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EARLY DIAGNOSIS OF CONGENITAL DISLOCATION OF THE HIP

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Ever since 1930 the importance of early diagnosis of congenital dislocation has been a commonly well-accepted precept for orthopedic surgeons. However, as to the time and method of its diagnosis, changes have occurred over the years.

In Japan the instructions for infant physical examinations by screening tests based on flexion-abduction of the hip were distributed by the Ministry of Welfare in 1942 (cited from Jinnaka et al. 1943). However, as there is a certain limitation in the significance of the flexion-abduction test for diagnosis of dislocation, x-ray photography has been introduced in the early diagnosis of dislocation in infants (Tateno 1953), and Imada et al. (1960, 1963) have actively employed the diagnosis of infant hip dislocations by roentgenography in various regions of Japan. As such, this roentgenographic method has come to be widely used in our country.

However, even this method of diagnosis employing x-ray films raises several important problems in that for the newborn infants of up to three months old, whose ossification centers of the femoral heads have not yet appeared, it is difficult to diagnose dislocation and subdislocation accurately, and there will also be danger of irradiation disturbances by x-ray (Ohara 1960, Imada 1961, Tada 1971). It has become clear that there is also an attendant danger in the mass screening depending solely on the roentgenograms.

As reported by von Rosen (1957, 1962), we tried the screening tests on newborn infants by employing click signs and the detection tech-

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nique of unstable hips of Barlow (1962), which we previously reported at the Fortieth Annual Meeting of the Japanese Orthopedic Association (Tanabe et al. 1967), but here we present our results in more detail.

MATERIAL AND METHODS

The cases reported here consist of infants of normal birth weight born at the Maternity Unit of Okayama National Hospital during the period from September 1, 1962 to August 31, 1967. The study was done to determine the following problems:

1. Would congenital dislocation of the hip be discovered within seven days after birth?
2. If so, what technique of mass screening diagnosis would be appropriate?
3. What course would congenital dislocation or subdislocation take?

Clinically, we employed Ortolani's click sign, Barlow's modification of Ortolani's test, and the techniques of flexion-abduction diagnosis at fixed intervals of seven days, one month, three months, six months, twelve months, and three years after birth. In those cases showing clinically abnormal findings the frequency of examination was increased as well as x-ray diagnosis, as the case required.

However, for the diagnosis of those babies over three years old, even those without any apparent abnormality, direct roentgenography of both hip joints was tried (provided, of course, with the prior consent of the parents) in order to ascertain normality or abnormality of the hip joints.

The reason for our follow-up examinations up to three years after birth was that the basic motor pattern would be set by this period; the reason why we selected infants of normal birth weight is because low birth weight infants are usually hospitalized in special wards, making it difficult to conduct mass screening at regular intervals.

The total cases examined are as shown in Table 1. In the cases followed over one year, there were 32 cases with congenital dislocation of the hip (11 males, 21 females) and 41 congenital subdislocations of the hip (6 males, 35 females). Aside from these there were two cases confirmed to be congenital hip dislocations (females only) and four cases of congenital subdislocations (1 male, 3 females) among those followed less than one year.

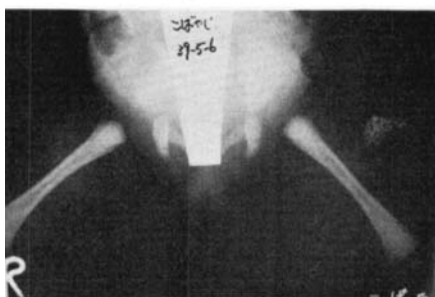
Table 1. Number of newborn at Okayama National Hospital from September 1, 1962 to August 31, 1967.

Total births	4,693 (2,404 males, 2,289 females)
Cases examined at birth	4,675 (2,390 males, 2,285 females)
Cases followed up	
over one year	2,756 (58.9 %)
	(1,452 males, 1,305 females)
Cases followed up	
over three years	2,072 (44.1 %)
	(1,103 males, 969 females)

Table 2. Clinical signs of 32 cases with CDH.

Time examined	No.	Click	Barlow	Flex./abduct.
7 days after birth	32	6 (3)	3	4 (3)
1 month	25	7 (6)	1	14 (6)
2 months	20	10 (8)	1 (1)	14 (9)
3 months	13	7 (7)	1 (1)	10 (8)
4 months	5	1	0	4
5 months	3	3 (3)	0	3 (3)
6 months	3	2 (1)	0	1 (1)

The number in parentheses represents the cases having two signs concurrently.



a. 2 days after birth. Click sign (+) on both hips.



b. 1 month after birth. Click sign (+) on both hips.



c. 3 years after birth.



d. 5 years after birth.

Figure 1. Case 8 female, both CDH that was treated. There was nothing peculiar clinically.

The Course of 32 Cases with Congenital Dislocation of the Hip (Table 2)

Of the 32 cases diagnosed as congenital dislocation of the hip, those showing clinical symptoms within seven days after birth amounted to 10 cases, and of them 3 cases gave both positive click signs and flexion-abduction tests.

Of those 25 cases examined at one month after birth, 16 cases showed some clinical symptoms (Figure 1).

Those examined at the age of two months amounted to 20 cases; of them 16 showed some clinical symptoms. For the cases showing no symptoms at this stage, 2 cases previously diagnosed as having congenital dislocations had already undergone spontaneous healing (Figure 2), and we could not find any clinical symptoms in the other 2 cases; hence no diagnosis of congenital dislocation was established.

Of the 13 cases examined at three months of age, 10 cases showed other symptoms, in addition to flexion-abduction symptoms (Figure 3). Of the 3 cases showing no clinical symptoms, one already had an established diagnosis but was on the way to spontaneous healing. Twelve cases other than those mentioned had



a. 2 days after birth. Click sign (+) on left hip.



b. 3 months old. Nothing peculiar clinically.



c. 3 years old. There was no clinical sign.

Figure 2. Case 26 male, 1. CDH healed spontaneously.



a. 3 months after birth; click sign (+) on right hip (at 1 day after birth, there was nothing peculiar clinically).



b. 3 years after birth. Flexion-abduction of both hips was limited slightly.

Figure 3. Case 1 female, right CDH that was treated.

already started treatment, and they were not included in the total here. Of the 32 cases, 26 had established diagnoses.

Of the 5 cases examined at the age of four months, all showed either click signs or flexion-abduction limitations. There were 19 cases who had already started treatment and 3 cases who received no treatment because of spontaneous healing (two cases) and personal reasons (one case).

The three cases examined at the age of five months showed click signs accompanied with limitations of flexion-abduction. Of them, two cases had already revealed congenital dislocation of the hip at three months of age but were not treated. The remaining case had shown no abnormality up to two months of age and had no examination at the age of three months.

Of the three cases examined at the age of six months, one case showed no clinical symptoms but this case was one of spontaneous healing, and the second case, whose dislocation had been noted at three months after birth, had received no treatment, and the last one had shown no abnormality at three months of age.

The cases of congenital dislocation of the hip noted at the age of six months were 31 out of 32. The remaining one had been diagnosed as without abnormality at the age of three months and received no examination at six months and twelve months after birth, but congenital dislocation was diagnosed when the patient started walking.

The Course of 41 Cases of Congenital Subdislocation (Table 3)

There is a problem as to how far we can take clinical findings and x-ray photographs in diagnosing congenital subdislocation of the hip. Be that as it may,

Table 3. Clinical signs of 41 cases with CSdH.

Time examined	No.	Click	Barlow	Flex./abduct.
7 days after birth	41	0	4 (1)	1 (1)
1 month	26	0	1 (1)	10 (1)
2 months	17	0	0	15
3 months	32	0	6 (5)	30 (5)
4 months	3	0	0	3
5 months	4	0	1 (1)	4 (1)

The number in parentheses represents the cases having two signs concurrently.

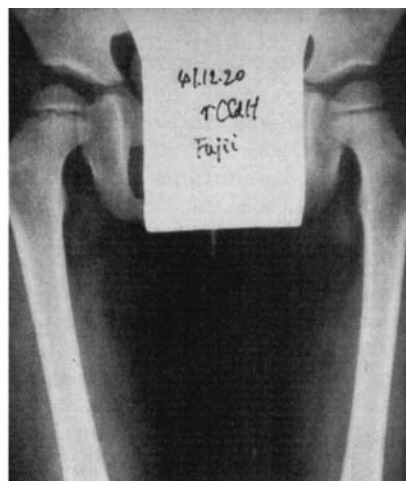
there were 41 cases of congenital subdislocation that we diagnosed as such, and, of them, 4 cases showed clinical symptoms within seven days after birth. We believe that cases who have click signs are cases of dislocation; hence in the congenital subdislocation group, no case with click sign was included.

Of the 26 cases examined at age of one month, 10 cases showed limitation of flexion-abduction. Of the 17 cases examined at the age of two months, 15 cases showed limitations of flexion-abduction.

Among the 32 cases examined at the third postnatal month, 31 showed clinical symptoms (Figure 4), and only one case revealed no clinical abnormality. Seven other cases had already started treatment, and 38 cases out of 41 were diagnosed as cases of congenital subdislocation.



a. 3 months old. Flexion-abduction limitation (+) on right hip (at 2 days after birth, there was nothing peculiar clinically).



b. 3 years old. There was nothing peculiar clinically.

Figure 4. Case 36 female, r. CSdH that was treated.

Of 3 cases examined four months after birth, 2 had already been recognized as cases of congenital subdislocation, and the remaining one had no examination at the third postnatal month.

Of the 4 examined five months after birth, 2 cases had their diagnoses established already at the second and third postnatal months respectively; of the rest, one had shown limitation of flexion-abduction but there was such slight limitation that diagnosis remained unestablished, and the other had shown no abnormality on examination at the third postnatal month.

In these cases of congenital subdislocation all the diagnoses had been established up to six months after birth.

CONCLUSION

We have avoided the use of the confusing and misused term of preluxation, and we consider that in diagnosing hip cases only categories should be used: unstable and stable hips. Unstable hips consist of congenital hip dislocation and congenital hip subdislocation. Stable hips are divided into two groups: normal hip and dysplasia of the acetabulum. As a result of long observation, we have come to agree with the theory that dysplasia does not result in congenital hip dislocation or congenital hip subdislocation, but those do often result in dysplasia.

In our examination of the unstable hip of infants we have deduced some conclusions, but there are several shortcomings in our studies.

These are:

1. The subjects of our study were limited only to those in one hospital.
2. Of the original group, those we could follow up over one year amounted to only 58.9 per cent and those for the period of over three years, only 44.1 per cent.
3. We consider that in dislocated hip cases there would be no difficulties in diagnosing because cases either show positive click signs or telescoping signs. Cases with positive click signs can be reduced manually; however, cases showing no click signs cannot be reduced manually and usually have definite telescoping signs as a result of loosening of the joint capsule. On the other hand, since in subdislocated hip cases diagnoses are based on radiological findings relative to Perkins' line (Perkins 1928) as well as clinical findings, there arises a difficulty in distinguishing them from normal joints of the hip. However, this point is unavoidable, as can be judged from the statement by Yamamuro

(1967, 1968) that it is difficult to actually distinguish the normal hip from the abnormal even after arthrography.

4. After eight years of continued consultation in addition to ten orthopedic surgeons who took a serious role in examining such patients, it was impossible to accurately detect unstable hip joint using Barlow's method.

Despite these shortcomings we have drawn the following conclusions.

The Incidence of Unstable Hip

Among the cases we could follow up for over one year, there were 73 cases of unstable hip or 2.7 per cent of the study population, and in adding those followed up for less than one year the number comes to 79 cases, which is 1.7 per cent of the total number of babies examined at birth.

Since it would be reasonable to consider that follow-up would be greater when some abnormality is noted than when none is noted, it stands to reason that the incidence of unstable hips would be greater in the group followed up for over one year than in the group followed up for less than one year. Thus, in our experience, the incidence is 1.7 to 2.7 per cent.

As for the regional statistics in Japan, the incidence in Miyagi Prefecture (northeastern part of Japan), as reported by Akabayashi (1958), is 3.3 per cent and in Tokyo, as reported by Tsuji (1964), it is 1.19 per cent, both of which roughly correspond to our data. However, when we compare these reports with the data in foreign countries such as 0.27 per cent in the Varese district of Italy, as reported by Poli (cited from Hass 1951) and 0.17 per cent in Malmö, Sweden, as reported by von Rosen, the incidence in our country is about ten times higher.

The Possibility of Diagnosis at Newborn Stage

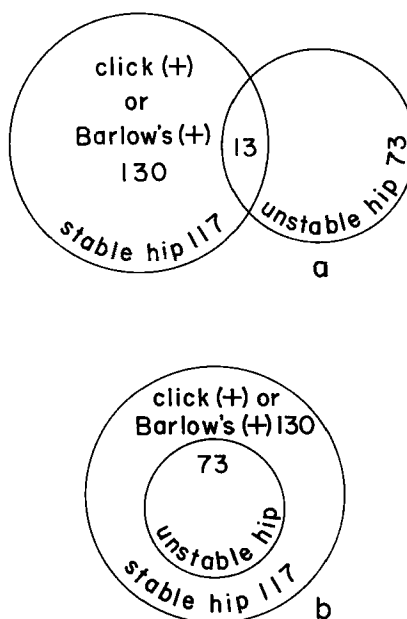
In 1963 Palmén of Sweden found 615 cases (0.56 per cent) with preluxation (this term seems to have been used to differentiate it from the case of complete dislocation in association with congenital malformations) in about 110,000 newborn babies, about 99 per cent of the total babies born in that year, and stated that the high incidence is in part likely due to overdiagnosis, and missed cases to diagnose are

Table 4. Clinical signs of 2,683 cases with stable hip.

Time examined	No.	Click	Barlow
7 days after birth	2,683	0	117

decreasing year after year with advances in newborn diagnosis techniques (Palmén 1970).

In our experience with newborn babies, only 14 cases (in 13 cases, Ortolani's or Barlow's test was positive) out of the 73 cases with unstable hips showed clinical abnormality within seven days after birth. Moreover, during observations of the course of those 2,683 babies who had been considered to have stable hips, 117 cases of unstable hip were detected within seven days after birth by Barlow's technique. When we add those with unstable hip with positive click sign or positive Barlow's test the amount was as high as 130 cases or 4.7 per cent (Table 4). Despite this, by mass screening of unstable hip as shown in Figure 5 a, there were only 13 out of 73 unstable hips which had been detected at the newborn stage (supposing it were like Figure 5 b, it would be significant as mass screening). In other words,

*Figure 5.*

some may be diagnosed at the newborn baby stage, but we must admit failure in mass screening.

About Flexion-Abduction Test

It has so far been considered that the flexion-abduction test widely in use for mass screening of infants was of no value at the newborn stage (Ikari et al. 1952-53). We have also found that the test revealed only five cases of newborns with unstable hip who showed limitation of flexion-abduction within seven days after birth. However, it is noteworthy that from one to five months after birth the number of cases with unstable hip showing limitation of flexion-abduction increases, and the test proves to be more useful as the diagnostic technique than the click sign or Barlow's test. Especially in our cases with congenital subdislocation, which differ from the report by Nozaki and others (1956-58), we have detected clinical limitation of flexion-abduction. In addition, even though the cases we handled were only a few in number, since it is easy to detect the loosening of hips which did not reveal limitation of flexion-abduction within three to six months, these techniques would help one another for diagnostic purpose.

The Time When Mass Screening is Indicated

We have confirmed 64 cases (87.8 per cent) out of 73 unstable hips that we examined at three months after birth. In 9 cases where diagnoses were not established, there were 3 cases thought to be misdiagnosed, 5 cases that had no examination at the age of three months, and one case of congenital subdislocation revealing limitation of flexion-abduction in clinical examination but not confirmed by x-ray photographs at the third postnatal month. Furthermore, we observed two cases of congenital hip dislocation with normal clinical findings at the age of three months due to spontaneous healing. Then, if mass screening had been conducted at the age of three months, we believe it would have been possible to detect unstable hip in about 90 per cent by clinical techniques.

S U M M A R Y

As described in the foregoing, in Sweden click sign is being used as the diagnostic method for mass screening of newborns and all cases with unstable hip have been practically diagnosed. With the advance

in therapeutic techniques favorable results are being achieved. In view of such reports, we have also employed this technique on diagnosis of newborn babies, but we find our results are not quite as satisfactory. This may be due to our inadequate technique or this technique still requires further improvements.

In any event, needless to say, early diagnosis of congenital hip dislocation is imperative, and further improvements in this field are to be expected.

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