*FROM THE ORTHOPEDIC HOSPITAL, COPENHAGEN*
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# ON THE INFANTILE COXITIS AND ITS SEQUELÆ

BY
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Among the many hip affections passing through the Orthopedic Hospital in the course of time, a very interesting form is encountered in the sequelæ of infantile coxitis—not least because the primary affection often is unnoticed. Taking up these cases for further investigation, we find a particular, in many ways characteristic, and well-defined morbid condition, namely: unspecific infantile coxitis. Its sequelæ are equally characteristic—something that it really quite convenient from a clinical point of view, enabling us to set up two separate clinical conditions of common origin.

Even though infantile coxitis—meaning unspecific coxitis in infancy—may not be fully established as a nosographic entity, it is really an old concept. As early as 1860 Volkmann set up a clinical picture—acute catarrhal synovitis in children—as a relatively benign disease, and several of the present cases fall in under this term. Others of the present cases fall in under the term of osteomyelitic coxitis described by Chassaignac in 1854.

Among the works subsequently published on this subject, mention is to be made of Townsend's paper (1890), giving an excellent description of 18 cases; a work by König (1902) with a very good pathologic-anatomical classification; and a work by v. Bruns & Honsell (1896) on osteomyelitis of the hip as based on examination by means of the then new X-rays, giving a good description of the variable morbid features and sequelæ (destructions, ankyloses, and luxations), without depicting precisely the infantile coxitis. A new and signal turn is marked

by Drehmann (1904—05) who gave a thorough clinical description of the disease in infants and as the first looked upon this lesion from an orthopedic point of view, estimating its severity not from the acute symptoms, but laying particular stress upon the later sequelæ which are often strikingly contrasting to the acute, mostly benign, course of the lesion.

To my knowledge, no particularly important contribution on this question has been offered by German authors since Drehmann gave his last paper in 1905. In recent years, on the other hand, significant works on this question have been published by French investigators—*e.g.*, Roederer, Froelich, Kirmisson & collaborators, and Nové-Josserand & Pouzet. These investigations deal in particular with the sequelæ, and they give a rather pessimistic outlook about these conditions even though Nové-Josserand & Pouzet attach considerable importance to the degree and character of the hip lesion in this highly variegated clinical picture, to the often fairly good function of the joint (in spite of extensive destructive changes)—something that stands out conspicuously also on going through the material here presented.

Finally, I wish to call attention to a prominent work by Soeur (1931), in Revue de Chirurgie, based upon a large American material—the most thorough, it seems to me, and perspicuous account of this question. In the Scandinavian countries, Rovsing has reported some cases of acute tuberculous pyarthrosis in infancy—a work I shall return to later on. Studies on the present question has been published also by Edberg, Einar Key, and Sv. Johansson. Recently, Friderichsen, has published a case of this kind.

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I shall briefly outline the picture of the disease here discussed, pointing out at the same time that this disease is not limited to the hip alone; it is encountered in all the large joints, most often in the knee, then in the shoulder, hip, and elbow. In the present paper we shall discuss only this condition as far as the

hip is concerned, because cases of this kind generally give particular orthopedic sequelæ, implying thus some particular therapeutic problems.

The disease comes as a streak of lightning from a clear sky, hitting an otherwise apparently normal child, often without any demonstrable source. In most cases, however, a thorough examination will reveal some phenomenon that may presumably constitute the primary focus of infection: a mild degree of enteritis slight excoriation around the anus, filthiness of the naval cord, etc. Or the disease may set in subsequent to an attack of angina, bronchitis, pneumonia, or otitis. The child has high fever. The mother notices that the child keeps fixing one leg and cries out whenever she touches this leg. The upper part of the thigh begins to swell, and there comes redness, with infiltration or even marked oedema, which may extend all the way down on the calf of the leg. In one word: we have here the picture of a severe infection—coxitis or osteomyelitis. The lesion goes on to abscess formation and perforation; or an incision is made, with evacuation of a large amount of pus. These clinical features are typical and well known. Later on, we see the same patients with a scar after the incision, in front of or back of the trochanter. Often these children are greatly exhausted, and the entire course of any given case may turn out very dramatic throughout. If the children do not succumb, however, the wounds usually heal rapidly, generally within a few weeks. On physical examination, free mobility of the hip is made out again, and the child is considered well; then—several years later—it is noticed that he has trouble in learning to walk, and he limps a little.

Or the primary affection may be milder; and such cases are by no means infrequent, being really quite typical of infantile coxitis, especially in early infancy. Without being particularly distressed the child has high fever perhaps for a couple of days during which it is rather fretful; then an ordinary boil appears to be developing in the inguen, or posteriorly in the fold of the buttock. This abscess perforates, and a fistula persists for a few days, with considerable secretion. In other cases the abscess is incised, with evacuation of the pus. These wounds heal rapidly,

leaving inconspicuous, almost invisible scars that are soon forgotten, so that in some cases no information can be given subsequently about their origin. Some years later the child is submitted to a physical examination on account of a limping, and usually the diagnosis of congenital luxation is made. Roederer has given an excellent description of the clinical aspects of this lesion.

Finally, there is a third type of affection encountered in certain cases which appears somewhat differently from those mentioned above. The disease has an acute or, most often, a more insidious onset, resulting in swelling, oedema, and fixation of the hip. The children are febrile, suffering more or less. In these cases, however, the affection does not go on to any demonstrable abscess formation; so there is no perforation—no fistula. The affection subsides gradually and spontaneously within a few days or a few weeks, and the child appears to be quite well until one day it is found to be limping. This is a clinical picture which has not received attention enough, and which often gives rise to various mistaken diagnoses—in our material: lymphadenitis, rickets, erysipelas, and, especially, tuberculous coxitis—or passes on without being noticed at all. Later, when the child is found to be limping, and an X-ray plate is taken of the hip, the affection is designated as congenital luxation.

These clinical features have been suggested by several authors (*e.g.,* Volkmann, König), while they have been pointed out explicitly by Drehmann who, being an orthopedist, met also with their sequelæ. Soeur, strange to say, states that these cases are very rare. At any rate, we have found something different. In our material of 29 patients we find this form of the affection in no less than 9. It was a case of this kind that Friderichsen reported recently. He states that the swelling subsided and that the mobility of the hip was normal when the child was discharged from the hospital. Nothing has been said as to how the child has been walking since.

*Etiology and Pathogenesis.* The disease, as will be expected, is of bacterial origin, developing most often in connection with

some pre-existing infection. The localization of the infection to the hip is to be looked upon as a part in a pyemic spreading of an infection from some inflammatory focus somewhere in the body, often produced through a slight injury (Towsend). On the whole, however, our material gives no anamnestic data on injuries of the hip region.

To begin with, considerable stress was laid upon the *gonococcus* as the etiological factor, because the disease was seen to arise in several cases subsequent to gonorrheal ophthalmoblennorrhea. This condition has not been demonstrated in our material, and in view of its relative infrequency it may be said to be a rather unusual affection in this country. Several authors hold that the prognosis is very good in gonorrheal coxitis in infancy, also as far as the later sequelæ are concerned.

*Pneumococci* constitute one of the most frequent causes of infantile coxitis. The primary focus most often consists in a process of pneumonia or a more or less latent state of otitis (according to Netter, in 41 % of the cases). Conspicuous features of pneumococcal arthritis are: profuse pus formation with enormous masses of diplococci, taking a relatively benign course, with rapid healing after evacuation of the pus. Something similar applies to *staphylococci.*

*Streptococci* are found especially in the more severe cases —the septic cases. When the old statistics give a mortality as high as 45 % (Townsend) the fatal cases have undoubtedly been due in particular to streptococcal sepsis. Among other bacteria, mention is to be made also of colon bacilli, enterococci, and Pfeiffer's bacillus.

A most interesting question turns up now: Is not the coxitis in many of these cases of tuberculous origin? And it will be appropriate here to look into this question more thoroughly.

In 1896 Rovsing read a paper in the Danish Medical Association on »an apparently hitherto unrecognized or, at any rate, a form of tuberculous arthritis not described before which seems to be particular to children in the first years of life, and it surprises by differing greatly from the usual features of tuberculous arthritis not merely in its onset but also in its subsequent

course and prognosis«. The condition here described by Rovsing looks clinically exactly as unspecific infantile coxitis. The diagnosis was based on some findings of tubercle bacilli and tuberculous granulation tissue. Rovsing's material comprised altogether 10 cases of pyarthrosis, including 1 case with the lesion in a hip joint. In the discussion that followed this paper, considerable doubt was raised about the diagnosis of tuberculosis. Now this question may hardly be settled.

In the following years, this view of Rovsing was cited by various authors, with due respect for his great authority (Portwich, and others). Still, his views concerning acute tuberculous pyarthrosis in infants are no longer supported. Now practically all authors agree that tuberculous coxitis in the first year of life is a very rare phenomenon (Drehmann, Gasne, Roederer). Only Froelich has described a similar case.

There can be no doubt, however, that tuberculous coxitis may exist also in the first year of life. Here in the Orthopedic Hospital we have seen the sequelæ of this lesion, among others, in 2 small Sleswigians (born during the world war), but the clinical picture of their illness did not resemble that of infantile coxitis. In our present material we have two cases, in both of which the acute course of the illness was quite typical of infantile coxitis, and yet the diagnosis of tuberculosis had to be ventilated. One of these patients, a boy of 7 years, gives now a strong positive Mantoux reaction (Case Record 23). The other patient, a woman, now 27 years old, had an acute hip affection in infancy, and 20 years later (i.e., 7 years ago) she had an exacerbation of this lesion, with demonstration of tuberculous granulation tissue, while in the intervening years she has shown no sign of any hip lesion except for her limp. In this case, I think, we are dealing with a superinfection (Case Record 17). But it is difficult afterwards to decide on such cases. One thing is sure, however: tuberculous coxitis is a rare disease in infants; its course and prognosis are quite different from those of infantile coxitis, also with a view to the later orthopedic sequelæ.

*Pathological Anatomy.* Since the days of Volkmann, a great many papers have been written on this question. Judging from

the literature accessible to me, however, it is a striking thing how few good papers have been published on the pathologic-anatomical findings. The great works by v. Bruuns & Honzell, by Klemm and by Johansson deal with osteomyelitis of the hip in general not particularly with infantile coxitis.

On account of the relatively benign character of this disease it seems obvious to raise the question: Does this lesion involve a simple pyarthrosis (Volkmann's »catarrhal synovitis«), or is it a form of osteomyelitis? Where does this lesion begin—in the synnovial membrane, in the epiphysis, or in some juxtepiphysial location in the head or the neck of the femur, corresponding to König's classification of 1902.

No doubt there are many mild cases, consisting merely in synnovial coxitis, which may either subside or give rise to permanent changes: deterioration of the cartilage, with subsequent destruction; pannus formation; perforation of the capsule; periarticular abscess formation, etc. Some cases of this kind have been described. Thus, for instance, Edberg has described a severe case of entirely synnovial involvement, terminating fatally.

Still, instances of osteoarthritis are probably the most numerous, and generally the most severe. They all give secondary pyarthrosis as the capsule envelops the entire epiphysis and a part of the neck of the femur. The capitular nucleus appears to be the primary site of the inflammation. Probably this is owing to the particular anatomical conditions of this region: a lively and copious blood supply through a few blood vessels, as illustrated by the injection experiments reported by Lexer and by Bentzon. Even though these arterial branches are not end-arteries, they practically function as such, going over into the capillary network with retarded rate of flow (Bobroff). Thus bacterial emboli are offered excellent conditions for settling in this region; and the result is complete or partial necrosis of the nucleus and cartilage; slipping epiphysis; extension of this process to the juxtepiphysial part of the neck of the femur, with subsequent total necrosis of this part of the bone.

The way in which the present material has been obtained, as I shall discuss again later on, leaves but little information

to elucidate these problems. Accounts of the operations performed in some of these cases tell but little; and the same applies to the X-ray pictures. In our material we have no less than 7 patients who were submitted to X-ray examination in the acute stage of the disease, and the plates from these examina-

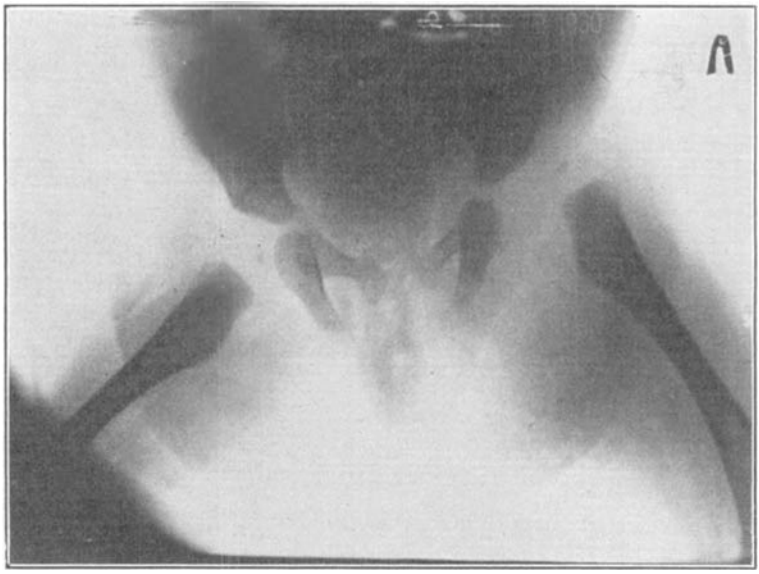


*Fig. 1. Case 5.*

tions are available. But, before discussing these X-ray plates, it will be appropriate, I think, to outline the picture of the normal hip in infancy.

In normal infants the capitular nucleus in relation to the acetabulum is located so that a line drawn through both of the Y-shaped cartilages and elongated outwards will about be tangent to its upper margin. The medial corner of the neck touches the most inferior margin of the acetabulum or—in infants within the first few weeks of life—it comes very close to this point; the lower margin of the neck of the femur together with the pubic bone make a well-defined curve, Shenton's line. The axis of the neck will pass straight through the centre of the head, aiming at the roof of the acetabulum, which will be more or less oblique, according to the age of the child.

The first changes to be seen consist in the subluxation outward-upwards: the distance between the corner of the neck and the lower margin of the acetabulum is increased; and the axis of the neck is now aiming at the margin of the acetabulum, or

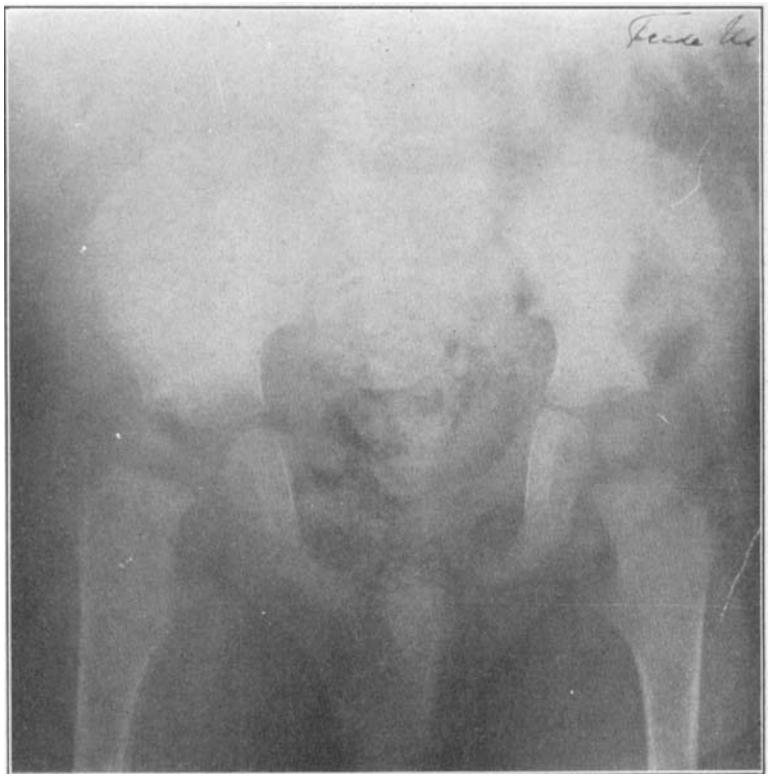

*Fig. 2. Case 8.*

even outside. This is seen in all 7 cases, and in three of these even at such an early juncture that neither the nucleus nor the neck showed any demonstrable changes.

Subsequent to this subluxation we find beginning changes in the capitular nucleus: it is decreasing in size, looking almost as if eroded at the margin, with the structures becoming blurred and finally completely absent. Not infrequently the capitular

nucleus is seen to change position in relation to the neck of the femur—on account of slipping epiphysis. In addition, we find structural changes in the neck of the femur, amounting in degree up to massive destruction, periosteal new-formation of bone extending rather far down on the femur, and sometimes (in technically perfect pictures) a large spindle-shaped density of the soft parts around the joint signifying some extravasation into the joint cavity together with periarticular infiltration. On subsequent plates, taken during the acute phase of the illness, there may be a defect or even marked deterioration of the head of the femur; in other plates the capitular nucleus, which was missing at an earlier examination, begins to show up again although rather weak in the outline. Processes of sclerosis are seen around the ostitic foci in the collum, that is, if the collum has not gone entirely. In none of these cases, however, is the subluxation—or luxation—completely restored.

So, really these X-ray plates give us some fairly good information about the pathological processes involved, especially with a view to the pathogenesis of the subluxation and the luxation—something that has not been appreciated properly in the literature even though this matter is of the greatest interest clinically as well as therapeutically. In all papers on this question, destruction luxation appears to be the predominant feature. Really it is a matter of luxation through distension; and our therapeutic management of a given case has to be adjusted accordingly. It is quite true that the destructive process is a concommittant phenomenon, having a quite decisive influence on the subsequent function of the hip. The fact that luxation is brought about merely by the distension is easily explainable when we keep in mind the structures of the infantile hip joint: a large head and a small and flat acetabulum—something which Morville has demonstrated very clearly in his experimental injections of the infantile hip.

Whether luxation of the hip in infancy may be reposed spontaneously, is a question I should not dare to discuss at the present; presumably such restoration takes place now and then. But, in order to discuss this question adequately, one would

have to be dealing with a large material of recent cases—and my studies have started from the other end of the line.

*Diagnosis and Differential Diagnosis.* Going through the case records which we have been able to collect, we meet with one striking feature: in most of the cases the diagnosis is not made at the time of the first onset of the lesion, and often the lesion is not noticed at all until an abscess formation—or even a perforation with evacuation of pus—calls attention to a suppurative lesion. If now an incision is made, the wound heals rapidly, and before long the motions in the hip joint become perfectly free, so that nobody thinks of any hip lesion until about 1—2 years later when the child begins to limp. Then there are the cases in which no suppuration takes place: Nobody notices a slight swelling of the hip in such cases—with a slight fixation of the hip. If the child cries and appears uneasy, its behaviour is explained in some other way. As stated by Cohen: »Often a painful flexing contracture of the hip shortly after birth is the only sign of infantile coxitis resulting in a permanent limp—throughout life«.

Diseases of differential-diagnostic interest in this connection are: Anterior poliomyelitis; Parrot's pseudoparalysis (especially in the older literature); Barlow's disease; erysipelas; various suppurative lesions; and then, of course, tuberculosis. Here, however, space does not allow of any particular discussion of this point.

*Prognosis.* In discussing the prognosis a very definite distinction has to be made between the prognosis of the patient as far as life is concerned and the prognosis with regard to the function of the hip joint. The mortality among these patients is given somewhat differently—*e.g.*, 45 % (Townsend) and 30 % (Gasne),—both published over thirty years ago. Now, I think, the mortality is considerably lower. Generally the clinical picture of infantile coxitis presents a fairly good prognosis. Those children who die with this affection show in most cases infectious foci in several points—a condition of sepsis—dying of the general infection, not of their hip lesion.

Another point is: Do these children recover completely? And how many of them recover? It is a given thing that many do not recover completely but have some permanent sequelæ of the disease. The aim of the present investigation is on the basis of a Danish material, which is larger than most other available materials, to give an account of the sequelæ encountered in these patients. But, how is the prognosis in general? As far as I have been able to find out this question has not been investigated before. And it may be elucidated only through re-examination of a fairly large number of patients, in whom the initial lesion was recognized at its first appearance, when they are learning to walk as well as later, in puberty and youth.

In the literature it is often stated that a good many of these children recover completely (and a few of these statements have been substantiated with clinical data). But in most cases the favorable impression of the illness is based on its rapid and mild course—besides on the fact that the mobility of the hip is not impaired at the end of the treatment. Nothing is said, however, about the subsequent condition of these patients—several or many years later—and, of course, such information is required to settle this question.

On the other hand, when the French school of orthopedy claims that the results are poor, this statement is largely based on a material of patients who apply for orthopedic treatment later on, while nothing is known as to how many patients have been free from later sequelæ. The truth must lie somewhere between the two extremes.

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I wish to acknowledge my indebtedness to Dr. Poul Guildal, Physician-in-chief to the Orthopedic Hospital, for his suggestion about gathering and reviewing the patient material of sequelæ of infantile coxitis admitted to this hospital in the course of time. This task has been somewhat difficult because it has been necessary, so to speak, to conclude backwards from the deformities of the hip to the initial affection, about which the case

records, especially the older ones, give only scanty anamnestic data or none at all. However, I have gone through most of the »hip records« since 1921 and a large part of the hip pictures in the roentgenographic archives.

The present material comprises:

1) Patients with definite anamnestic, clinical and roentgenological data—the greater part of this material.
2) Cases in which the roentgenographic findings have been of such a character that the diagnosis seemed most probable, and in which the anamnestic information obtained by inquiry substantiated the diagnosis.
3) Cases in which the diagnosis had to be regarded as certain even in spite of wanting anamnestic data.

The reexamination of many of these patients was carried out by myself.

The term »infantile coxitis« is here used to designate an attack of unspecific coxitis manifesting itself in the first year of life. This age-limit is perhaps somewhat arbitrary. At a higher age, however, we find in our material several cases in which it has been difficult to differentiate between traumatic and pathological luxation, besides many cases of unquestionable osteomyelitis of the neck of the femur.

The material comprises 29 cases, including 27 patients admitted to the Orthopedic Hospital, 1 case from the Court of Invalidity Insurance, and 1 case which Dr. Sven Müller has been kind enough to turn over to me. There are 16 children and 13 adults. It may be that several other cases have been overlooked; in some instances the picture of the disease has been so obscure that these cases had to be omitted on that account. For the aim of this work has not been in particular a statistical quantitative investigation, but rather to obtain a material that will elucidate the disease qualitatively, illustrating the various forms of sequelæ it may give rise to. Hence this material does not allow of any conclusions as to the frequency of such cases. Only 4 of these patients entered the Home for the Crippled immediately after they had come over their acute attack of the disease (Case Records 4 6, 27, 28).

In 20 of these 29 cases the acute attack was associated with pus formation, requiring operative treatment. As far as may be seen from the records the operation in all these cases consisted in incision with evacuation of pus, whereas nothing is said about any operation on the bones. In the 9 cases, in which no operation was performed, the lesion consisted in osteomyelitis of the head of the femur and of the juxtepiphysial part of the neck (Cases 10, 11, 16, 17, 20, 21, 23, 26, 28).

Under the pathological anatomy of infantile coxitis, mention was made of the following phenomena as typical of this lesion: distension luxation, necrosis of the head, ostitic foci in the neck (visible in most of the pictures), and periarticular abscesses. After the inflammation has subsided, the following phenomena remain: luxation or subluxation, a more or less extensive defect of the head and neck, destruction and scar-formation of the soft parts, and scars from fistulas or incisions in the inguen or back of and below the trochanter. In particular, the inconspicuous and almost invisible scars in the groin may in many cases enable us to trace the causal aspects properly, indicating that in such cases we are dealing with a pathological coxitis, not with a congenital luxation. Roederer emphasizes rightly that these small scars are almost pathognomonic of infantile coxitis. A few of our patients have been discovered by means of these scars (cf. Case 29).

The pathologic-anatomical aspects of the condition are illustrated most plainly by the X-ray pictures. We have several X-ray plates of most of our patients, usually a series of roentgenograms of each patient, showing the development of the pathological picture through the course of several years. These pictures vary greatly, giving no uniform impression as, for instance, the roentgenograms in cases of congenital luxation. Yet, it is possible to set up a few types:

*Type I.* This is the general type presenting: luxation with destruction of the head and neck, so that these parts of the femur are almost completely absent or lacking altogether. The femur is straight as a cane, poorly adapted for support to the pelvis, especially as there is often a tendency to slight adduc-

tion. There is luxation with upward displacement of the trochanter, usually to a marked degree. The acetabulum is flattened, filled with osseous masses, leaving no sign of any joint cavity. The roof is an irregular sclerotic structure with osteophytes along the margin. On the whole, there is a pronounced tendency


*Fig. 3. Case 27.*

to new-formation of bone: osseous projections, »stopping props«, »shelves«, veritable spontaneous Lance operations. It is as if nature mends herself the defective adaptation and support by forming new supporting elements that ensure a relatively good function. Fig. 3 (Case 27) affords a very good illustration of this feature. Finally there is a general hypotrophy of the femur and the corresponding half of the pelvis (Fig. 4, Case 9). This group comprises 20 patients (Cases 3—22 inclusive).

*Type II.* The head and the neck are more or less defective, forming a beak-like tip, hooking on to the acetabulum. Various transitions are seen between Types I and II. This group com-

prises 4 patients (Cases 23—26). It is characterized clinically by a pronounced tendency to flexion contracture, with reduction in the mobility of the joint, resulting in a poor function of the hip. (Fig. 5, Case 24).


*Fig. 4. Case 9.*

*Type III.* Clear-cut luxation, as seen in two cases (Cases 1 and 2). (Fig. 6).

*Type IV.* Subluxation of the head is observed in 3 cases (Nos. 27—29). In two of these cases it is impossible to differentiate this condition from subluxation of other etiology; reposition has been performed in the third case.

In general, two things may be said to be characteristic of these pictures—as has been emphasized by several authors:

a) Osseous ankylosis is an extremely rare phenomenon, practically never seen—in contrast to tuberculous coxitis in which it often develops.

b) These inflammatory processes present the picture of something finished, something that has completed its course. In typical cases these processes are characterized by the extensive and massive destruction of the head and the neck of the femur,

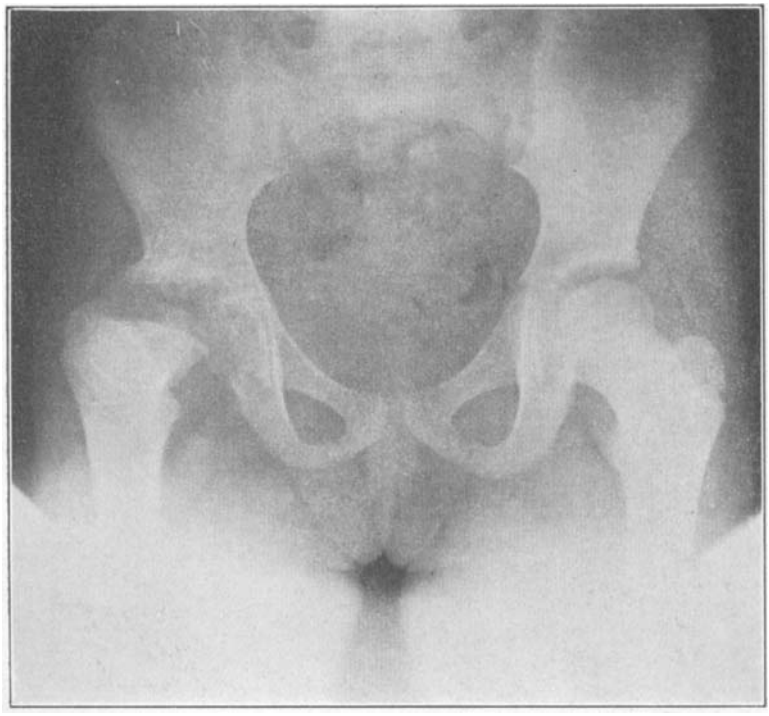

*Fig. 5. Case 24.*

and by the marked responsive new-formation of bone, with the new elements adjusting themselves also functionally. In these cases we seldom meet with such phenomena as are often seen in the chronic stage of tuberculous coxitis: gradually progressing destruction of the bone, and localized rarification of the bone without reactive new-formation of bone. Here the morbid process heals definitely in the acute stage of the disease—in striking contrast to tuberculous coxitis that may persist for years as an active process before it terminates in osseous ankylosis.

The diagnostic difficulties are greater when it comes to differentiate this condition from congenital luxation, especially in the early stage, as both the head and the neck of the femur may be greatly deformed in congenital luxation.

*Fig. 6. Case 1.*

Drehmann holds that it is not practicable in doubtful cases to make the differential diagnosis by means of X-ray examination; and Wette claims the opposite, stating that it is typical of the congenital luxation that the roof of the acetabulum is slanting steeply and atrophic, while its osseous rim is marked but little, and the bottom of the socket is thickened. Lamy says something similar, in addition he emphasizes the sclerosis, resulting from the reaction of the osseous tissue to an infectious and destructive process, besides the general hypotrophy of the femur and pelvis as typical of the coxitic deformity, whereas

the head and the neck of the femur in congenital luxation are nearly always normal—even though rather small—with normal diaphyses. I think it will be possible in most cases to make the differential diagnosis by X-ray examination; and this is a rather important point, as the anamnesis may be misleading. Reposition of a pathological luxation is far more difficult than reposition of congenital luxation; besides, it may also involve a considerable risk.

In my opinion the best differential-diagnostic criteria are: the sclerosis of the acetabulum and the atrophy of the entire diaphysis, besides the structural changes in the neck if any part of this is preserved. In doubtful cases, on the other hand, the outlines of the head and neck are not decisive, as these structures may be well preserved in coxitis, greatly deformed, or difficult to estimate on account of outward rotation in congenital luxation. I wish to maintain, however, that a great majority of these cases will leave no doubt about the proper diagnosis. The picture of a straight and atrophic femur without any head or neck (or only a small remnant of this) is by far the most frequent feature of infantile coxitis, and it is practically pathognomonic of this disease.

*Clinical Aspects.* Besides the anatomical and roentgenographically demonstrable damage to the hip in these cases, there are also conspicuous clinical features: impairment of the function of the hip, of its stability and its mobility. One feature common to all these patients is that they limp. This limp is the result of several different factors, chiefly the following: shortening, luxation, reduction of mobility, contracture, ankylosis, impairment of muscles, and secondary changes in the knee, ankle, etc.

The *shortening* may be considerable, even 2—4 cm. in the joint itself; and then there is additional shortening due to adduction, atrophy of the femur, contracture, etc. In several cases, therefore, we meet with a practical shortening of up to 9 cm.—even in children. In our material, luxation was seen in 22 cases; 8 of these are limping badly (Cases 2, 6, 7, 9, 10, 14, 15, 19).

In some of these the luxation is sliding, loose, as the femur finds no support in the pelvis; and here the shortening is marked. In some cases the trochanter finds support only under the crista ilii, against the muscles of this region. These patients appear to be worse off than patients with congenital luxation, for in the latter the trunk is suspended firmly by the strong capsule, especially the hypertrophic superior ilio-femoral ligament (Gocht), while in the former the soft parts have undergone destruction and the tight scar tissue affords no particular support. When we meet such patients, with marked shortening and atrophic muscles, they remind a great deal of poliomyelitis patients with gluteal and quadriceps paralysis. They do not sway in walking as do patients with congenital luxation, but they move the body more abruptly as if to swing it up on a higher post when they take the next step.

Fortunately, however, most of these patients get along considerably better. It has been mentioned that the inflammation often leaves a deformed head and neck, or merely a little piece of the neck, which then rests on the pelvis, most often in a nearthrosis or against a new bony bridge. Or there are some tense, shrunken scar-like remnants of the capsule that keep the bones together. In this way the shortening becomes less pronounced, with better solidity; and even though the mobility usually is reduced through a tendency to slight contractures, the rule holds good here too, that solidity is more important than mobility. On the whole, these patients show similar degrees of gait as are seen in congenital luxation and subluxation. In view of the roentgenographic features, these patients often walk surprisingly well. Two of these patients show a normal Trendelenburg phenomenon when they put their weight on the affected leg; others show a relatively slight degree of gluteal insufficiency.

*Reduction of movements and contractures* are common. Moderate reduction in the capacity for abduction, inward rotation and flexion is seen in all these patients, without meaning any great functional impairment. Flexion contractures of 10—15° are common. Still, contracture cannot be said to be particularly

typical of this affection, especially not in the luxated cases that make up the greater part of this material; and the marked tendency to adduction contracture which is such an annoying feature of tuberculous coxitis is a rare phenomenon in these patients. Contractures in infantile coxitis are most often of the flexion type. We have here 7 patients with flexion contractures of about 45° or more, including the three cases in which there were destructive changes without luxation, and one patient in whom the head has remained in the acetabulum after reposition (Cases 6, 7, 14, 23, 24, 25, 27). It appears as if the shrinking parts of the capsule forces the hip into a flexion contracture if the head of the femur cannot yield by sliding out of the acetabulum.

This strong contracture naturally means a serious obstacle to the function of the hip, partly by producing a marked lordosis of the back, partly through the functional shortening due to secondary contracture of the knee. These patients all limp markedly. One has a functional ankylosis at a right angle, and he limps frightfully (Case 23).

Considerable impairment of the muscle power is an almost constant finding; a decrease of 3—4 cm. in the circumference of the thigh is common in children. The insufficiency of the gluteus medius is often pronounced, which is of considerable functional importance. Thus, on the whole, we may say that a good many of these patients walk but poorly, while some walk surprisingly well. But even children who are limping badly may have a fairly good function of the hip, in so far as they are able to run about, playing, riding bicycle, skating, etc. Even the little fellow with the rectangular ankylosis (Case 23), whom I meet in the street now and then, runs about fast. These children seldom complain of any pain, but sometimes of tiredness.

In adults, on the other hand, pain is a conspicuous symptom —the one thing who makes them apply to the Orthopedic Hospital and disables them as a rule. All the adult patients in the present material complain of pain in the hip, radiating down in the leg, seldom out in the back—in contrast to cases of congenital luxation, in which the pain usually is referred to

the back, on account of the marked lordosis. It is chiefly the pain that throws gloom upon the prognosis of infantile coxitis, which usually heals rapidly, leaving a limp but a fairly good function of the hip in infancy, whereas pain and invalidity are the sequelæ in the adult. In this respect, the outlook seems worse for these patients than for patients with congenital luxation.

Finally I shall briefly mention 2 patients with subluxation of the hip, in both of whom the lesion had been diagnosed as Calvé-Perthes' disease (Cases 28 and 29). In the first case, the X-ray findings give rise to this diagnosis; and this is not surprising as all the plates showed the morphological changes typical of this lesion: spots of rarification in the structure of the head, flattening and hypertrophy of the head, with a slight degree of coxa vara (case reported in the dissertation by Flemming Möller). In the other case, the inflammatory stage in infancy had been forgotten. When this patient was 11 years old he had marked pain in the hip, and Calvé-Perthes' disease was diagnosed after X-ray examination, although the roentgenograms showed some evidence of an earlier inflammatory process (personal communication from Dr. Wegge, Odense). These X-ray plates are not available now. Here in the Orthopedic Hospital we were led on to the diagnosis of infantile coxitis through some delicate scars around the hip.

These cases are interesting, I think, very instructive and well substantiated, in particular the first one. There can hardly be any doubt that both these patients have had infantile coxitis. It seems probable, at any rate, that the first patient in adolescence has presented the symptoms typical of Calvé-Perthes' disease, morphologically and clinically.

This shows that it may be impracticable to make the differential diagnosis between these two affections—or rather: that infantile coxitis may be one of the yet not established causes of Calvé-Perthes' disease, which is really a clinical-morphological concept, but hardly an etiological unit.

*Treatment.* It is obvious that here, in the Home for the

Crippled, we have had no particular experience in the treatment of this disease in its acute initial stage. Still, an analysis of the present material offers some suggestions in this respect too.

Here as in all other affections where pus is produced the rule holds good: that the pus has to be eliminated. In view of the fact, however, that distension luxation develops rapidly in this joint, that the capsule is becoming flaxid through the distension, and that the nutrition of the cartilage is impaired, it becomes even more imperative to institute a rapid evacuation of the pus—through a puncture, and repeated puncture, if necessary, or a small incision. When this is done, the inflammation will often subside, and the wound will heal within a relatively short length of time. Judging from his experiences, Roederer emphasizes the effectivity of the early small incisions, in some cases together with button-hole drainage.

At the same time, with a view to the distension luxation as the primary factor in the subsequent clinical picture of these cases, it seems important at once to fix the leg in abduction and slight inward rotation, in order to prevent this luxation. Still, several authors (*e.g.,* Judet and Soeur) claim that this measure makes no difference as the luxation takes place anyhow, and, furthermore that it is impracticable because the bone cannot be fixed, and because the skin is rapidly undergoing maceration from the effect of the pus, and so on. Yet, I think, such an attempt ought to be made. But, I wish to emphasize, the leg ought to be abducted strongly, in something like Lange's position. Thus it will be possible to get a better hold of the leg and perhaps bring a subluxated head back in its place once more.

It is obvious that X-ray examination of these children is to be carried out as soon as the acute process subsides, in order to see whether the joint is luxated or destroyed. But it is to be mentioned that it may be extremely difficult at this time to make out a possible subluxation—or, rather, to make sure that there is no subluxation.

In the case of luxation, reposition of the hip is to be performed as soon as possible. With subluxation and a mild degree of destruction, the condition of the joint has to be watched

steadily. For, no doubt, there is a considerable tendency to spontaneous reposition, and it has to be supported. At the same time efforts should be made to facilitate the important function of the head: to adapt itself to the acetabulum and, on the other hand, to excavate and shape this socket, in order, if possible, to avoid the flat subluxated incongruous hip-joint. This, too, may be accomplished most effectively through abduction treatment for a considerable length of time by means of night splints, plaster casts for night use with abduction and slight inward rotation of the leg, etc.

In cases of luxation and destruction of the joint, attempts should be made at reposition as soon as the inflammatory symptoms subside. It would be wrong to wait for a spontaneous reposition, till the limping of the child shows that something is wrong—the more so as these children are late in learning to walk. It is essential in the treatment to get ahead of the shrinkage of the scarforming soft parts and the osseous filling of the acetabulum.

In cases with considerable upward displacement it will be proper to apply extension treatment for some length of time, in order to stretch the soft parts. The reposition is accomplished best after the Lorenz method; naturally it has to be carried out cautiously so as not to fracture the friable femur. A reposition sound is heard but seldom. The usual form of bandage is to be applied.

Opinions differ greatly as to the practicability of the reposition and the usefulness of this measure—largely because each author sets forth a view that is based on his own, usually rather limited, material of cases. Thus, Drehmann performed reposition in a few of his cases »with good results«, he says; but he tells nothing about reexamination of these patients. Ziegner is the most optimistic, having made reposition in 8 of 11 cases, all with good results. He publishes X-ray pictures from all these cases, and they show at once, that he has been fortunate in this respect that everyone of his patients presents a little stump of the neck that hooks on firmly to the acetabulum. These results are reexamined up to 6 months later, and are said to

be good. He quite properly emphasizes this point: even an extensive destruction of the head and neck should not contra-indicate an attempt at reposition, as the cartilaginous parts of the head often are less deformed or defective than what might be suggested by the bony parts in the X-ray picture.

*Fig. 7. Case 15.*

Roederer, Froelich, Judet and Lamy are skeptical about the possibility of reposition. Roederer says: »Generally reposition is of no use«. When the head and the neck are destroyed there is nothing to hold; it is of no use to place the trochanter in the acetabulum under strong abduction, for it slips out again. The same holds good when treatment is undertaken so late that the acetabulum is filled with scar-like connective tissue. And this is just the thing that happens in so many cases. When the inflammatory process in the hip subsides, the mobility of the hip seems to be good. Then, about 1—2 years later, the child begins to limp, and it comes back to the doctor for further treatment. The results reported by these authors are poor, and on the whole, I think, they are right in their views. Still, of course, we cannot in a given case say anything definite about

the subsequent result; and hence it seems advisable to try reposition, without expecting too much benefit from this measure.

We have tried reposition in 3 cases, Nos. 4, 6 and 27. In one case there came a fracture of the femur; in another there

*Fig. 8a.*

appeared a considerable flexion contracture that could not be quite counterbalanced by division of the tensor fasciæ latæ, sartorius and rectus femoris; and in the third case there appeared a reluxation (Figs. 8a, b, c, and d). These results illustrate very well the difficulties in a successful employment of reposition, and they suggest that Ziegner's series of 8 cases with successful reposition is rather unique.

In childhood and puberty, even later in life, symptomatic, more conservative, orthopedic measures are to be employed: balancing of the shortenings by elevation of the heal, orthopedic footwear, etc. The prerequisite of the employment of such

*Fig. 8b.*

measures is that the patients are kept under constant observation, returning frequently for control examination; under these conditions the favorable effect of these measures may hardly be overrated. If there is a pronounced degree of flexion contracture, efforts may be made to abolish or reduce it by means of tenotomy of the spinalis muscles, with division of the tightening capsular band on the anterior surface of the hip-joint; if there is also a contracture of the knee, this is repaired at the

same time. Osteotomy of the femur may be necessary, as in our Case 25. Or the position may in some cases be corrected by means of brisement and perhaps be consolidated later by arthrodesis (Case 26). There are many employable methods, depending on the individual cases.

*Fig 8c.*

In puberty and youth when the insufficiency of the hip and the leg asserts itself under working conditions, while pains make their appearance too, these cases present new problems for solution. The question is in particular to obtain a better support in the hip for some of these patients with a sliding loose luxation, to balance the shortening of the limb and to improve the gluteus medius insufficiency, which is the direct cause of the patient's throwing the trunk over on the affected side.

For this purpose we have several methods of osteotomy at our disposal. The Lorenz-Bayer bifurcation osteotomy, I think,

is probably not employed very much nowadays. Drehmann's subtrochanteric osteotomy seems to be more rational, as the area immediately below the lesser trochanter is supported against the acetabulum, while a suitable abduction at the site

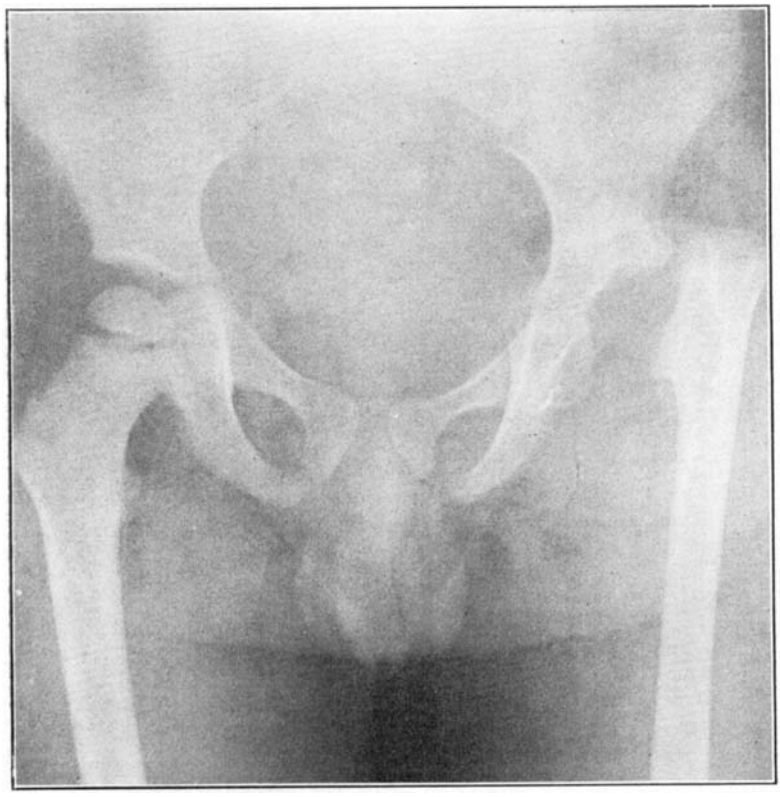

*Fig. 8d.*

of osteotomy gives a functional lengthening of the bone and better utilization of the gluteus medius. The operation is fairly simple, and it has generally given good results when it has been applied to luxations of other etiology. In our material this operation has been performed in one case (No. 15) with a good functional result (Fig. 9).

The Lance operation (arthroplasty with an extra-articular

*Fig. 9.*

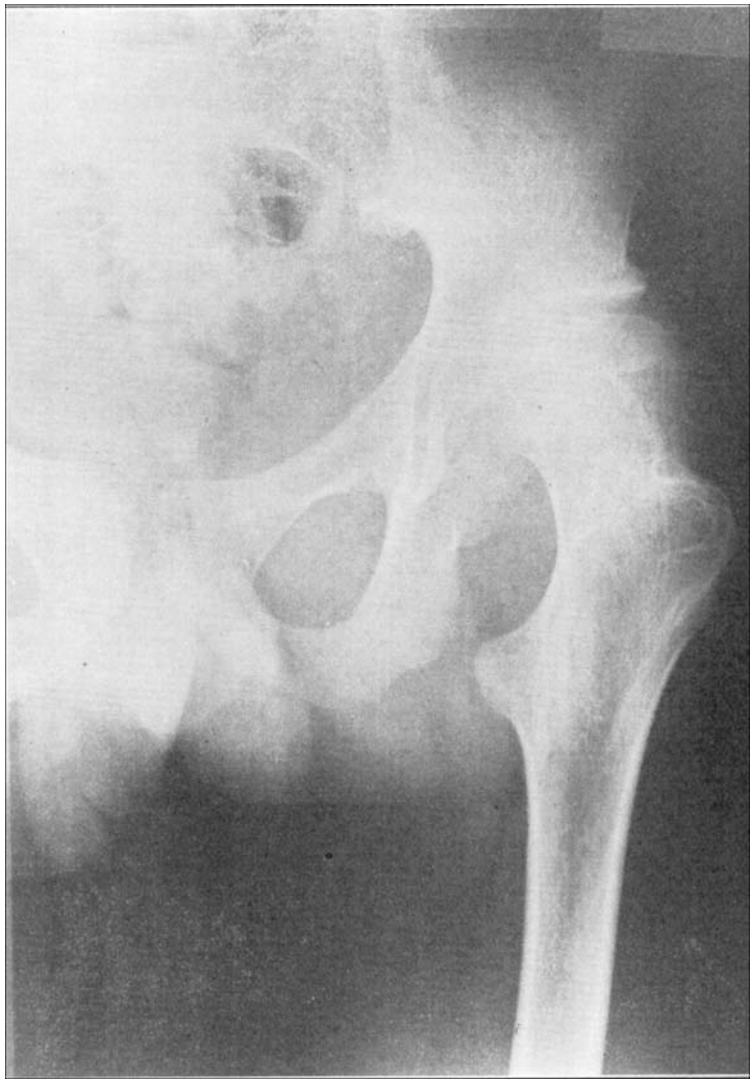

*Fig. 10.*

bone graft for support of the head) might have been employed in some of these cases, but it was not. Really, I think, its proper employment is found in cases of congenital luxation and subluxation. Putti has recommended to move the great trochanter more distally on the femur, after reposition. This method has not been used in the present material.

The general impression conveyed by a review of this material is on the whole a little sad—for one thing, because this disease implies the possibility of subsequent severe defects in the physical ability of these patients. It is to be kept in mind, however, that most of these patients are children in whom the treatment is not yet concluded. Several of these patients, we think, will later be suitable for additional treatment with osteotomy of the Drehmann type, which in all its constructive simplicity aims at the same time to solve several problems as suggested above. This operation is likely to find even greater employment in future.

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## LIST OF CASES

*A. Simple luxation:* Case Records 1 and 2.
*B. Destruction luxation:* Case Records 3—22.
*C. Largely destructive processes:* Case Records 23—26.
*D. Subluxation:* Case Records 27—29.

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## CASE RECORDS

*Case 1.*

Lizzi P., born Feb. 26, 1931 (Orthoped. Hosp. Reg. No. 981/35).

At the *age of 6 months:* Attacks of colds, bronchitis, measles and whooping-cough. Subsequently the child became feverish, and there was swelling of the left hip. Operative treatment in Dep. I, Kommunehospital.

*Orthoped. Hosp., 1935:* The child has been running about

freely; but lately she has been complaining of pain in the left hip.

*Physical exam.:* A scar, 12 cm. in length, is seen under the left trochanter. The leg is kept in 10—15° abduction, 20° outward rotation, with 15° flexion contracture in the hip. Flexion, in addition: 75°. Abduction: 15°. Adduction: 0°. Outward rotation: 45°. Inward rotation: 5°, Trendelenburg: +. Circumference of thigh: — 4 cm. Shortening balanced by abduction.

*X-ray exam.* (see Fig. 6): Collum anteverted, in marked valgus position. Head somewhat reduced in size, luxated upwards, located in a nearthrosis with strongly developed »shelves«. Acetabulum almost completely effaced. Slight hypotrophy of the femur.

*Epicrisis:* A girl, 4 years old, who in her first year of life had an attack of infantile coxitis, that was treated operatively, now presents the sequelæ of this lesion in the form of luxation of the head of the femur with production of nearthrosis, and the clinical signs: insufficiency of the gluteus medius, limping and moderate pain in walking.

*Case 2.*

Esther C., born July 12, 1928 (Orthoped. Hosp. Reg. No. 1198/34).

At the *age of 2 weeks,* without any known cause, there suddenly appeared a marked swelling and tenderness of the thigh, accompanied by fever. Operative treatment in the Rigshospital: Incision. At her discharge from the hospital, 4 months later, the wound had healed completely. Since that time, however, the left leg was lagging in growth.

*Orthoped. Hosp., 1934:* The patient is a bright little girl, with waddling gait.

*Physical exam.:* Upward displacement of the left trochanter, about 3 cm. Flexion: 90°. Extension: Normal. Abduction: 10—15°. Adduction: 25°. Rotation: About ⅓ to either side. Crepitation on passive motion. Trendelenburg positive.

*X-ray exam.:* Upward-outward luxation, without nearthrosis. There is a broad. plump, short, anteverted neck with a small

irregular head. Osteophytes at the edge of the acetabulum. Acetabulum flat, filled in.

*Epicrisis:* A girl, 6 years old, who in her first month of life had an attack of infantile coxitis, which was treated by incision, now presents luxation of the hip and a bad limp.

*Case 3.*

Axel P., born Oct. 20, 1920 (Orthoped. Hosp. Reg. No. 1084/22).

At the *age of 3 weeks:* Adm. to the Rigshospital for pyarthrosis of the right hip, with distension luxation; treated with arthrotomy. The wound healed rapidly, and the head of the femur was regarded as located in the acetabulum.

*Orthoped. Hosp., July 1922:* Right trochanter projecting, with upward displacement of 2 cm.; good mobility.

*1931:* Pain in the hip on physical exertion. Shortening of about 6 cm.

*X-ray exam.:* Small head, irregular in outline, luxated, without any support on the pelvis. Acetabulum flattened, filled in. Marked atrophy of the femur.

*1935:* Gait rather limping. Mobility in the hip almost free, with only a slight reduction in abduction. Trendelenburg, standing: Slightly positive.

*X-ray exam.:* The head of the femur is somewhat better developed, with upward luxation; the neck is in marked valgus position. No visible nearthrosis. Marked atrophy.

*Epicrisis:* A boy, 15 years old, who in the first month of life had an acute attack of pyarthrosis of the right hip with distension luxation. The subsequent result of this is permanent luxation with marked shortening and atrophy, but surprisingly good mobility and gait.

*Case 4.*

Svend N., born July 23, 1932 (Orthoped. Hosp. Reg. No. 1642/34).

At the *age of 8 months:* Osteomyelitic coxitis, subsequent to pneumonia, with great swelling of the left thigh, and fluctua-

tion above. X-ray exam.: Thickening of the trochanteric area; beginning destruction of the neck; slipping epiphysis; and upward-outward subluxation. Incision with evacuation of an enormous amount of pus (staphylococci). One-third of the femur is laid bare in the large abscess cavity; and the head is quite detached. One month later: Healing of the wound. The position of the leg is normal; and there is no shortening. Passive motions give the impression of a perfectly normal hip-joint; and the child is capable of natural spontaneous movements.

*Orthoped. Hosp., 1934:* The parents think that the left leg of the child is shorter than the right.

*Physical exam.:* Flexion contracture of 25°. Abduction: About $^2/_3$, and it is not practicable in this way to make out the caput within the acetabulum.

*X-ray exam.:* Luxation of the left hip; absence of the head and neck of the femur; spontaneous »shelf«-formation along the margin of the joint.

*Treatment:* After 6 weeks of extension, reposition is performed successfully. In spite of continuous control, however, with protracted employment of abduction position with sparing of the leg, there keeps being a tendency to reluxation—and 1½ years later the reluxation is complete. The child is limping badly (cf. Figs. 8a, b, c, and d).

*Epicrisis:* A boy, 8 months old, has a violent attack of severe coxitis with marked destruction. Healing proceeds rapidly but there remains a destruction together with a luxation, which can be reposed but not retained, as the head of the femur is destroyed, and it is really the great trochanter that is introduced into the acetabulum.

*Case 5.*

Karen Margrethe L., born Nov. 27, 1929 (Odense County and City Hosp.).

At the *age of 2½ months:* An attack of enteritis is followed by a sore swelling of the left thigh and hip region. After a few days of observation, and after subluxation of the hip has been demonstrated, there appears a definite fluctuation; incision is

made, with evacuation of thick pus. The inflammatory process heals rapidly, and the joint appears to be freely movable. Repeated X-ray examination shows periostitis, with destruction of the capitular nucleus, and increasing luxation (Fig. 1). During the following years the patient was under treatment now and then with abduction splints and ambulatory plaster cast, on account of a persistent tendency to adduction. At the age of 3 years an attempt is made operatively to place the trochanter in the acetabulum, while the gluteal muscles are shifted at the same time. The acetabulum is found to be effaced completely; the head of the femur is all gone, and of the neck only a little bit remains.

*1935:* The patient is still getting about in the plaster cast. There is an outward rotation of the left femur amounting to 45°. Flexion: ca. 60°. Abduction: 20—30°. Adduction reduced but little. Shortening: Ca. 3 cm. Extension complete. The child is a little imbecile.

Repeated X-ray examinations: Absence of the head and most of the neck of the femur, with the stump located at the level of the upper margin of the acetabulum, where there appears to be a gradually increasing production of osteophytes—like the eaves of a roof. Considerable atrophy.

*Epicrisis:* A girl, 2½ months old, has an attack of enteritis followed by infantile coxitis on the left side; an incision is made, and the process heals rapidly. The subsequent result is luxation of the hip with deterioration of the head and the neck. Clinically there is a persisting tendency to pronounced adduction, for which reason the patient is still under treatment.

*Case 6.*

Annelise E., born Jan. 21, 1924 (Orthoped. Hosp. Reg. No. 1381/24).

At the *age of 2 months* the patient had an excoriation around the anus, and suddenly there was swelling and redness of the left hip and thigh, accompanied by fever. On incision a large abscess was evacuated (pneumococci).

*Orthoped. Hosp., 1925:* The patient is brought to the hospital

because her left leg seems to be shorter than the right; otherwise no complaints. There is a shortening of about 1½ cm., with slight limitation of the abduction. X-ray exam. (plates indistinct): Subluxation (possibly luxation) of the left hip.

*1926:* X-ray examination shows almost complete destruction of the head and neck, with luxation of the femur. Remnants of an ostitic process are seen in the femur as well as in the acetabulum.

Under a very cautious attempt of reposition, the femur is fractured, just below the lesser trochanter, but so fortunately that the fracture takes the shape of a successful Drehmann osteotomy. Bandaging. Rapid healing.

During the following years the patient returns regularly to the Orthopedic Hospital for control, and she is supplied with footwear as required. There is some tendency to flexion contracture. Now and then she complains of pain.

*1930:* The X-ray plates show how the angulation is almost straightened out. The lesser trochanter appears to rest against an enormous bony prominence that has developed at the margin of the acetabulum. There is a very considerable hypoplasia of the femur (Fig. 9).

*1935:* The child feels well, and appears to be well. She is able to run about and play, without ever complaining of pain in the hip. *Physical exam.:* Flexion contracture of 45°, with the leg in 20° abduction, and the child is capable of additional 40° flexion. Adduction, abduction, and rotation: 0°. In walking, she is limping markedly, with pronounced lordosis, flexion of the knee, and an actual shortening of 7—8 cm., swaying towards the left. *X-ray exam.:* The area of the lesser trochanter is firmly lodged against the acetabulum, which is filled with osseous masses.

*Epicrisis:* A girl, 2 months old, has an attack of infantile coxitis, treated operatively, and followed subsequently by destruction luxation. Reposition is attempted, but fails, producing a fracture of the femur. Later there is a marked functional impairment of the hip, owing to stiffness and contracture. The gait is limping badly, now and then with pain.

*Case 7.*

Carl Otto L., born June 10, 1923 (Orthoped. Hosp. Reg. No. 2495/29).

At the *age of 7 months,* after an attack of otitis media, the patient had an acute coxitis on the left side, with violent abscess formation, which was evacuated by incision. The attending physician declared the boy to be moribund at that time. But he improved rather rapidly, and the wound healed—but he was limping ever since.

*1929:* The left hip is kept in a flexed and adducted position. Flexion: 80°. Extension: 115°. Adduction and abduction impossible. The foot is kept in an extreme pes equinus position. Shortening (practical): 7 cm.

*X-ray exam.:* Caput absent. The stump of the collum is located above the acetabulum, possibly in a process of nearthosis.

The patient is given a boot with elevation, which is adjusted as required during the following years.

*1932:* Complaint of pain in the hip in the last months, especially when he starts walking after sitting down.

*Physical exam.:* General condition good. Shortening of the leg: 9 cm. Position of the hip: Adduction 30°; flexion 45°; other measures normal.

*X-ray exam.:* Adduction-flexion of the femur. The irregular stump of the collum articulates against a poorly pronounced nearthrosis on the outside of the os ilium. The acetabulum is almost completely effaced. Considerable atrophy.

*1934:* Condition unchanged.

*Epicrisis:* A boy, 7 months old, has an attack of infantile coxitis, taking and acute and violent course, and being followed by destruction luxation with marked contractures, presumably on account of strong cicatricial shrinkage of the destroyed soft parts. The shortening is great, and the gait is poor—now, at the age of 11 years. Corrective subtrochanteric osteomy will be indicated later on.

*Case 8.*

Bill L., born June 7, 1923 (Orthoped. Hosp. Reg. No. 377/27).

At the *age of 8 months,* after an attack of enteritis and pyelitis, the left hip began to swell, and the patient was admitted to the Rigshospital where X-ray examination showed a luxation of the hip, with slipping epiphysis and ostitis of the collum (see Fig. 2). A few days later the child was transferred to a surgical department, where an incision was made, with evacuation of a large amount of pus (pneumococci).

*Orthoped. Hosp., March 1927:* Considerable limping; shortening of 3 cm. Tendency to adduction. Mobility in the left hip: Flexion 90°; abduction 5°; adduction 10°. *X-ray exam.:* Luxation of the left hip. The neck is anteverted, short, plump, with a small deformed head on its top; acetabulum fairly well preserved; atrophy of the femur.

In the following years the patient was treated with boots, with elevation as required.

*1935:* The boy is feeling well and enjoying good health, even though he limps considerably, and complains of some pain in the hip after exertion. Pirquet negative. Upward displacement of the trochanter by 4 cm.; it cannot be shifted, neither up nor down. Flexion 90°. Abduction 10°. There is a flexion contracture amounting to 10°. Outward rotation 30°. Inward rotation minimal. X-ray exam.: Absence of the head and neck of the femur. The area where the neck was located before is now perfectly smooth. The acetabulum is filled in. There is upward luxation, without definite apposition to the pelvis.

*Epicrisis:* A boy, 8 months old, has an attack of infantile coxitis, for which an operation is performed. Now, at the age of 12 years, he presents a luxation of the hip with complete loss of the head and neck of the femur. There is moderate mobility in the joint, and moderate limping.

*Case 9.*

Frede Egon N., born May 10, 1923 (Orthoped. Hosp. Reg. No. 1831/25).

At the *age of 9 months,* after an attack of bronchitis, the

patient had an acute onset of coxitis of the right hip, with osteomyelitis of the femur and pyarthrosis of the knee. In the hospital incisions were made, and the swelling subsided; the wounds healed in two months. The mobility of the hip soon returned to normal, but there persisted a shortening of the leg amounting 1½ cm., with moderate degree of outward rotation.

*X-ray exam.:* Destruction of the caput and collum, with subluxation of the joint.

*1924:* Moderate repair of the collum, with formation of a small capitular nucleus; subluxation still persisting.

*Orthoped. Hosp., 1925:* Shortening amounting to 1½ cm.; mobility of the hip free.

Since then, the functional result is getting worse as the years pass by, and the patient is not seen again until

*1934:* Flexion contraction in the hip; pes equinus; practical shortening amounting to 5 cm.

*1935:* The patient is feeling well. He uses ordinary footwear; he is limping badly, however, but this is not seen to inconvenience him; he even skates on the ice, and so on. *Physical exam.:* The boy is thin, but he looks healthy; he limps badly. There is an upward displacement of the trochanter amounting to 4 cm., with a practical shortening of 7 cm. Flexion contracture of 15° in the right hip, with slight adduction and outward rotation. Flexion: 90°. Abduction: 10°. Outward rotation: 60°. Inward rotation: 20°. Flexion contracture of the knee: 5°. Slight degree of pes equinus. Circumference of the thigh: — 4½ cm.; circumference of the calf: — 2 cm. Trendelenburg positive. Pirquet negative. *X-ray exam.:* Caput absent; the neck forms a little parrot-beak-like projection, flattened medially, which appears to be resting against the slightly sclerotic margin of the acetabulum. Acetabulum almost completely filled in. Shortening amounting to 4 cm., measured after the Shenton line. Considerable hypotrophy (see Fig. 4).

*Epicrisis:* A boy, 8 months old, has an attack of infantile coxitis, resulting in destruction luxation and considerable shortening of the leg. Now, at the age of 12 years, there is a tendency to contractures, with a bad limp, but at present no particular subjective discomfort.

*Case 10.*

Alf Reinhardt D., born April 28, 1922 (Orthoped. Hosp. Reg. No. 511/31).

At the *age of 1 year* the patient had coxitis, on the right side, as a part in a general septicemic condition (pyelonephritis, bilateral pneumonia, hepatitis). No incision was made; and there was no perforation. X-ray exam.: Blurred and indistinct outlines, with an abnormally wide joint slit. No involvement of the left hip was noticed.

*1931:* The patient has been limping ever since the affection mentioned above. The gait is waddling, with marked lumbar lordosis. The abduction is slightly impaired on both sides; otherwise the mobility is free.

*X-ray exam.: Right hip:* Complete destruction of the head and the neck of the femur. The acetabulum is flattened, almost completely filled with osseous masses; and there is a conspicuous marginal hyperostosis, against which the stump of the collum appears to find support. Atrophy of the femur and the pelvis. *Left hip:* The acetabulum is flattened, irregular in outline; the head of the femur is subluxated. Coxa vara.

*1935:* The patient is limping, but there is no complaint of tiredness or pain. *Right hip:* The great trochanter is at a level with the ant. sup. iliac spine, moving backwards under flexion, and being palpable just beneath the skin. Flexion: 130°. Abduction: 20°. Inward rotation: 30°. Outward rotation: 45°, under crepitation. Shortening: 4 cm. *Left hip:* Abduction: 30°; flexion 120°. Gait waddling with marked swaying.

*X-ray exam.: Right hip:* Now there is better support against the well developed shelf of the socket. *Left hip:* Same features as before. Still, there are now some well developed osteophytes along the posterior margin of the acetabulum.

*Epicrisis:* At the age of 1 year, subsequent to an attack of pneumonia, this boy contracts infantile coxitis on the right side as a part in a general septicemic condition. At that time no definite signs of any affection of the left hip are noticed. Subsequently there remains a destruction luxation on the right side, with a fairly good support against the pelvis, while the left hip now shows subluxation with coxa vara formation.

Whether the latter affection is congenital or due to a synchronous affection of the left hip at the time when the right hip was damaged, is a question that cannot be settled now.

The gait is the same as observed in patients with bilateral congenital luxation of the hip.

*Case 11.*

Poul Bent C., born May 6, 1921 (Orthoped. Hosp. Reg. No. 1478/26).

At the *age of 1 year* the patient was taken ill with high fever and pain in the right hip. He was confined to bed for several months; later, he was found to be limping.

*1926:* Gait limping; practical shortening of 3 cm.; movements in the hip free. *X-ray exam.:* Absence of the head and neck; upward-outward luxation, the trochanteric part appearing to rest against the edge of the acetabulum.

*1935:* No complaint except for a slight tiredness of the right leg after exertion. Shortening: 4 cm. Abduction: 0. Flexion: 90°. Rotation: 0. Gait good, but somewhat limping, with high-heeled boot.

*Ex-ray exam.:* Acetabulum partly effaced, being filled in upwards. The edge of the acetabulum presents a vigorous exostosis against which the stump of the neck is resting; above this, there is also a nearthrosis. The pelvis is moderately oblique and atrophic.

*Epicrisis:* At the age of 1 year the patient had an attack of infantile coxitis, with subsequent destruction luxation. Now, at the age of 14 years, the function of the hip is good, apart from the shortening, and this is attributed to the firm support of the femur against the pelvis.

*Case 12.*

Tove Alexandra O., born Jan. 10, 1920 (Orthoped. Hosp. Reg. No. 838/23).

At the *age of 7 months* this girl was operated for an inflammatory process in the right hip. She was confined to bed for 9 months, and she was limping afterwards.

*1923:* Gait limping, with positive Trendelenburg on the right

side. Shortening: 3 cm. Flexion: 90°. Extension normal. Adduction and abduction: 10°. *X-ray exam.:* Practically complete absence of the head and neck, but the trochanteric part finds good support against the upper margin of the acetabulum, which is sclerotic and projecting.

*1924:* Gait good, without pain. The patient has not been seen since.

*Epicrisis:* At the age of 1 year, this girl has an attack of infantile coxitis, with subsequent destruction luxation. At the age of 4 years the function of the hip is good, in spite of some limping, as the trochanter finds good support against the pelvis.

*Case 13.*

Henrik C., born Sept. 9, 1912 (Orthoped. Hosp. Reg. No. 2046/23).

The data in the past history are not very instructive, but there can hardly be any doubt that the patient was suffering from infantile coxitis at the age of 6 months, when it says that he was submitted to an operation on the upper part of the left thigh, on account of a swelling that had appeared after an attack of cold and enteritis. He has been limping since. At the age of 5 years an attempt at reposition is said to have been made.

*1920:* Left leg shortened by 3 cm. Two scars on the upper anterior surface of the thigh. Flexion normal; other movements reduced. Trendelenburg positive. Limping gait. *X-ray exam.:* Complete destruction of the head, with upwards shift of the stump of the neck. The patient is given a high boot.

*1925:* The patient walks well on level road, but tires readily, and has pain in the hip now and then. Mobility unchanged. Trendelenburg now negative.

*1935:* The patient has had no treatment in the last 10 years. He is a painter by trade, and able to work.

*Epicrisis:* At the age of 6 months the patient has an attack of infantile coxitis, resulting in destruction luxation, for which reposition was attempted at the age of 5 years—unsuccessfully.

Now, at the age of 23 years, the clinical result is good, in

so far as he is fully able to work, although he limps and has slight pain in hip occasionally.

*Case 14.*

Elvina Marie J., born Feb. 8, 1913 (Orthoped. Hosp. Reg. No. 960/23).

At the *age of 5 months* the patient was admitted to a hospital for coxitis with abscess formation; she was in a poor shape, and poorly nourished. The diagnosis appears to have been tuberculosis. Still, after incision with evacuation of a large amount of pus, the child improved rapidly and the wounds healed. Two months later, she was fat and thriving, able to move the leg freely in all directions, but there was a shortening of 2—3 cm.

She has been limping since.

*1923:* Limping badly. Shortening: 5 cm. Flexion and extension normal. Adduction: 10°. Abduction: 0. Practical shortening: 9 cm. *X-ray exam.:* Luxation with very marked upward displacement; almost complete destruction of the head. (Communication by her private physician).

*1935:* Pregnancy and uneventful normal delivery about 1 year ago. Since then, the patient sometimes gets rather tired from walking, but she has never any pain in the hip. *Physical exam.:* Waddling gait, as she sinks down markedly in the right side. She is using ordinary footwear. The right leg is shortened by 11 cm. There is a considerable flexion contracture with lordosis of the loin. Flexion: Only a few degrees. Abduction: 20°. Rotation very slight. *X-ray exam.:* Femur markedly atrophic, in adduction-flexion position. The small deformed head of the femur is located in a nearthrosis back of the os ilium. Acetabulum effaced.

*Epicrisis:* This is the case of a married woman, now 23 years old, who at the age of 5 months had an attack of coxitis on the right side that was regarded of tuberculous nature; still, the clinical features and subsequent course of this lesion are strongly suggestive of unspecific infantile coxitis. The sequelæ have been a luxation without pronounced destructive changes and a poor gait, owing to the great shortening of the leg, atrophy

and contracture; but the patient would undoubtedly be able to walk much better if she would use a boot with high heel.

*Case 15.*

Ellen I., born Sept. 6, 1910 (Orthoped. Hosp. Reg. No. 361/34).

At the *age of 6 months* the patient had an attack of pneumonia that was followed by a swelling of the anterior surface of the left hip. After some diagnostic difficulties (incarcerated hernia !), an incision was made, with evacuation of large amounts of pus. She has been limping since.

*1918:* Upwards displacement: 5 cm. Slight outward rotation. Free mobility.

*1934:* The patient complains that she cannot stand walking any more on account of pain in the hip. *Physical exam.*: Shortening of 4½ cm. Slight adduction in the hip. Flexion: 120°. Abduction: 5°, coarse friction. The head is felt posteriorly. Limping considerable. *X-ray exam.:* A small irregular and atrophic head is located in a nearthrosis above and behind the acetabulum, which is flattened and filled in. *Treatment:* Osteotomy ad modum Drehmann.

*10 months later:* The patient is now able to walk fairly well, without a cane, in ordinary footwear. Flexion: 60°. Extension normal. Abduction: $^2/_3$. Adduction: ½. Rotation: ½, in both directions. Practical shortening: 6 cm. *X-ray exam.:* 25° abduction at the site of osteotomy; healing good. (Fig. 7).

The patient is given a boot with an elevation of 6 cm.

*Epicrisis:* This is the case of a women, 25 years old, who at an age of 6 months had an attack of infantile coxitis resulting in luxation, with considerable limping. In recent years pain and tiredness made her partly disabled. Osteotomy ad modum Drehmann gives a considerably better support, and reduces the functional shortening, so that the gait improves considerably, and the subjective discomfort is abolished in part.

*Case 16.*

Anna V., born July 12, 1910 (Orthoped. Hosp. Reg. No. 1852/25).

At the *age of 7 months* the patient had an attack of pneumonia, which was soon followed by a violent swelling of the left hip region. This swelling subsided in 6 weeks, without perforation. The child was able to walk when she was 2 years old, and she has always been limping.

*1925:* Marked limping. Shortening of the left leg: 5 cm. Mobility in the left hip: Flexion-extension good; abduction only a few degrees; rotation minimal. *Treatment:* Boot with elevation.

*1935:* The patient is now working as a maid on a farm, but she is not quite able to keep up in her work with other girls of her age. She has pain in her left hip if she walks a considerable distance. (Personal information). *Physical exam.:* She is healthy and able to work. The leg is shortened by 4—5 cm. The circumference of the left thigh is reduced by 4 cm., the calf by 2 cm. Mobility of the hip: Abduction poor; other motions slightly reduced. *X-ray exam.:* Upward luxation of the left hip. The atrophic, flat and deformed head is located in a nearthrosis above the flattened and filled acetabulum. Considerable hypotrophy and halisteresis of the left half of the pelvis, with asymmetry.

*Epicrisis:* This is the case of a woman, 25 years old, who in her first year of life had an attack of infantile coxitis that subsided spontaneously, but resulted subsequently in luxation of the hip with nearthrosis formation above. The gait is limping, and there is moderate pain. Her capacity for work is somewhat impaired.

*Case 17.*

Petrea Marie C., born Sept. 20, 1909 (Orthoped. Hosp. Reg. No. 58/22).

At the *age of 9 months,* the patient had rickets and an attack of bronchopneumonia followed by swelling of the left hip and elbow. The swelling persisted longer in the hip; yet, it subsided in 2 months (statement of the family physician).

*1922:* The patient applies to the Orthopedic Hospital, giving a history of limping all her life, in recent years associated with

pain in the left hip. *Physical exam.:* Marked limping. Practical shortening: 4 cm. Ankylosis of the left hip, in slight adduction. *X-ray exam.:* Complete absence of the head and neck. The lesser trochanter appears to rest against the upper margin of the acetabulum. Acetabulum filled in. X-ray plate not suitable for reproduction.

*1928:* The patient applies for disablement benefit. In the invalidity court papers it says: In August 1927, complaints of tiredness, emaciation, loss of appetite, coughing, and expectoration. *Physical exam.:* No evidence of an active lung lesion. Sedimentation test: 12 mm. *X-ray exam.:* Apex of the left lung presenting several spots of calcified shadows.

*1929: Surgical exam.:* Shortening amounting to 9 cm.; slight abduction; extension free; flexion 25°. No swelling, fistulas, or scars. The patient walks rapidly, and is sure on her feet, but she limps badly. *Diagnosis:* Sequelæ of destructive coxitis in infancy.

*1933:* The patient has been well till 1932, when a swelling appeared on the lateral surface of the left hip, followed by perforation. *Biopsy:* Tuberculosis. *X-ray exam.:* There is now extensive rarification of the bone in the trochanters. Processes of ossification are seen in the surroundings of the joint.

*Epicrisis:* The patient is a woman, 24 years old, who in her first year of life had an attack of infantile coxitis. At the age of 13 years she presented the subsequent changes typical of this lesion; and 7 years later, a special surgical examiner interpreted these changes in the same way. In adolescence she presented several phenomena of tuberculous processes. Subsequently tuberculous destructive processes were demonstrated in the hip.

To me it seems most reasonable to assume that here we are dealing with a tuberculous superinfection in a joint with previous impairment of its resistance—something that is not altogether uncommon.

*Case 18.*

Ellen Ida J., born March 4, 1909 (Orthoped. Hosp. Reg. No. 77/20).

At the *age of 1 year,* the patient had suddenly a very painful attack of swelling of the left hip, and she was operated (in a hospital in Germany). She recovered rapidly, and was well since.

*Orthoped. Hosp., 1920:* Shortening of the left leg amounting to 4 cm., with some atrophy of the thigh. Flexion-extension free. Abduction limited. *X-ray exam.:* Absence of the head and neck of the femur. The shaft of the femur is straight as a rod, appearing to find support against a vigorous osteophyte that has developed just above the effaced acetabulum. *Treatment:* Boot with raised heel, and supporting hip bandage.

*1936:* The patient is feeling well, able to walk long distances easily, and never feeling any pain. She had a child 4 years ago (normal delivery). *Physical exam.:* Shortening amounting to 7 cm. The leg is kept in 10° flexion and 10° adduction. Abduction: 0. Flexion free. Some crepitation made out in motions. The patient does not use any raised heel, but walks on her toes. *X-ray exam.:* Same as before. Absence of the head and neck. Only more upward displacement, as the trochanter now rests against the ant. sup. iliae spine.

*Epicrisis:* The patient, a woman, is now 27 years old. As a result of infantile coxitis she presents a destruction luxation with considerable shortening and reduction in mobility. Gait limping but firm, and free from pain.

*Case 19.*

Margrethe K.-J., born May 5, 1905 (Invalidity Insurance Court, Reg. No. 74424).

At the *age of 2 years,* the patient was hospitalized on account of a hip lesion, and she was under treatment for two years. After this she limped, with a considerable shortening of the leg, but she was able to get along well in childhood by means of a boot with raised heel. She married at the age of 18 years. She has been pregnant three times before, and the delivery was

difficult each time. Now she is pregnant again. In the last years, movements in the left hip have been associated with increasing pain, extending down in the leg. As to work, she is capable only of light indoor work.

*Physical exam.:* The patient is small and delicate of frame. The left leg is shortened by 6 cm., atrophic, slightly flexed, adduced, and rotated inwards. Flexion: 80°. Adduction: 30°. Abduction: 20°. Inward rotation: 30°. Outward rotation: 0°. Pes equinus. Scoliosis. Trendelenburg positive. Marked limping.

*X-ray exam.:* Considerable obliquity of the pelvis, with asymmetry of the upper inlet of the pelvis. The entire left half of the pelvis is markedly atrophic. The acetabulum is almost completely effaced, flat, and filled in. The head and neck are absent. The trochanter is resting against the os ilium. The femur is adducted 30°, markedly atrophic.

The patient uses no elevation of the left foot.

*Epicrisis:* The patient, a woman, 28 years old, presents a luxation of the left hip which appears roentgenographically to be a result from an attack of infantile coxitis, from which she may be assumed to have suffered at the age of 2 years. The symptoms of her affection have been aggravated considerably after childbirths, in the form of pain and partial invalidity.

*Case 20.*

Esbern Aksel K., born May 4, 1902 (Orthoped. Hosp. Reg. No. 2241/25).

When this patient was *10 months old* his mother noticed that he was incapable of movement in the hip-joint. In the local hospital his condition was diagnosed as erysipelas of the thigh. No information can be obtained about the course of his illness, except that he was 4 years old when he learned to walk. He has always been limping, and in the last 10 years there has been increasing pain in the left hip on walking.

*Orthoped. Hosp., 1925:* Attack of pleurisy 6 months ago, on which account he was confined to bed for 4 months. When he got up again, the pain and stiffness in the left hip were aggravated considerably.

*Physical exam.:* Left leg shortened by 4 cm. Flexion: 90°. Extension complete. Abduction of only a few degrees. Circumference of the thigh: — 4 cm. Gait fairly good.

*X-ray exam.* (plate destroyed later on): Marked deformity of the left hip-joint. The head of the femur is absent; the neck is rather short. The acetabulum is almost effaced, but a nearthrosis are formed above, corresponding to the stump of the neck.

*Epicrisis:* The patient is a man, 23 years old, who in infancy had an acute affection of the hip (diagnosed, presumably incorrectly, as erysipelas), resulting in destruction of the head of the femur and upward luxation with nearthrosis formation. The function appears to be fairly good, as the neck finds good support against the pelvis, but the patient is disabled by pain.

*Case 21.*

Petra J., born June 29, 1898 (Orthoped. Hosp. Reg. No. 715/23).

*In infancy* the patient had an inflammatory process in the left hip, and it is said to have been discharging pus. From the age of 7 years she has been treated with bandaging for 7—8 years; later, she has been using elevation of the left heel.

*Orthoped. Hosp., 1923:* Gait limping, with positive Trendelenburg on walking and standing erect. Considerable atrophy of the thigh and calf. Shortening: 6 cm. Flexion about half of normal. Adduction and abduction almost abolished. Left foot in equinovarus position. Outward rotation of the leg.

*X-ray exam.* (plate now indistinct): Head and neck of the femur absent. The part of the lesser trochanter appears to find support against the margin of the effaced acetabulum.

*Treatment:* During the following years the patient was treated with boots with elevation; from 1926, when she began to have pain in the hip, she further used a supporting hip bandage. Under this management she was feeling fairly well, until 1934, being able to earn her living as a charwoman.

*1936:* In the last year she has had several febrile periods, in which she was hospitalized, but no other cause could be found

for these attacks than a possible hip lesion. Lately, she has been getting about only with two crutches.

*Physical exam.:* Shortening amounting to 6 cm. Left leg slightly inward-rotated, with 15° flexion contracture in the hip. Flexion of the hip: 110°. Abduction: 10°. Adduction: 10°, but without pain. No tenderness in the hip on impact against the sole of the foot. Only slight tenderness on pressure over the trochanter, which is palpable just back of the spine; also tenderness of the area between the trochanter and the iliac crest.

*X-ray exam.:* Absence of the head and neck (as before), but the femur appears to find support against the area over the acetabulum, where the structure is quite irregular, being densified in some spots, rarified in others. A clearing is seen in the middle of the os ilium (ostitic focus ?).

*Epicrisis:* The patient, a woman, 38 years old, had in infancy a suppurative hip affection, presumably infantile coxitis, which resulted in destruction luxation, with considerable limping and functional impairment of the hip, subsequently pain in the hip and increasing disableness.

In the last year there has been a marked aggravation of her condition, with signs of an ostitic process in the os ilium. Still, judging from the location of this process it can hardly be connected with her original lesion.

*Case 22.*

Ingeborg Clara P., born Oct. 19, 1886 (Orthoped. Hosp. Reg. No. 88/26).

At the *age of 4 months* the patient had a boil back of the right hip, for which she was operated in a hospital. She began to walk when she was 2 years old, but she has always been limping. Since 1926 she has been applying to the Orthopedic Hospital, where she has been provided with orthopedic footwear. In addition, she has been admitted several times to other hospitals for various affections which are of no interest in this connection.

*1936:* There is never any pain in the hip, but she limps badly.

*Physical exam.:* The right femur is resting midways between adduction and abduction, without contracture in the hip. Shortening: 7 cm. Flexion: 45°. Abduction: 15°. Inward rotation: 15°. Outward rotation: 20°. The patient is very obese. She now uses a boot with an elevation of 9 cm.

*X-ray exam.:* Luxation of the hip. Absence of the head and neck. Acetabulum almost completely effaced, filled in. The femur appears to find good support in a nearthrosis on the os ilium. 20° adduction. Considerable atrophy.

*Epicrisis:* The patient is a woman, 49 years old with destruction luxation of the hip, considerable shortening of the leg and a bad limp—resulting from an attack of infantile coxitis at the age of 4 months. But there is no pain, and she walks fairly well, being sure on her feet, probably because the femur is resting well against the pelvis.

*Case 23.*

Finn Raymond H., born Feb. 29, 1929 (Orthoped. Hosp. Reg. No. 1463/32).

At the age of 11 months, this boy fell down from a table. Fever set in at once, and two days later it was noticed that he was not able to move the left leg. The upper part of the thigh began to swell and be tender to pressure, and now the child was whining for the next 3 weeks. It took about half a year before he began to support himself on the left leg. *X-ray exam.,* 3 weeks after the onset of illness: Slight outward subluxation; the capitular nucleus is smaller and the epiphysis wider than normally. Irregular clearing in the neck of the femur. 1 year later: The head of the femur appears to be more displaced outwards and upwards. Irregular clearings in the head and neck. Acetabulum apparently normal.

*Orthoped. Hosp., 1932:* The boy is able to walk only with support. 45° flexion contracture in the left hip. Adduction: 15°. Additional flexion-adduction: 10°. Rotation: 0.

*X-ray exam.:* Absence of the head. The stump of the neck is located in the acetabulum, the roof of which is the site of a destructive process which appears now to be healing, with shelf

production. Considerable atrophy of the left femur and pelvis.

*1934:* Additional flexion contracture (90°). The parents are unwilling to cooperate in the treatment.

*1935:* The boy is little and delicate for his age, limping badly. The hip is alkylosed in 100° flexion and slight adduction. Deficit in circumference of the thigh and calf: 3 cm. Slight defect in extension of the knee. Shortening of the leg: 7 cm. Mantoux: + (weak).

*X-ray exam.:* Findings about the same as last. Marked sclerosis of the roof of the acetabulum, with large shelf. The stump of the neck is firmly wedged into the bottom of the acetabulum.

*Epicrisis:* The patient is a boy, 6 years old, who had in his first year of life a traumatic injury to the hip, followed by acute coxitis, which according to its course and the X-ray plates taken at that time appears to have been infantile coxitis. Since then, the child has been treated poorly because the parents have refused to cooperate with the hospital, and the functional result is bad. Tenotomy or osteotomy will be indicated later on.

A diagnosis of tuberculosis has to be considered. But, to me, the X-ray plates do not appear to suggest this diagnosis; and a weakly positive Mantoux reaction 5 years after the onset of illness does not seem to prove anything.

*Case 24.*

Karen Kirstine J., born July 25, 1928 (Orthoped. Hosp. Reg. No. 1470/34.

At the *age of 9 months,* the patient had an acute swelling in the right groin, extending down on the thigh. A large amount of pus was evacuated by puncture and incision, and cultures from this pus showed growth of Pfeiffer's bacillus. X-ray exam., 2 weeks before the operation: The capitular nucleus has disappeared, the upper part of the femur is thickened, with clearings in the spongiosa. Outward subluxation of the femur. Increase in density of the soft parts.

*Orthoped. Hosp., April 1934:* The patient was able to walk at the age of 1 year, but the gait is waddling. 20° flexion contracture. Mobility: Flexion 20°; abduction one-fourth; adduction

one-third; rotation insignificant. *Treatment:* Boot with elevation of 2 cm.

*Oct. 1934:* Now 50° flexion contracture. Flexion: 15°. Abduction: 0. Knee and ankle: Free mobility. The patient limps badly, but she moves about easily and freely. *X-ray exam.:* A part of the head and neck destroyed. The stump is lodged in the acetabulum, which is partly filled in with osseous masses, and with its upper margin extended as in Lance's operation. There is an upward displacement of 2 cm. from Shenton's line. No halisteresis, but slight hypotrophy.

*Epicrisis:* A girl, 9 months old, has an attack of infantile coxitis on the right side; an incision is made, with evacuation of a large amount of pus; the result is only partial destruction of the head and neck, without luxation. The patient, who is now 6 years old, has a rapidly increasing flexion contracture, with a bad limp; and pain in the hip has already began to appear.

*Case 25.*

Henry J., born Jan. 11, 1922 (Orthoped. Hosp. Reg. No. 3503/34).

At the *age of 11 months* the patient had scarlet fever, followed by an abscess in the right trochanterie region, which was incised, with evacuation of a large amount of pus. The incision was repeated a few days later. The wounds healed rapidly. One year later the patient was readmitted to the same hospital, for ankylosis of the right hip with flexion contracture, that was straightened out by means of extension. *X-ray exam.:* The head of the femur has disappeared and the stump of the collum is located in the somewhat widened and flattened acetabulum. The contours are blurred; the structures of the upper part of the femur are irregular.

*Orthoped. Hosp., 1934:* The patient is limping badly. The right femur is kept in 70° flexion contracture, with slight inward rotation, and 25° adduction. Practical shortening: 8 cm.

*X-ray exam.:* The femur is kept in 25° adduction. The collum-corpus angle is 75°. The collum is almost completely destroyed,

and there is now a quite irregular, flat joint slit with marginal osteophytes and irregular osseous structures.

*Osteotomy* is performed; and the femur is brought into a position of 20° abduction and 15° flexion. The little fellow, who previously was crouching badly, straightened considerably through this operation. At his discharge from the hospital, 3½ months later, the position of the femur is good. There is functional ankylosis. He walks very well. »I can now walk any distance—and easily«, he says. He is given a boot with elevation of 3 cm.

*Epicrisis:* A boy, 11 months old, has an attack of infantile coxitis, resulting in destruction of the head and neck, but not luxation, and ankylosis, besides marked contractures. The gait is miserable. Although he is rather young for operative treatment, a correcting osteotomy is performed, with good functional result.

*Case 26.*

Helga M., born Nov. 24, 1913 (Orthoped. Hosp. Reg. No. 1785/35).

The patient is said to have had an affection or her right hip ever since *early childhood.* She has always been limping; lately, she has been troubled with pain in the hip, having had some rather hard jobs.

*Orthoped. Hosp., 1935:* This is the first time the patient seeks medical advice for her affection. *Physical exam.:* Shortening: 5 cm. Almost ankylosis in 15° flexion, 5° adduction, and midway rotation. *X-ray exam.:* Destruction of the head of the right femur (infantile coxitis ?).

*Correction* of the right hip is performed, with bandaging in 0° flexion and 20° abduction. 4 months later the hip appears to be ankylosed in this position. The patient is discharged with walking plaster casts. Extraarticular arthrodesis may possibly be indicated later on.

*Epicrisis:* The patient, a woman, 22 years old, has contracted a hip lesion in infancy, but never received any treatment until now, when examination reveals sequelæ of infantile coxitis. The

leg is shortened and adduced. Correction is made to the optimal position for the function of the hip.

*Case 27.*

Otto Peder H., born Nov. 13, 1921 (Orthoped. Hosp. Reg. No. 724/22).

At the *age of 6 weeks* the patient had a swelling on the anterior surface of the left hip, associated with fever; later, a swelling of the left shoulder too. Incisions were made, and pus was evacuated. The wounds healed in about 1 month. Shortly after this, the patient is referred to the *Orthopedic Hospital,* where luxation of the left hip is ascertained. The head of the femur could not be made out.

*1925: Reposition* performed successfully.

*1926:* General condition poor; rectangular flexion contracture. Tenotomy of the spinalis muscles is performed. After this, 10° contracture.

The patient returns the following years for reexamination.

*1934:* The patient walks surprisingly well, swaying a little to the left (slight insufficiency of the gluteus medius). The left leg is outward rotated 25°. There is 60° flexion contracture in the hip. Abduction: 35°. Flexion: 90°. Deficit in circumference of the thigh: 2 cm.

*X-ray exam.:* The flat and deformed head of the femur is slightly subluxated upwards in the flat acetabulum, the upper margin of which presents a vigorous osteophyte that appears to form an effective barrier against further upward displacement of the head (Fig. 3).

*Epicrisis:* An attack of infantile coxitis in the 2nd month of life results in a luxation that is reposed 3 years later. There has been a tendency to flexion contracture, which could not be prevented by tenotomy. But the gait is good, chiefly on account of the good stability in the hip.

*Case 28.*

Børge N., born June 22, 1918 (Orthoped. Hosp. Reg. No. 1401/20).

At the age of 14 months the patient had an attack of bronchitis, followed suddenly by a swelling of the left hip, with fever up to 40°. He was then crying, and immobilizing the leg. At that time he was admitted to a hospital, where X-ray examination showed a tumor-like shadow (with macular clearings) around the upper end of the femur, an increase in the distance between the upper end of the diaphysis and the capitular nucleus, and periosteal deposits extending down to the middle of the femur. Wassermann negative. The swelling subsided a little, and the parents requested that the child should be discharged. The swelling yielded during the following months to treatment with compresses.

*Orthoped. Hosp., 1920:* The child is still unable to walk. The abduction in the left hip is reduced a little; otherwise the movements are free. *X-ray exam.:* The capitular nucleus appears irregularly spotted and eroded. Irregular clearings in the neck of the femur. Subluxation in the joint. A conspicuous round shadow of soft parts in this region. The roof of the acetabulum is very steep.

Similar changes observed 1 year later.

During the next 2 years the patient was treated under the diagnosis Calvé-Perthes' disease, with thyroid preparations. During the same period he had an unnoticed attack of poliomyelitis, that was followed by paralyses, chiefly of the anterior tibialis and of the extensors of the foot—for which affection muscle transplantation was performed later on.

During the following years he was treated with balancing of the shortening, etc.

*1935:* He now limps rather badly, throwing the body over to the left in walking; otherwise no complaints. He is now an apprentice in a jeweller's shop (he was previously and apprentice in a gents' furnishing shop, but had to give up that work on account of his hip trouble).

*Physical exam.:* Shortening: 2 cm. The leg is kept adducted 15°. Abduction possible to medial position. Flexion: 90°. Rotation: 15° to both sides. Knee 180/60°. Foot in pes equinus position (120°).Deficit in circumference of the thigh: 6 cm.; calf:

4 cm. There is partial paralysis of the gluteus medius, tensor fasciæ latæ, internal popliteal, and extensors of the foot.

*X-ray exam.:* Femur somewhat outward rotated. Coxa valga. The head of the femur is flat, subluxated outward in the rather flat acetabulum, the bottom of which is filled with osseous tissue (see Fig. 10).

*Epicrisis:* An attack of infantile coxitis, which heals without suppuration, is followed later by a condition that is diagnosed as Calvé-Perthes' disease. The final result is subluxation.

*Case 29.*

Aage R., born July 28, 1915 (Orthoped. Hosp. Reg. No. 3514/34).

At the *age of 1 year* the patient had an attack of pneumonia, followed by a »boil« in the right hip, for which he was operated. He was able to walk at the age of 1½ years. He was 11 years old before he began to limp. At the age of 15 years he began to have pain in the hip and decreased capacity for flexion (he was unable, when riding his bicycle, to raise the leg sufficiently for treading the pedal). Roentgenography in 1926 is said to have shown signs of previous inflammatory processes in the joint, but at that time his lesions was regarded clinically as Calvé-Perthes' disease.

*Orthoped. Hosp., 1934:* Delicate scars on the anterior and posterior surfaces of the hip. Slight limp. Trendelenburg positive on the right side. Shortening: 2 cm. Flexion: 30°. Abduction and adduction about one-third. Inward rotation: 0. The leg is rotated outwards.

*X-ray exam.:* The head of the femur is flattened, mushroom-shaped, subluxated upwards and outwards. Acetabulum flat. Femur rotated outwards.

The patient is provided with a huckaback corset. Later, however, he states, in a letter, that the symptoms have been getting worse again, after a temporary improvement, and that now he is unable to work and troubled with pain, also when standing still or sitting.

*Epicrisis:* The patient, a man, 19 years old, had in infancy

a suppurative hip lesion that did not give rise to any limping until 10 years later. Subsequently pain appeared in the hip. The lesion was at that time considered as Calvé-Perthes' disease. Now there is a subluxation that disables him badly on account of pain.

## SUMMARY

Account is given of a material from the Orthopedic Hospital (Home for the Crippled), Copenhagen, comprising 29 cases of infantile coxitis with sequelæ. After a brief historical review, the etiology, clinical aspects and pathological anatomy of infantile coxitis are discussed.

It is emphasized that this disease in many cases fails to be diagnosed because the symptoms are relatively mild—calling merely for an incision of an abscess—or because the swelling and soreness of the joint in some cases subside spontaneously without any evacuation of pus.

In all the present cases there has been ostitis of the head and the neck of the femur together with pyarthrosis, and in most of the cases this lesion has brought about a destruction of the bony parts. The early distension luxation is pointed out as a phenomenon concurrent with the destruction; they both bring about the later sequelæ: luxation, destruction of the head and neck, contractures and shortening of the leg.

In the present material the sequelæ were: simple luxation with nearthrosis formation in 2 cases; luxation with more or less severe destruction of the head and neck in 20. A striking feature is the efforts made by nature herself by means of sclerotic new-formation of bone, vigorous osteophytes, etc. to give the defective femur some degree of support against the pelvis. In 4 cases there is destruction of the bone without luxation, but with marked flexion contracture; subluxation is seen in 3 cases, two of which were previously diagnosed as Calvé-Perthes' disease.

All these patients are limping, 3 very badly, the others in a lesser degree, some of them strikingly little. In the adult patients the pain is the most disabling factor.

In discussing the treatment, emphasis is laid upon the early incision and the early reposition, although this measure proves often unsuccessful. In discussing the special indications for subsequent operative measures, osteotomy ad modum Drehmann is recommended in particular.

## ZUSAMMENFASSUNG

Es wird aus dem Heim der Gesellschaft für Krüppel über ein Material von 29 Fällen von infantiler Coxitis und ihren Folgezuständen berichtet. Nach einer kurzen historischen Darlegung werden Ätiologie, Klinik und pathologische Anatomie der infantilen Coxitis besprochen. Es wird hervorgehoben, dass das Leiden in vielen Fällen nicht diagnostiziert wird, entweder weil die Fälle leichter sind — es wird ein Abszess incidiert — oder weil in einigen Fällen Schwellung und Empfindlichkeit sich spontan ohne Eiterentleerung verlieren. Es handelt sich in allen Fällen um eine Ostitis im Caput und Collum mit Pyarthros, und meist ist Destruktion der ossösen Teile die Folge. Die frühzeitigen Distensionsluxationen werden als ein der Destruktion nebengeordnetes Phänomen hervorgehoben; beide bedingen die späteren Folgezustände: Luxation, Destruktion des Caput und Collum ,Kontrakturen und Verkürzungen. Im Material verteilen sie sich wie folgt: 2 reine Luxationen mit Nearthrosebildung; 20 Luxationen mit grösseren oder kleineren Destruktionen von Caput und Collum. Auffällig ist die Beobachtung, wie die Natur selbst durch sklerotische Knochenneubildungen, kräftige Osteophyten u. ä. dem defekten Femur eine gewisse Stütze gegen das Becken zu geben sucht. In 4 Fällen liegt Destruktion ohne Luxation vor, aber mit starker Flexionskontraktur; in 3 Fällen Subluxation, und von diesen waren 2 früher als Calvé-Perthes'sche Krankheit diagnostiziert worden.

Alle Patienten hinken, davon 3 sehr stark, die anderen weniger, oft auffallend wenig. Bei den Erwachsenen sind Schmerzen das am meisten invalidisierende Moment.

Bei Besprechung der Behandlung wird die frühzeitige Inci-

sion und die frühzeitige Reposition erwähnt, die aber oft misslingt. Schliesslich werden die besonderen Indikationen für operative Eingriffe besprochen, von dessen die Osteotomie a. m. Drehmann hervorgehoben wird.


## RÉSUMÉ

Il est rendu compte d'un matériel d'observation comprenant 29 cas de coxite infantile et des suites de cette affection, tous les malades se trouvant à l'Institut Orthopédique. Après avoir donné un exposé historique sommaire, il est parlé de l'étiologie, de la clinique et de l'anatomie pathologique de la coxite. Il est relevé que, dans de nombreux cas, cette maladie n'est pas diagnostiquée, soit parce que les cas sont légers — on procède à l'incision d'un abcès —, soit parce que, parfois, l'enflure et les sensations douloureuses disparaissent spontanément, sans évacuation de pus. Il s'agit dans tous les cas d'ostite dans caput et collum avec pyarthron, ce qui entraîne le plus souvent la destruction des parties osseuses. On relève également, comme phénomène parallèle de la destruction, une luxation de distension. Celles-ci ont pour effet: la luxation, la destruction du caput et collum, des contractures et un raccourcissement. Les cas observés se répartissent comme suit: 2 luxations pures avec formation de néarthrose; 20 luxations avec des destructions plus ou moins grandes des caput et collum. Il est frappant de voir comment la nature, par de nouvelles formations osseuses sclérotiques, de puissantes ostéophytes, etc. essaie de donner au fémur défectueux un certain appui contre le bassin. Dans 4 cas, la destruction n'est pas suivie de luxation, mais d'une forte contraction de flexion; dans 3 cas, il y a subluxation, deux de ces derniers avaient été antérieurement diagnostiqués comme des cas de la maladie de Calve-Perthès.

Tous les malades boîtent, les trois très fort, les autres moins, même remarquablement peu. Chez les adultes, les douleurs sont le facteur le plus invalidisant.

Dans l'exposé du traitement, on souligne l'importance de l'incision faite à un moment récent de la maladie; toutefois, il

arrive souvent que celle-ci ne réussisse pas. Enfin, on mentionne dans quelles conditions particulières, l'intervention chirurgicale est indiquée et l'on relève entre autres l'ostéotomie a. m. Drehmann.

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