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LATE DIAGNOSIS DISLOCATION OF THE HIP JOINT IN CHILDREN

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In 1950 we began in Sweden to examine newborns for luxation and preluxation of the hip (Palmén 1953). The results obtained during the first few years were so good that in 1953 this examination was introduced as a routine method in all maternity departments where there was a paediatric consultant. At that time about 30 per cent of all children born were delivered at such departments. With the increasing centralisation of deliveries in the larger hospitals and the increasing availability of paediatric consultants, even in the smaller maternity departments, as many as about 85 per cent of all newborns are now examined at birth by paediatricians well trained in the manual examination of hip joints. Today more than 99 per cent of all infants are delivered in maternity wards. This has substantially improved the possibilities for diagnosing the condition.

At the same time orthopaedic surgeons began to focus their attention on the condition which resulted in a close cooperation between paediatricians and orthopaedists (von Rosen 1956).

The possibility of diagnosing and treating congenital dislocation or preluxation of the hip at birth or within the first year of life has created many new problems. Formerly the condition was first observed by the mother who noticed that the child limped when it began to walk and she consulted a paediatrician or a district physician, who referred the child to an orthopaedist. However, these doctors have not, as a general rule, examined the hips at late health examinations of infants.

As far as the orthopaedists are concerned, the situation meant a revision of the diagnostic criteria and treatment and, to some extent also, of the traditional concept of the pathogenesis of congenital dislocation of the hip.

Thanks to the expansion of orthopaedics during the last few decades,

most district hospitals in Sweden now have an orthopaedic department. All cases of diagnosed or suspected dislocation of the hip in the neonatal period are referred to the department of orthopaedics for investigation and treatment. Only a few are treated by paediatricians, and then only if no orthopaedic consultant is available. All cases of dislocation, subluxation or dysplasia of the hip diagnosed at a late stage are treated at orthopaedic departments. (Here "diagnosed at a late stage" is to be understood as diagnosed after the infant has left the maternity department.)

The diagnostic work in Sweden has been described previously (Palmén 1961, 1970). Therefore it is sufficient to mention here that the frequency of late diagnosis (below 10 years of age) fell from 110–120 cases per year before 1953 to about 25–30 per year in 1960–1963.

These good results obtained during the first 10 years strongly suggested that dislocation later in life could be avoided by early diagnosis and treatment in the neonatal period. Cases discovered late were often called "missed" cases. In the beginning of the 1960s, however, some cases had not been discovered until the second year of life even in children born at maternity departments with a paediatric consultant, as well as those born at the small maternity departments.

In 1962 we decided therefore to stress the need for examination of the hips of *all* newborns. To assess the results it was decided to review all infants born in 1963 who were treated because of late diagnosis.

It was hoped that this would reveal why such cases had not been diagnosed in the neonatal period. It was also hoped that it would shed some light on other diagnostic and therapeutic problems.

INVESTIGATION PROCEDURE

Diagnosis of preluxation and luxation in newborns

Towards the end of 1962 all doctors at all maternity departments were requested by letter to examine, within the first few days of life, the hips of all infants born in 1963. They were also furnished with a detailed description of the examination technique, Le Damany-Ortolani's clicking test and testing of the stability of the hip joints by provoked subluxation (Palmén 1961).

Specially designed cards for recording diagnosed cases were issued with a request to return them filled in at the end of the year and at the same time to state how many children had been born alive at the deparment that year.

Late diagnosis dislocations

The chiefs of all orthopaedic departments were requested to make a separate list of all cases of luxation, subluxation and dysplasia of the hip seen in infants born

in 1963 and treated in 1963–1966. All cooperated and all consented to let us have copies of the hospital records and to lend us roentgen films. After the end of each year we requested a report of all cases treated during the year, and in 1967 it was checked that all the cases seen during these years were reported. Supplementary information was obtained from the records of maternity departments and from the parents.

The children were reviewed in 1971–1972. In those cases where follow-up had been concluded earlier, the chief clinician often reexamined the children again in order to get as long an observation period as possible.

RESULTS

Diagnosis of luxation—preluxation of the hip in newborns

In 1963 children were born at 101 maternity departments and at 32 small maternity units in areas catered for by district physicians. At 48 of the hospital departments there was a paediatric consultant who examined all the newborns.

		No.
A.	Maternity departments with paediatric consultant	48
B.	Small obstetric departments without paediatric consultant	53
C.	Small maternity units with district physician	32

Distribution of luxation – preluxation.

	Infants born	Number of cases	Frequency per thousand
A.	81,931	534	6.5
B.	23,055	60	2.6
C.	4,880	21	4.3
	109,866	615	5.6

The total number of live births in 1963 (deaths within first 7 days not included) was, according to Statistiska Centralbyrån, 111,662.

The geographic distribution of the cases diagnosed coincided largely with that of the population, but with a few exceptions, e.g.

Obstetric department in Uppsala: 44 cases among 2,803 newborns (15.7 per thousand).

Obstetric department in Västerås: 61 cases among 2,113 newborns (29 per thousand).

At the seven departments of obstetrics in Stockholm the frequency of diagnosed cases varied widely, from 1.4 to 10.9 per thousand, with a mean frequency of 5.6 per thousand of 18,212 newborns.

It might also be mentioned that the frequency of cases diagnosed was in:

Falköping: 7 of 1,302 newborns, frequency: 5.4 per thousand.
Malmö: 28 of 3,746 newborns, frequency: 7.5 per thousand.

In the evaluation of the frequencies it should be recalled that the figures stem from several different maternity clinics and that the examinations had been made by a large number of examiners, many of whom had had little or no earlier experience with examination of the hips of newborns. A certain over-diagnosis owing to inclusion of uncertain cases may also have occurred. In the instructions for the examination method, however, it was pointed out that crepitations of the joint alone were not sufficient grounds to warrant a diagnosis of preluxation of the hip.

Late diagnosis luxation, subluxation and dysplasia
27 cases were reported.

Of these, two were cases of different malformations and in three the diagnosis must be regarded as uncertain. These cases were, however, included in the following classification.

Sex: 24 girls, 3 boys.
Obstetric presentation: cephalic: 23, breech: 4.
Premature birth: 2 (birthweight 1,280 and 2,300 g, respectively).
Born at maternity departments with paediatric consultant: 15 cases.
Born at small maternity units without paediatric consultant: 12 cases.
Family history of dislocation: In 6 cases out of 20 there was dislocation in the family (in 2 cases dislocation in older siblings).

Symptoms that suggested dislocation
8 cases, diagnosed at *less than 1 year* of age:

- one premature child admitted to the children's department where limited abduction was noticed when the child was 3 weeks old;
- one girl referred at 3 months of age to the department of orthopaedic surgery by a physician who had been consulted by the mother regarding the child's malformed feet: arthrogryposis with bilateral dislocation was found;
- at the child health examination a 9-month-old girl had coarse crepitations of both hip joints, and was referred to the department

of orthopaedics, where mild unilateral limitation of abduction and mild dysplasia were diagnosed;

- in the other five cases the mothers had noticed differences in the lengths of the legs, in the medial thigh folds, in the degree of abduction in the hip joints, or in rotation of the legs when the child was standing. They therefore approached the physician at the child health centre and requested that the child be referred to a paediatric or orthopaedic clinic for further examination.

Remaining 19 cases discovered at more than 1 year of age:

- in 17 cases it was the parents themselves who had noticed that the children limped and therefore sought advice,
- in only 2 cases did it appear to be the physician at the child health centre who had suspected dislocation at the routine examination.

Roentgen examination at the time of the diagnosis showed:

	Number of cases		
	right hip	left hip	bilateral
Dysplasia	3	1	
Subluxation		3	
Middle-high dislocation	9	2	1
High dislocation	4	1	3
	16	7	4

One child with middle-high dislocation had subluxation on the other side. (Here "middle-high" dislocation designates that the epiphyseal line between the neck and the head was roughly at the level of the Y-cartilage; "high" luxation, still higher.)

The four children with "dysplasia" had on one side a somewhat larger acetabular angle and a somewhat smaller ossification centre of the head. In three of these, abduction was limited (at 4, 5 and 6 months) and one was referred because of "coarse crepitations" on both sides. At attempted reduction under general anaesthesia no typical feeling of reposition was noticed in these four cases. In three of the cases the minor roentgen changes might be explained by an asymmetric position of the pelvis by exposure. In these cases, therefore, the diagnosis cannot be regarded as certain.

Type of treatment:

Reduction and immobilisation in plaster (with adductortenotomy, if necessary)	16 cases
Reduction after traction and immobilisation in plaster	4 cases
Open reduction	5 cases
No primary treatment	2 cases

The two cases not treated were seen in:

- a mentally retarded boy who at 3½ years of age had bilateral high dislocation,
- a girl, aged 2 years 2 months, with dysplasia and subluxation. At 9 years she was treated with osteotomy of the ilium.

Secondary operations were done in a further three cases: subtrochanteric osteotomy in one, acetabular plasty in one and osteotomy of the ilium in one.

Findings at follow-up examination:

Age at time of subsequent examination:

10–9 years: 12 cases, 8–7 years: 13 cases, 6–4 years: 2 cases.

Last roentgen examination showed:

normal hip joints	5 cases
practically normal hip joints	9 cases
acetabular dysplasia + subluxation	8 cases
severe "coxa plana" changes	1 case
severely deformed joint	2 cases
moderate pelvic deformity after osteotomy	1 case
dislocation (untreated)	1 case

In *14 cases (52 per cent)* the results were thus good, i.e. the hips were normal or practically normal (Figure 1). The mild changes persisting in nine cases will probably disappear with time. Of these 14 cases the diagnosis had been made during the first half year of life in seven and during the second year of life in the others. All these cases could be treated with closed reduction and immobilisation in plaster (in two cases after previous traction treatment). In the three cases where the diagnosis had been uncertain the hips were normal.

Eight cases with persisting dysplasia with subluxation: in five of these the diagnosis had been made between the ages of 9 months and 2 years and in two at 2 years 2 months, and 2 years and 6 months,

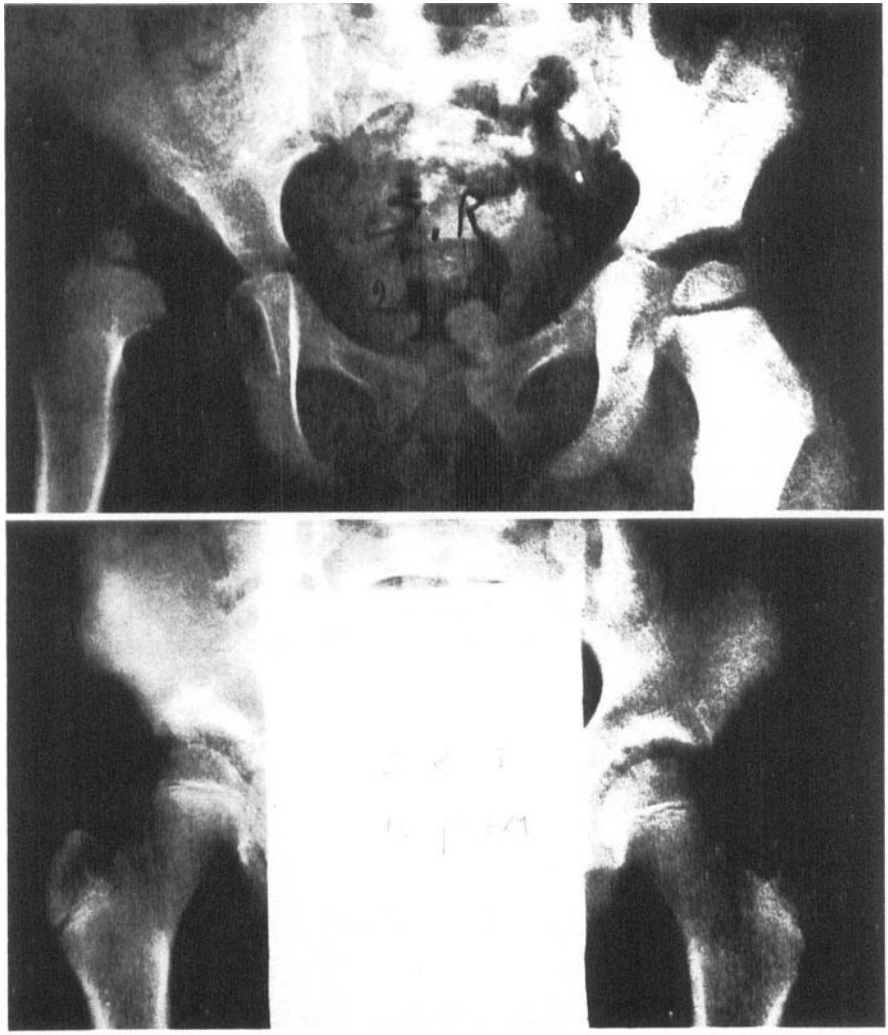

Figure 1. Middle-high dislocation, diagnosed at 2 years 4 months, treated by closed reduction and plaster for 7 months. The last X-ray at 10 years 3 months considered as "practically normal".

respectively. Three of these five were treated with open reduction and two also with osteotomy later.

In one case severe joint changes persisted with a flat, irregular head, dysplasia of the acetabulum and mild subluxation. At 1 year 10 months bilateral high luxation was diagnosed and treated with closed reduction with adductortenotomy and immobilisation in plaster.

Two cases with severely deformed joints:

One of these cases was the previously-mentioned premature baby girl, in whom treatment with an abduction bandage was initiated at 3 weeks of age. It appears that she had high dislocations on both sides from the very beginning, and these were not reduced by treatment with the bandage. Open reduction at 5 and 7 months showed interposition of the capsule and the limbus.

The other case was a girl who had bilateral pes equino-varus and in whom bilateral dislocation at the hip had been diagnosed at 2 years. She was treated first with open reduction and later, at 4 and 5 years, with osteotomy.

The case with persisting untreated dislocation has been discussed in a previous section.

DISCUSSION

Of the children born in Sweden in 1963, late diagnosis dysplasia or dislocation was detected in 27 within the first 3–4 years of life. Compared with the frequency before 1953 this meant a praiseworthy decrease by about 75 per cent. This decrease was due mainly to the realisation and spread of knowledge of the significance of examination of the hips of newborns. As many as 19 (70 per cent) of the 27 cases were not diagnosed before 1 year of age.

Figures collected in recent years suggest a further reduction in the frequency of dislocation after 1 year of age. Instead, however, the frequency of diagnosis of "dysplasia", with more or less severe subluxation, in infants has increased, especially between the ages of 3 and 6 months.

The main purpose of the present investigation was to find out why the diagnosis was not made until a late stage and to assess the results of treatment.

Careful examination by an experienced examiner is important for diagnosing congenital dislocation of the hip in the neonatal period. The frequency of cases not diagnosed until a late stage was found to be more than twice as high among children born in small maternity units without a paediatric consultant, 12/28,000, compared with 15/82,000 at departments with such a consultant. This difference was still more obvious in a large series of 127 cases diagnosed at a late stage and treated at orthopaedic departments in the years 1963–1966 (Palmén 1970). In that material the frequency was four times as high in children born at maternity units without a paediatric consultant.

Fifteen of the 27 infants born in 1963 with congenital dislocation of the hip had been delivered at departments where newborns were routinely examined by paediatricians. In two of these cases the hips were probably not examined during the first few days of life:

- a premature baby girl with a birthweight of 1,280 g was transferred immediately to a paediatric department for intense treatment. At 3 weeks it was noticed that abduction was limited and bilateral dislocation was diagnosed.
- a boy with asphyxia at birth was transferred immediately to the paediatric department and no note was made about any examination of the hip. He was mentally retarded and dislocation was not diagnosed until he was 3½ years old.

In one case, examination of the hip at birth revealed a "click", but roentgen examination showed no signs of dislocation. The girl was therefore not treated or followed up and at 1 year 11 months dislocation was diagnosed. It is probable that the roentgen examination had not been technically adequate or that the films had been misinterpreted and therefore misleading.

The three cases of dysplasia, where the diagnosis may be questioned, were also seen in children examined by paediatricians.

Of the 12 infants born at small maternity units without a consultant paediatrician some deserve comment:

- the above-mentioned two cases with malformations, pes equinovarus and arthrogryposis, respectively;
- one girl who at 2 weeks of age was admitted to the department of paediatrics because of a skin disease. The parents themselves requested examination of the hips because a brother had previously been treated for preluxation as a newborn. Examination of the hips, however, revealed nothing remarkable and roentgen examination was not carried out. Dislocation was detected at 9 months of age.

Though some of the hips affected had probably not been examined during the neonatal period, our material contained several cases in which the children had been properly examined, in 9 of the cases by an experienced paediatric consultant. We must therefore expect that even in the future some cases will not be diagnosed until a late stage despite examination in the neonatal period. This is in line with experience in

other countries, such as Norway (Bull-Hansen 1970), England (Mitchell 1972) and Jugoslavia (Brécelj 1973).

One of the reasons why a dislocation may not be diagnosed in the neonatal period is that the luxation is complete at birth, and not reduceable by manipulation, and any instability is not able to be felt (von Rosen 1968, Wilkinson 1972). At least one of the cases in the present material diagnosed at a late stage probably belongs to this group. Amongst the cases diagnosed and treated immediately after birth there are some where a poor primary result of treatment can be explained by the possibility that luxation was total from the beginning and was not reduced by bandaging the legs in abduction.

It is remarkable that in 22 of the 27 cases the parents themselves had suspected the dislocation, including 17 of the 19 cases discovered after 1 year of age. In most cases the children had attended normal health check-ups once or twice without the dislocation having been observed. This underlines the importance of a careful examination of the hip at every medical examination during the first year of life. In some cases the diagnosis was delayed because the mother's suspicion of dislocation had been ignored or because roentgen examination, which could have demonstrated the condition, had not been carried out.

The favourable results of treatment with normal or practically normal results in 52 per cent of the cases can be explained by the relatively early treatment: in eight cases before the age of 12 months and only in three cases after 2 years of age.

Most cases were treated with closed reduction and immobilisation in plaster, in some cases after treatment with traction and with or without adductortenotomy.

In five cases where closed reduction proved unsuccessful, open reduction was performed. Reduction was found to have been impossible owing to a narrow capsule and inverted limbus. In four of these cases the dislocation was high, and in the fifth it was middle-high. The operations were not performed before 6–8, 21, 23, 25, and 31 months of age, respectively. Two of the patients were not operated until after 5 and 6 months' treatment with abduction in plaster after uncertain closed reduction. This emphasizes the importance of early arthrography which can give detailed information of the state of the joint in uncertain cases.

Follow-up examination of these five patients showed severely deformed joints in two and persistent dysplasia in the remaining three.

The number of cases of dislocation of the hip diagnosed at a late

stage has decreased in Sweden to such an extent that now only a few cases per year are referred to orthopaedic departments in regional hospitals. In several departments, including university departments, not even one case is seen per year. A question of practical importance is therefore whether it might not be advisable to centralise treatment of these cases to orthopaedic departments at universities and other regional hospitals, in order to obtain, among other things, sufficient cases for teaching purposes and continued research.

SUMMARY

Dating from 1953, the hips of newborn have been examined routinely all over Sweden. In 1963 more than 99 per cent of all newborns (about 110,000) were delivered at maternity departments, where such examination was recommended. 615 cases of preluxation or dislocation were diagnosed, which means a frequency of 5.6 per thousand. A high frequency reported in some hospitals suggests overdiagnosis.

To assess to what extent the examination of newborns has reduced the frequency of late diagnosis dislocation and dysplasia, extracts of the records were obtained concerning all infants born in 1963 and treated for dislocation of the hip in 1963–1966 at orthopaedic departments in Sweden.

Twenty-seven reported cases were analysed and the children were reviewed after 4–10 years. Fourteen (52 per cent) of the children were found to have normal or practically normal hips at the review. Eight still had dysplasia with subluxation and 3 had substantially deformed joints, one had moderate deformity and one, untreated, still had luxation.

Possible causes of late diagnosis are discussed and it is stressed

- that all physicians who examine newborns should be well versed in examination of the hip joints.
- that the hip joints should, when possible, be examined on two occasions during the first weeks of life, especially newborns predisposed to dislocation owing to heredity, breech presentation or different kinds of malformations.
- that it should be borne in mind that complete luxation, though rare, may exist already in the neonatal period,
- that one should not forget to examine the hips of newborns who, because of prematurity, asphyxia etc., are referred immediately for

intense treatment before routine examination of the hips has been carried out,

- that at child health centres one should not rely on the results of the examination during the neonatal period, but should always examine the hip joints.

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