

GUNNAR WIBERG, STOCKHOLM :

RELATION BETWEEN CONGENITAL SUBLUXATION OF
THE HIP AND ARTHRITIS DEFORMANS

(A Roentgenological Study)

The previously prevailing obscurity concerning the causes of arthritis deformans of the hip-joint has now been reduced to some extent, as it is realized more and more how great a rôle in this respect is played by preceding deformities of the joint, congenital or acquired at an early age. Nor does it seem reasonable any longer to doubt that congenital malformations may be of considerable significance to the development of this disease of the hip.

Various classifications of the material have been suggested with reference to the etiology in arthritis deformans of the hip, and I have adopted the one employed in recent years in the Orthopedic Clinic of the Karolinska Institut, Stockholm :

1. Congenital causes.
2. Arthritis deformans developing on the basis of deformities of the joint acquired in childhood or adolescence.
3. Traumatic causes.
4. Infectious or toxic causes.
5. *Malum coxæ senile*.

On the basis of the experiences reported in the last three decades, "congenital causes" covers not only the congenital subluxation but also subluxation arising secondarily after reposition of luxations, and cases with modification in the position of the acetabulum.

The theory about poor adaptation between the head of the

femur and the acetabulum as a cause of arthritis deformans was advanced first by Preiser in 1907. On the basis of measurements of 97 skeletal pelves from a gynecological clinic he thought he was able to establish three pelvic types with differing directions of the acetabulum, which would have a definite connection with the configuration of the pelvis, especially the inclination of the alæ of the ilium. Thus he differentiates between cases in which the socket turns obliquely forwards and cases in which it turns laterally, besides a third type in which the socket has an intermediate position between the two others. He takes this last type of acetabulum to be the most normal, while in the others, he thinks, there is a lack of congruence between the articular surfaces of the head of the femur and the acetabulum, giving rise to abnormal distribution of the weight on the cartilage as well as the bones in the joint. He looks upon the latter factor as the more direct cause of the changes encountered in arthritis deformans.

Many objections have been raised against Preiser's theory. Among others, Hoffa has pointed out that all the preparations in Preiser's material came from a gynecological clinic—something that detracts considerably from the value of the material. Besides, it is difficult to apply his theories to a living material, as is also evident from the fact that his measurements now have been given up almost completely.

In principle, Murk-Jansen has advanced the same idea when he ascribed the lacking congruence between the head and the acetabulum either to an "ischium varum", or to an excessive width of the acetabulum. But he has furnished no evidence to show that this may result in arthritis deformans.

Calot thinks that about one half of all hip lesions are attributable to a congenital subluxation, and that all cases of arthritis deformans originate from such a defect. This statement has proved completely untenable, and it has been refuted by several authors.

In 1916 Köhler suggested the possibility that the subluxation might develop into arthritis deformans, and in the latter lesion he described two different forms of the head of the femur

as seen in the roentgenograms, resulting from differing localisation of the marginal osteophytes—cylindriform head and mushroom-shaped head. In this paper Köhler reports altogether 10 cases: 5 cases of congenital subluxation and 5 cases of reposition of luxation (including one with operative treatment). As to the genuine subluxations he makes the diagnosis, besides on the roentgenograms, on the complaints of the patient too, as the case history should be typical of subluxation. But, as to roentgenograms he presents only such as were taken of the hip when examined for arthritis deformans—and no previous roentgenograms.

Somewhat more convincing evidence is furnished by the two cases presented by Scolan (1924) in her dissertation where she reports 6 cases of arthritis deformans of the hip arising, she thinks, after subluxation. In 2 of these cases she is able to present previous roentgenograms, but only as drawings of such. One is the case of a woman, 31 years old, who was roentgenographed at the age of 10 years and at that time showed luxation of one hip and moderate subluxation of the other. At the last examination (21 years later) both capita are deformed, but the picture gives no definite impression of their features. The other patient was a woman, aged 32 years, who had been roentgenographed 3 years before, and at that time there were no signs of arthritis deformans. Three years later, pronounced changes had appeared, with the head drawn out inferiorly as a plug. Scolan makes no mention of possibly different projections in the two X-ray examinations, although this possibility seems highly probable in this case, as the patient presented a luxation on the other side. In one case it seems reasonable to take the symptoms the patient presented at an earlier age as conclusive evidence to the effect that here the lesion involved a subluxation.

In 1926 Duvernay & Parent, who have studied especially arthritis deformans of the hip, presented their views concerning this localization. They differentiate between four types (roentgenologically), namely: simple, proliferating, ankylosing, and deforming arthritis; and they discuss the origin of these types.

All four types may develop from normal or slightly deformed hips and also from coxa valga even though the picture of the lesion then becomes somewhat more complicated. As a third group the authors give the cases of arthritis arising from hips with a double socket. According to these authors the coxa plana group should give particularly complicated pictures. As to the sublucation group the authors point out that several hips of this kind never undergo any change, and for illustration of this point they cite a case of the congenital sublucation type, in which a woman, 63 years old, with a history of complaints for 4 years, did not present any changes in the hip. In fact, the authors hold, 4 types of arthritis deformans may develop from sublucation: 1) Revolver-butt type, in which the length and direction of the neck is preserved, while the head is flattened a little. 2) Square-built head with a short and broad neck. 3) Flat head, reminding more or less of a railway buffer. 4) Overflowing head, appearing as if the head is slipping down along the neck. In none of the cases the authors have been able to show any previous roentgenograms. Hence the schema they set up is encumbered with a great deal of uncertainty.

In 1931 Lance reported his studies on 50 cases, in which he too tried to arrive at some kind of classification of arthritis deformans developing after sublucation. As conclusive evidence in favour of sublucated hips he accepts the following features: 1) typical case history; 2) past reposition of congenital luxation; 3) presence of luxation on the other side. The first changes in arthritis deformans are claimed to be the filling of the lower part of the acetabulum, *i.e.*, the formation of a double floor in the socket. In certain cases a redression of the neck takes place without deformation of the head (coxa valga luxans), and the head is not flattened till later on. In other cases the neck is lowered, so that the roentgenogram mostly reminds of coxa vara; and this lowering of the neck may take place with or without anteversion of the head, most often without. In more advanced cases there is in addition an anteversion of the head together with redression of the neck, giving rise to the aforementioned down-flowing head. At the same time, deposits ap-

pear on the socket, partly on the margin of the acetabular roof, partly inferiorly as a double bottom in the socket. Thus Lance does not limit himself to more schematization, but he tries also to give a picture of the process in its development. Still, like the preceding authors, his illustrations are merely outlines of roentgenograms, and his studies are based exclusively on X-ray examination of the given cases, that is, he has not at his disposal any earlier roentgenograms of the hips concerned.

In connection with reexamination of patients on whom reposition of luxation had been performed in the past, Lindemann (1934) has reported some instances of arthritis deformans on the "normal" side, but he gives no detailed account of their appearance. One patient who presented small osteophytes was only 18 years old.

As is evident from this review, many authors hold the view that arthritis deformans often develops in congenital subluxation of the hip. But none of them has furnished the required proof of the correctness of this theory. For in order to prove scientifically that arthritis deformans may develop from congenital subluxation of the hip one would have to be able to present a material in which the patients had been roentgenographed with an uncomplicated congenital subluxation and subsequently followed through decades from time to time till the changes typical of arthritis deformans made their appearance. And reproductions of the roentgenograms taken in the various cases would have to be presented too. They constitute the only sure proof and cannot be replaced by drawings in which the subjective view of the author may play a rôle.

With these critical requirements in mind the writer has been occupied in 1938 with the gathering of such a material. This investigation has been carried out as follows: A thorough review was made of all the hip lesions admitted to the Orthopedic Clinic in the period of 1913—1925 and to the Serafimer Hospital 1908—1922. This yielded 44 instances of congenital subluxation of the hip, and after-examination of these patients has been possible in 18 cases. Thus the first roentgenograms have shown only a subluxation without any arthritis changes, whereas such

features have appeared on subsequent X-ray plates. As all these cases present quite the same train of development, it will suffice here to cite merely three of the case histories.

Case 1.

V. J., female, aged 53 years (1938).

1920. *Right side* (Fig. 1). The socket is more shallow and steep than normally. The head shows a slight planing. Shen-



Fig. 1.

Case 1, right hip, 1920.



Fig. 2.

Case 1, right hip, 1932.

ton's line is broken but very little. In the lateral margin of the socket there is a suggestion of an absorption cyst. Between the head and the U figure a density is seen in the inferior part. Whether this is due to a beginning formation of a double bottom in the socket or to the freely projected posterior horn of the facies lunata is difficult to decide.

1932. *Right side* (Fig. 2). In the roof of the socket there is now a rather pronounced sclerosis, and within this area there are several suggestions of rarefaction. Some small beak-shaped deposits are seen on the lateral margin of the roof of the socket. A considerable destruction of cartilage has taken place, so that the bony part of the head is almost in contact entirely with the



Fig. 3.
Case 1, left hip, 1932.

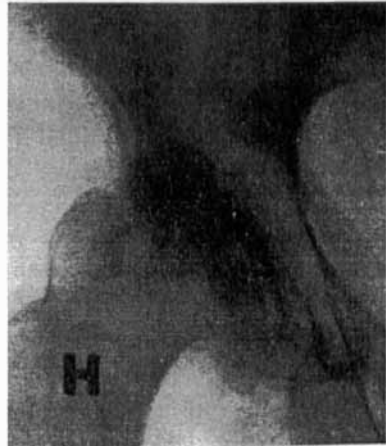


Fig. 4.
Case 1, right hip, 1934.



Fig. 5.
Case 1, right hip, 1938.



Fig. 6.
Case 1, left hip, 1938.

osseous part of the socket. There is a distinct double floor in the lower part of the socket. Since 1920 the head has become sclerotic in its upper parts, and it presents also several small absorption cysts. By tracing the pictures from 1920 and comparing them with those taken now, it is found that the shape of the head has remained unchanged, and no flattening has taken place. On the lower part of the head there appears a deposit in the form of a yet rather thin shadow.

Left side (Fig. 3). The socket is shallow on this side too, but not so markedly as on the right side (cf. picture from 1920). No destruction of cartilage, and no sign of arthritis deformans.

1934. *Right side* (Fig. 4). The sclerosis in the roof of the socket is even more pronounced. But the cystic clearings are still but very faint suggestions. There is no change in the osteophytes on the margin of the roof of the socket. The double floor of the socket has increased inferiorly and become more pronounced. In the head the clearings observed in 1932 have become more pronounced, and also the deposit on the lower margin of the head has increased and become more distinct; the latter feature appears more conspicuously when the roentgenogram is taken with the leg in outward rotation.

Left side. No additional changes since 1932.

1938. *Right side* (Fig. 5). The absorption focus in the roof of the socket is now well-defined, presenting itself as a pea-sized rarefaction 1 cm. from the lateral margin of the socket. The double floor is more pronounced. In the head the areas of rarefaction have increased in the upper part, corresponding to the lateral margin of the roof of the socket, and on comparison with the first pictures, taken in 1920, the head has now been planed to some degree at the same time as it is displaced upwards and laterally. The deposit on the head has increased further and its margin is quite corresponding to the margin of the double floor of the socket. Owing to the incapacity of the patient for abduction-flexion of the hip it is no longer practicable to make out any particular difference in the capital deposit in the various layers.

Left side (Fig. 6). Here a beginning destruction of the car-

tilage is now established, and a beginning beak appears on the lateral margin of the socket.

Case 2.

G. Z., female, aged 67 (1938).

1918. *Right side* (Fig. 7). The socket is markedly shallow with declining roof, where there is a certain degree of sclerosis. The articular cartilage is reduced, and the head is upward displaced so that Shenton's line is broken. 1 cm. outside the lateral margin of the roof there appears a very dense shadow, twice the size of a grain of rice, that is attributable to a beginning double-floor formation. The head is planed but very little.

1927. *Right side* (Fig. 8). On comparison with the X-ray plates 9 years before a lateral displacement of the head appears to have taken place. As not the same projection has been employed at the two examinations, however, it is impossible with certainty to decide whether the apparent displacement might not be due merely to different centration. A very beautiful double floor has formed in the socket. Undoubtedly the increased valgus position is ascribable to the more outward rotated position of the extremity at the later roentgenography. In the upper part of the joint the cartilage has now disappeared completely. A marked degree of sclerosis is seen in the roof, but without any areas of rarefaction. Tracing of the head gives almost the same form as in 1918, apart from the large deposit on the lower margin that has been added since that time. There is a certain degree of sclerosis in the head, alternating with small areas of rarefaction. Lateral to the caput there is a dense shadow, twice the size of a grain of rice—the same as seen in 1918.

Left side (Fig. 9). The socket is very shallow with sloping roof. Shenton's line is slightly broken. As yet there is no particular destruction of the articular cartilage. The roof shows an area of sclerosis, and at its lateral margin there appears to be some small dense shadows, evidently beginning marginal osteophytes. No suggestion of any double-floor formation. On comparison with a tracing of the right head from 1918, the latter is found to be of almost exactly the same form as the left head in 1927.



Fig. 7.
Case 2, right hip, 1918.



Fig. 8.
Case 2, right hip, 1927.



Fig. 9.
Case 2, left hip, 1927.



Fig. 10.
Case 2, right hip, 1938.



Fig. 11.
Case 2, right hip in Lauenstein's
position, 1938.



Fig. 12.
Case 2, left hip, 1938.



Fig. 13.
Case 2, left hip in Lauenstein's
position, 1938.

1938. *Right side* (Fig. 10). No particular changes have appeared since 1927. The deposit on the head appears more conspicuous in roentgenograms with the leg in Lauenstein's position (Fig. 11).

Left side (Fig. 12). Here the same changes are now developing as were observed on the right side, *i.e.*, the articular cartilage has disappeared almost completely, there is now formed a rather large double floor, and the head presents inferiorly a large deposit, besides being slightly sclerotic. It is observed on this side too that the capital deposit appears more conspicuous in flexion and abduction (Fig. 13). The form of the head is essentially the same as in 1927.

Case 3.

N. B., female, aged 53 years (1938).

1916. *Right side* (Fig. 14). (Obverse of the picture reversed after copying from glass plates.) Socket very shallow, with very sloping roof. The head is at a high level of lateral displacement, with a completely broken Shenton line. There is a certain degree of destruction of articular cartilage and also slight sclerosis of the roof of the socket, but no suggestion whatever of double-floor formation in the socket, nor any other changes suggestive of arthritis deformans. The head is somewhat planed.

1922. *Right side* (Fig. 15). The articular cartilage is further reduced, and the sclerosis of the roof is increased. In continuation of the upper socket vault there now appears a thin linear shadow between the head and the U figure, undoubtedly due to a beginning double-floor formation in the socket. At the lateral margin of the roof some thin shadows present themselves, suggestive of beginning beak-shaped osteophytes. On the other hand, there is no evidence whatever of sclerosis in the head, nor of any foci of absorption in the roof or in the head.

1924. *Right side* (Fig. 16). Since 1922 there has been a distinct increase in the double-floor formation, and there is now a distinct linear shadow running parallel with the entire medial



Case 3, right hip, 1916.



Case 3, right hip, 1922.



Fig. 16.

Case 3, right hip, 1924.



Fig. 17.

Case 3, right hip, 1931.



Case 3, left hip, 1931.



Case 3, right hip, 1938.

aspect of the contour of the head. Otherwise no changes in the picture.

1931. *Right side* (Fig. 17). The double floor in the socket is now formed completely, and its margin corresponds well to the capital deposit. The most conspicuous feature since the last examination is the peg-shaped deposit on the inferior part of the head. Within this part of the head that looks as if marked off there is a certain degree of sclerosis, besides some small areas of absorption.

Left side (Fig. 18). High iliac luxation.

1938. *Right side* (Fig. 19). The double floor in the socket has increased somewhat in thickness, but otherwise it has remained unchanged since 1931. On attempts at Lauenstein's position, the deposits on the head appear more conspicuous.

Left side unchanged.

After the findings in these 18 cases that have been examined roentgenographically at varying intervals through a period from 15 to 30 years, it seems as if it is reasonable not only to point out that arthritis deformans can develop on the basis of a subluxation, but also to outline certain principles for the development of the roentgenologically noticeable changes that appear secondarily to subluxation and poorly developed sockets. In many cases thus the first sign seems to have been the sclerosis appearing sooner or later in the roof of the socket. Of course, it is not possible to make any definite statement. But it is my impression that the sclerosis may be more pronounced in those cases where the subluxation has been more marked to begin with; if so, this would agree very well with the view that the sclerosis is due to an increase in the loading. The subluxation implies a reduction in the size of the supporting surface which the head of the femur turns against the roof of the acetabulum, *i.e.*, the weight is distributed over a smaller area, and the sclero-

sis is the reaction of the organism to the resulting overweight; for the sclerosis has to be interpreted as a reinforcement of the osseous tissue, intended to make the latter more resistant to the increased pressure.

The sclerosis always appears in the roof of the socket, however, before there are any demonstrable changes in the head. A rather plausible explanation of this sequence is, that while the head under its movements in the socket continuously changes its loading surface, the socket is always exposed to the pressure over the same area, and thus the strain becomes considerably greater for the roof of the socket. Naturally we may also compare the sclerosis here with the sclerosis that appears on reposition of luxations, as has been pointed out by several authors, and in recent years in particular by Faber who takes this phenomenon as an expression of inferiority of the osseous tissue. According to the same author, this inferiority of the bone is also the cause of the defective development of the roof of the socket, which in turn is the direct cause of the subluxation and luxation. It is obvious that these changes in the roof of the socket often are present prior to the age period when a general reduction on the vitality of the organism conceivably may promote the arthritic changes—namely the menopause. On the other hand, it looks as if the roentgenologically demonstrable changes subsequent to the establishment of the sclerosis have some tendency to accumulate about the climacteric age, or perhaps are somehow causally connected with some exogenous or endogenous factor (disease or pregnancy).

Even though the sclerosis in the roof of the socket thus is often the first reactive change in the joint, the arthritis deformans changes may commence in various ways. Thus it is safe to say the destruction of the articular cartilage—ascertained through a diminution in the height of the joint gap—needs not necessarily precede a sclerosis; on the other hand, I have not observed any case with pronounced destruction of the cartilage without sclerosis. In the latter process in most of the cases there gradually turn up some areas of rarefaction, which constantly are localized to the roof of the socket, not to the floor—

that is, they correspond to the site of the greatest pressure. The size of the cystic rarefication varies, and so does their number; most often there are several small areas of this kind. In one case, however, there was a rather large solitary cyst, reminding of the picture seen in *ostitis fibrosa*.

A particularly interesting feature is the appearance of the double floor in the socket. Calot has claimed that this is always present in subluxation, and he thinks he has been able to demonstrate it already in children of 3—4 years. This statement has been opposed by several authors (*e.g.*, Nové-Josserand), and its incorrectness is confirmed also by the roentgenograms from several of my cases. For illustration, I may refer to the case of G. Z. (Figs. 9 and 12) in which nobody would be able to claim the presence of a double floor on the left side at roentgenography in 1927, while the double floor is quite evident in the last roentgenogram, in 1938.

So it is quite sure that the presence of a double floor cannot be established in all subluxations—at least not roentgenographically—not even in adults. Lance thinks that the double floor probably is the first sign of arthritis deformans of the hip in cases of subluxation, and that it is an incontrovertible fact that in every case of subluxation where an arthritis deformans has been developing for some length of time there appears a double floor in the socket, and most often a corresponding deposit about the same extent on the head—something I shall return to later on.

A great many roentgenograms present a linear shadow parallel with the outline of the head that undoubtedly is mistaken sometimes for a double floor in the socket; as demonstrated by Polgar, however, this line represents the anterior margin of the posterior horn of the lunate surface.

Occasionally a beak-formed osteophyte develops on the lateral margin of the roof after the process of arthritis deformans has been going on for some length of time. The development of this deposit may be more or less vigorous, but if we are to look upon this new-formation of bone as an attempt of the organism to heal itself, it has to be admitted that only in exceptional cases

does this effort result in such forms of bone formation that a real support is obtained in this way.

As mentioned before the sclerosis in the roof always precedes the sclerosis of the head, but after the latter process has been established the subsequent changes may appear more rapidly in the head. Even if it be not the general rule, it happens now and then that foci of absorption appear in the head before such processes are seen in the roof, and in the head these foci are also very variable in size as well as number. In one case I have observed cyst formation without destruction of the articular cartilage.

In all the cases where capital deposits have appeared in the roentgenograms they were localized to the lower part of the head. When the roentgenography is carried out with the legs in flexion-abduction (attempt at Lauenstein's position as far as practicable in this patient material) these capital deposits become more conspicuous—something that has been interpreted as indicating that the deposits are localized chiefly *inferiorly and posteriorly*. The position in which the patient is photographed (with the extremity flexed and abducted as far as possible) will generally give nearly 90° rotation of the head (owing to the additional rotation through the disappearance of the lumbar lordosis and the backward inclination of the pelvis), and thus a given point on the anterior surface of the head will be projected in profile, *i.e.*, the presence of a deposit would appear on the upper contour of the picture (cf. Fig. 20). In keeping herewith, a point on the posterior surface of the head is projected in profile on the lower contour.

In roentgenograms the osteophytes most often assume the form of a parrot beak, and their development correspond very well to that of the double floor, *i.e.*, both new-formations are facing each other with the margins at the same level. Looking on such a picture with osteophytes on the head, one has an impression as if the head had been flowing downwards ("*tête coulée*"), and that the height of the head thus is reduced at the same time as the deposit is added below. This is not always correct, however, as may be ascertained by tracing the outline on

the head from the first pictures and compare it with the features of the same head in a far advanced stage of arthritis deformans. Then it will be noticed that the form of the head often has been preserved completely or changed but very little, and it is only through the appearance of large cystic rarefactions in the upper part of the head that this may sink and become more flat. Thus the definitive form of the head is dependent in the highest degree upon its initial form; and when various authors speak about different forms of the head in arthritis deformans after subluxation, the difference is often due very largely to differences in the "initial head". The most common form is the one just described with a proboscis-shaped or parrot-beak-like deposit below, and the few cases in which there is a suggestion of buffer formation have then presented this form already before the development of the arthritis deformans process. This condition, as is well known, is encountered in patients with pronounced subluxation, in whom the head often shows a rather marked flattening. Thus it is not correct in general to speak of a planing of the head in cases of arthritis deformans after subluxation; most often the matter involves a deposit on the head, which gives the impression that the head has become broader.

In no case have I been able to find any change in the collum-diaphysis angle under the development of arthritis deformans.

This deposit on the lower part of the head may give rise to faulty interpretations. Thus, in 1927, Nussbaum described 4 cases in which the features in the roentgenograms might just as well have resulted from arthritis deformans after subluxation. Nussbaum took the proboscis-formed deposit to be a slipped epiphysis. That also other mistakes of diagnosis may be made on account of lacking knowledge concerning the features of arthritis deformans developing in cases of subluxation is evident from those cases that have been treated as instances of tuberculous coxitis, and in which an analysis of previous roentgenograms shows an indisputable condition of subluxation. In such cases, naturally, it is the focal rarefactions and the destruction of the articular cartilage that give rise to the mistake.

From the evidence I have presented here I find the definitive form of arthritis deformans in a subluxated hip-joint to be fairly typical. It is the changes in the head and the double floor in the socket that dominate the picture. Whether it may be asserted that subluxation in most cases always leads on to arthritis deformans changes of the appearance here described, such a view will not exclude that also other deformities of the hip may lead on to the same changes. As just pointed out, the cases described by Nussbaum might just as well have originated from a subluxation as from slipping epiphysis. Nor is the double floor, as claimed by Calot, any special characteristic of a subluxation hip. Duvernay is perfectly right in asserting that this new-formed floor in the socket may occur in arthritis deformans developed after other deformities of the hip—as has been demonstrated by several authors, e.g., Morville—and as long as no after-examination has been made on cases of slipping epiphysis with a view to subsequent eventual arthritis deformans changes, the possibility cannot be denied that this condition of the hip may lead on to the same picture of arthritis deformans as the subluxation.

An affection of the hip-joint which in connection attracts considerable interest is coxa plana. In this condition, as shown by Waldenström, the healing is associated with an adjustment of the socket to the head of the femur. As the head usually becomes more or less elongated with the less curved part against the socket, the form of the socket will look a great deal like the socket seen in congenital subluxation of the hip in adults. This likeness is particularly pronounced when the deformity of the head is slight (cf. Fig. 3 c in *Acta Radiologica*, vol. 1). In contrast to the findings in subluxation, in cases of coxa plana the head is seen to reach the bottom of the socket. It seems very likely, therefore, that in coxa plana no double floor will form in the socket, as this phenomenon does not appear till the head ceases being in contact with the bottom of the socket. At any rate, no suggestion is seen of any double floor in the socket or any deformity of the head in those cases which Wal-

denström has followed from the beginning of the disease up towards the age of 30 years, not even in his Case X, in which a pronounced arthritis deformans developed. The final stage in another group of deformities described by Waldenström, which he designates as *coxa magna valga luxans* (Nord. Med. Tidskrift 1938) may greatly resemble an arthritis deformans subsequent to congenital subluxation of the hip. For here we find the shallow sloping socket, "*cotyle à double fond*", "*caputdroppe*".

SUMMARY

The congenital deformities of the hip-joint as a cause of arthritis deformans in adults are attracting increasing attention, and in this group of hip lesions the congenital subluxation stands out prominently.

The writer first reviews the previous literature concerning this subject. Then an account is given of the findings in an after-examination of 18 patients who have been roentgenographed at varying intervals through a period of from 15 to 30 years for congenital subluxation of the hip and now are suffering from arthritis deformans of the joint concerned. The histories of three of these cases are cited. It is found that the development of the disease always leads to distinct typical changes in the head as well as in the acetabulum. The inferior part of the head is the site of a deposit, which in roentgenograms often has the form of a parrot beak, and in the socket there develops a new floor, "*cotyle à double fond*".

DISCUSSION:

Guildal, Copenhagen:

G. looked upon the cases demonstrated here as types of the course of a subluxation of the hip, at any rate for that form which Morville has characterized as acquired subluxation of the hip or lateral subluxation. The point of time for the appearance of the changes might probably depend on some individual factor, perhaps also on microtraumata from excessive strain.

Robert Hanson, Varberg:

I beg to ask Dr. Wiberg the following question: Do you think it is a matter of true cyst formation, or do you merely mean a "roentgen cyst"? In my anatomical examinations I have not found true cyst formation.

On biopsy it is found that the so-called cyst formation on the roentgenograms is due to marked atrophy of the bone tissue. The atrophic areas are surrounded by strong sclerotic zones of bone corresponding to the parts which, so to speak, have become the sustaining structures in the rebuilding of the bone.