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EDEN-HYBBINETTE'S OPERATION FOR RECURRENT DISLOCATION OF THE HUMERO-SCAPULAR JOINT

By

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In this study an account is given of the results of a clinical and radiological follow-up of a series operated on according to Eden-Hybbinette in consequence of recurrent anterior luxation of the humero-scapular joint.

SERIES

The series is formed of all patients who were operated on owing to recurrent shoulder dislocation in Surgical Department I, Södersjukhuset, during the period 1948–1963 and consists of 119 patients, including 77 men and 42 women. One patient was operated on bilaterally, so that the number of shoulders is 120, 58 right and 62 left shoulders.

The pre-operative information is collocated in Tables 1–5. Table 1: the usual excess representation of low ages is found at the first dislocation, here it is 89 per cent below 40 years of age. 11 shoulders were dislocated primarily without trauma, = 9.2 per cent, while in 6 cases there was no definite information whether the first dislocation occurred in association with trauma.

Table 2: the degree of severity of the initial trauma is difficult to evaluate afterwards so that only a rough division into two groups could be made. 6 cases could not even be placed in one of these. 8 shoulders were reduced by laymen, 71 by doctors and, with few exceptions, under narcosis. Spontaneous reduction was relatively somewhat more common with slight than with more severe trauma. Details concerning the reduction are lacking in 6 cases.

Table 3: although the details must be taken with some reservation owing to the frequently long period of time between the first disloca-

tion and the operation, it is nevertheless obvious that the period of fixation on average was short and only exceptionally extended to 3 weeks.

Table 4: a surprising number of patients remembered the initial trauma well and could give a fairly adequate description of the mechanism of injury. The series illustrated the fact, long well known, that recurrent dislocations may be the consequence of varying types of initial force. Falls onto an extended arm dominated among these and were reported by almost half of the patients.

Table 1. Age at 1st dislocation. Traumatic and atraumatic cases.

Age at 1st dislocation	No. of cases	Trauma	O trauma	Uncertain
< 20 years	46	38	5	3
20–39 years	61	53	5	3
40–60 years	13	12	1	0
	120	103	11	6

Table 2. The initial trauma. Reduction at 1st dislocation.

	No. cases	Self-reduct.	Red. doct. or layman	No inform.
No or slight initial trauma	25	9	16	0
More severe initial trauma	89	23	62	4
Uncertain degree of severity	6	3	1	2
	120	35	79	6

Table 3. Immobilisation on 1st dislocation.

No fixation	41
Sling max. 1 week	20
Sling 1–2 weeks	20
Sling 2–3 weeks	7
Sling >3 weeks	5
Fixation to trunk 1–2 weeks	13
Fixation to trunk at least 3 weeks	7
No information	7
	120

Table 4. Type of trauma at 1st dislocation (103 traumatic cases).

Fall on extended arm	48
Excessive rotation of abd. arm	15
Trauma from the rear directly against the shoulder or indirectly via the elbow	14
Throw effect or jerk on forward-raised arm	4
Forced passive rear movement of abd. arm	4
Uncertain	18
	103

Table 5. Duration of anamnesis. No. of dislocations.

Anamnesis duration	No. of cases	No. of dislocations <5	5–10	11–20	>20
<1 year	8	1	2	3	2
1–3 years	27	6	15	4	2
3–5 years	26	6	13	5	2
5–10 years	26	3	8	9	6
>10 years	33	3	12	6	12
	120	19	50	27	24

Table 5: the anamnesis is quite long on average (more than 5 years in almost half of the cases). In cases previously operated outside this series, which recurred, (7 in number) the length of the anamnesis (period from first dislocation to operation) and the number of dislocations were calculated up to operation in this series.

OTHER PRE-OPERATIVE INFORMATION

13 patients had bilateral recurrent shoulder dislocation. One was operated on bilaterally in this series, 4 were operated on the second shoulder at a different hospital and 8 were not operated on the second shoulder. One of the 8 nonoperated patients has had freedom from recurrence for one year, the remaining 7 for between 4 and 16 years. (In addition to these 13 cases of bilateral recurrent dislocation 3 pateient had dislocated the second shoulder once).

4 patients had epilepsy.

8 out of 113 patients (= 7.1 per cent) who were asked this question stated that there was familial connection with recurrent shoulder dislocation. No case had a history of massive heredity, but patients referred to one relative only who had the condition (5 to a brother or sister, 2 to a cousin and 1 to a grandmother). All 8 patients had sufficient trauma on the first dislocation and only one had a bilateral condition (second shoulder not operated on). 7 patients were operated in this series because the condition recurred after a previous operation at a different hospital. 3 of them had been operated on according to Camitz, 2 according to Eden-Hybbinette, one according to Orell and one according to Magnuson.

OPERATIVE TECHNIQUE AND POSTOPERATIVE TREATMENT

All 120 shoulders in this series were operated on according to Eden-Hybbinette following the technique described by Palmer and Widen in 1948. Its main feature is that a hook-shaped transplant (L- or J-form), taken from the iliac crest, is inserted into a subperiosteal pocket, prepared with a raspatory, along the anterior aspect of the neck of the scapula; the transplant is so shaped that with the best possible adjustment its short leg can be hooked up on the anterior rim of the glenoid. In those not infrequently occurring cases in which the labrum was missing and the periosteum was torn away within a fairly large area of the neck of the scapula the fixation of the transplant was not so good, but no attempt was ever made to carry ðut any form of osteosynthesis. The capsule and the subscapularis tendon were sutured together in one layer with strong mattress sutures and the arm was inward-rotated. (The procedure involves a degree of raphe but the shortening of these structures is not of course so marked as if they are sutured with overlapping).

The post-operative treatment was also fairly uniform. The arm was fixed to the body with a cushion underneath the axilla for 2–3 weeks. Afterwards abduction movements were permitted in an arm sling although outward-rotation was avoided for 4–6 weeks. After this period the patient was encouraged to take up active exercises without reservation. The period of hospital care varied from 4 to 20 days but was with few exceptions 6–11 days.

POST-OPERATIVE COMPLICATIONS

Only one post-operative complication occurred and this was a mild wound infection without any effect on the operative result.

OPERATIVE FINDINGS

The documentary value of accounts of operations must be considered to be limited in a follow-up investigation which has not been planned beforehand and with several surgeons involved (9 surgeons in this series). Information concerning possible pathological findings may be incomplete and interpretation of them vary. Information concerning the labrum is to be found in 111 reports. It was stated to be intact in 29 cases, detached or ruptured in 46 and to be completely missing in

36 cases. Other operative findings of interest were the description of a capsular pouch before the neck of the scapula in 34 cases, of a rounded or worn anterior rim of the glenoid in 14 shoulders and of arthrosis in 4 shoulders. In a few cases the surgeon stated that he could palpate a posterior defect in the humeral head.

METHODS

Clinical Follow-up

A stencilled questionnaire was sent out to all 119 patients in which each patient had to answer questions on possible recurrence, ability to work, strength and mobility in the operated shoulder as well as subjective trouble in the form of aching or pain on movement. Answers were received from 113 patients representing 114 operated shoulders = 95 per cent of the whole material. 7 patients who could not appear for the follow-up were also interviewed by telephone. The remaining 106 were examined clinically, 102 by the author and 4 by willing colleagues at other hospitals.

The observation periods can be seen in Table 6. The average observation period was 8.5 years (variation: 2–17.5 years).

Table 6. Observation periods (114 shoulders examined).

2–3 years	14
3–5 years	20
5–10 years	36
>10 years	44
	114

Radiological Follow-up

In connection with the clinical follow-up 105 patients were X-rayed (one of these was operated on bilaterally in this series).

The purpose of the X-ray examination was to obtain information concerning possible arthrosis in the humero-scapular joint and its degree of severity, to identify the transplant, to demonstrate the possible occurrence of ossifications in the humero-scapular joint or its immediate surroundings, to demonstrate the presence of a postero-lateral compression cavity and possible anatomical abnormalities which might indicate a disposition to recurrent shoulder dislocation.

Radiological Technique

Both shoulders were examined according to the same technique and the following three projections were used in all cases:

1. Frontal (antero-posterior) projection: the arm is rotated inward approx. 60 degrees and the X-ray tube is angled 15 degrees from above.

2. "Stryker" or "notch view": the arm lifted fowrard and upward with the elbow bent and the palm of the hand on the neck, while the tube is angled 10 degrees from below. This projection gives a profile picture of the postero-superior and the antero-inferior area of the humoral head and the anatomical neck.

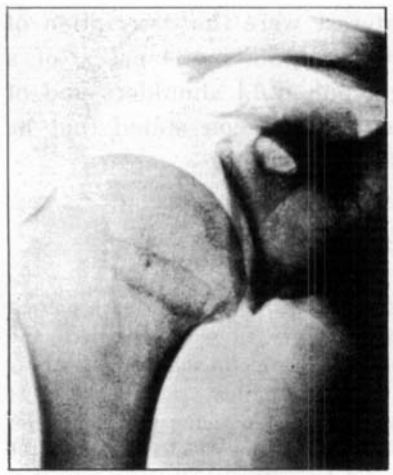
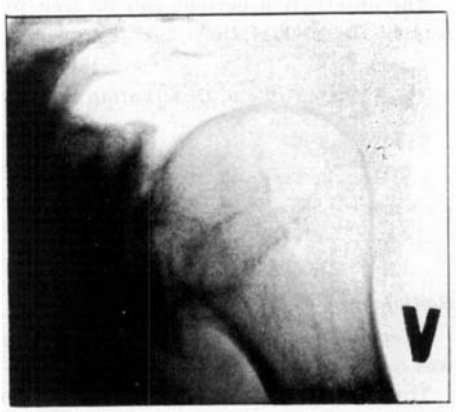


Figure 1. Moderate arthrosis 16 years after op. No subj. symptoms. End result excellent.

Figure 2. Severe arthrosis 14 years after op. No subj. symptoms. End result excellent.



3. Lateral (axillary, inferior-superior) projection: the cassette is placed like an epaulette above the shoulder, the arm is abducted 90 degrees and pronated, the X-ray tube is angled directly from below centreing on the axilla. This projection, described by *Jakobsson* (1950), allows i.a. evaluation of the anterior rim of the glenoid.

The tangential "epaulette picture", described by *Hermodsson* (1934), where the arm is maximally rotated inward, would also have been interesting, above all in demonstrating the postero-lateral compression cavity. To avoid further complications in the follow-up examination which was undertaken by a department heavily involved in normal routine, the radiological diagnostic procedure, however, had to be confined to the three projections enumerated.

Classification of the degree of arthrosis:

The evaluation of the extent of the cartilage damage was naturally not often possible with the X-ray technique used. Attempts were made however to classify

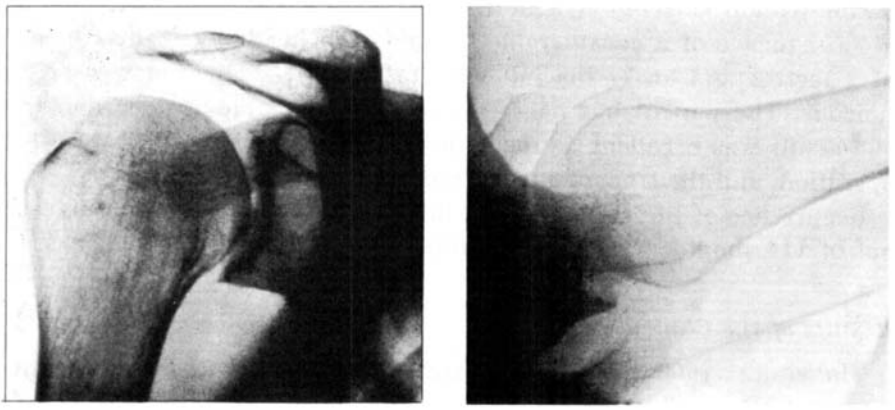


Figure 3. United transplant in frontal (left) and inferior-sperior (right) projection 17 years after op.

the arthrosis and these were mainly based on an estimation of the relative size of the osteophytes and the possible presence of sclerosis in skeletal structures near the joint.

Slight arthrosis: fairly small osteophytes on the edges of the articular surfaces were the only finding.

Moderate arthrosis: medium-sized osteophytes were the only finding. There were medium-sized or minor osteophytes in association with lesser degrees of sclerosis in skeletal structures near the joint. (Figure 1).

Severe arthrosis: there were large or fairly large osteophytes on the articular surface edges in association with severe degrees of cartilage reduction and sclerosis in adjacent skeletal parts. (Figure 2).

Evaluation of the transplant:

The transplant was judged to be united when it could be identified as a rim of bone which projected above the anterior caudal area of the glenoid and which could be distinguished with certainty from an osteophyte. (Figure 3).

RESULTS

Recurrence

One patient had recurrence 3 years after operation without adequate trauma. After almost 10 further dislocations the patient was operated on by means of the same method (Eden-Hybbinette's operation). A large capsular pouch was found which had also been observed at the first operation. The transplant had been resorbed for the greater part and the small remnant had a cartilage-like appearance. At follow-up 6 years after the last operation the result was excellent and no further recurrence had occurred. The new transplant had united.

One patient suffered a fresh dislocation 16 weeks after operation as a consequence of a considerable trauma (fell headlong from a height of 2 metres and broke his fall with his hand). Reduction was spontaneous. The patient has never dislocated his shoulder since and the end-result was excellent at the follow-up examination, 15 years after operation, and the transplant was united.

Recurrence of the condition has therefore only occurred in one case out of 114 shoulders which were followed-up = 0.88 per cent.

Results of the Clinical Follow-up

The results referring to subjective symptoms and mobility are collocated in Table 7.

The following characteristic examples of slight subjective discomfort may be mentioned: slight pain on certain movements, slight aching with changes of weather or after heavy work, some tiredness associated with heavy or lengthy work, insignificant limitation of function owing to slightly reduced strength or mobility. All the patients in group B stated that they had full working capacity.

Table 7. Subj. symptoms and range of movement.

Subj. symptoms	No. of cases	Mobility 1. Free/slight limitation	2. Moderate limitation	3. Considerable limitation
A. None	64	57*	7	0
B. Slight	44	34§	10	0
C. More severe	6	0	3†	3
	114	91	20	3

* 5 by letter. § 1 by letter. † 1 by letter.

Amongst the 6 patients who had severer subjective troubles 2 attributed this solely to reduced mobility and strength, 2 had in addition slight periodic aching and tenderness in the shoulder, while 2 had severer periodic aching. One of the latter two had a cervical disc syndrome later with pain in the same arm and had been operated on for arthrosis in the acromioclavicular joint with a clavicle resection on the same side, the other had rheumatoid arthritis, which had shown symptoms from the shoulder before the first dislocation. Only one patient had had a change of occupation owing to residual trouble after

the operation, while one (a woman) had finished with her trade for this reason.

Group 1 includes shoulders with a maximum of 20 degrees limitation of elevation and/or outward rotation.

Group 2 comprises cases with an elevation of 90–160 degrees and/or an outward rotation of 45–70 degrees.

Three patients (group 3) had still greater limitation of mobility both in elevation and rotation but no one had anakylosis.

Table 8. Classification of end results. Average observation period for the respective groups.

Results	No. of cases	A:1	B:1	A:2	B:2	C:2	C:3	Av. obs. period (yrs)
Excellent	57	57	0	0	0	0	0	9.2
Good	41	0	34	7	0	0	0	7.8
Satisfactory	13	0	0	0	10	3	0	8.1
Unsatisfactory	3	0	0	0	0	0	3	
	114							

In evaluating the clinical end-result (Table 8) both objective and subjective symptoms were taken into consideration. Therefore in 7 cases which had moderate limitation of mobility, mainly rotation, but no subjective symptoms, the end result was judged good, and three cases belonging to group C were classified satisfactory, although the subjective trouble admittedly could not be designated slight while yet being of moderate severity, and since the patients themselves were satisfied with the result of the operation. According to these criteria therefore the end result was excellent or good in approx. 86 per cent, satisfactory in 11 per cent and unsatisfactory in 3 per cent. In cases which were observed for a long period no tendency towards a deterioration in the results was seen.

Results of the Radiological Follow-up

Pre-operative films were sought in the 105 cases (106 shoulders operated) which were X-rayed during the follow-up. This gave positive results for 54 shoulders, while in 39 cases only the radiological reports were available. Neither films nor reports could be traced in the case of 13 shoulders.

Table 9. Radiological findings concerning arthrosis in the humero-scapular joint and postero-lateral defect before operation and at the follow-up of 93 shoulders.

	Postero-lat. defect	0 arth.	Slight arth.	Mod. arth.	Severe arth.
Pre-operative X-ray	54	74	13	5	1
Post-operative X-ray	78	13	16	44	20

Table 9 groups information concerning arthrosis in the humero-scapular joint and posterolateral defect in the humeral head in pre-operative radiology of 93 shoulders and compares this with post-operative radiological findings for the same shoulders. The larger number of posterolateral defects found in postoperative radiology is probably explained by the better radiological technique used in this investigation than in the pre-operative one. The pre-operative films which were examined were taken with few exceptions in two projections only, that is, frontal with inward-rotated arm and lateral, and this is probably also true of those X-rays of which only the reports have been recovered. The same conditions may also have affected the number of arthroses demonstrated but the difference in the number of cases of moderate and severe arthrosis in pre- and postoperative radiology is far too great to be explained by a variation in radiological technique. As a rule the pre-operative films did not produce any more certain evaluation of

Table 10. Radiological findings on arthrosis in the humero-scapular joint and postero-lateral defect at the follow-up (210 shoulders).

	A. Operated shoulders this series (106)	B. "Second" shoulder (104)			
		a) non disloc. (90)	b) one disloc. (3)	c) recur. disloc. nonop. (7)	d) recur. disloc. op. outside series (4*)
0 arthrosis	13	64	1	4	1
Slight arthrosis	17	20	1	2	1
Moderate arthr.	54	5	1	1	2
Severe arthr.	22	1	0	0	0
Posterolateral defect present	88	0	2	4	4
Posterolateral defect absent	18	90	1	3	0

* All according to Eden-Hybinette.

the shape of the rim of the glenoid, since axial projections were lacking. In no case could any noteworthy skeletal anomalies be demonstrated.

In Table 10 the frequency of arthrosis in the humero-scapular joint and of posterolateral defect in the humeral head in the radiological follow-up (210 shoulders) is stated. It will be seen from the table that moderate or severe arthrosis was present in approx. 72 per cent of the shoulders operated in this series, while the figure for non-dislocated shoulders (group a) was approx. 7 per cent: a ratio of approx. 10:1. The figures for dislocated, non-operated shoulders (group b and c) and shoulders operated outside the series (group d) are too small to allow conclusions to be drawn even if an increased disposition to arthrosis in group b + c as compared with group a can be noted and in group d when compared with group c.

No posterolateral defect could be found in 18 cases operated in this series nor in any of the shoulders which had never been dislocated.

In 79 cases the transplant had united at the site where it had been placed at operation while in 27 cases it could not be identified.

In 19 shoulders one or more capsular ossifications could be seen. Definite conclusions concerning their origin could not be drawn. They could, for example, be an expression of athrosis, they could be determined by a loosened transplant, calcification of the labrum or fragments following a previous fracture of the rim of the glenoid. In 8 cases which had non-united transplant and a single large capsular ossification it was considered probable that this was formed by the transplant. Moreover in the two shoulders which were re-operated on in this series after previous operation according to Eden-Hybbinette, a capsular ossification appeared, in addition to the new, united transplant, and this ossification in all probability consisted of a remnant of the old non-united transplant. In one of these cases the old transplant was found on operation to be firmly grown into the anterior capsular wall, where it was visible at the follow-up. In the second case no trace of the old transplant was found at operation but radiology revealed a 3 cms long osseous body in the soft tissues caudally of the glenoid cavity.

Dysplasia of the caput or cavity which could be interpreted as a disturbance of development was not demonstrated in any one case.

In Tables 11 and 12 the relationships between subjective symptoms and clinical end results respectively and arthrosis in the humero-scapular joint are shown. (Slight arthrosis was considered to have no significance in this connection and was made the equivalent of no arthrosis). The dominating incidence of moderate to severe arthrosis even with the absence of subjective symptoms and with excellent end results is striking. Out of a total of 22 cases with severe arthrosis 19 declared that they had no or only slight subjective symptoms and the

Table 11. Subjective symptoms in relation to arthrosis in the humero-scapular joint. (106 op. shoulders followed-up).

	No. of cases	0 or slight arthrosis	Moderate arthrosis	Severe arthrosis
No subj. symptoms	58	17	30	11
Slight subj. symptoms	43	13	22	8
Severe subj. symptoms	5	0	2	3
	106	30	54	22

Table 12. Clinical end results in relation to arthrosis in the humero-scapular joint.

	No. of cases	0 or slight arthrosis	Moderate arthrosis	Severe arthrosis
Excellent	51	16	26	9
Good	40	10	24	6
Satisfactory	12	4	3	5
Unsatisfactory	3	0	1	2
	106	30	54	22

clinical end result was judged to be excellent or good in 15 of them. The presence of severe arthrosis was however considerably more common in the group satisfactory-unsatisfactory than in the group excellent-good (7 out of 15 as against 15 of 91).

The relationships between arthrosis and a few factors of possible importance in its genesis are shown in Table 13. Here only those shoulders with confirmed arthrosis have been included in which any other cause of arthrosis but recurrent dislocation and/or treatment of this condition by an operation according to Eden-Hybbinette was regarded as improbable. Consequently shoulders operated on twice (7) were excluded and also cases with another injury or disease in the operated shoulder (3, one of which had rheumatoid arthritis, one had been operated on with a clavicle resection owing to arthrosis in the acromio-clavicular joint and one had incurred a fracture of the greater tubercle 12 years before the first dislocation) together with all cases with arthrosis in the second non-dislocated or injured shoulder (24). Out of the 24 with arthrosis in both shoulders this was more severe in the shoulder operated on in 22 cases. 22 of these 24 patients were aged more than 39 at the follow-up.

Table 13. Arthrosis in the humero-scapular joint in relation to the duration of anamnesis and observation period, number of dislocations, united and non-united transplants. (72 cases; see text).

		No. of cases	No or slight arthrosis	Moderate or severe arthrosis
Duration of anamnesis	< 5	44	18	26
Duration of anamnesis	> 5	28	10	18
Observation period	< 5	31	17	14
Observation period	> 5	41	11	30
No. of dislocations	< 10	46	22	24
No. of dislocations	> 10	26	6	20
Transplants "united"		54	22	32
Transplants not identified		18	6	12

Since the genesis of arthrosis is probably dependent upon a large number of combined factors, the figures in Table 13 must be evaluated with care and in no case be regarded as providing conclusive proof. With this reservation it may be pointed out that the occurrence of moderate to severe arthrosis seems to have a certain correlation to the length of the observation period but on the other hand scarcely to the length of the anamnesis if the material is divided on either side of a 5 year limit. The figures also argue in favour of a connection between such arthrosis and the number of dislocations at a limit of 10. On the other hand no significant difference existed respecting the incidence of striking arthrosis between the group where the transplant could be seen projecting over the cavity rim and the group in which it could not be identified.

DISCUSSION

The intention of this study is not to try to elucidate the etiology of recurrent shoulder dislocation. Some reflections may be made however on the importance of various possible etiological factors.

Bankart's theory concerning detachment of the labrum as the essential injury is contradicted to a certain extent by the results presented by De Palma. The latter found at autopsy of a large material, consisting of previously non-dislocated, nor otherwise injured shoulders, an incidence of labrum detachment which rose with age, so that the injury was most common in those age groups in which recurrent dislocation is rare. It is of course possible that a traumatically con-

ditioned avulsion of the labrum in younger years has a different significance from the injury conditioned by degenerative changes in older people, yet the lesion is already fairly common between 30 and 40 years of age. In this series the labrum was intact according to operation reports in about every 4th case.

Palmer & Widen (1948) presented a theory based on the compression fracture (which they found in all their 60 cases) situated postero-laterally in the humeral head, regarding this fracture as the essential etiological factor. They emphasised that "recurrent dislocation is an intracapsular subluxation which occurs when the anterior rim of the glenoid slides into the hollow in the humeral head". The majority of later authors have agreed with Palmer & Widen that an intracapsular dislocation is involved while they have doubted the great importance of the compression hollow and preferred to regard this as a consequence and not as a cause of the recurrence. In various accounts the hollow was found in from 60 per cent to 100 per cent obviously dependent on the radiological technique used. *Hermodsson*'s (1934) very detailed radiological studies argued clearly in favour of the theory that the defect arose through compression against the lower edge of the glenoid at the 1st dislocation and then did not appreciably increase in size as a result of recurrence, and he found the defect in all his 23 cases of recurrent dislocation. He also discovered the defect however in a very large group of the cases which had no recurrence and therefore he did not attribute any great causal importance to it. In this series the defect could be demonstrated at the follow-up in 88 out of 106 cases (= 83 per cent). It is probable that more defects would have been revealed if Hermodsson's tangential projection had also been used. In Moseley's monography (1961) it is stated that a compression hollow can be demonstrated in all cases of recurrent anterior dislocation but obviously it may be very small, since no less than 5 different projections are required for this 100 per cent *distribution*. Nor could the size of the defect be determined with any great certainty with all these projections. The etiological significance of the postero-lateral compression fracture must continue to be described as not clear.

De Palma (1950) drew attention to the short rotators of the joint, which in his opinion are much overstretched at the first dislocation (especially the subscapularis tendon) and afterwards do not regain normal length and tone, possibly owing to incorrect treatment, so that a condition of "neuromuscular imbalance" sets in with consequential recurrence.

In the later literature more care was taken in evaluating the significance of various etiologic factors. *Brav* (1955) declared "there is no common cause of the condition" and Moseley writes that "several factors are present in varying degrees". Taking into consideration the often rather contradictory information in the literature concerning the incidence and degree of various pathologico-anatomical changes it appears probable that the opinion of these authors is correct. If however we consider that we are generally justified in talking about an essential lesion (defined as the main etiologic factor in the majority of cases) De Palma's theory undeniably seems to be the most plausible. In the shoulder joint where the glenoid cavity only embraces ¼ of the humeral head, in which full stability may exist without restriction of mobility in spite of total detachment of the labrum and a large posterolateral defect and where the fibrous capsule is spacious enough to include two humeral heads, it seems reasonable to accept that the stability is mainly dependent on the tone of the surrounding musculature. It also seems reasonable to consider the fibrous capsule with its anterior strengthening gleno-humeral ligament and the subscapularis muscle, the tendon of which is firmly inserted in the capsule, to be a functional unity ("anterior capsular mechanism" according to Moseley) and to assume that these structures can be overstretched and lengthened at the 1st dislocation especially in younger individuals, in whom they are elastic. Arthrographic studies (*Pettersson* 1942 and others) have revealed that the capsule in "habitual" dislocation is as a rule dilated, particularly in its anterior and lower part. "Neuro-muscular imbalance" which is presumed to be the consequence of this "healing with lengthening" is difficult to record objectively (electrophysiological research may perhaps provide us with a chance to do so) but clinical observations indicate its great importance. Thus it is not unusual that these patients can practice in competitive athletics without mishap but may on the other hand experience a recurrence through an everyday action. In our series there was, for example, a patient who was a ski jumper and one who was a competition gymnast, both of whom could dislocate their shoulders when they were putting on their coats. Moseley declares that professional athletes often want to postpone the operation "until the end of their active careers". The proprioceptive signal system is clearly restored after a successful operation, for even if some patients state that they go carefully with the shoulder after the operation, the great majority says (those also with completely recovered mobility) that they never "think about the shoulder". *Moberg* (1957)

presumes that this restoration occurs as a result of a certain shortening owing to scar formation of the anterior capsular structures. The same author points out that the most reliable method of achieving scar formation is free bone transplantation.

A much discussed but little clarified question which may be brought up in this connection is that of the importance of the fixation period at the first dislocation. In consequence of his opinion that overstretching of the subscapularis tendon takes place at the primary dislocation, De Palma recommends lengthy (8 weeks) immobilisation in adduction and inward rotation while other authors doubt that the period of immmobilisation has any great importance in the risk of recurrence. *Rowe* (1956) found that although this period was of secondary importance compared with the age factor, yet a considerably higher incidence of recurrence could be stated amongst those fixed less than a week than amongst those fixed over a longer period. Amongst those who had more than a week's fixation the differences were quite small, although the best prognosis was for those shoulders which were fixed to the trunk for 3 weeks or immobilised by arm sling alone for 4 weeks, while a further lengthening of the fixation period did not diminish the risk of recurrence. Rowe concludes cautiously that "perhaps three weeks of immobilisation may be sufficient time for healing to occur". Here it will only be stated that in the present series as in most previous reports this period was as a rule much shorter. Grounds undoubtedly exist for testing a fixation of arm to trunk (sling and swathe) over a period of 3 weeks in a large series of primary dislocations in younger patients.

With respect to the results it may first be stated that the incidence of recurrence in this series was less than 1 per cent, a result which is equal to or more favourable than the best reported by Bankart's and Putti-Platt's methods and clearly superior to those achieved by other methods (possibly with the exception of Gallie's very complicated method). Previous information in the literature (*Thomasen* and others) that Eden-Hybbinette's operation was a satisfactory method from this point of view can therefore be confirmed. The mechanisms which decide the curative effect are not completely known but probably they are mainly dependent on an anterior scar formation fastening the capsule to the rim and leading to a certain shrinking of the capsule and shortening of the subscapularis tendon. Extra-articular interventions, of which there were a great number of variants at the beginning of the century, proved to be unreliable as a rule. Such interventions

can probably only produce reliable results if measures are taken to diminish the range of outward rotation to a considerable extent (*e.g.*, Magnuson's operation). A great limitation of outward rotation cannot however be regarded as irrelevant for these patients who are usually young and often athletes.

The results of the Eden-Hybbinette operation can also be regarded as satisfactory from a functional point of view. In this series 80 per cent of the patients had almost normal mobility. Similar results are reported by *Hellens* (1947), *Palmer & Widen* (1948), *Jakobsson* (1949), *Hedman* (1952). Putti-Platt's method on the other hand produces according to most information in the literature (*Crawford Adams, Osmond Clarke* and others) a fairly substantial restriction of outward rotation. This is probably associated with the fact that the subscapularis tendon is shortened in this method through overlapping. Bankart's method seems in this respect to be more favourable than Putti-Platt's but possibly not as favourable as Eden-Hybbinette's.

As far as the results of the radiological follow-up are concerned, the high incidence of arthrosis is notable. This series diverges in this respect from those previously published. Von Hellens found only 7 arthrotic cases out of 75 shoulders X-rayed, Jakobsson 5 out of 38, Hedman 1 out of 28 and *Lavik* (1961) 5 out of 22. The difference between this series and those of the authors mentioned is surprisingly large. However it can probably be explained partly by the longer period of observation on average in this series, partly by differences in radiological technique and possibly also in radiological evaluation. A comparison with the second shoulder which was made here with identical projections certainly makes possible a sharpening of diagnostics.

Even if the causes of arthrosis are many and difficult to evaluate, one can scarcely avoid the impression that the operation as such plays a part in its appearance. Indications of this are the slight incidence of arthrosis at operation and in pre-operative radiology by comparison with that at the follow-up and also the convincing correlation between the length of the observation period and the manifestation of arthrosis. Bearing in mind the figures in this series one naturally asks whether Eden-Hybbinette's operation is unfavourable, as far as arthrosis is concerned, when compared with other methods. The risk of arthrosis has in fact been claimed as an argument against the "bone-block" method. The above question must however be left unanswered since no information regarding the incidence of arthrosis on the follow-up

of comparable series operated on according to other methods has been encountered in the literature.[1]

It is well known that arthrosis in the humero-scapular joint often does not produce symptoms and De Palma declares that a certain degree of arthrosis almost always occurs after 40 years of age. In this series it was also established that the connection between clinical symptoms and arthrosis upon the whole was slight and that freedom from symptoms often existed even with severe arthrosis.

SUMMARY

120 shoulders were treated by Eden-Hybbinette's operation for recurrent anterior dislocation of the humero-scapular joint. A detailed report is given concerning age at the 1st dislocation, initial trauma, immobilisation at the 1st dislocation, length of the anamnesis and the number of dislocations. For 114 shoulders (= 95 per cent of the whole series) the clinical end result was evaluated 2 to 17.5 years after the operation. The average observation period was 8.5 years. The results were classified with regard to subjective symptoms, ability to work and range of movement: 86 per cent of the cases were evaluated as excellent or good, 11 per cent as satisfactory and 3 per cent as unsatisfactory. One recurrence appeared and this was successfully treated by renewed operation according to the same method.

105 patients (106 of the shoulders operated on in the series) were X-rayed in association with the clinical follow-up and both shoulders were presented in three projections. This revealed the existence of moderate or severe arthrosis in the humero-scapular joint in fully 70 per cent of the shoulders operated while the incidence among non-dislocated shoulders was approx. 7 per cent. The presence of such arthrosis increased with more than 5 years observation and more than 10 dislocations.

Etiological factors are discussed as well as the incidence of recurrence and the clinical end results in relation to other methods.

Independently of whichever etiologic factor dominates, Eden-Hybbi-

[1] In 1949 Jakobsson reported a modification of the Eden-Hybbinette method introduced in 1937 at the Orthopaedic Clinic of Karolinska Institutet. In this the transplant is not hooked up onto the glenoid margin, but its lateral, rounded part extends to and builds out the anterior glenoid rim level with it. The modification was designed on the assumption that the risk of postoperative arthrosis deformans would be diminished if conflict was avoided between the transplant and the humeral head.

nette's operation seems to be a satisfactory method giving a low incidence of recurrence and good functional end results. Certain facts favour the argument that the operation increases the risk of arthrosis arising in the humero-scapular joint. If this is really the case, however, it does not probably constitute a basic disadvantage to the method when the good clinical results which do not deteriorate with long observation are taken into consideration.

RESUME

120 épaules ont subi l'opération Eden-Hybbinette pour récidive de dislocation antérieure de l'articulation huméro-scapulaire. Un rapport détaillé est fourni concernant l'âge de la première dislocation, le trauma initial, l'immobilisation lors de la première dislocation, la durée de l'anamnèse et le nombre des dislocations. Pour 114 épaules, il a été fait l'estimation du résultat clinique final entre 2 et 17 ans et demi après l'opération. La période moyenne d'observation a été de 8,5 ans. 86 pour cent des cas ont été considérés comme excellents ou bons, 11 pour cent comme satisfaisants et 3 pour cent seulement comme non satisfaisants.

105 malades ont été examinés aux rayons X à l'occasion d'examens cliniques complémentaires, les deux épaules étant présentées dans trois projections. Cet examen a révélé l'existence d'arthrose modérée ou grave dans l'articulation huméro-scapulaire dans 70 pour cent des épaules opérées, alors que dans les épaules non disloquées, l'incidence n'est que de 7 pour cent approximativement.

Indépendamment du facteur étiologique qui domine, l'opération Eden-Hybbinette semble être une méthode satisfaisante avec laquelle le taux de récidive a été très bas et les résultats fonctionnels finaux bons.

ZUSAMMENFASSUNG

120 Schultergelenke wurden mittels Eden-Hybbinette Operation wegen Verrenkung nach vorne behandelt. Ein ausführlicher Bericht hinsichtlich des Alters bei der ersten Verrenkung, des ersten Traumas der Ruhigstellung nach der ersten Verrenkung, der Länge der Vorgeschichte und der Anzahl der Luxationen wird gegeben. Bei 114 Schultern wurde das klinische Endergebnis 2 bis 17,5 Jahre nach der Operation beurteilt. Die durchschnittliche Beobachtungszeit war 8,5 Jahre. 86 prozent der Fälle wurden als ausgezeichnet oder gut angesehen, 11

prozent als befriedigend und 3 prozent als unbefriedigend. 105 Patienten wurden im Zusammenhang mit der Nachuntersuchung Röntgenuntersucht und beide Schultern wurden in drei rojektionen dargestellt. Dies zeigte das Vorhandensein von moderater bis schwerer Arthrose im Schultergelenk bei vollen 70 prozent der operierten Schultern auf, während die Häufigkeit bei den nicht luxierten Schultern ungefähr 7 prozent war.

Unabhängig davon welcher etiologische Faktor vorherrscht, scheint die Eden-Hybbinette Operation eine zufriedenstellende Methode zu sein, da sie ein seltenes Entstehen von Rückfällen und gute funktionelle Endresultate ergiebt.

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