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EARLY DIAGNOSIS AND TREATMENT OF HIP JOINT DYSPLASIA

By

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Congenital dislocation of the hips has probably been known for thousands of years. Treatment has varied through history. Both the treatment and the results of the treatment have been made the subject of intense interest in medical literature.

In more recent decades it has become more and more obvious that the earlier the treatment begins, the greater is the chance of achieving a good result. It is generally accepted in the literature that the best results are obtained when treatment is started in the neonatal stage. These observations form the background to the study of which an account is given in these pages.

During the years 1950 to 1954 a relatively large number of patients were admitted to Fylkessjukehuset in Ålesund for treatment of congenital hip joint dysplasia (h.d.) at the age of 1–3 years. In the late fall of 1954, therefore, it was decided to begin routine examination of all newborn children in the hospital's maternity department and from the 1st of January, 1955, such an examination was consistently carried out.

SCHEME OF INVESTIGATION

a. Clinical examination:

Examination of the hips was made part of the routine examination of all babies in the maternity ward. Doctors on duty examined the hips of all children when they were 3–5 days old. When somewhat later a pediatrician was added to the hospital staff this series of examinations was so well organised that no reason could be found for changing the routine.

The clinical signs which were looked for were as follows:

1. Ortolani's sign (snapping sign).
2. Instability of the hips (telescoping sign).
3. Limited abduction of the hips.
4. Shortening of the femora.
5. Crepitation sound/feeling in the hip joints on passive abduction.

This last sign has scarcely any pathognomic significance as e.g. 1 and 2, but in certain cases this was the only pathological finding in hips which were undoubtedly dysplastic. We followed up all babies with this sign. In the great majority the hips developed in a completely normal way without any treatment. No exact explanation of the finding can be given. It may possibly be due to a certain looseness of the connective tissue in newborns who are still under the influence of the mother's hormones. In the few cases in which it indicated the presence of a dysplasia the sign was regarded as an abortive Ortolani's sign.

b. Radiological examination:

In the first year of this series X-rays were taken of the hip joints in all babies who were suspected of hip joint dysplasia following clinical examination. X-ray examination was made the day after the clinical examination, i.e., when the baby was 4–6 days old.

In the following two years X-ray examination was only carried out on newborns when convincingly positive symptoms were present on clinical examination. In all cases, however, X-ray examination was undertaken at the age of 3–4 months.

The findings at this time decided the need for future follow up.

We sought to evaluate by means of X-ray pictures taken of newborns the following radiological details:

1. The acetabular index.
2. Lateral position of the diaphysis in relation to the acetabulum.
3. Shenton's line.
4. The development of the anterior and the posterior acetabular rim.
5. The upper, lateral border of the acetabulum.
6. The upper end of the diaphysis in relation to the obturator line.

c. Other data on mother and child:

In connection with the first clinical examination certain data was collected on mother and child so as to determine further factors of etiologic importance.

The following were noted, the child's sex, weight at birth, length,

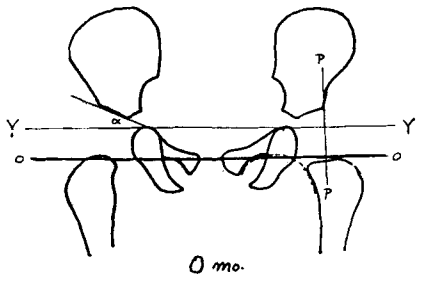


Fig. 1.
Normal pelvis with auxiliary lines.
YY = Y-line. OO = obturator line.
PP = line of gravity through the upper, lateral border of the acetabulum.
a = the acetabular index.

position in womb and order of precedence in the family. In addition the mother's age was recorded and information was sought as to any history of h.d. in the family.

TREATMENT

The principle determining treatment was that this should be initiated as far as possible immediately the diagnosis was made, i.e., in the first week of life.

This was observed with 41 of the 50 babies.

In 7 of the remaining cases treatment was begun along with the first check-up, i.e., at the age of 3–4 months. The cause of this was partly administrative mistakes partly the fact that the diagnosis could only be determined with certainty at this period.

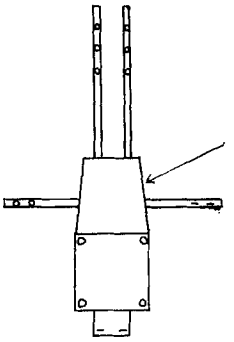
In the last two cases treatment was not started until the age of 7 and 10 months for the last-mentioned reason. One of these cases will be discussed later (case no. 134, Fig. 7).

In the newborns difficulties in reducing the dislocation was never encountered. Frejka's cushion splint was used for immobilisation. See Fig. 2.

For practical reasons the actual cushion in this splint was encased in waterproof material. Thus the individual patient's need for cushions was reduced to 2–3 cushions. The cushion has to be hard to prevent it from being squeezed from one side to the other.

On discharge from hospital each mother received instruction in the use of the splint and got one complete splint as a gift from the hospital so that one should be certain that the remaining splints had the correct dimensions. In our very first case, forming one of the cases in which the treatment is stated to have begun only at the age of 3–4 months an attempt was made to obtain the effect of the Frejka splint by an apparently more easy way.

On discharge the mother was requested to use several diapers at a



Shoulder straps with buttons.

Back support.

Stomach straps with buttons and buttonholes.

Cushion section, size 20 × 20 cm. Thickness about 5 cm.

Flap for fastening shoulderstraps.

Fig. 2.
Frejka's cushion splint, size 1: 10.
The buttons in the corners of the cushion section are connected with elastic around the child's thighs.

time thereby achieving the intended abduction position of the hips. This method of treatment proved to be completely useless and at the first follow-up it was replaced by the customary cushion splint delivered and demonstrated for the mother as described above.

Any attempts to replace the original Frejka splint in this way is inadvisable. Regarding the relationship of the patients to the cushion splint and perhaps especially the mother's attitude to this, the following questions were put as routine to the mother at each later check-up:

1. Do you think that the baby suffers any discomfort from the splint?
2. Does it seem to you yourself that it is troublesome to put on the splint?
3. Have you any objections to the splint?

The first question was consistently answered: No.

In reply to the second question a few found that it seemed difficult to put the splint on to begin with. Afterwards all went smoothly and the common answer was that it was not more difficult to put the splint on than to put on ordinary diapers.

In answer to the third question a few brought forward the objection that they did not care for the splint from purely aesthetic reasons. They were reluctant to show the baby to the family and friends because it was so difficult to dress up the child in the way that mothers appreciate. The great majority had, however, no objection to the cushion splint.

In a few individual cases where at the check-up 3 months later no satisfactory reduction had been obtained the cushion splint was replaced by a plaster cast. This enclosed the pelvis and both lower extremities to the knee. The plaster kept the lower extremities fixed at

about 90° flexion and 70° abduction of the hip joints. Corresponding procedures were employed in individual cases where treatment was initiated at the age of 3 months or later, when abduction was hindered to such an extent that the dislocation could not be reduced without recourse to anesthesia. In such cases also immobilisation in a plaster cast was adopted for 3–4 weeks. Afterwards the plaster was removed and replaced by cushion splint. This procedure proved very effective and was clearly much less troublesome to the patient and mother than a lengthy immobilisation in plaster.

Complete immobilisation in the cushion splint was pursued until a clinically stable hip joint was achieved. This was very often the case as early as the first check-up (age: about 3 months). In doubtful cases, especially when the clinical and radiological findings did not correspond, the immobilisation was maintained longer. In the last follow-up period it was recommended that the cushion should only be used in the normal sleeping hours of the baby so that she/he was free to move the lower extremities for some hours every day.

PATIENT MATERIAL

My series comprises all children born in the department during the years 1955–1956–1957. Table 1 records the total of these patients.

As the table shows, the examination comprises 3242 children.

At the clinical examination the findings were negative in 3099 children, but in the remaining 143, findings were made which were regarded primarily as pathological. The latter were all examined once or several times both clinically and radiologically. On the basis of the findings which were made at the first examination or later, 50 children were selected in whom the author believed that clear pathological changes were present in the hips, either in the form of hip joint dislocation or subluxation or a type of h.d. This gives a morbidity of about 1.5 %.

TABLE 1
Survey of children examined.

Year	No of births with children living	Twin births amongst these	Twins living	No of children examined
1955	1035	8	16	1043
1956	1115	14	28	1129
1957	1054	19	35	1070
Total number of children examined				3242

This figure may seen strikingly high and manifests a morbidity in this series which surpasses by far what is commonly thought to occur with h.d. in Norway. The author has observed this point and has repeatedly gone through the series with the aim of reducing the number of probable pathological hips. This attempt was not successful, however, and it was thought that the series should be reported so that it could speak for itself.

It was mentioned above that 143 babies were originally selected who were thought to show pathological changes in the hips on clinical examination, immediately after birth. Of these there were only 50, therefore, in which the primary diagnosis was thought to be correct. The other 93 babies offered at birth only sensations of crepitation in the hip joints on abduction. Radiological confirmation of the disease could not be obtained by pictures taken when the baby was 3–4 days old. At the beginning of the investigation treatment was started in a number of these patients. After more experience was gained this treatment was found unnecessary, so that the great majority were not treated.

In spite of this the diagnosis h.d., could never be confirmed at later clinical and X-ray examination and one must therefore assume that the crepitating sensation on abduction of the hips in newborns may occur without any pathological significance. In a few cases of these babies with crepitation as the sole clinical symptom it has been possible, however, to demonstrate undoubted h.d. at further check-ups (3 months old and later). Attention is therefore drawn to this symptom which in the author's opinion may represent an abortive Ortolani's symptom.

RESULTS OF EXAMINATION AT THE NEW-BORN STAGE

a. Clinical examination:

On examination just after birth the clinical symptoms of the 50 children were as follows:

Ortolani's sign bilaterally	8
Ortolani's sign right hip	16
Ortolani's sign left hip	8
Instability bilaterally	1
Instability right hip	7
Instability left hip	1
Doubtful instability in one or both hips	4
Crepitation in one or both hips on passive abduction	4
No clinical findings	1
	50

Ortolani's sign is only stated positive when one could dislocate and reduce the hip concerned with certainty.

Moreover, it is felt that the instability sign most probably represents a pathological hip. This is stated positive when one could with certainty press the femur so far in the dorsal direction that one would not consider it reasonable that this movement should proceed within a normal joint.

In the four patients where instability is recorded as doubtful, mobility was so small that it was possibly due to general relaxation of the joint in the postnatal period.

Greater doubt may arise concerning the group with crepitation in one or both hips. As stated above, the author believes that this symptom can be regarded as an abortive Ortolani's sign, even if it can be provoked in a number of babies in whom at later examinations h.d. can be excluded.

A good illustration is obtained of a case where such a crepitation on passive abduction movement of the hip joints was the only finding on examination in the newborn stage on studying X-rays of case 36, Fig. 13. Unfortunately the first X-ray examination was undertaken at the age of 3½ months.

The last case, in which nothing pathological was noticed on examination immediately after birth, was discovered when the baby was 7 months old, see case no. 134, Fig. 7.

b. Radiological examination:

The radiological findings in newborns were as follows:

Certain dislocation or subluxation	16
Probable dysplasia	10
Probable negative finding on X-ray examination	19
X-ray exam. not carried out in newborn stage	5
	50

There are scarcely any reasons for general remarks on the above, apart from the fact that the X-ray examination produces far fewer positive findings than the clinical examination. What is most interesting in this connection is whether there is any correspondence between the clinical and the radiological findings.

If one reviews the eight cases with clinical findings:

Ortolani + bilat., the radiological findings are as follows:

Bilateral dislocation or subluxation	5
Bilateral dysplasia	1
Unilateral dysplasia	1
Negative findings	1
	8

The 24 cases with clinical findings: Ortolani positive in right or left hip, show the following X-ray findings:

Dislocation or subluxation same side	11
Dislocation or subluxation opposite side	2
Dysplasia same side or both	5
Negative findings	6
	24

A corresponding summary can be made of the other clinical groups with an increasing failure in the radiological diagnosis.

With regard to the 32 cases with the clinical diagnosis: Ortolani's sign positive, all the cases with radiological findings, dislocation or subluxation, coincide within this group. On the other hand, however, convincingly positive radiological findings were only found in 16 of 32 babies who were declared to have completely reliable positive findings on clinical examination, and in fully 7 cases the X-ray diagnosis was completely negative in a very critical evaluation in spite of the positive clinical findings.

The question may then be put: is not amongst these 7 the clinical diagnosis faulty and the radiological one correct? With this in mind I studied the results of the first follow-up examination of these 7 children. This took place when the child was 3–4 months old.

The findings on clinical and radiological examination were these:

Clin. ex.:	Neg. findings.	
Rad. ex.:	No or doubtful positive findings	2 cases
Clin. ex.:	Neg. findings.	
Rad. ex.:	Delayed development of epiphysis	2 cases
Clin. ex.:	Neg. findings.	
Rad. ex.:	Undoubted dysplasia findings	2 cases
Clin. ex.:	Not performed.	
Rad. ex.:	Neg. findings	1 case
		7 cases

In order to evaluate the above one must bear in mind that all these babies commenced treatment immediately after birth. In the author's experience it rarely or never happens that on examination at 3 months

of age clinical symptoms will be found positive and it is rare that there will be definite pathological findings on X-ray examination. In spite of this, however, pathological findings were made at the first follow-up examination in 4 out of 7; these findings were due in all probability to a hip joint dysplasia or—dislocation. This makes it most likely that the clinical diagnosis at the neonatal examination was correct and that the X-ray diagnosis was at fault.

The conclusions to be drawn from this rather detailed evaluation of the symptoms found on clinical and radiological examination of newborns are that the radiological examination is much inferior to the clinical at this age. In addition I believe to have demonstrated that a positive Ortolani's sign at birth is such a certain symptom of h.d. that it will be a failure of technique if it is not heeded and treatment does not begin with the newborn baby.

c. Other clinical data from the newborn stage.

As stated above the series comprises 3242 children. Based on clinical and radiological examination of the hip joints of these children, it is considered that hip joint dysplasia is present in 50 children.

Below is given more clinical data on these 50.

TABLE 2
Sex distribution.

Sex	No.	No. given in %
Girls	43	86
Boys	7	14

This distribution between the sexes corresponds well with the figures found elsewhere in the literature.

The information collected about the position of the foetus determined in relation to the birth showed nothing unexpected. On the whole the distribution was normal with a certain emphasis on the breech position, since 6 children or 12 % were born in this position.

Nor was anything unusual found in respect to which order in the family these children came.

As far as the mothers were concerned, the mother's age was noted when the child was born. This was on average 29.9 years. In a control series of 93 mothers with normal children born in the same period the average age was 29.3 years.

Finally information was requested about other known cases of h.d.

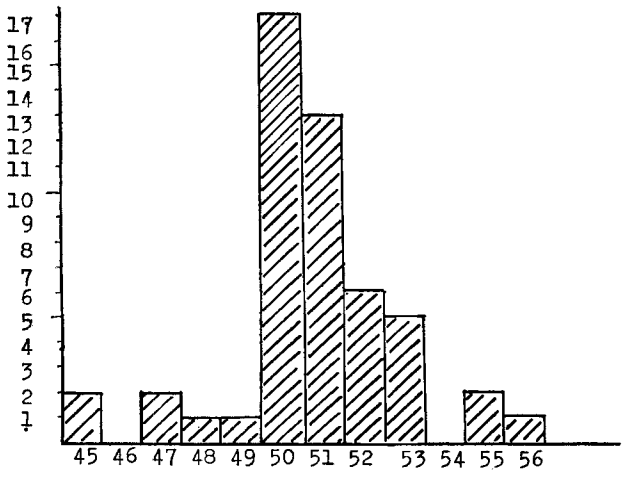


Fig. 3.

Length at birth:

Abscissa: Length at birth given in centimetres.

Ordinate: Number of children.

Each column represents the children whose length at birth lies within the same centimetre. If this graph of length at birth is compared with the corresponding graph in Sundal's normal series from Bergen in 1956, the same pattern is found on the whole. If the average length of the 50 children is calculated, this is 50.74 cms. Sundal states that the average length of boys is 50.9 cms. and of girls 50.2 cms. A series composed of 14 % boys and 86 % girls will then achieve an average length of approx. 50.3 cms., i.e., somewhat less than in my series.

in the family. Here positive information was received in 17 of the 50 children, i.e., 34 %.

RESULTS OF TREATMENT

In the great majority of children the treatment was commenced a few days after birth. As explained above such early treatment was started in 41 out of the 50 children. In the remainder the treatment commenced later, but in all cases before the child had begun to stand or walk.

In order to assess the results of treatment it was decided to divide the children into two groups. Group I comprises the 41 children in whom the treatment was started in the newborn stage. Group II comprises the remaining 9 children.

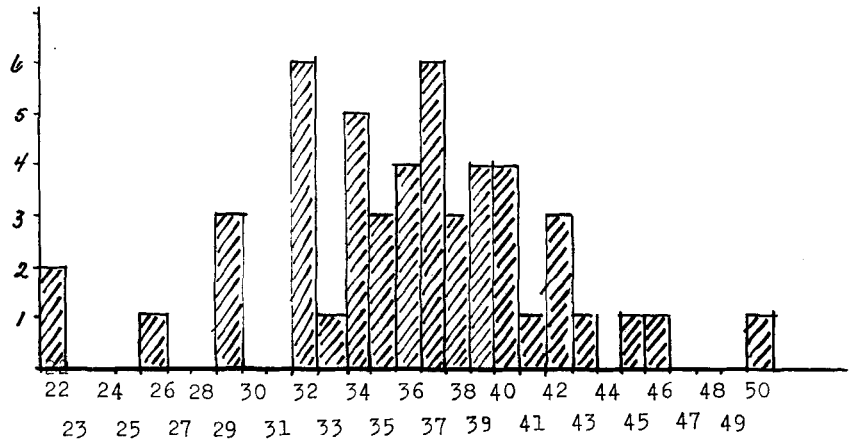


Fig. 4.

Weight at birth:

Abscissa: Weight at birth stated in 100 grams.

Ordinate: Number of children.

Each column represents the children whose weight at birth lies within the same 100 grams. The pattern in this graph of the weight at birth of the 50 children also corresponds with the graph in Sundal's normal series. The average weight at birth is calculated at 3.608 gr. Sundal states the normal weight of boys to be 3.500 gr. and of girls to be 3.400 gr. A group composed of 14 % boys and 86 % girls will then have an average weight of 3.414 gr., i.e., somewhat less than in my series.

GROUP I:

The first control examination within the group took place in 39 cases when the child was between 3 and 4 months old. In the last two cases the age was respectively 5 and 6 months. The results of the clinical examination at this point was as follows:

Negative findings	37 patients
Positive findings	4 patients
	41 patients

Positive findings in this connection mean that the hip could be dislocated and reduced with certainty or that shortening of the extremities could be demonstrated with limited abduction and positive "telescoping sign". In the X-ray examination, which took place the same day, the following was found:

Negative findings	23
Dysplasia signs in one or both hips	11
Dislocation or subluxation in one or both hips	4
No satisfactory X-ray exam.	3
	41

There was very good correspondence here between clinical and X-ray examination, since all in the group "negative findings" in the X-ray examination turned up again in the same group in the clinical examination.

All the dislocation findings in the clinical examination could, as was to be expected, be confirmed at the X-ray examination.

The X-ray symptoms which were given importance in referring a case to the radiological dysplasia group were as follows:

a. Increased relative acetabular index	6
b. Delayed development of epiphysis	3
c. Poor development of the anterior and posterior lips of the acetabulum, and poorly marked upper lateral border of the acetabulum	11

Cf. a: This symptom is relatively easy to evaluate and is only noted positive when there is an obvious increase of the angle of incline on one side in relation to the other.

Cf. b: This symptom is also easy to assess. One cannot, however, expect to find it positive in all cases where the control is undertaken at the age 3–4 months, since the epiphysis normally does not become radiologically visible until the age 3–6 months.

Cf. c: This X-ray symptom may be the subject of considerable subjective assessment, but is on the other hand present in all babies. In 6 out of 11 it is, however, supplemented by one of the above more objective symptoms, so that one may draw the conclusion that the subjective assessment of the acetabulum is probably not too fortuitous.

If the radiological findings in this group are compared with the clinical findings of Ortolani's sign at birth, the following is found:

Of the 32 babies who had positive Ortolani's sign at birth, 30 appear in group 1. In 2 of these the X-rays at the first check-up were of such quality that no X-ray diagnosis may be ventured.

In the remaining 28 the X-ray findings are negative in 15 (over 50 %), 4 have radiological subluxation and 9 have radiological dysplasia. No one has now a complete dislocation. From this it can be concluded that Frejka's cushion splint is very effective and that it is a fundamental advantage to begin treatment at such an early stage.

Final results of treatment:

In assessing the final result of treatment certain difficulties of evaluation are encountered. As stated the children were followed-up until the examiner at the clinical and radiological check-up was of the opinion that the hips were normal and showed no signs of becoming worse after the splint treatment was ended, i.e., the last check-up occurred at least 3 months after the continuous treatment was finished. The end result of the examined babies will be assessed according to this principle at most varying ages, and these lie between 6 and 33 months.

In 26 children the age was from	9–15 months
In 9 children less than	9 months
In 5 children more than	15 months

One child did not return for check-up owing to geographical reasons.
Total 41 children.

A. *Clinical examination.*

No signs of h.d. were found in any of the 40 children. In 19 cases the child was 12 months old on check-up, and all these could walk or stand with or without support. In these cases all had negative Trendelenburg sign as far as could be demonstrated.

It may then be maintained that from a clinical standpoint all the children had normal hips.

B. *Radiological examination.*

This appears more problematic both because the end stage is recorded at ages varying between ½ and almost 3 years and because there is no definite standard for the normal hip in this age group. The results of X-ray examination were judged according to two different principles.

First a general picture was formed of the hip joint, by taking into consideration the mutual development of the osseous parts of the caput and acetabulum and the adjustment of the caput to the acetabulum.

From this point of view an end result was found in 39 of these 40 children which was quite satisfactory. The caput and acetabulum had even contours, the acetabulum's roof had a suitable angle, the anterior and posterior lips were well developed and closed laterally. Moreover, the caput seemed to be well centred in its joint cavity.

A hip joint of normal appearance may thus be said to be present in 39 out of 40 cases. In the last case the caput is placed so far laterally and the acetabular contours are so blurred and uneven that an h.d. is probably still present or possibly a slight subluxation.

This method of assessment must undoubtedly be rather subjectively influenced, since it depends on the general judgement of the examiner.

Secondly these 80 hip joints were assessed strictly geometrically, by drawing up 2 of the previously mentioned auxiliary lines. Even at this point one comes across the first difficulty, since the Y line, judging from the literature, is drawn rather differently by different authors.

It was decided to draw the line as described by *Wiberg*. He draws it as a tangent to the upper contour of the os pubis. Others draw it rather differently, but in all cases it is situated further cranially than that described by *Wiberg*.

The second auxiliary line, called the P line, is drawn through the lateral, osseous border of the acetabulum and vertical to the Y line. Since the above border is often slightly rounded a slight difficulty is encountered in deciding the localisation of the line and the judgement of the examiner again comes into the picture.

After these lines are drawn, all hips are said to be "normal" where the caput in its entirety lies in the lower medial quadrant.

In those cases where 0–2 mm. of the caput lies above the Y line or laterally of the P line, the hips are called "normal?". This method of assessment was chosen because there will always be a certain doubt about the exact localisation of the auxiliary lines described. In no case does the caput lie more than 2 mm. above the Y-line.

In those cases where 3–5 mm. of the caput project laterally of the vertical line, the designation "dysplastic?" is used.

In those cases where the divergence is greater than that stated above, the hip joint is called "dysplastic".

The results of this strict assessment of the babies are as follows:

"Normal" hips	22 babies
"Normal?" hips	12 babies
"Dysplastic?" hips	5 babies
"Dysplastic" hips	1 baby
	40 babies

Much doubt was felt whether it was right to describe pathological conditions in a hip joint so systematically. Firstly, as already mentioned, some doubt was felt where the auxiliary lines were to be drawn. Secondly the question occurs whether here as elsewhere in man's anatomy, one must not make allowances for minor individual variations. Thirdly it was not possible to find anywhere in the literature an account of what should be regarded as the norm for the hip joint in children of

this age group, namely, 1–3 years. Studies were found which stated the normal outer limits for hip joints in adults and children down to 6 years, but not for the younger children.

When the investigation was being pursued *Andrén & von Rosen*'s examination technique was not published and therefore this could not be evaluated.

If the end results of the treatment of these 40 children according to the three procedures described are studied, the following emerges:

Clinical exam.	Normal hips	40 children
General radiological assessment	Normal hips	39 children
	Dysplastic hips	1 child
Radiological assessment in relation to the quadrant division of the hip joint		
	Normal hips	34 children
	Possible dysplastic hips	5 children
	Certain dysplastic hips	1 child

On the basis of the above it is believed that the treatment in 39 of the 40 children has led to the healing of the existing defect in the hip joints, while in one case complete healing has not yet been achieved.

This last case represents undoubtedly an error in treatment on the part of the examiner, in that the whole purpose of the investigation originally was aimed at demonstrating how valuable Frejka's cushion splint was. For this reason splint treatment alone was continued until the child was 14 months old. At this time certain dislocation existed in the right hip. A change was made to plaster and at the next check-up the right hip was reduced very nicely, but as stated, the caput is still placed rather far laterally, nor can one say really that any certain subluxation is present. A more elastic attitude by the author would undoubtedly have produced a better result. In later cases of the series the experience acquired from this lesson was applied. If complete stability was not achieved in the hip during the course of a control period of 3 months, the cushion splint was replaced by plaster administered if necessary under anesthesia. After 3 weeks the plaster was removed and the Frejka treatment was again adopted. In such cases no sign of recurrence was ever seen.

GROUP II:

The group comprises 9 children.

In 7 of these children treatment was begun at the age 3–4 months. In the last two the age was respectively 7 and 10 months.

A. *Clinical examination.*

The last clinical examination of these took place between 1 and 2 years of age. In no case could signs be demonstrated of pathological conditions in the hips. All had started to put weight on their lower extremities in the erect position. In those cases where it was technically possible, Trendelenburg's test was carried out with negative results.

The results of the clinical examination were thus negative in 100 %.

B. *Radiological examination.*

The last X-ray examination was carried out at the same time as the clinical one. On assessing this, uncertainty arises again as described before, since it is not definitely known which radiological standards must be applied to the normal hip in the age group involved here.

The general impression of the examiner in assessing the present X-rays is that in all cases the hip joints concerned under routine conditions would be regarded as normal. The acetabulum is well developed with a centrally placed epiphysis of normal shape.

If the existing pictures from the last check-up are studied strictly geometrically in this group and if the caput's position is assessed in relation to the previously described auxiliary lines in the same way as in Group I, the following end results are obtained:

"Normal" hips	2 children
"Normal?" hips	2 children
"Dysplastic?" hips	5 children

On comparing the clinical and radiological findings this group is believed to have achieved probable normal hips in all cases, i.e., 100 %.

If the strictly geometrical assessment of the end result has any value in comparison between these two groups, it appears that even a postponement of treatment from the birth of the child until he (she) is 3–4 months old, is unfavourable.

COMBINED ASSESSMENT OF GROUP I AND II AT THE CONCLUSION OF TREATMENT

It is the author's opinion that the two groups of results treated here are so small and that the time of initial treatment varies so little that no great mistake will be made if the two groups are combined.

The following total results are given for the 49 children who underwent full follow-ups:

Clinical examination:	Normal hips:	49 children
General radiological assessment:	Normal hips:	48 children
	Dysplastic hips:	1 child
Radiological assessment in relation to the quadrant division of the hip joint:	"Normal" hips:	24 children
	"Normal?":	14 children
	"Dysplastic?" hips:	10 children
	Dysplastic hips:	1 child

Even after the strictest assessment, therefore, 38 children or 77.5 % emerge from their congenital hip joint dysplasia with normal hip joints.

In 10 children or 20.5 % the clinical examination shows a completely normal hip joint, while a strict radiological assessment shows a slightly lateral position of the caput in one or both hip joints, although one cannot definitely say that h.d. exists.

In one child certain dysplasia is present in the one hip joint, while the other lies in the group above.

In 1 child an adequate follow-up could not be pursued owing to geographical conditions.

Seen in relation to the percentage of healing obtained in congenital h.d. when treatment is commenced after the child has started to walk, the results are believed to be so favourable that any postponement at all of the treatment after the newborn stage must be regarded as an error of technique.

PRESENTATION OF CASES

To give the reader a better understanding of the view-points maintained by the author some case-histories with tracings of X-rays are presented. There are three cases from each of the groups: "Normal" hips, "Normal?" hips and "Dysplastic?" hips.

Group: "Normal" hips:

Case No. 30 R.O. b. 25/9.1955. Fig. 5.

Family history:	No known cases of h.d.
Clin. ex. at birth:	Ortolani's sign pos. right hip. Shortening of right femur and assymm. skin folds.
X-ray ex. at birth:	Probable sublux. in right hip.
Treatment and course:	Commenced immediately after birth with Frejka's cushion splint. This was used day and night for 6 months, afterwards at normal sleeping hours for a further 2 months. Walked and stood with support at ca. 10 months.
Last check-up (15 mos.):	Clinical ex.: Completely normal hips.

Walks without limp. Trendelenburg — bilat.
X-ray: normal hips, both caputs in the lower medial quadrant. Right caput insignificantly smaller than the left.

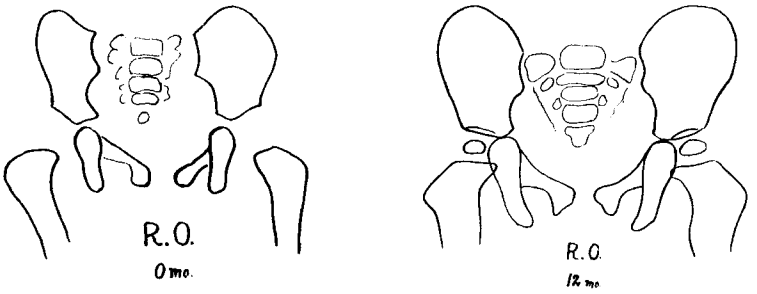


Fig. 5.

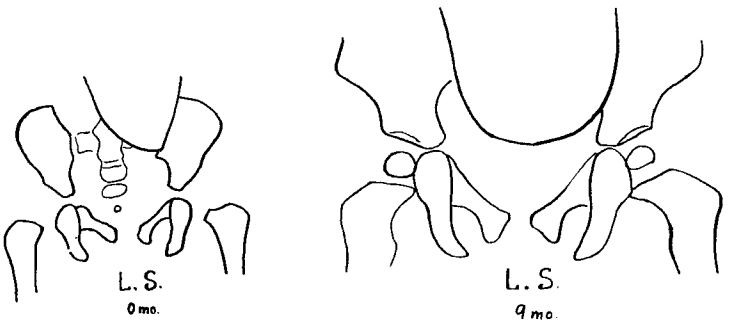


Fig. 6.

Group: "Normal" hips:

Case No. 143 L.S. b. 12/12.1957. Fig. 6.

Family history:	No known cases of h.d.
Clin. ex. at birth:	Ortolani's sign pos. bilat. with relative shortening of the femora.
X-ray ex. at birth:	Probable dysplasia bilat.
Treatment and course:	Frejka's cushion splint treatment started at birth. This was used continuously for 6 months, afterwards during sleeping hours for a further 3 months. Normal development of the hip joints.
Last check-up (9 mos.):	Clin. ex.: normal hips.
	X-ray: normal hip joints. Caput in lower medial quadrant bilat.

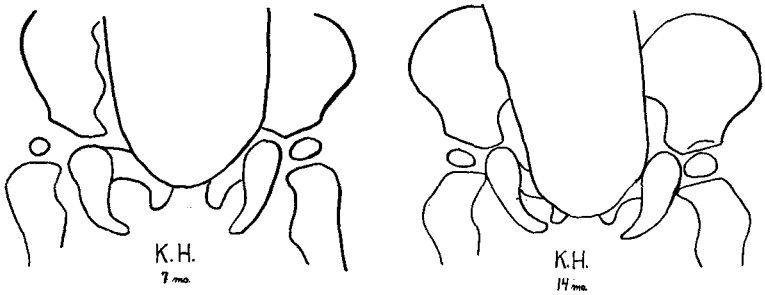


Fig. 7.

Group: "Normal" hips:

Case No. 134 K.H. b. 5/9.1957. Fig. 7.

Family history:	Twin sister with certain clinical and radiological luxation in left hip at birth.
Clin. ex. at birth:	Neg. findings.
X-ray ex. at birth:	Not performed.

Owing to the examiner's interest in twin cases in this series the patient was called for check-up with her sister, 7 months old.

Clin. ex., age 7 months:	Limited abduction in right hip, assymm. skin folds and probable shortening of right femur.
X-ray ex., age 7 months:	Certain dislocation in right hip.
Treatment and course:	Reduction performed under anesthesia without difficulty. Position maintained in plaster. After 3 weeks, plaster-cast replaced by Frejka's cushion splint. This was used continuously for 3 months, afterwards during sleeping hours for a further 3 months.
Last check-up (14 mos.):	Clin. ex.: normal hips.
	X-ray ex.: both hip joints appear normal, but right caput is still a little smaller than the left.

Group: "Normal?" hips:

Case No. 43 S.H. b. 12/4.1956. Fig. 8.

Family history:	3 certain cases of h.d. in the father's family.
Clin. ex. at birth:	Ortolani's sign pos. right hip.
X-ray ex. at birth:	Certain lat. position of upper end of femur, right side, with slight uprooting of same and increased acet. incline bilat.
Treatment and course:	Frejka's cushion splint used from birth. The cushion was used continuously for 6 months. Afterwards treatment was concluded. After only 3 months clin. ex. was negative, while there were continued signs of dysplasia in both hips on X-ray ex.—Started to walk without limping at 1 year.

Last check-up (26 mos.): Clin. ex.: completely normal hip joints.

X-ray ex.: at first sight the hips appear completely normal bilaterally, but on both sides the caput projects about 2 mm. above the Y line and about 2 mm. laterally of the P line.

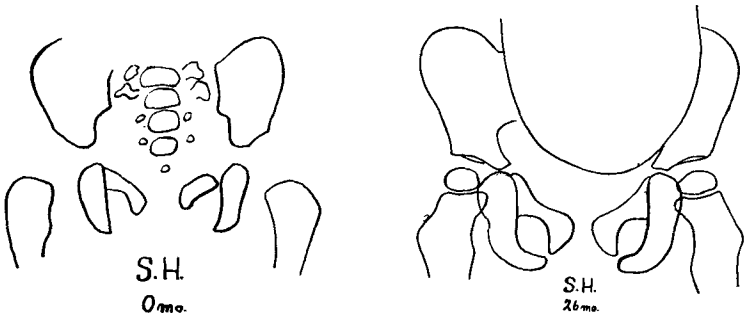


Fig. 8.

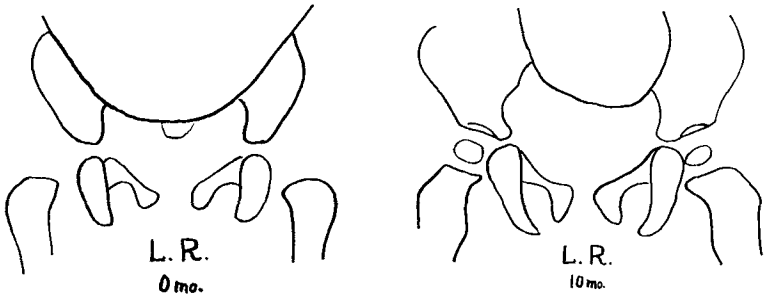


Fig. 9.

Group: "Normal?" hips:

Case No. 118 L.R. b. 8/7.1957. Fig. 9.

Family history: One case known in a distant relative in the mother's family.

Clin. ex. at birth: Ortolani's sign positive bliat. Left hip was so loose that it did in fact dislocate as soon as the baby was laid on its back.

X-ray ex. at birth: Considerable increase in acetabulum's angle of incline bilat.

Treatment and course: Frejka's cushion splint treatment started at birth. At the first check-up certain dislocation continued to be present in the left hip. Easy reduction without anestesia was obtained. Reduction maintained in plaster. After 3 weeks the

plaster was replaced with Frejka's splint. This was used continuously for 3 months. Afterwards again for 3 months with two hours freedom from the splint each day. Could stand with support after 10 months.

Last check-up (10 mos.): Clinical ex.: normal hips.

X-ray ex.: bilat. the caput projects 1 mm. above the Y line and on the right side 2 mm. outside the P line.

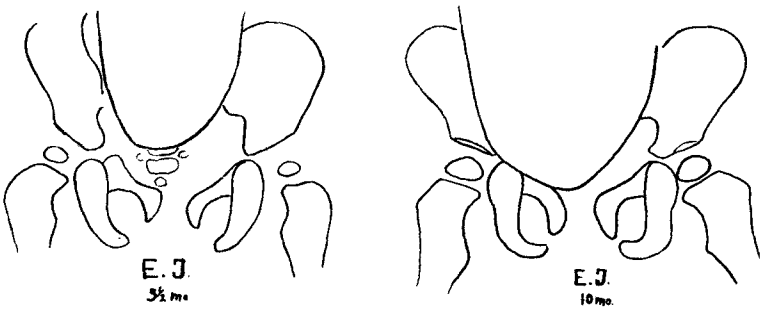


Fig. 10.

Group: "Normal?" hips:

Case No. 79 E.J. b. 5/1.1957. Fig. 10.

Family history: No known cases of h.d.

Clin. ex. at birth: Pronounced crepitation and some looseness in left hip joint. Ortolani's sign neg. No instability.

X-ray ex. at birth: Not performed.

Treatment and course: No treatment begun at birth. At first check-up aged 3½ months limited abd. was found in right hip and definite instability in left hip. X-ray findings: Probable subluxation in both hips. Reduction was undertaken under anesthesia. Stability was easily obtained in the reduced position with Frejka's cushion splint. This was used continuously for 3 months, then at sleeping-hours for a further 3½ months.

Last check-up (10 mos.): Clinical ex.: Normal hip joints.

X-ray ex.: On immediate study both hip joints appear normal, but the caput projects 2 mm. above the Y line bilat. and also 2 mm. outside the P line.

Group: "Dysplastic?" hips:

Case No. 115 J.T.V. b. 28/5.1957. Fig. 11.

Family history: Elder sister had certain bilat. h.d. In addition the child is closely related with another child in the series.

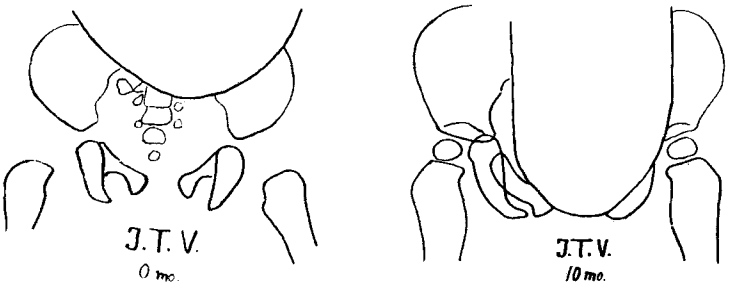


Fig. 11.

Clin. ex. at birth: Ortolani's sign pos. left hip, probably instability in right hip.

X-ray ex. at birth: Upper lateral border of acetabulum is not well marked. Rather large angle of incline in left hip. Certain signs of dislocation are not present.

Treatment and course: Frejka's cushion splint treatment started at birth. In first check-up after 3 months there was probable instability in both hips on clinical ex. X-ray showed certain sublux. in right hip, and somewhat laterally placed caput in left hip. It proved that the cushion used was too thin and soft to obtain the desired effect and it was exchanged. The new cushion was afterwards used day and night for 6 weeks, afterwards omitted 2 hours daily for 6 weeks, and then worn only at night for a further 4 months.

Last check-up (10 mos.): Clin. ex.: normal hips.

X-ray ex.: left hip completely normal, caput on right side projects 3 mm. outside the P line.

Group: "Dysplastic?" hips:

Case No. 10 E.E. b. 8/4.1955. Fig. 12.

Family history: No known cases of h.d.

Clin. ex. at birth: Ortolani's sign pos. right hip.

X-ray ex. at birth: Relatively increased acetabulum angle of incline on right side. Shenton's line broken bilat. Lateral position of both femoral diaphyses.

Treatment and course: With clinically certain hip joint dislocation on the right side a directive was given that treatment should be started before discharge from the maternity ward. The directive was misinterpreted, however, and no treatment was begun. On the first check-up certain clin. dislocation existed in the right hip, which could be confirmed on X-ray ex. No success was obtained in trying to achieve stable reduction

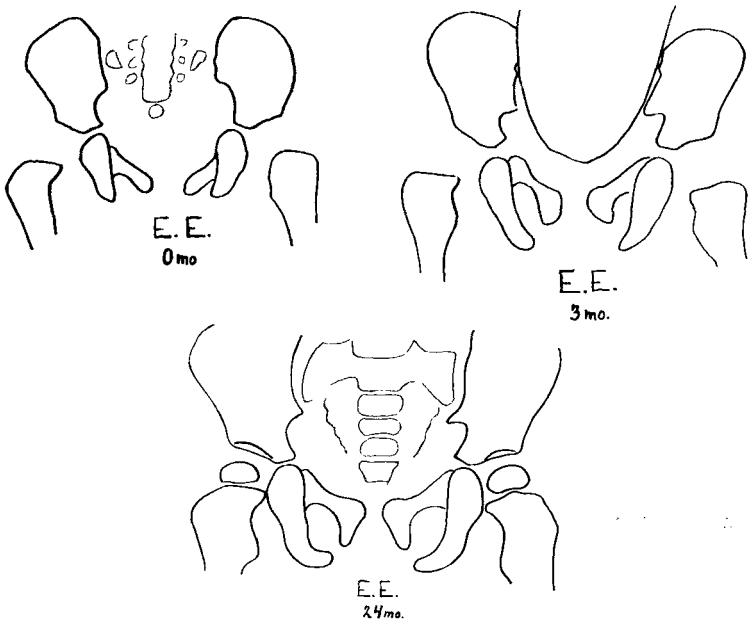


Fig. 12.

without anesthesia. The reduction was maintained in plaster for 3 weeks. Then normal Frejka's splint was used continuously to the age of 6 months and then during sleep to 12 months. Later checks gave normal findings from the right hip, but plain abduction spasm in the left, where the epiphysis as well seemed to be more laterally placed than on the right side. At 14 months tenotomy of the adductors on the left side was performed. Later the course was normal, apart from temporary fragmentation of both caputs. At 14 months she could stand with support. Walked at 16 months.

Last check-up (24 mos.): Clinical ex.: Neg. findings.

Walks freely without limp. Trendelenburg's sign neg. bilat.

X-ray ex.: Well developed acetabulums. Right epiphysis 1 mm. above and 5 mm. laterally of the auxiliary lines. Left epiphysis projects 1 mm. above and 3 mm. laterally of the same lines.

Group: "Dysplastic?" hips:

Case No. 36 G. F. b. 5/1.1956. Fig. 13.

Family history: No known cases of h.d.

Clin. ex. at birth: Slight crepitation on abduction beyond 80° of left hip.

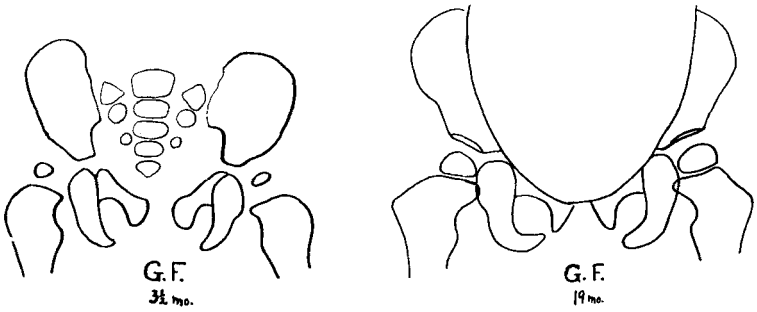


Fig. 13.

X-ray ex. at birth:	Not performed.
Treatment and course:	At the first check-up, age 3½ months, certain clin. dislocation in the right hip, confirmed at X-ray ex. Under anesthesia an easy reduction was carried out. The position was maintained in plaster for 4 weeks. Then the plaster was replaced by Frejka's splint. This was continuously used for 3 months. Then it was used at sleeping hours for a further 6 months. The patient walked without support at the age of 13 months.
Last check-up (19 mos.):	Clin. ex.: walks normally. No pathological findings on ex. of the hips. X-ray ex.: The general impression is that the hip joints are developing normally, but the caput projects respectively 4 and 3 mm. above the Y-line and 4 and 3 mm. laterally of the P line.

DISCUSSION

I have presented the results of a consistently pursued investigation into hip joint dysplasia in 3242 children.

The 50 children whom I believe had h.d. at birth were treated and followed-up until I considered the hips to be normal.

a) *Incidence of h.d. in the series.*

I was very surprised at the high incidence of h.d. According to other studies from the Scandinavian countries the disease occurs to the order of 0.1 % while in this series it shows a figure of 1.5 %. In the Samic population in Finnmark a morbidity of 4–5 % was found, while the Norwegian population in this province has much the same incidence as elsewhere in the country.

According to the research I have made, there are at any rate no official statistics on the occurrence of h.d. The figures presented in the literature are not based then on normal health statistics.

From other parts of the world the morbidity incidence is reported as varying quite considerably from place to place. The interpretation must be that h.d. is a disease which in certain geographical areas arises with great frequency while in others it may be very rare. I therefore satisfied myself with the explanation that Möre and Romsdal county forms just such a geographical area in which h.d. has a higher incidence than in Norway as a whole.

This theory is supported by the fact that before this investigation was commenced a relatively large number of children were admitted to hospital aged 1–3 years, with hip joint dislocation. During the years 1950–54, 4–7 newly-diagnosed cases were admitted each year. Even this number is only a third of the incidence shown in the series. The explanation of this may be partly that some cases of h.d. were referred for treatment to a special clinic instead of to the local hospital. It is also known from the literature that spontaneous healing of h.d. does occur. It is therefore probable that a number of the cases included in the series would also have achieved healing without treatment. The difficulty arises only in that it is not known with certainty who will develop a complete dislocation and who will achieve spontaneous healing.

The few cases in which a certain diagnosis of dysplasia was made at birth but in which treatment was mistakenly not commenced, do not encourage postponement of treatment in the hope of spontaneous healing.

b) *The clinical examination of the hip joint in newborns.*

The examination was undertaken with the baby lying supine. The hip joints were flexed 90°. The examiner placed his thumb over the distal end of the femur and the other fingers over the trochanter region. From this initial position the mobility and stability of the hip joints were examined.

Based on past experience I believe that Ortolani's sign (snapping sign) and instability (telescoping sign) of the hip joints are convincing symptoms of h.d. Using the examination technique described these symptoms are relatively easy to observe even for a less skilled examiner.

I have never observed limited abduction in the newborn stage except as a link in Ortolani's sign, i.e., when the abduction movement is undertaken in a dislocated hip joint, slight resistance to continued abduction

is felt before the caput is tilted into the joint cavity. Afterwards abduction may normally be undertaken to about 70°. For the symptom to appear alone I assume that a better development of the musculature is required than is found in newborns. Later, e.g., at the age of 3 months, the abduction blockage will be an important symptom of hip joint dislocation.

I have also as a matter of routine taken notice of whether asymmetry was present in the thigh, groin or gluteal skin creases.

I should like to draw attention to the crepitation noise to be heard on passive abduction of the hip joint. In a good number of cases where this was observed at the first examination, I checked on the child later without finding signs of pathological development of the joint. In some few cases this was the only clinical symptom of h.d. in the neonatal stage and later examination showed the development of dislocation (see case 36, Fig. 13). I would therefore recommend that children who offer this symptom are examined as routine at the age of about 4 months when the epiphysis is visible on the X-ray pictures.

c) *Hip joint dysplasia in children with negative findings on examination at the newborn stage.*

Among the 3242 children who were examined immediately after birth, and where the primary result of the examination was "Normal hips", only 2 cases occurred which were later to be admitted to hospital with hip joint dysplasia. In both cases only a moderate degree of dysplasia was present without complete dislocation. Both were treated with favourable results.

I take this as indicating that clinical examination at the neonatal stage is very reliable.

Naturally the objection may be made that perhaps there were other cases of which the examiner was not aware. I consider this to be hardly probable because this series of investigations was much publicised by the hospital both amongst the women who were admitted to the maternity ward and amongst the doctors in the district.

The fact that, taken as a whole, overlooked cases do arise is an inspiration towards constant control of the hip joints of infants. Carrying out a hip joint examination is so easy and takes so little time that it ought to be included as a routine examination in all infant check-ups. In particular the examination should apply to girls in families where it is known that h.d. occurs amongst other members of the family.

If this procedure is carried out, all cases of hip joint dysplasia should be discovered and treated before the child begins to walk.

d) *Radiological examination of the hip joint.*

An attempt was made to take all pictures with the patient lying supine in complete rest with straight lower extremities in the neutral position of rotation and centred towards the symphysis. It will be well known to all who have performed such an examination that it can be difficult, not to say impossible, to persuade a patient in the age group involved here to lie in the correct position during the examination. To avoid overlong exposure I therefore approved in a number of cases X-rays which were obviously not taken in an ideal position. This circumstance should be born in mind when assessing a radiological diagnosis on a purely geometrical basis.

As will appear in the assessment of the end results, I found on careful scanning of the X-rays a number of babies who had a very slight lateral dislocation of the caput but at the same time no sign of dysplasia could be detected in the hip joint as a whole, i.e., the caput was normally formed, with entirely normal size and contours. The same applies to the acetabulum, including the angle of incline. The author cannot declare with certainty today that these hips are normal and will develop normally. It is hardly reasonable to believe that the above-mentioned changes are only due to inaccuracies in the radiological technique. A possible explanation is that these cases concern femora with increased anteversion, so that X-rays taken with the lower extremities in the correct position of rotation, really give a very slight lateral projection of the caput in relation to the acetabulum. I consider it very doubtful that a genuine subluxation is involved. Some children in the series who presented such radiological findings were checked again after getting about without any form of treatment. No increased lateral displacement or signs of uprooting were observed.

It is stated in the literature that the hip joint ends its development in persons in the 17 years age group. I assume than the population group from which this series is derived has stable housing conditions so that it would be possible to follow-up these children when they are about 17 years old. Such an investigation is planned. It will possibly give the answer to the question of how much importance a lateral position of the caput may possess in the development of the hip joint.

In this series I have omitted to divide the patients into the usual groups of unilateral and bilateral cases.

In the literature published 20–30 years ago and earlier, a strict differentiation was made between uni- and bilateral cases. On the whole it was agreed that ⅓ were bilateral and ⅔ were unilateral. In later publications this distribution was altered in favour of a larger number of bilateral cases. I am strongly convinced that one should perhaps go further in this direction and say that congenital hip joint dysplasia is a systemic disease which affects the development of the hip joint generally. The degree of dysplasia may vary and this explains why the symptoms found on clinical and radiologacil examination may be localised to one hip only.

With a serious degree of dysplasia at birth, dislocation may occur in one or both hips.

With a slight degree of dysplasia one of two things may happen: either the hip joint will develop so that the child begins to stand and walk with normal hip joints, or the dysplasia will persist or become worse in the first years so that weight bearing on the lower extremity concerned will pass into a genuine dislocation on one or both sides.

If the above view of hip joint dysplasia is correct, then the fact that we constantly examine our children in their younger years and that methods of examination constantly grow better, will provide, in the author's opinion, a good explanation of the tendency found in the literature towards a constant increase in the bilateral cases at the expense of the unilateral.

I have deliberately paid little attention to the importance of the angle of incline of the acetabulum in the radiological assessments.

The reason is partly that more recent literature very decidedly asserts that this angle varies so much individually that no clear boundary can be drawn between normal and pathological values. Nor in this study was any complete correspondence found between the acetabulum's angle of incline and other symptoms utilised to make the diagnosis h.d.

It must be said that the angle of incline in the series as a whole is high. The average figure for normal angles of incline is put in the literature at 28–29° in newborns, but with large individual variations which cannot be designated as pathological.

In this series X-ray pictures of the newborn stage are included of 44 babies, in all 88 hip joints. 68 of these show an angle of incline of 29° and more. An angle of incline less than 25° is found in only 5 hip joints.

These figures should indicate that a large angle of incline certainly is a feature in the picture of a hip joint dysplasia, but as previously stated I would not venture, on the basis of the present radiological findings,

to draw up any boundary between normal and pathological angles of incline.

A circumstance which caused the author somt thought during the collection of the material was the danger of overlong irradiation of the gonads. As the figures from the casepresentation will show, an attempt was made to cover the gonads with lead plate during the exposure.

In this field my experience is that it is difficult to achieve satisfactory covering of the gonads, at any rate in girls, without at the same time covering parts of the hip joints. It may therefore be asked if it is more advisable to take the pictures without covering than to present the patient for two or more exposures in order to include both hip joints.

Skin dosage in exposure of the joints was measured. This is of such a degree that a control examination at intervals of 3 months will scarcely cause any injury to the gonads. I would, however, emphatically warn against exaggerated use of X-ray examination, not least because the clinical examination may be of more value than the radiological examination in newborns.

e) *Treatment with Frejka's cushion splint.*

My experience with Frejka's cushion splint has been very favourable. In the great majority of cases I obtained normal development of the hip joints after 3 month's treatment. In certain cases where instability was unusually large, or where treatment began later than the newborn stage, I utilised plaster immobilisation for a short period. In these cases I replaced the plaster by a cushion splint after 3–4 weeks and found this completely satisfactory.

The advantage of the cushion splint is that it causes the patients little or no inconvenience. It also is simple and cheap to make and easy to take off and put on in the daily care of the baby.

f) *The results of other clinical observations of the child.*

The information which I have collected about the length and weight of the child at birth shows considerable correspondence with the average figures for the country. Length and weight relationships in the series therefore give no support to the theory that space conditions in the womb are an etiologic factor in h.d.

As far as the position of the foetus in the womb is concerned, conditions on the whole agree with what is found in a normal material, with the exception that breech position occurs more often than usual.

6 children or 12 % were born in the breech position. This also corresponds with what is found in other series. It is asserted in the literature that children are born in the breech position because they are not so large and are more delicate than others and that their leg movements in the womb would therefore be less active. I find no support for this theory if length and weight are to form an expression of muscle activity. The average weight of the 6 children born in the breech position is 3560 gr., thus somewhat above the average for the whole series. This is in spite of the fact that one of these 6 children is a twin.

I also noted the mother's age at birth to see if this could have any importance in the etiology. The average age of the mother was 29.9 years. The series includes two cases of twins. In calculating the above figures I included the age of these mothers twice. If this error is corrected, an average age of 29.4 years results. The average age of 93 mothers with normal children amongst the 3242 examined equals 29.3 years, and therefore this forms no reason for the assertion that the mother's age has any significance in the development of h.d.

As with other series, definite information about other cases of h.d. in the family to a high figure were found, in this series the figure was 34 %. Moreover, it may be said that several children in the series are related. Finally it ought to be stated that amongst the 50 children 3 pairs of twins were affected. I found h.d. in both twins in two of the pairs. This also supports the theory of the familiar emergence of h.d.

On the basis of the information gathered about the length and weight of the children at birth, their foetus position, their order of birth in the family, the mother's age at birth and other cases of h.d. in the family, one can only draw the conclusion that h.d. occurs more often in children born in the breech position than in other foetus positions and that the disease seems to be conditioned by the respective family, facts which were well known from previous research.

SUMMARY AND CONCLUSION

The results are presented of an investigation into hip joint dysplasia in all children born at County Hospital in Ålesund, Norway, in the years 1955–57, in all 3242 children. The findings indicate an incidence of morbidity far above the accepted average for Norway.

On the basis of the series presented, it is thought that these conclusions may be drawn:

1. A clinical examination of the hip joints of all newborns should be consistently pursued.
2. A positive Ortolani's sign or a definite instability of the hip, when demonstrated in newborns, is a convincing symptom of hip joint dysplasia which demands treatment. Treatment should be commenced immediately after birth.
3. The normal hip joint in newborns can be moved passively with complete freedom without any form of crepitation. A repeated and constant crepitation in a certain position of the hip joint may indicate the presence of a dysplasia and ought to lead to control examination of the baby at 4 months of age, when the epiphysis is radiologically visible.
4. Limitation of abduction in the hip joint occurs rarely or never in in newborns as a sign of hip joint dysplasia.
5. In newborns clinical examination of the hip joints is so superior to X-ray examination that the latter can be dropped without consequences. It is only when the epiphyses becomes visible radiologically that the X-ray offers more than the clinical examination.
6. The reduction position achieved in the hip joints with a Frejka's cushion splint in children up to 9 months of age, is completely satisfactory and will in the great majority of patients provide recovery.
7. Treatment of hip joint dysplasia with Frejka's splint is so little troublesome to the patient and mother that commencement of treatment is justified even if there may be doubt about the diagnosis.

RESUME ET CONCLUSION

Présentation des résultats de l'examen concernant la dysplasie de l'articulation de la hanche pratiqué chez tous les enfants nés à l'Hôpital Fylke à Ålesund, en Norvège, dans les années 1955–57, en tout chez 3242 enfants. Les trouvailles indiquent une incidence de morbidité beaucoup plus élevée que la moyenne normalement présumée en Norvège.

Sur la base de cette série d'observations, on considère que les conclusions suivantes peuvent être tirées:

1. Il faut continuer à procéder à un examen clinique des articulations de la hanche chez tous les nouveau-nés.

2. Un signe Ortolani positif ou une instabilité définie de la hanche constatée chez un nouveau-né un symptôme certain de dysplasie de l'articulations de la hanche qui demande à être traitée. Le traitement doit être entrepris immédiatement après la naissance.

3. Le mouvement passif d'une articulation normale de la hanche chez les nouveau-nés est entièrement libre sans aucune forme de crépitation. Une crépitation répétée et constantée dans une certaine position de l'articulation de la hanche indique la présence d'une dysplasie et doit engager à un examen de contrôle du bébé à l'âge de 4 mois, lorsque l'épiphyse est radiologiquement visible.

4. La limitation de l'abduction de l'articulation de la hanche est rarement ou jamais constatée chez les enfants comme signe de dysplasie de l'articulation de la hanche.

5. Chez les nouveau-nés, l'examen clinique de l'articulation de la hanche est si supérieur à l'examen aux Rayons X que celui-ci peut être abandonné sans inconvénient. C'est seulement quand l'épiphyse devient visible radiologiquement que les Rayons X donnent plus que l'examen clinique.

6. La position de réduction pratiquée dans les articulations de la hanche au moyen d'une attelle Frejka chez les enfants jusqu'à l'âge de 9 mois est complètement satisfaisante et entraîne la guérison dans la grande majorité des cas.

7. Le traitement de la dysplasie de la hanche par l'attelle Frejka est si peu gênant pour le bébé et sa mère qu'il est justifié de l'entreprendre même si l'on a des doutes concernant le diagnostic.

8. Les résultats obtenus par le traitement conforme de la dysplasie de l'articulation de la hanche chez les enfants sont si bons qu'il devrait être possible dans un proche avenir de rayer les dislocations de la hanche comme problème orthopédique chez les enfants plus âgés ou les adultes.

9. Les données présentées concernant la position de l'enfant dans la matrice, la longueur et le poids après la naissance n'offrent aucune base à l'explication mécanique d'une dysplasie de l'articulation de la hanche.

ZUSAMMENFASSUNG UND SCHLUSSFOLGERUNGEN

Die Ergebnisse einer Untersuchung der Hüftgelenksdysplasien aller Kinder, die in den Jahren 1955–57 am Fylkes (Bezirks) Krankenhaus in Ålesund, Norwegen geboren wurden (insgesamt 3242 Kinder), werden vorgestellt. Die Befunde weisen eine Häufigkeit der Morbiditet auf, die weit höher als der angenommene Durchschnitt für Norwegen ist.

Auf Grund der vorgewiesenen Untersuchungsreihen glaubt man die folgenden Schlussfolgerungen ziehen zu können:

1. Eine klinische Untersuchung der Hüftgelenke aller Neugeborenen sollte konsequent vorgenommen werden.

2. Ein positives Ortolani Zeichen oder eine sichere Unstabilitet der Hüfte sind, sobald sie am Neugeborenen nachgewiesen werden, überzeugende Symptome einer Gelenksdysplasie und erfordern Behandlung. Diese soll unmittelbar nach der Geburt begonnen werden.

3. Das normale Hüftgelenk des Neugeborenen kann passiv vollständig unbehindert und ohne jegliche Krepitation bewegt werden. Eine wiederholte und konstante Krepitation in einer gewissen Stellung des Hüftgelenkes kann das Vorhandensein eine Dysplasie anzeigen und sollte zu einer Kontrolluntersuchung des Kindes im Alter von 4 Monaten, wenn die Epiphyse im Röntgenbilde sichtbar wird, führen.

4. Begrenzung der Abduktion im Hüftgelenk des Neugeborenen ist als ein Zeichen von Dysplasie kaum oder niemals vorhanden.

5. Bei Neugeborenen ist die klinische Untersuchung des Hüftgelenkes der Röntgenuntersuchung weitaus überlegen, so dass die letztere ohne Folgen fallen gelassen werden kann. Nur sobald die Epiphyse röntgenologisch sichtbar wird, bietet das Röntgenverfahren mehr als die klinische Untersuchung.

6. Die Einrenkungsstellung im Hüftgelenk, welche mit Frejkas Polsterschiene erzielt wird, ist bei Kindern bis zu 9 Monaten vollständig zufriedenstellend und wird für die Mehrzahl der Patienten eine Heilung ergeben.

7. Die Behandlung der Hüftgelenksdysplasie mit der Frejka-Schiene stört Kind und Mutter so wenig, dass die Inangriffnahme der Behandlung berechtigt ist selbst wenn Zweifel über die Diagnose bestehen.

8. Die Ergebnisse einer konsequenten Behandlung der Hüftgelenksdysplasie bei Säuglingen sind so gute, dass es möglich sein sollte, Hüftgelenksverrenkungen bei älteren Kindern und Erwachsenen als ein orthopädisches Problem in der nahen Zukunft auszuschalten.

9. Die vorgelegten Daten über die Lage des Kindes im Uterus, ferner über Länge und Gewicht bei der Geburt bieten keine Grundlage für eine mechanische Erklärung der Entwicklung von Hüftgelenksdysplasie.

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