow-up on their series of Bankart and Magnusson-operated shoulders, but a high rate of redislocations after more than 13 years' follow-up (Table 4).

Table 4. Some follow-up studies on E.-H. materials. For comparison, long-term studies on Magnusson and Bankart materials.

Author	Year of public.	Method	Follow-up period (years)	No. of oper. cases	No. of re-exam. cases	No. of re-disloc. cases	% re-disloc. cases
Jakobsson	1949	E.-H.	1-10	43	43	0	0
Eigenthaler	1950	E.-Brun	2	41	27	6	22
Hedman	1952	E.-H.	1.5-20	37	31	6	19
Lavik	1961	E.-H.	1.7-10	22	22	1	4
Schwarzer	1966	E.-H.	5-12	19	14	0	0
Present material		E.-H.	0.5-27	96	78	14	18
Day, MacDonnell & Pedersen	1966	Magnusson	13-20	24	14	2	14
Day, MacDonnell & Pedersen	1966	Bankart	13-20	17	9	3	33

However, the redislocations in the present study occurred most commonly within the first 2 years, the majority without adequate trauma, while a minority, occurring later, redislocated traumatically.

Seven of the redislocating cases had their primary dislocations before the age of 20. This suggests that the E.-H. method is most insufficient in the very young patients. According to the follow-up X-rays, a flattened anterior glenoid rim may indicate a poorer prognosis for the E.-H. operation.

In conclusion it must be said that redislocations in 18 per cent of the cases is not a satisfactory result, but according to the literature no other method, with sufficiently followed materials, seems to be significantly better.

SUMMARY

96 cases of recurrent anterior dislocation of the shoulder treated by the Eden-Hybinette operation are reviewed. 78 cases were re-examined after a follow-up period of 6 months to 27 years. 14 cases had had redislocations, usually spontaneous, 10 within the first 2 years. Four of the 14 cases had had successful reoperation by the E.-H. method, 5 were still suffering from dislocations, while 5 did not worry about the shoulder at follow-up.

A remainder of the bone graft was visible in half the X-rayed cases, irrespective of whether redislocation had occurred.

With support from the literature it is concluded that the effect of the operation must consist in scarification of the anterior joint structures. This can explain why inexperienced surgeons get better results than experienced operators.

There have been no reports on methods giving significantly better results after a long follow-up period.

RESUME

Une série de 96 cas de récides de la discolation antérieure de l'épaule, opérés d'après la méthode Eden-Hybinette a été réétudiée. 78 cas ont été réexaminés après une durée d'observation variant entre $\frac{1}{2}$ et 27 ans. Dans 14 cas, il y avait eu nouvelle dislocation, dont 10 au cours des deux premières années qui ont suivi l'opération. Habituellement, celle-ci s'était produite spontanément. 4 de ces 14 cas ont été réopérés avec succès par la méthode E-H, 5 souffrent toujours de la dislocation, alors que dans les 5 autres cas, il n'y avait aucune plainte concernant l'épaule au moment du réexamen.

Un reste de la greffe osseuse était visible aux rayons X dans la moitié des cas radiographiés qu'il y ait nouvelle dislocation ou non.

En s'appuyant sur la littérature, il est conclu que l'effet de l'opération peut être causé par le scarifice des structures de l'articulation antérieure. Cela peut expliquer pourquoi des chirurgiens inexpérimentés obtiennent de meilleurs résultats que des chirurgiens expérimentés.

Il n'est pas possible de trouver dans la littérature une méthode donnant des résultats appréciablement meilleurs après une très longue période d'observation.

ZUSAMMENFASSUNG

Eine Studie von 96 Fällen von recidivierender Schultergelenksverrenkung, die nach der Methode von *Eden-Hybinette* operiert worden waren, wurde vorgelegt. 78 Fälle wurden nach einer Beobachtungszeit von $\frac{1}{2}$ –27 Jahren wiederuntersucht. 14 Fälle hatten eine Wiederverrenkung, 10 innerhalb der ersten 2 postoperativen Jahre und dann gewöhnlich spontan. Vier der 14 Fälle waren mittels der E-H. Methode erfolgreich reoperiert worden und 5 litten fortgesetzt an Luxationen, während die restlichen 5 sich zur Zeit der Nachuntersuchung nicht um ihre Schulter bekümmerten.

Ein Rest der Knochenspanne war in der Hälfte der mittels Röntgenstrahlen untersuchten Fälle sichtbar, gleichgültig ob Reluxation entstand oder nicht.

Mit Unterstützung aus der Litteratur schliesst man, dass der Effekt der Operation in der Skarifizierung der vorderen Gelenkspartien begründet sein muss. Dies erklärt weshalb unerfahrene Chirurgen bessere Resultate erzielen als erfahrene.

In der Litteratur kann man keine Methode mit signifikant besseren Ergebnissen nach einer langen Beobachtungszeit finden.

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