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HABITUAL POSTERIOR DISLOCATION OF THE SHOULDER-JOINT

A report on 5 operated cases.

BY

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According to earlier reports habitual posterior dislocation of the shoulder-joint is a rate lesion. Kaplan summarised 15 cases in the literature up to 1933. Since then, 10 further cases have been described; no author has described more than 2 cases. (*Kaplan, Aryolo, Fevre-Mialeret, Asplund, May, Sjövall, Rowe-Yee, Möllerud, Hindenach*).

During 1946-47 5 cases have been diagnosed and treated here, 3 at this Orthopaedic Clinic, and 2 at the Surgical Department of the Karolinska Sjukhuset. This relatively large number of cases occurring within a short period of time may be worth analysis.

Classification

Sjövall, Möllerud and *Hindenach* have accepted *Blumensaat's* classification, which was originally used for describing patellar dislocations, for describing the dislocations of the shoulder-joint. It is a clinical classification and does not refer to the aetiology. The cases are divided into 3 groups.

1. Fresh dislocations.
2. Recurrent „ „
3. Permanent „ „
   a) habitual type,
   b) constant type.

The dislocations to be discussed here are of the habitual permanent type: i.e. they occur every time the joint is in a certain position, and are spontaneously reduced when the position is changed.

Frequency

At Brun's Clinic, according to *Finkh*, there were only 5 posterior dislocations over a period in which 501 anterior dislocations were diagnosed, and Aryolo found the same proportion in the material of the Rizzoli-Institute: 4 posterior and 200 anterior dislocations. These figures appear to refer only to fresh or traumatic cases.

Fèvres and *Mialaret* have estimated the frequency of posterior dislocations in recurrent and habitual cases: they found it to be 3 % of the cases, but do not mention how many cases were studied.

The material from this Clinic suggests that the percentage is actually higher. 21 cases of recurrent and habitual shoulder dislocations were seen in the years 1946-47, and of these 3 were posterior habitual dislocations.

Pathology

Some authors, who have operated on cases with posterior habitual dislocations of the shoulder, have attributed the disorder to a stretched and thinned capsule (*Aryolo, Asplund, Sjövall, Hindenach*), but this explanation seems to be unsatisfactory, as the normal capsule of the shoulder is large enough to hold twice the volme of the humeral head. Other workers believe that congenital malformation plays an important part, and this view is supported by the observation of hereditary cases (*Valentin*). However true congenital cases must be classified among the constant permanent dislocations, since reposition never occurs spontaneously. A number of workers have failed to find any characteristic bone abnormality.

Symptoms and Signs

The dislocation sometimes occurs without any apparent cause, sometimes after trauma to the shoulder. Pain is often mild, and patients who do not do heavy work often manage without treatment. The chief complaints are weakness of the arm and a clicking in the shoulder, causing the patient to avoid certain movements.

Few authors have given an exact description of the actual dislocation. It always occurs when the arm is rotated medially and brought to a position between flexion and abduction, below the horizontal plane. The head glides out of the glenoid fossa, and its posterior surface can be felt on the back of the joint. As the arm is rotated laterally, the head snaps back into its proper position. Complete dislocation never occurs without severe trauma. Radiography of the shoulder usually shows no bone change, and, in fact, the dislocation itself can be easily overlooked on routine radiography unless tangential views are taken. (*Schinz, Thomas*)

Treatment

Treatment is indicated when the dislocation interferes with the patient's working capacity. A number of operations have been recommended to prevent these posterior dislocations: shortening of the muscles and the capsule, plastic muscle operations of Clairmont-Ehrlich type, Bankart's operation, and plastic operations on bone and periosteum.

At this Clinic and at the Surgical Department of the Karolinska Sjukhuset posterior dislocations have been treated by the *Eden-Hybbinette* method, following Zahn's recommendation. An iliac crest bone graft is inserted into a periosteal pocket outside the joint on the posterior surface of the scapula, the lateral part of the graft overlapping the capsule for about 1 cm. The graft is held in position by sutures, vitallium screws or nails. In 4 cases the joint capsule was opened and the cavity explored for diagnosis. Mobilisation of the joint was begun 3 to 8 weeks after operation.

Case Reports

Case No. 1. E. R. N. A labourer aged 25 years. In 1938 his right shoulder had been compressed between two iron rings. He had pain for some days but noticed nothing else abnormal. 5 months later he began to complain of a snapping in his shoulder which could not be controlled, and occurred in a certain position of the arm. It recurred with increasing frequency and finally every time his arm reached the position already described, and he sought medial advice.

In May, 1944 he had an operation, presumably for habitual anterior dislocation, at another hospital, and he had further operations there in the same year, but without improvement.

In April 1946 he was sent for further treatment to the Orthopedic Clinic of the Karolinska Institute. He complained of slight pain every time the joint snapped and of rapid tiring of his right arm.

Examination showed: Athletic build. No atrophy of the shoulder muscles. There is an operation scar running along the deltoid-pectoral groove. The acromio-clavicular joint is tender. Normal range of active anteflexion and abduction; external rotation limited to 20′ and internal rotation to 10′. The right deltoid muscle is weaker than the left. When the right arm is raised, the head of the humerus glides backwards and projects posteriorly. This can be seen, but is more readily palpated with the hand on the posterior surface of the joint. When the raised arm is abducted to 80-90′ the humeral head jumps suddenly back into the joint. Dislocation always occurs with active and sometimes with passive anteflexion of the arm.

On April 1946 a dorsal Eden-Hybbinette operation was performed by Prof. S. Friberg. The posterior joint capsule was exposed by blunt dissection between the teres minor and infraspinatus muscles. The dislocation could be reproduced, but it was impossible to analyze its mechanism, even after opening the capsule. The glenoid labrum seemed to be rather enlarged. The capsule was closed and a periosteal pocket was made on the posterior surface of the scapula. An iliac bone graft 5 × 3 × 1.5 cm. was fixed into the pocket by two Rissler nails. The lateral end of the graft overlapped the joint capsule by about 1 cm. The wound was closed and the arm immobilised in abduction. The postoperative course was uneventful. Mobilisation was begun after 4 weeks and the movements were gradually increased.

The patient returned to work 3 months after the operation. There was no recurrence of the snapping. Examination in March, 1948, nearly 2 years after the operation, showed a normal shoulder except for slight limitation of external rotation, though this was less marked than before the final operation. Radiography showed bony union between the scapula and the bone graft.

Case No. 2. F. A. J. A labourer aged 59 years. In March, 1945, he suffered slight trauma to the right shoulder, and the shoulder region was painful for some days. In April, 1947, while he was carrying a heavy load with a second worker, the latter stumbled, leaving the whole weight suddenly on the patient's flexed arm. He felt a strong pull on the shoulder, followed immediately by severe pain. He could not continue his work. Rest and physical treatment were ineffective; he continued to complain of pain and weakness, and he noticed pain and weakness in his shoulder with certain movements.

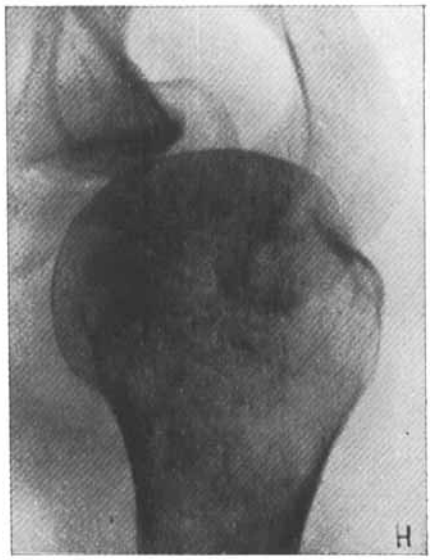

Fig. 1.

Examination at the Orthopaedic Clinic of the Karolinska Institute in September 1947 showed: Atrophy of the muscles of the right shoulder, particularly in the infra- and supraspinatus regions. Slight limitation of all the movements of the joint. In moderate anteflexion and abduction the humerus sometimes hooks itself onto the posterior edge of the glenoid, and the examiner feels a slight bulging at the back of the shoulder. When the anteflexion is increased, the head suddenly jumps back into the joint. An axial radiograph shows posterior subluxation of the humerus. (Fig. 1.)

An Eden-Hybbinette operation was performed on Sept. 18, 1947, by Dr. R. Magnusson. The joint was exposed by a posterior approach, and blunt dissection between the fibres of the teres minor and infraspinatus

muscles. The capsule was found to be definitely thinner than normal. It was incised and the glenoid labrum was found to be separated from the glenoid posteriorly. A bone graft was taken from the iliac crest and inserted under the periosteum of the scapula, its lateral part covering the back of the capsule. Sutures and immobilisation. 4 weeks after operation movements were started and slow progress was made.

5 months later the patient still complained of pain in the shoulder and elbow on movement, even when the shoulder-joint was fixed. The

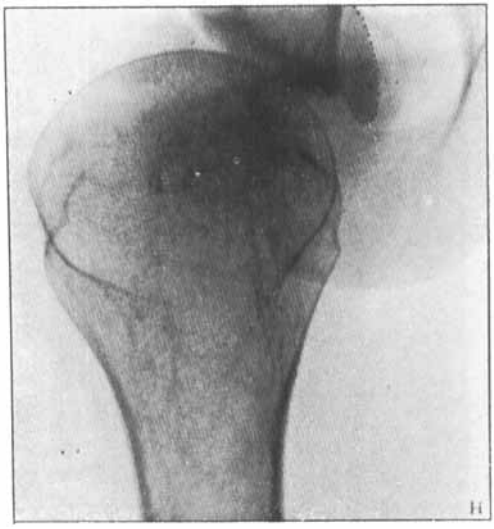

Fig. 2.

arm was weak and the patient did not resume his work, as he hoped for improvement. The dislocations did not recur after the operation. Examination showed slight muscular atrophy round the scapula. The head of the humerus remained firmly in the joint during all the movements which were possible. Rotation and abduction were a few degrees less than before the operation. Radiography showed that the graft was united to the scapula and in the desired position. (Fig. 2.)

Case No. 3. P. M. K. A labourer aged 21 years. In May 1946, during military service, he failed to throw a grenade correctly: instead of throwing it over his head, his arm, externally troated, swung round in the horizontal plane. He immediately felt a snap and sharp pain in his shoulder, and soon afterwards there was a big subcutaneous haematoma in the axilla and on the thorax. The joint was immobilised for three

Fig. 3.

weeks. At the end of the this time he could not use his rifle or lift weights with his arm in internal rotation. A few weeks later the shoulder began to lock in certain positions.

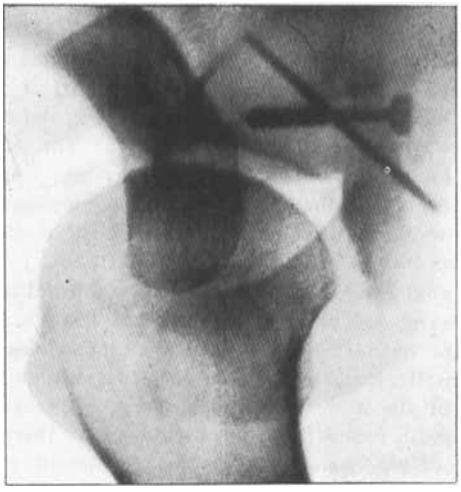

Fig. 4.

Examination on October 1946 at the Orthopaedic Clinic of the Karolinska Institute showed: No muscular atrophy round the right shoulder. Full range of movement. With the arm hanging by the side the humeral head can easily be pushed 1 cm. backwards. This is not possible on the left side. With the arm internally rotated and raised to 70′ of abduction and anteflexion the head glides gradually back and out of the plane of the joint, under the acromion. If this movement is reversed the head reduces itself with a snap. The dislocation occurs only on active movement. Radiography shows a posterior subluxation. (Fig. 3.) The diagnosis of posterior habitual dislocation was made.

On Oct. 29, 1946 an operation was performed by Dr. A. Jacobsson. The joint was first opened anteriorly for diagnosis. Muscles, capsule and the glenoid labrum were all found undamaged. The wound was closed and the joint was opened posteriorly. Still no damage could be found. A large iliac bone graft was implanted into a periosteal pocket on the scapula, lying laterally against the posterior part of the capsule. It was secured by a vitallium screw, but this had later to be replaced by a Rissler nail, since it reached into the joint. The shoulder was immobilised for 6 weeks. After 3 months almost full mobility was obtained, except for limitation of internal rotation.

Examination after 17 months showed: No dislocation has occurred since operation. The patient is doing full work. There is some residual weakness of the right arm. Slight atrophy of the supra- and infraspinatus muscles. Rotation reduced by 30′ compared with the left side. Radiography: The bone graft is fully united with the scapula. (Fig. 4.)

Case No. 4. W. K. G. Printer aged 21 years. In July, 1946, for no apparent reason, the left shoulder dislocated. It reduced itself spontaneously. This was repeated with increasing frequency until it was happening several times a day. In November, 1946, the right shoulder also began to dislocate. The dislocation was not very painful. The patient attributed the condition to his work: he had to pull down a very heavy lever, which was fixed high near the ceiling; he reached it by jumping up and hanging onto it with both hands. His left arm took most of the pull, and he thought that was why it dislocated first.

Examination at the Surgical Department of the Karolinska Sjukhuset, January, 1947: Active and passive moments full in both shoulder joints. In both joints the head of the humerus dislocates backwards with 90′ abduction and anteflexion. About half the head seems to leave the joint. With adduction of the arm the shoulders are easily reduced. There is some muscular spasm round the right shoulder, and there is pain at the moment of dislocation. Axial radiographs confirmed the presence of bilateral subluxation in internal rotation and abduction. (Fig. 5 and 6.)

On January, 9, 1947, a posterior bone block operation of Eden-Hybbin-

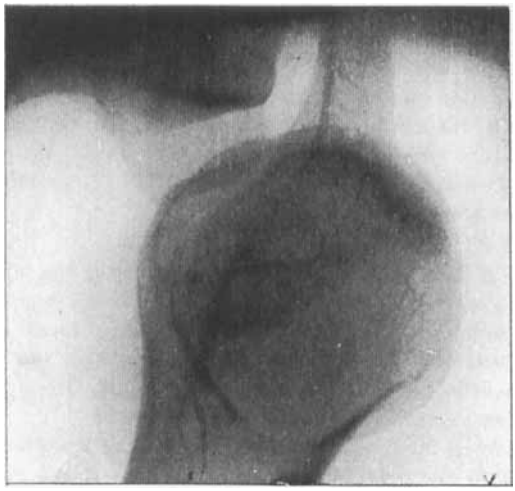

Fig. 5.

ette type was performed on the left shoulder by Dr. Roden, using a bone graft from iliac crest. The joint was not opened.

On February 20, 1947, the same operation was performed on the right

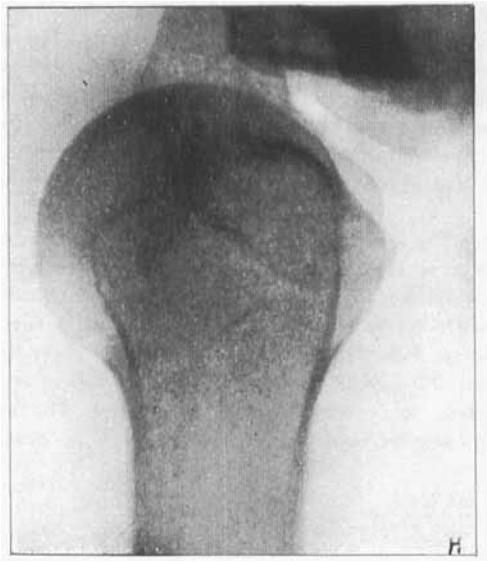

Fig. 6.

shoulder, a screw being used to fix the graft to the scapula. After the first operation there was a slight bronchopneumonia; 6 weeks after the second operation the screw was removed, as its end had penetrated the joint. Movements were begun on both sides 6 weeks after operation.

Examination on March 15, 1948, showed: The patient is satisfied with the result. He has no pain; is doing heavy work as a farmer, and has had no recurrence. Both shoulders are stable. On the left side, abduction and rotation are diminished by 15°. Radiography shows bony union between scapula and graft on both sides.

Case No. 5. S. E. E. A sailor aged 21 years. In 1933, fracture of the right clavicle, which united well. In August 1946, he had a bad fall on board ship and dislocated his right shoulder; it was reduced by the ship's surgeon; no details are available. After the accident the shoulder dislocated frequently, particularly when the patient lifted his arm; the dislocation was painless.

Examination at the Surgical Department of the Karolinska Sjukhuset on Aug. 22 1946 showed: Normal configuration of the right shoulder. With the right arm hanging by his side, it is possible to push the humeral head posteriorly and produce a posterior subluxation of the shoulder. This also happens spontaneously, and more markedly, every time the arm is actively abducted and anteflexed, and the patient tries to avoid raising his arm to the horizontal level. Posterior habitual dislocation of the right shoulder was diagnosed and confirmed by axial radiography.

On Sept. 16, 1946 a posterior Eden-Hybinette operation was performed by Dr. Gibson. The capsule was opened posteriorly. The glenoid labrum and capsule appeared to be enlarged; no other abnormality was detected. An iliac crest bone graft was fixed to the scapula with a vitallium screw, partly covering the joint capsule posteriorly. Mobilisation was begun 3 weeks after operation, and a full range of movements was obtained after 3 weeks. Radiography showed a satisfactory position of the bone graft.

For one year the condition was satisfactory; but in Sept. 1947, the dislocations recurred. The patient had now completed his service in the navy and was working as a business man, so that the dislocations did not interfere with his work, and he did not want a further operation.

Examination on Feb. 25, 1948 showed: The shoulder dislocates backwards every time the arm is flexed or abducted, if it is at the same time internally rotated. It is reduced with a snap as the arm is rotated externally. Radiography shows no trace of the bone graft.

Fig. 7.

Case No.	1	2	3	4	5
Age *Sex*	25 M	59 M	21 M	21 M	21 M
Trauma	slight, 5 months earlier	severe accident	threw grenade badly	slight, chronic trauma	fall
Operation finding	labrum enlarged,	labrum separated, thin capsule	negative	not recorded	?labrum enlarged, wide capsule
Follow-up in months	24	5	17	13	17
Relapse	no	no	no	no	yes
Pains	no	yes	no	no	no
Return to work	yes	no	yes	yes	yes desk-work

Comment

(see Fig. 7)

The first 3 cases were treated in the Orthopaedic Clinic of the Karolinska Institute from 1946-47. During the same period 18 anterior habitual and recurrent shoulder dislocations were seen. The first case had had earlier operations for anterior habitual dislocation without effect. On admission here the posterior dislocation was demonstrated on axial radiographs. After seeing this case every patient with dislocating or snapping shoulders was examined for clinical signs of posterior dislocation, and axial radiographs were taken as a routine.

Since the cases were only diagnosed correctly after improvement in the routine examination we feel that similar cases may have been overlooked in the past, and that the condition may be more common than was previously thought. However, the proportion of 3 posterior to 18 anterior dislocations should not be accepted as representative, as only patients

with complicated and undiagnosed shoulder complaints are transferred to this clinic and the cases do not represent normal routine material.

In our cases no characteristic changes could be detected in the joints at operation, except in the second case where there was separation of the glenoid labrum, which does not itself

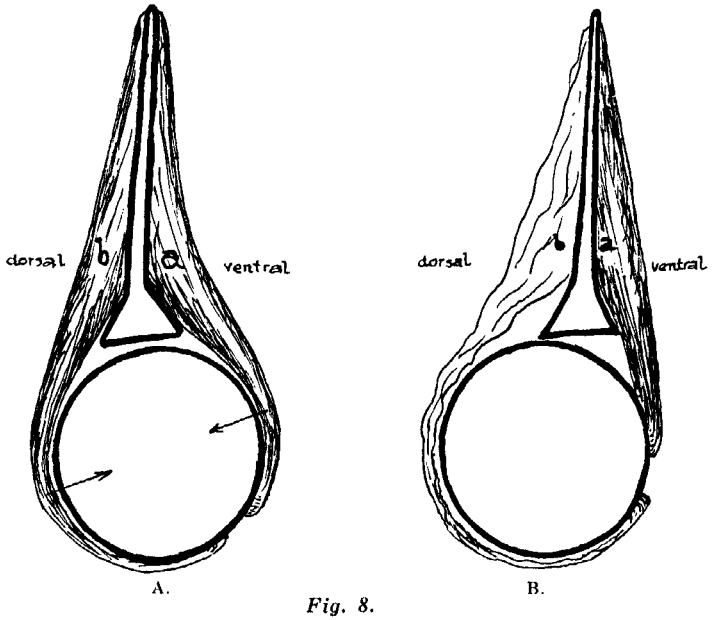

Fig. 8.

Horizontal section through shoulder joint, schematic.

A. Shoulder internally rotated, with both externally and internally rotating muscle groups contracted and coordinated. Both groups, by contracting, press on the humeral head. (Arrow.)

B. Same shoulder with the external rotators (b) relaxed and atonic. No opposition to internal rotators (a), which contract and press back the head, thus producing posterior subluxation.

explain the posterior dislocation. Bone and joint structure appeared normal on the radiographs, and at operation.

The head of the humerus is much larger than the glenoid fossa. The two are connected by a loose capsule which allows a wide range of movement. Rotation is controlled by two antagonistic muscle groups, the internal rotator (the subscapul-

aris muscle) and the external rotators (the supraspinatus, infraspinatus and teres minor muscles). The latter are attached to the posterior capsule of the joint, and form a strong wall resisting posterior subluxation of the humeral head. Horizontal section of the joint shows that both groups originate from the body of the scapula (Fig. 8 a), and reach their insertions by encircling it, forming a ring round the head laterally. When they contract they must press on the head.

Antagonistic muscle groups are innnervated by co-ordinated impulses. In internal rotation the anterior muscle group contracts, and the posterior group gradually relaxes. The relaxation is coordinated with the contraction of the antagonist, and is only enough to allow internal rotation; the muscles' tonus must always be sufficient to resist the action of the anterior muscle, in forcing the head posteriorly.

If the relaxation of the posterior group is uncoordinated the equilibrium is disturbed, and the unopposed action of the contracting anterior muscle presses the head posteriorly. (Fig. 8 B).

Thus a disturbance in the co-ordination of the external rotators may lead to subluxation. *Moullin* and *Keith* in 1904 described an acute traumatic shoulder dislocation and attributed it to lack of co-ordination between the rotators. However, we do not know what factors cause this failure of co-ordination.

In Case 4 both shoulders were affected. Trauma alone can hardly explain this, and one must rather assume that the shoulders had not the normal capacity for resisting it. The bilateral disturbance suggests that there was a congenital predisposition to dislocation. A number of authors attribute the condition to congenital factors. *Fèvres* spoke of "malformation luxante", but he believes that there is aplasia of the bones. There was a congenital dislocation of the hip in the family of his case. Asplund's case had several other dislocating joints. Sjövall believes in "weakness of the mesenchyme", and Möllerud, describing a bilateral case, attributed the condition to a congenital capsular insufficiency.

All the cases reported here have been treated by a posterior bone block operation of Eden-Hybbinette type. 6 joints were operated. In one the graft was absorbed and dislocation recurred after 12 months. All but one of the patients returned to work. The exception had a stable joint, but had pain and diminished mobility of the joint. The patient's age (59 years) originally gave a less good prognosis.

SUMMARY

21 habitual and recurrent shoulder dislocations were seen at the Orthopaedic Clinic of the Karolinska Institute in the years 1946-7. 3 were posterior dislocations. It is thought that similar cases may often be overlooked, as special care is required for a correct diagnosis. Usually the joints dislocate when the arm is in medium abduction and anteflexion, and at the same time internally rotated. It is recommended that axial radiographs be taken to confirm the diagnosis.

The action of the muscles which rotate the arm is discussed. It is possible that posterior dislocation is due to lack of coordination of their action; but it is not clear how normal coordination is disturbed by trauma or congenital predisposition, though both of these undoubtedly play some part in producing the condition.

5 cases are reported; one was bilateral. All were treated by a bone block operation on the posterior surface of the joint; this was a modified Eden-Hybbinette operation. 5 of the 6 operated joints were stable, both clinically and radiographically, 5-24 months after operation. In one case a recurrence occurred after one year, the bone graft having been absorbed.

RESUME

21 dislocations de l'épaule habituelles et récurrentes ont été constatées à la Clinique Orthopédique de l'Institut Karolinska de Stockholm pendant les années 1946/47. 3 de ces cas étaient des dislocations postérieures. On suppose que des cas

similaires ont souvent échappé à l'attention, étant donné qu'il faut un soin tout spécial pour poser un diagnostic correct. En général, l'articulation se disloque lorsque le bras est en abduction médiale ou en antéflexion et qu'il effectue en même temps une rotation vers l'intérieur.

Il est recommandé de faire une radiographic axiale pour confirmer le diagnostic.

L'action des muscles de rotation du bras est discutée. Il est possible que la dislocation postérieure soit due à un défaut de coordination des muscles. On ne voit cependant pas clairement comment la coordination normale est troublée par un trauma ou une prédisposition congénitale, bien que ces deux facteurs jouent sans aucun doute un rôle à cet égard.

Il est rendu compte de 5 cas dont l'un était bilatéral. Tous ont été opérés d'après la technique modifiée d'Eden-Hybbinette. Un morceau d'os a été inséré sur la surface postérieure de l'articulation.

Sur ces 6 cas, 5 ont montré des articulations stables aussi bien cliniquement que radiographiquement au bout de 5 à 24 mois après l'opération. Dans un cas il y eu une récidive après un an, la greffe osseuse ayant été absorbée.

ZUSAMMENFASSUNG

Im Materiale der Orthopädischen Klinik des Karolinska Institutes wurden während der Jahre 1946—1947 21 habituelle Schulterverrenkungen gezählt. Drei davon waren hintere Verrenkungen. Es wird angenommen, dass ähnliche Fälle oft übersehen werden, da besondere Sorgfalt nötig ist um die Diagnose zu sichern. Die Gelenke luxieren meist mit dem Arm in mittlerer Abduktion und Anteflexion, kombiniert mit Innenrotation. Sie werden durch Aussenrotation schnappend wieder eingerenkt. Achsiale Röntgenaufnahmen werden empfohlen zur Bestätigung der Diagnose.

Die Tätigkeit der Rotatoren der Schulter wird besprochen. Es ist möglich, dass unkoordinierte Aktion dieser Muskeln zu hinterer Schultergelenksverrenkung führen kann. Es ist

aber unklar, in welcher Weise Trauma und angeborene Prädisposition, die zweifellos beide eine Rolle in dieser Krankheit spielen, die normale Koordination der Rotatoren beeinflussen können.

Es werden 5 Fälle beschrieben, einer davon doppelseitig. Alle wurden operiert, wobei eine modifizierte Eden-Hybbinette Technik angewendet wurde. Ein Knochenspan wird hierbei an der Rückseite der Scapula so eingesetzt, dass er ein dorsales Abgleiten des Humeruskopfes verhindert. 5 von den 6 operierten Schultern waren 5 bis 24 Monate nach der Operation klinisch und röntgenologisch stabil. In einem Falle kam es zu einem Rezidiv, nach einem Jahre, da der Knochenspan resorbiert wurde.

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