

UNSATISFACTORY RESULTS OF EARLY TREATMENT OF INFANTS WITH UNSTABLE HIPS AT BIRTH

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Among 19,864 infants born in Trondheim between 1 May 1969 and 31 December 1974 instability of the hip joint was diagnosed in 378 (19.03 per thousand live-born). All infants were treated with a Frejka cushion splint, usually for 3 months. In spite of this early treatment, 31 infants (8.2 per cent) developed subsequent signs of CDH. In 20 children the diagnosis of CDH was based solely on radiological criteria, while 11 children also displayed clinical abnormalities, most often restricted abduction of the hip joint. The prenatal and perinatal condition of the 31 children, with persistent signs of CDH in spite of early treatment, was compared with that of the 347 children who showed no obvious signs of CDH. The former group of patients had a relatively high frequency of hip abnormalities in their families, and an increased frequency of breech presentation at birth, concomitant foot deformities and instability of the hip joint also on the eighth day after birth. It is suggested that infants with unsatisfactory results from the early treatment of unstable hips constitute a separate clinical entity and an especially severe form of CDH.

Key words: hip; dislocation; congenital; early treatment; unsatisfactory results

Accepted 14.vii.77

On the basis of several reports (Weissman & Salama 1966, Finlay et al. 1967, James & Sevastikoglou 1970, Mitchell 1972, Bjerkreim 1974, Ackermann et al. 1974) it seems necessary to conclude that a certain number of infants with unstable hips at birth develop dysplasia or subluxation of the hip joint in spite of apparently correct early treatment.

The purpose of the present paper is to present the results of a detailed analysis of a group of children with unstable hips at birth in whom early therapy seemed to have failed.

PATIENTS AND METHODS

Among 19,864 infants born in Trondheim between 1 May 1969 and 31 December 1974 instability of the hip joint was diagnosed in 378 (19.03 per thousand live-born). A detailed description of the patients has been given in a previous paper (Cyvin 1977b).

All infants with unstable hips were treated with a Frejka cushion splint, usually for 3 months. In 347 patients (group B) the results of this early treatment were considered satisfactory.

Thirty-one infants (group A) subsequently developed signs of congenital dysplasia of the hip joint (CDH). The diagnosis of CDH was made before 3 months in two patients, between 3 and 6 months in nine, from 7 to 12 months in

Table 1. The criteria for the subsequent diagnosis of CDH in 31 children with unstable hips at birth.

Criteria of CDH	No. of patients
<i>Radiological only</i>	
Sloping of the acetabular roof and/or indistinctly marked lateral margin	11
Subluxation or luxation	3
Pathological acetabulum + subluxation	5
Retarded development of the femoral epiphysis	1
<i>Clinical + radiological (subluxation in all)</i>	
Restricted movements of the extremity	5
Restricted movements + shortening	6
Total	31

Table 2. Prolonged therapy of 31 children with unstable hips at birth.

Type of treatment	Duration in months			No. of patients
	0-3	4-6	> 6	
Abduction splint	15	13	3	31
Plaster cast	4	13	14	31
Operation				5

twelve and after 12 months in eight. Table 1 shows the criteria on which the diagnosis of CDH was based.

In all patients in group A, prolonged treatment was instituted at the Orthopaedic Department of the Regional Hospital. Table 2 shows the type and duration of the different therapeutic procedures.

Information regarding the prenatal and perinatal condition of the patients was obtained from maternity unit records. The following data were recorded:

a) Family history of abnormalities of the hip joint and other malformations.

b) The age and parity of the mother, and history of previous abortions or stillbirths.

c) Abnormalities of pregnancy such as proteinuria, elevated blood pressure, signs of infection, diabetes, Rhesus immunisation, administration of drugs, X-ray examination or therapy, and studies of placental function.

d) Duration of pregnancy estimated from the date of the last menstrual period.

e) The course of delivery including type of presentation, special procedures (oxytocin induction, rupture of the membranes, forceps or vacuum extraction, caesarean section), and the following complications: bleeding, pathological foetal heart beat, meconium stained liquor, duration of delivery exceeding 24 hours, and efflux of liquor more than 12 hours before delivery.

f) The birth weight, birth length, head circumference, and Apgar score of the child and pathological findings such as signs of dysmaturity, hypotonia, irritability, jaundice and malformations.

g) The weight of the placenta and any macroscopic abnormalities, especially infarcts and calcification.

h) Date of examination, name of examiner, side affected, degree and duration of the instability of the hip, and treatment instituted.

Information regarding the subsequent management of the cases of CDH was obtained from the records of the Orthopaedic Department of the Regional Hospital.

The collected data were processed in a UNIVAC 1108 computer at the Computing Centre of the University of Trondheim. The mean values for group A and group B were computed. Differences of means were tested by the *t*-test and *P*-values below 0.05 were regarded as statistically significant. When indicated, regression curves and confidence limits were computed. A correlation coefficient of greater than 0.75 was regarded as significant.

RESULTS

Table 3 shows the frequency of hip joint abnormalities in the families of infants with unsatisfactory and satisfactory results from the early treatment of unstable hips. CDH occurred significantly more often in group A families than in those of group B ($P < 0.01$).

There was no significant difference in the incidence of previous abortions or stillbirths between mothers of group A and those of group B.

There were no significant differences between infants in group A and those in group B in the incidence of the following gestational complications: emesis, early and late bleeding, polyhydramnions, anaemia, pelvic instability, neurological

Table 3. Hip joint abnormalities in the families of 31 infants with persistent signs of CDH in spite of early treatment (group A) and in those of 347 early treated infants without obvious persistent abnormalities (group B).

Relatives	Group A			Group B		
	CDH	Others	Total	CDH	Others	Total
1st degree	5	0	5	34	2	36
Others	6	0	6	29	12	41
Total	11 (35.5 %)	0	11	63 (18.2 %)	14	77

Table 4. Course of labour in mothers of 31 infants with persistent signs of CDH in spite of early treatment (group A) and in mothers of 347 early treated infants without obvious persistent abnormalities.

Course of labour	Group A		Group B	
	No.	%	No.	%
Spontaneous	16	51.6	243	70.0
Oxytocin induction	11	35.5	56	16.1
Rupture of membranes	2	6.5	25	7.2
Vacuum extraction, forceps	3	9.7	25	7.2
Caesarean section	0	0.0	20	5.8

symptoms, blood pressure above 140/90, proteinuria, and infections.

There was no significant difference between mothers of group A and those of group B in the use of the following drugs: antiemetics, diuretics, antibiotics, hormones, and sedatives.

Table 4 shows the frequency of special procedures during the delivery of mothers

in group A and those in group B. Spontaneous delivery occurred significantly more often in group B than in group A, whereas oxytocin induction was instituted more often in mothers of group A than in mothers of group B. The different incidence of caesarean section in the two groups is not statistically significant.

There was no significant difference in

Table 5. The birth presentation of 31 infants with persistent signs of CDH in spite of early treatment (group A) and of 347 early treated infants without obvious persistent abnormalities.

Birth presentation	Group A		Group B	
	No.	%	No.	%
Left occiput anterior	19	61.3	198	57.1
Right occiput anterior	2	6.5	81	23.3
Breech, left sacrum anterior	4	12.9	41	11.8
Breech, right sacrum posterior	3	9.7	13	3.7
Breech, unspecified	0	0.0	1	0.3
Footling, left sacrum anterior	1	3.2	2	0.6
Footling, right sacrum posterior	1	3.2	2	0.6
Left brow	0	0.0	8	2.3
Unspecified	1	3.2	1	0.3

the complications of delivery between mothers of group A and those of group B.

In Table 5 can be seen the birth presentation of infants in group A and group B. The total frequency of breech presentation was 29.0 per cent in group A and 17.0 per cent in group B. The difference is statistically significant on the basis of the $A > B$ -hypothesis, but not on the basis of the $A \neq B$ -hypothesis.

Some of the characteristics of infants in group A and group B are shown in Table 6. Foot deformities occurred more frequently in group A than in group B ($P < 0.01$), otherwise there was no significant difference between the two groups.

Table 7 shows the sex distribution and birth rank of infants with satisfactory and unsatisfactory results from early

treatment. There was no significant difference in the sex distribution, but birth rank one occurred significantly more often in group B than in group A when the $B > A$ -hypothesis was adopted.

From Table 8 can be seen the incidence of perinatal asphyxia by the Apgar scores. There was no significant difference between infants in group A and those in group B.

Table 9 shows the results of the luxation provocation test on the first or second day of life and on the examination at the age of 1 week. Results of the first examination are similar in groups A and B. On the last examination 29 per cent of infants in group A and 11.5 per cent of infants in group B showed persistent instability of the hip joint. The difference is statistically significant ($P < 0.01$).

Table 6. Some characteristics of 31 infants with persistent signs of CDH in spite of early treatment (group A) and of 347 early treated infants without obvious persistent abnormalities (group B).

Characteristics	Group A		Group B	
	No.	%	No.	%
Foot deformities	3	9.6	6	1.7
	Mean	S.D.	Mean	S.D.
Gestation (days)	284.80	12.32	286.14	10.35
Birth weight (g)	3644.88	490.53	3618.24	498.21
Birth length (cm)	51.28	1.90	50.93	2.07
Head circumference (cm)	35.44	1.15	35.56	1.73
Weight of placenta (g)	692.06	153.50	672.82	137.84

Table 7. Sex distribution and birth rank in 31 infants with persistent signs of CDH in spite of early treatment (group A) and in 347 early treated infants without obvious persistent abnormalities (group B).

	Group A		Group B		Total	
	No.	%	No.	%	No.	%
Boys	7	22.6	86	24.8	93	24.6
Girls	24	77.4	261	75.2	285	75.4
Total	31	100.0	347	100.0	378	100.0
Birth rank one	11	35.4	178	51.3	189	50.1

Table 10 shows the correlation between the side affected at birth and the lateralisation of subsequent pathological findings in the hip. It can be seen that in 12 infants (38.7 per cent) there was a positive correlation between the findings at birth and the late diagnosis of dysplasia.

Table 8. Apgar scores of 31 infants with persistent signs of CDH in spite of early treatment (group A) and of 347 early treated infants without obvious persistent abnormalities (group B).

Apgar scores at the age of 5 min	Group A		Group B		Total	
	No.	%	No.	%	No.	%
0-4	0	0.0	6	1.7	6	1.5
5-8	0	0.0	4	1.2	4	1.1
9-10	31	100.0	337	97.1	368	97.4
Total	31	100.0	347	100.0	378	100.0

Table 9. Results of the examination of the hip joint at birth in 31 infants with persistent signs of CDH in spite of early treatment (group A) and in 347 early treated infants without obvious persistent abnormalities (group B).

Side affected	Group A		Group B		Total	
	No.	%	No.	%	No.	%
Right	10	32.3	93	26.8	103	27.2
Left	12	38.7	138	39.8	150	39.7
Bilateral	9	29.0	116	33.4	125	33.1
Total	31	100.0	347	100.0	378	100.0
Stable on first examination	1	3.2	11	3.2	12	3.2
Persistent instability after 1 week	9	29.0	40	11.5	49	13.0

Table 10. Correlation between the side affected at birth and the localisation of the subsequent dysplasia/subluxation in 31 infants with persistent signs of CDH in spite of early treatment.

Unstable hip at birth	Late dysplasia or subluxation			Total
	Right	Left	Bilateral	
Right	5	3	2	10
Left	3	3	6	12
Bilateral	3	2	4	9
Total	11	8	12	31

DISCUSSION

The results of the early therapy of unstable hips in newborn infants vary considerably in different series. Some authors (Palmén 1961, von Rosen 1970, Fredensborg 1976) report excellent results, while others include smaller or larger groups of patients in whom apparently correct early treatment has failed (Finlay et al. 1967, James & Sevastikoglou 1970, Mitchell 1972).

In the present series the therapeutic results of the early treatment of 378 infants with unstable hips at birth were considered unsatisfactory in 31 (8.2 per cent). Similar discouraging results have been presented by Weissman & Salama (1966), Bjerkreim (1974) and Ackermann et al. (1974).

The variable results of the different follow-up studies may be due to one or more of the following factors:

1. "Congenital dislocation of the hip" probably covers several clinical entities with different aetiology and pathogenesis (Carter & Wilkinson 1964, Wynne-Davies 1970, Stohr 1972, Wilkinson 1972). In a great proportion of infants, mostly girls, the instability of the hip joint at birth is associated with a prolonged gestational period (Cyvin 1977 b) and a hormonal disorder (Andrén & Borglin 1961). The majority of these infants will recover spontaneously. A small proportion of infants with a relatively short gestational period and stable hips at birth may develop CDH at a later stage, either due to inherited or environmental factors (Cyvin 1977 b). The present group of infants with unstable hips at birth and subsequent development of CDH possibly represents a third pathogenetic entity. In Norway this manifestation of CDH seems to occur relatively frequently (Bjerkreim 1974) in contrast to Sweden (Palmén 1961, Fredensborg 1976). The results of early treatment of CDH must necessarily be influenced by

the relative frequency of the various types of the hip disorder in the different series.

2. Different therapeutic results of the treatment of CDH may also be due to lack of standardised diagnostic procedures and different definitions of the concept "dysplasia" (Finlay et al. 1967, Sommer 1971, Uher 1972, Mitchell 1972, Moore 1974, Komprda 1974). It may be noted that in the present series the diagnosis was based solely on radiological criteria in 20 patients, whereas 11 children displayed clinical abnormalities as well. The evaluation of the acetabular sloping and the lateral acetabular margin is sometimes difficult (Felländer et al. 1970) and it is generally accepted that there exist great individual and age-dependent variations of the acetabular appearance (Caffey et al. 1956). Even among children with positive clinical findings the diagnosis may be difficult. In a large proportion of infants one-sided limited abduction of the hip is probably due to habitual oblique positioning of the infants (Palmén, personal communication 1977). This benign condition will recover spontaneously.

3. The different long-term results of the early therapy of CDH may depend on different therapeutic regimes (Felländer et al. 1970, Emnéus & Undeland 1971, Lauritzen 1971, Ilfeld et al. 1972). A great number of different splints are in use (Frejka 1941, von Rosen 1970, Palmén 1961), and the duration of splintage varies from a few weeks (Palmén 1961) to several months (Weissman & Salama 1966).

The present series of 31 infants with unsatisfactory results from early treatment of unstable hips shows the following features: a relatively high frequency of hip abnormalities in the families, a relatively low incidence of birth rank one and a relatively high frequency of breech presentation at birth, associated foot deformities, and persistent instability of

the hip joint. These characteristics are not sufficient to allow a precise definition of the group. However, they seem to lend some support to the view that the children under discussion represent a clinical entity including pronounced instability of the hip joint at birth and a tendency to late development of CDH, possibly on a hereditary basis.

The poor correlation between the instability of the hip joint at birth and the subsequent clinical and radiological findings is in agreement with results reported previously (Cyvin 1977 a). The results demonstrate the unclear and complicated relationship between so-called neonatal CDH and late-diagnosis CDH, both of which probably represent heterogenous groups of patients.

A question of great importance is whether it is possible to prevent the pathological development of unstable hips in the small group of severely affected children solely with abduction splints.

More frequent examination will probably disclose some patients with subluxation of the hip in spite of the splintage. Some parents obviously need more detailed and repeated instructions both on the close observation of the child and on the principles of correct therapy.

Special attention ought to be paid to infants with a hereditary predisposition to CDH, infants born by breech delivery and those with foot abnormalities or prolonged instability of the hip.

ACKNOWLEDGEMENTS

The present investigation was carried out at the Paediatric Clinic of the Regional Hospital of Trondheim.

I am greatly indebted to Professor Per Edvardsen, the Head of the Orthopaedic Department of the Regional Hospital, for his great interest in the project and his valuable advice.

To all colleagues, both at the Paediatric Clinic and the Orthopaedic Department, I wish to express my gratitude for their cooperation.

Paul Rusten, M.Sc., has carried out the technical part of the computer work and helped me with the statistical analysis. For this I am very grateful. My thanks are due also to Dr. James Judson who corrected the English text.

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