Instability of the hip in neonates

AN ETHNIC AND GEOGRAPHICAL STUDY IN 24 101 NEWBORN INFANTS IN MALMÖ

L. G. Danielsson

From Malmö University Hospital, Malmö, Sweden

In a prospective study conducted between 1990 and 1997, 24 101 newborn infants were examined for neonatal instability of the hip and classified by the ethnic origin of their parents. In 63% their mother and father were of Swedish extraction and in 24% they were born in a foreign country. Those of foreign extraction were split into ethnic and geographical subgroups. Although the incidence of treated (dislocatable-unstable) hips was greater in Swedes (7.6‰), than in other geographical groups (5.8‰) it was not significantly different ($p = 0.065$). A total of 12.7‰ were referred from the neonatal ward to the orthopaedic clinic with suspected dislocatable or unstable hips; 6.8‰ were treated (5.4‰ dislocatable, 1.4‰ unstable), but 5.9‰ were not treated since their ultrasound examination was normal.

Two hips were diagnosed late and one case of mild avascular necrosis was found. Examination by dynamic ultrasound decreased the number of treated cases by 5.9‰ but was not an absolute guarantee of diagnosis.

J Bone Joint Surg [Br] 2000;82-B:545-7.

Received 30 June 1999; Accepted after revision 12 November 1999

The incidence of neonatal instability of the hip (NIH), as well as early and late diagnosed developmental dysplasia (DDH), differs from place to place.¹ Definition, age at clinical and ultrasound examination, ligamentous laxity, postnatal position, as well as ethnic factors have been discussed. There have been no well-defined studies on the incidence of NIH and DDH in different geographical or ethnic groups in which the investigators and the routines of examination were the same and in which the parents' primary geographical or ethnic origin was registered.

In Malmö the number of immigrants and refugees, as

well as of newborn infants with parents of foreign extraction, has drastically increased during recent years. Detailed census data are available which have provided information for a prospective study of the geographical and ethnic influences on NIH and DDH.

Patients and Methods

NIH is defined, in this study, as a condition in which the hip is dislocated, dislocatable or unstable at examination during the first five days after delivery. Teratological and neuromuscular cases were excluded. Detailed census data and information from the parents allowed determination of their ethnic origin.

From 1990 to 1997, all living newborn infants in Malmö were examined clinically for NIH within five days, and most within two days, by a paediatrician (Table I). Those with clinically indisputable dislocated or dislocatable hips were referred directly to the orthopaedic clinic (Table I). Patients in whom the paediatricians judged that the hips were clinically unstable, but not clinically dislocatable,² were examined using a dynamic anterior ultrasonic technique.³ This was carried out in nearly all infants on the day of referral, but in a few up to five days after delivery. The radiologist and the paediatric orthopaedic surgeon measured the instability together. The orthopaedic surgeon carried out the dislocation-reduction manoeuvre. If the femoral head was dislocatable on sonography, the child was treated in a von Rosen splint for three months. If the femoral head was not dislocatable, but the sonographic displacement of the head exceeded one-fourth (≥ 4 mm) of its diameter, the patient was treated for six weeks in a von Rosen splint (Table I). If the sonographic displacement of the femoral head was less than one-fourth (< 4 mm) of the diameter of the head, the patient was not treated.⁴

All patients, whether treated or untreated, were examined clinically one week after the first orthopaedic examination, after three months and at one year. Radiological examination was also carried out at three months and one year.

The infants were classified with regard to the ethnic origin of their parents.

For statistical analysis chi-squared and Fisher's exact tests were used.

L. G. Danielsson, PhD, Associate Professor
Department of Orthopaedics, Malmö University Hospital, SE-205 02
Malmö, Sweden.

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0301-620X/00/410331 \$2.00

Table I. Number of living newborn infants in Malmö between 1990 and 1997 and the number referred to the orthopaedic clinic with suspected NIH classified with regard to final diagnosis and parents' extraction

	Total number	Referred	Treated	Dislocatable	Unstable	Not treated
Total number	24 101	306	163	129	34	143
Main groups						
Mother and father of Swedish extraction	15 189	211	115	93	22	96
Mother or father of foreign extraction	3185	34	15	10	5	19
Mother and father of foreign extraction	5727	61	33	26	7	28
Subgroups of ethnic origin						
Mother and father from Iraq, Iran, Lebanon	1604	8	7	6	1	1
Mother and father from Yugoslavia	861	4	3	1	2	1
Mother and father from Africa	439	2	2	2	0	0

Table II. Comparison between 15 189 newborn infants with both parents of Swedish extraction and 5727 with both parents of foreign extraction

	Total (%)	Parents of Swedish extraction (%)	Parents of foreign extraction (%)	p value
Referred	12.7	13.9	10.7	0.065
Treated	6.8	7.6	5.8	0.164
Dislocatable	5.4	6.1	4.5	0.175
Unstable	1.4	1.4	1.2	0.695
Not treated	5.9	6.3	4.9	0.229

Results

Newborn infants with an entirely Swedish parentage were compared with those with both parents of foreign extraction. There was a higher incidence of referred, treated, dislocatable, unstable and untreated hips in the Swedish group but this was not statistically significant (Table II). In a further comparison of subsets of ethnic and diagnostic groups no significant differences were found. The hypothesis that infants with parents of foreign extraction (immigrants, refugees) have a higher incidence of NIH and DDH was not supported by these findings.

Two patients with DDH were diagnosed late. The first was referred to the orthopaedic clinic the day after delivery. At birth the neonatologist considered that the left hip was dislocatable. On the day after delivery another neonatologist classified the left hip as definitely unstable. Later the same day an experienced paediatric orthopaedic surgeon could not confirm any instability and a dynamic ultrasound examination at that time was considered to be normal. The child was re-examined one week later when clinical and dynamic ultrasound examinations were still considered normal. The child was therefore not treated. Clinical and radiological examination at the age of three months showed that the hip was dislocated. The second patient was classified as normal at birth. A routine check at the child health centre at four months revealed a dislocation of the left hip. Closed reduction after skin traction and adductor tenotomy

was carried out in both cases. One hip treated in a van Rosen splint for three months showed mild avascular necrosis at the age of one year. Radiographs at the age of 4.5 years were normal.

Discussion

In a survey of the literature, Tachdjian¹ found that the reported incidence of DDH varied from 188.5 per 1000 in Canadian Indians to zero among Bantus in Africa. Edelman⁵ reported that among 16 678 Bantu infants he had not found a single case of dysplasia and Paterson⁶ stated that DDH was very rare among Aborigines. Artz et al⁷ found unstable hips to be three times more common among Caucasians than Negroes in New York.

In very few of these reports were the different ethnic groups examined by the same investigators and with full knowledge of detailed census data. In Malmö the number of patients referred with NIH varied from 36‰ in 1981 to 9‰ in 1992 and the number of patients treated from 35‰ in 1980 to 4.5‰ in 1994. It is therefore easy to understand that figures for studies on incidence from different geographical areas, with different examiners and different definitions of NIH, may be unreliable.

In our study we found no significant difference in the incidence of diagnosed and treated NIH between newborn infants with both parents of Swedish extraction and those with both parents of foreign extraction. The subgroups

were, however, comparatively small. The general tendency was for NIH to be more common among infants of Swedish than of foreign extraction. A study with greater numbers in the subgroups may very well have proved to be more significant. The general conclusion is that in Malmö NIH is at least not less common among newborn infants of Swedish extraction than among those of foreign extraction.

Ligamentous hyperlaxity, mechanical forces, intrauterine malposition and genetic, racial, geographical and environmental factors causing NIH and DDH have been discussed.¹ The findings in our study support the theory that genetic, racial and geographical factors are of minor importance in the early diagnosis of NIH and DDH and that organisation is of particular importance in the outcome of screening. The incidence of late diagnosis of DDH was 0.08%. This is comparable with the previously reported incidence in Malmö of 0.07%⁸ and 0.16% found between 1956 and 1988 (129 734 living newborn infants). One of the two late diagnosed hips was dislocatable at birth, but judged to be stable at clinical and ultrasound examination after one day and one week. A similar case has been reported by Holen et al.⁹ It is not possible to state if the finding of a hip which is originally dislocatable, then is considered stable and later found to be dislocated is a rare,

but natural occurrence or due to human error in examination. Sonography diminished the number of treated cases, but did not totally eliminate late diagnosis.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

References

1. **Tachdjian M.** *Paediatric orthopaedics*. 2nd ed. Vol. 1. Philadelphia: W B Saunders Co, 1990:296-312.
2. **Barlow TG.** Early diagnosis and treatment of congenital dislocation of the hip. *J Bone Joint Surg [Br]* 1962;44-B:292-301.
3. **Dahlström H, Öberg L, Friberg S.** Sonography in congenital dislocation of the hip. *Acta Orthop Scand* 1986;57:402-6.
4. **Dahlström H.** Dynamic ultrasonic evaluation of congenital hip dislocation. Thesis, Umeå University, 1989.
5. **Edelstein J.** Congenital dislocation of the hip in the Bantu. *J Bone Joint Surg [Br]* 1966;48-B:397.
6. **Paterson DC.** The early diagnosis and treatment of congenital dislocation of the hip. *Clin Orthop* 1976;119:28-38.
7. **Artz TD, Levine DB, Ngo Lim W, Salvati EA, Wilsson PD Jr.** Neonatal diagnosis, treatment and related factors of congenital dislocation of the hip. *Clin Orthop* 1975;110:112-36.
8. **Fredensborg N.** The results of early treatment of typical congenital dislocation of the hips in Malmö. *J Bone Joint Surg [Br]* 1976;58-B:272-8.
9. **Holen KJ, Tegnander A, Terjesen T, Johansen OJ, Elk-Nes SH.** Ultrasonography of clinically unstable hips: a prospective study of 143 neonates at birth and early follow-up. *Acta Orthop Scand* 1997;68:527-32.