

## HABITUAL SHOULDER LUXATION

### *Eden-Hybinette's Operation*

*By*

KAARE LAVIK

In 1918, at the same time and completely independent of each other, Eden in Germany and Hybinette in Sweden described their operative methods for habitual shoulder luxation (h.s.l.).

In Anglo-saxon countries the method is little used and there is amazingly little discussion of it in Anglo-saxon literature.

In Scandinavia, on the contrary, the Eden-Hybinette operative method is much used. Especially from Sweden a comprehensive literature exists on E.H. with h.s.l. Hybinette (1932), Dahlgren (1936), Orell & Petré (1942). Palmer & Widén (1948), Jacobson (1949), Hedman (1952), Thomasen (1944), Hublin (1946).

From Norway publications on E.H. have been few. Bruusgaard (1953) published a study of 15 operated cases in which he employed the original E.H. method. Alvik (1951) preferred to modify this method somewhat.

During the 10 year period from 1946–1955, 22 operations were performed at the Central Hospital in Trondheim, all carefully following the original E.H. method.

Our series comprises only the anterior luxation of the humerus. This is a frequent luxation and forms more than half of all luxations.

With the arm abducted the axis runs through the shoulder joint aparallel with the sagittal plane of the body but forming an angle of 45° forward of this.

There are two pathologico-anatomic changes in h.s.l. which, it is generally agreed, represent important pathogenetic factors in the disease: 1) loosening and damage to the joint capsule and the glenoid labrum at the anterior edge of the glenoid cavity. 2) impression frac-

ture, (impression groove) dorsolaterally to the caput humeri. These changes were carefully described by Broca & Hartmann in 1890.

Blundell Bankart (1938–1948) believes that the sole "essential lesion" in h.s.l. is the loosening and damage to the capsule and labrum at the anterior edge of the cavitas glenoidale. He admits that compression fractures of the caput humeri certainly occur, but they are a consequence of, and not a cause of the luxations.

Palmer (1948) does not completely agree with Bankart and he attributes most importance to the impression fracture dorsolaterally to the caput humeri. In Palmer's opinion an intracapsular subluxation occurs in reality with h.s.l.

Tavernier (1930) has also drawn attention to the point that the flattening of the caput humeri may be of congenital origin.

Brav (1952) supports in particular this theory about congenital pathogenetic factors. In his series of h.s.l. he found a number of cases in which the caput humeri showed the same defect on the healthy, non-luxated side as on the luxated side. A control group of 100 men showed flattening in 28 when the arm was photographed rotated inward ca. 50° and abducted ca. 45°.

De Palma (1950) points out that damage and loosening of the capsule and glenoid labrum occur frequently after the age of 30 years and that these findings increase with age, so that they are present in almost 100 % after the age of 60. Clinical experience has shown (this is also borne out by our series) that h.s.l. is rare after 30–40 years of age and diminishes considerably with advancing age. The change in the glenoid labrum and the capsule, on the other hand, grows with age.

Moberg (1957) is the spokesman for roughly the same point of view as De Palma. He believes that the signal apparatus of the shoulder joint is destroyed when ruptures in the muscle-ligament apparatus heal with lengthening.

Watson-Jones (1948–1955) firmly maintains that the arm must be immobilized for 4 weeks in the inward rotation position after luxations, and that certainly many fewer relaxations would then be seen and so many operative interventions could be avoided.

Rowe (1956) found also the highest incidence of recurrence to follow no or only one week's immobilization. But the results were no better after 6 than after only 3 weeks immobilization. He believes that age plays a great part in relaxations: moreover that the severest first-time trauma shows the least recurrence.

## OPERATIVE TECHNIQUE

In the Central Hospital at Trondheim we have employed the original E.H. method with the same technique as that described by Palmer & Widén (1948).

Placing the patient in the best possible position is not of little importance at the operation. It seems to us that the half-sitting position is the best. After the shoulder joint is opened it is important to pull the arm strongly backward and rotate it fully outward. A good view is then obtained and the joint cavity and joint capsule's anterior rim can be inspected from the inside. We chose to take the transplant from far behind on the iliac crest, so as to obtain the most suitable form for this. The size of the transplant is usually  $2.5 \times 3.5$  cm. and should preferably not be less: it must be shaped exactly. A subperiosteal pocket is made on the forward aspect of the collum scapulae between the anterior margin and the labrum. The pocket is often found preformed and is then enlarged if necessary. The transplant, formed as the letter L, is placed in the subperiosteal pocket with the flat spongiosa side turned in toward the denuded collum scapulae and with the short leg of the transplant turning inward toward the joint cavity so that it rests on the rima glenoidale. The "pocket" must not be too wide, otherwise there may be a risk that the transplant will not hold completely firmly. The transplant must fit the "pocket" as the finger fits a tight glove. We have not usually found retaining sutures to be necessary. The joint capsule with the subscapularis tendon is sown firmly together but we have not undertaken any routine shortening of the latter. Since 1949 we have stopped placing the arm on an abduction splint but bandage the arm rotated firmly inward to the body. After ca. 14 days we unfasten the bandage and as early as this we initiate cautious exercises with the shoulder joint, but we take care that no outward rotation occurs in the shoulder joint. The patient gets up from the 2nd day post-operatively and can as a rule be transferred to the out-patient dept., after about 3 weeks.

## PERSONALLY INVESTIGATED MATERIAL

This comprises 22 operations on 21 patients. A woman who had bilateral luxation was operated previously on both sides following Henderson's suspension method, but there was constant recurrence after these operations.

All the operations were performed according to the E.H. original

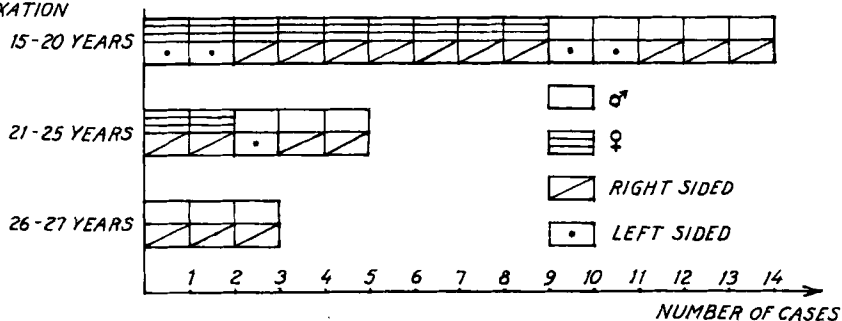
AGE AT THE PRIMARY  
LUXATION

Fig. 1.

Distribution of age and sex in connection with right and left sided dislocation at primary luxation.

method. There was no case in which we attempted any modification of the method.

The observation period varied from 20 months to 10 years. Only in one case was the observation period less than two years.

Fig. 1 shows the age-sex distribution and also the relationship between left and right-sided luxations with first-time luxation.

The average age on 1st time luxation was 20.5 years. The youngest patient with first-time luxation was 12 years and the two oldest were both 27 years.

It is a recognized fact that h.s.l. is found within the younger age groups while the traumatic luxations occur at more advanced ages. The average age for traumatic luxations is usually reported to be 50 years, while that for h.s.l. is stated in the majority of series to be 22-25 years. Thomassen reported an average age for h.s.l. at 22.5 years.

The right-sided luxations predominated in our series and the figures for right and left side were 17/5. This is a rather higher figure than is usually reported.

An interesting point at the follow-up examination was the manner in which reduction had taken place after first-time luxation. In all, 8 of the 21 patients managed to put the arm back into place themselves by turning and wriggling with the shoulder blade and arm, 6 were given help by chance passers-by. There were only 8 who had to obtain medical aid for reduction and only 4 of these had to have narcosis. In the later relaxations the same patients who had no medical aid for the first-time luxation managed to carry out their own reductions the first 4-6 times, but afterwards it became more and more difficult to obtain

reduction. Finally nearly everyone was forced to have medical aid for reduction in later luxations.

3 of our patients had luxation so easily that they had adopted the habit of binding the arm to the body before they went to bed at night.

The circumstance that the first luxations were so easy to reduce but that later luxations were more difficult to put back must be attributed to the fact that h.s.l. begins as incomplete luxations and afterwards becomes complete.

#### SIGNIFICANCE OF TRAUMA

On questioning the patients for the first time, falls on the arm had been accepted as an adequate trauma. 12 of the patients reported that the 1st luxation happened after falling on skis or on smooth ice. On closer questioning whether the fall on the arm was very severe, the majority stated that it was not. On the whole the reply was that they could not understand that an arm could go out of joint for so little.

Direct trauma against the shoulder region had occurred in 5 of the patients at the first luxation, but 2 of these were slight.

In 5 patients, after careful and repeated questioning, no grounds for adequate trauma could be found. To these belonged the patient with bilateral luxations.

It is difficult to establish a criterion whether a trauma is adequate or not. If a patient's statements are accepted after only one enquiry, I believe that all too many trauma will be regarded as adequate. With most injuries there is a tendency to exaggerate the traumas. Revision of the traumas involved in 1st time luxation and a more sober evaluation of these, give me the impression that the traumas in our series can in many cases hardly have been adequate.

#### IMMOBILIZATION WITH PRIMARY LUXATION

Those patients who had no or merely short immobilization seem to demonstrate the greatest number of relaxations before operation. This point is, however, not completely clear since the period between the 1st time luxation and the operation must come into consideration. On the other hand it is plain that patients with the severest trauma at the 1st-time had the fewest number of relaxations. As far as the relaxations are otherwise concerned, a majority of these undoubtedly occurred in patients who had easily been subject to 1st-time luxation and in whom these were also easily reduced.

The period between 1st-time luxation and operation was on average fully 10 years, varying from 2 to 23 years.

#### PRE-OPERATIVE RADIOLOGICAL FINDINGS

Table 1 shows radiological findings in the 22 luxations before operation. The impression fracture of the caput humeri is as a rule missed if the arm is not photographed rotated 50–70° inward and in an abduction position of about 45°. Fig. 2 a and Fig. 3 a show how this is missed with a normal frontal picture. Figs. 2 b and 3 b show the impression plainly when the arm is photographed in the correct position. We can demonstrate a definite impression fracture in more than half the series, not including doubtful flattening dorsolaterally on the caput humeri.

TABLE 1

| Preoperativ<br>x-ray findings | Artrosis.             | Subluxat.<br>position. | Impres-<br>sion fract.<br>of cap.<br>humeri. | Fract. of<br>tub.<br>maior. | Rounding<br>or defect<br>of glen.<br>cavit. | Peritend<br>initis<br>calcareae. | Corp.<br>libr. |
|-------------------------------|-----------------------|------------------------|----------------------------------------------|-----------------------------|---------------------------------------------|----------------------------------|----------------|
| No. of shoulder joint         | 5                     | 7                      | 12                                           | 0                           | 13                                          | 3                                | 1              |
|                               | (2 bilat.) (2 bilat.) |                        |                                              |                             |                                             |                                  |                |

It can be seen from the table that we have not been able to find fractures or sequelae of the above on the humerus otherwise.

We found a radiologically demonstrable wearing-away or defect in the anterior margin of the glenoid cavity in all 13 patients. 3 of these were regarded as definite tears. In their case histories these 3 patients had definite adequate trauma against the shoulder region at the primary luxation, (kicked by a colt, fall downstairs, a severe fall on the arm during ski-jumping).

Axial pictures revealed 7 subluxation positions, bilateral in 2. One of these was the patient operated on for bilateral luxation. The other patient complained of pain in both shoulders and arthrotic changes in both shoulder joints were demonstrated in this patient. Unfortunately the shoulder joints of both sides were not routine-photographed on examination. This was only done when the patients complained of trouble from both shoulders.

*Fig. 2 a.**Fig. 2 b.**Fig. 3 a.**Fig. 3 b.*

*Figs. 2 a and 3 a.*

Normal frontal picture shows no defect of caput humeri.

*Figs. 2 b and 3 b.*

With the arm inward rotated  $50^{\circ}$ – $70^{\circ}$  and abducted there is a plain impression groove dorsolaterally on the caput humeri.

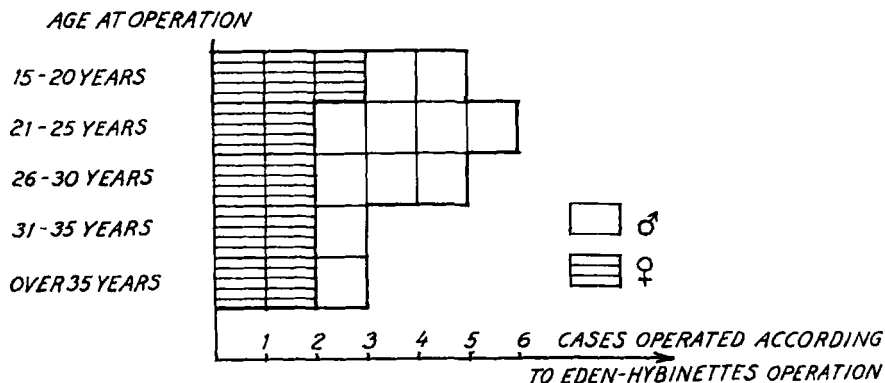


Fig. 4.

Age and sex distribution at operation.

TABLE 2

| Operative findings    | Injuries or loosening of glen. labrum | Rounded worn glen. cavity | Defects in ant. margin glen. cavity | Normal joint capsule | Normal glenoid labrum | Larger or smaller capsule loosening | Corp. libr. | Supra-spin. rut. |
|-----------------------|---------------------------------------|---------------------------|-------------------------------------|----------------------|-----------------------|-------------------------------------|-------------|------------------|
| No. of shoulder joint | 17                                    | 9                         | 4                                   | 9                    | 5                     | 8                                   | 2           | 0                |

## OPERATIVE FINDINGS

Fig. 4 shows the age-sex distribution at operation of the 21 patients.

From table 2 which shows the findings from the 22 operations, it appears that there is complete agreement between radiological and operative findings as far as the anterior rim of the glenoid cavity is concerned. At operation, defects in the anterior margin were found in 4 cases and obvious wearing or rounding in 9 cases. Thus in more than half the series definite changes were found in the cavity forward and downward. It is thought beyond doubt that the changes play a large part as pathogenetic factor in h.s.l. Whether wearing is involved in every case is by no means certain. Where the changes forward in the cavity exist in patients with slight primary trauma and a relatively small number of luxations, it is reasonable to believe that it is a question of dysplasia and not of any phenomena of wearing away. I am more inclined to believe that we are dealing with an important cause of h.s.l. here, and not always with a condition resulting from this same disease.



The changes found at the glenoid labrum vary from small to complete detachments and injuries. In one patient the labrum was completely torn away and lay enclosed in the joint. In a few cases it was not possible to find even the remains of the labrum.

It is debatable how much importance one should attribute to small detachments of the labrum. Gallie & Mesurier (1948) refer to the anatomist Grant (Toronto) who states the labrum is not constantly connected firmly to the rim of the cavity, but that the attachment may be intermittent. The same conditions are also mentioned by De Palma.

A free body in the shoulder joint was discovered in two operations. The one, about the size of a pea, was revealed pre-operatively by X-ray. The other, on the contrary, as large as a shell almond, was not discovered at the X-ray examination. A clear defect was found in the anterior margin in both these patients, so an avulsion fracture certainly existed here and in turn gave rise to a free body. It is recommended that one should look for free bodies at operation since they are not always diagnosed at routine X-ray examination.

Capsular injuries were found at operation to be less pronounced. In 5 patients it was not possible to discover any deviation from the normal at all at the capsule or labrum, but in 3 of these there was a definite rounding of the cavity in front.

There were no post-operative complications in the series.

All patients replied that they were very pleased with the operation and many of them were deeply grateful. (One of those operated on had taken part three times in Holmenkollen's ski-race after the operation. During training on the skiing slopes he had experienced many bad falls following his operation, but his shoulder had always held, however severe the falls had been).

#### RECURRENCE

In our series there was one reluxation. One may be certainly permitted to regard this as traumatic recurrence, owing to the unusually powerful trauma which led to the reluxation 3.5 years after the operation.

It has been argued against E.H. that it would easily produce arthroses in the shoulder joint. During the follow-up examination we could not demonstrate any more arthroses than were known before the operation.

The transplant could be seen to lie forward and downward of the anterior margin in one case only and does not seem to have contact with

the collum scapulae. Amongst the others the transplant was found to have healed or to be resorbed.

#### MOBILITY IN THE OPERATED SHOULDER

In the follow-up examination mobility in the operated shoulder was compared with that in the healthy shoulder. In the great majority of cases the mobility was found to be very good. Only 5 patients were observed to have plainly reduced outward rotation and backward movement of the arm.

None of the patients examined complained of pain in the operated shoulder. Only a few reported some tiredness in the evenings. This was only when they had worked harder than usual in the day. The strength in the arm of the side operated on could be seen in no single case to have diminished when compared with the healthy, non-operated arm.

#### DISCUSSION

There are indeed few diseases which have been the subject of such a number of proposed and used methods of operation as h.s.l. The majority of these have now been dropped. A number of operative methods gradually emerged which demonstrably seemed to give the lowest recurrence figure. In the Anglo-saxon countries the methods evolved by Bankart, Putti & Platt or Magnusson are mostly used.

In Scandinavian and German-speaking countries the E.H. operation has held its own and series from these countries show that the method gives a very low recurrence figure. It must be quite definitely stated that the method belongs to the better class.

It is in all probability a correct therapeutic principle that all luxations must be immobilized for a period after the injury so that possible lesions to the joint apparatus may heal.

Personally I believe that the are, however, a number of luxations of the shoulder which will become recurrent, even if the immobilization is complete and correctly executed.

The follow-up examination of our series seems to show that there may be good grounds for supposing that a luxation of the shoulder will become recurrent: 1: if the patient belongs to an age group below 25 years. 2: no demonstrably certain primary trauma. 3: reduction without difficulty of the primary trauma. 4: no injuries to the shoulder joint demonstrable on the X-ray. 5: if in addition the other shoulder has been luxated.

Hereditary dispositions are not regarded on the whole as having any special significance. One of our patients had a brother and a cousin with the same disease. Two others stated that a parental brother or sister suffered from h.s.l.

An important discovery in our series was that in 13 out of 22 luxations there was rounding or wearing of the anterior margin of the glenoid cavity.

Loosening of the glenoid labrum in front was the most frequent finding at operation amongst our patients. If a slight detachment is found no particular importance can be attributed to this since Grant and De Palma have shown that the attachment of the labrum is not always complete. With advancing age an increasing number of injuries and detachments of the labrum and the capsule are to be found.

Following our investigation our opinion about the E.H. operation is that the method is very good and that it is fully in a class with the other methods now accepted and employed.

We have one recurrence in the series and firmly regard this as purely traumatic, since it was a more than usually severe trauma which led to the relaxation, 3.5 years after the operation. The patient has not had any relaxation during the last 5 years.

In our series we have found less restriction of outward rotation and backward movement of the arm than is usually so in those operated according to other methods. Too great a limitation of these movements plays no insignificant part in the dynamics of the shoulder joint, since outward rotation is from the beginning the weakest of the movements manifested. It represents, moreover, the most important depressor mechanism of the shoulder joint (Alvik, 1957).

It was only in 5 patients of our series that we found a slightly reduced outward rotation and backward movement of the arm operated on. The changes were so small that none of the patients themselves had noticed them.

These unimportant restrictions, we have found, can be attributed to the fact that during the last 6 years we have not immobilized the arm inward-rotated to the body more than 14 days after the operation. Immediately the period is over we have allowed the patient to have physiotherapy but have of course taken great care that no outward rotation movement occurs during the early days.

In our opinion the investigation of our series gives grounds for stating that h.s.l. begins as an incomplete luxation but afterwards develops into a full luxation.

Our series, even though small, also seems to show plainly that h.s.l. affects the younger age groups.

If one looks for the average interval between the primary luxation and the operation, this will be found to be 10 years. If the age group 15–20 years is taken, including the primary luxation, the interval for 11 of the 14 patients will be seen to be only 3 years. The 3 others in this age group were not operated on until 12, 20 and 23 years afterwards respectively. I believe that the operation should not be postponed too long when diagnosis h.s.l. is a fact.

#### S U M M A R Y

A follow-up survey of 22 h.s.l. operated on according to the original E.H. method is presented from the Central Hospital of Trondheim.

Briefly a review of the problems of the disease is given and the significance of the pathogenetic factors is discussed. My personal conclusion is that h.s.l. is caused by the interplay of several factors.

The observation period extended from 20 months to 10 years.

There were no post-operative complications in the series. All the patients were very pleased with the operation. No one was compelled to change work after the operation.

We have not found any grounds for the opinion that the E.H. operation would easily produce arthrotic changes in the shoulder joint.

Our follow-up survey shows that the E.H. operation for h.s.l. is a fully satisfactory procedure.

#### R E S U M E

L'examen complémentaire de 22 cas de luxation habituelle de l'épaule, opérés d'après la méthode originale Eden-Hybinette est présenté par l'hôpital central de Trondhjem.

Il est donné un compte rendu sommaire des problèmes posés par la maladie et il est discuté de la signification des facteurs pathogéniques. Ma conclusion personnelle est que la luxation habituelle de l'épaule est causée par l'interférence de plusieurs facteurs.

Les observations se sont étendues sur des périodes allant de 20 mois à 10 ans. Dans cette série de cas il n'y a pas eu de complications post-opératoires. Tous les malades ont été très satisfaits de l'opération. Aucun n'a été contraint de changer de travail après l'opération.

Un malade a eu une reluxation 3 ans et demi après l'opération.

Nous n'avons trouvé aucun fondement à l'opinion que l'opération Eden-Hybinette produit facilement des modifications arthrotiques de l'articulation de l'épaule.

Un examen complémentaire montre que l'opération Eden-Hybinette dans les cas de luxation habituelle de l'épaule est un procédé entièrement satisfaisant.

#### ZUSAMMENFASSUNG

Eine Nachuntersuchung von 22 habituellen Schulter-luxationen, die gemäss der originalen Eden-Hybinette Methode operiert wurden, wird vom Zentralkrankenhaus in Trondheim vorgestellt.

Eine kurze Übersicht der Probleme der Erkrankung wird gegeben und die Bedeutung der pathogenetischen Faktoren wird besprochen. Meine persönliche Schlussfolgerung ist die, dass die h.S.l. durch des Zusammenspiel mehrerer Faktoren hervorgerufen wird.

Der Beobachtungszeitraum reichte von 20 Monaten bis zu 10 Jahren.

Keinerlei postoperative Komplikationen entstanden in dieser Gruppe. Alle Patienten waren sehr zufrieden mit der Operation. Keiner war genötigt seine Arbeit zu wechseln.

Ein Patient erlitt eine Reluxation 3,5 Jahre nach der Operation.

Wir haben keinen Grund für die Meinung gefunden, dass die E.H. Operation leicht arthrotische Veränderungen im Schultergelenk hervorrufen könnte.

Unsere Nachuntersuchung zeigt, dass die E.H. Operation für die h.S.l. ein zufriedenstellendes Vorgehen darstellt.

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