PAPERS AND SHORT REPORTS

Congenital hip dislocation: an increasing and still uncontrolled disability?

JOHN C CATFORD, GEORGE C BENNET, JOHN A WILKINSON

Abstract

A study of 178 cases of congenital dislocation of the hip in babies born between 1965 and 1978 in Southampton health district showed that the incidence had virtually doubled over this period. Established cases (persisting beyond the first birthday) had risen to around two cases per 1000 live births. One-third of these were first diagnosed after the age of 1 year and one-fifth after 18 months. The findings are particularly disappointing as there were opportunities after the neonatal period for earlier diagnosis. Thus, neonatal screening appears to have failed to make a substantial impact on the morbidity of the disease, probably because of a combination of inherent difficulties in the neonatal screening test as well as failure in its proper application. Much greater vigilance is needed during the first year of life if congenital dislocation of the hip is to be detected and treated as early as possible. Perhaps this could be achieved if all health professionals were more aware of the problem and were encouraged to examine hips at every opportunity and health authorities periodically audited their results.

Introduction

Congenital dislocation of the hip is one of the commonest congenital deformities of the locomotor system. The reported incidence varies widely.¹⁻³ This can partly be attributed to differences in diagnostic criteria. Treatment after the first year of life results in a poorer prognosis, greater distress to the child and family, and increased costs to the health service.⁴⁻⁶

The development of tests aimed at detecting the defect in

the neonatal period by Ortolani⁷ in 1937 and later by Von Rosen⁸ and Barlow⁹ led to hopes that early detection and treatment would prevent or reduce later disability. Routine testing programmes in the neonatal period were introduced in several countries in the 1950s.⁸⁻¹¹ Clearly not all cases of congenital dislocation of the hip, however, are clinically detectable in the neonatal period.^{5 12 13} Nevertheless after the age of 2 months limited abduction is present in almost all cases.¹⁴ Certainly by the age of 1 year the clinical diagnosis should be comparatively easy in most children.

In the Southampton health district routine screening of all children at birth has been practised since 1965. In addition child health clinics have provided developmental and physical screening examinations during the first year of life. Most children will have seen their general practitioner on at least three occasions before the age of 1 year.¹⁵ By that time 90% or more children will have attended the health service for three immunisations. If the hips had been examined on these occasions it might be expected that all cases of congenital dislocation of the hip would have been detected during the first year of life.

From 1965 to 1971 cases diagnosed in the neonatal period were treated using rigid Barlow splints. Because of the inherent risk of producing avascular necrosis, however, neonatal treatment was changed in 1972 to prone lying and the wearing of double nappies. If the hips remained dislocated at the age of 1 year frame reduction and surgical treatment were started.¹⁶

As part of a programme of research into the epidemiology and treatment of congenital dislocation of the hip, we sought to determine its incidence and the cause of delayed diagnosis in Southampton with a view to recommending changes in clinical practice if required. Alternative methods of collecting and analysing data were also investigated.

Patients and methods

In this study cases of congenital dislocation of the hip were included only if an orthopaedic surgeon considered there was clear hip instability. This meant either a positive Ortolani or Barlow sign or radiographic evidence of dislocation at 1 year or later. Stable "clicking" hips and dislocations secondary to neurological disorders were not included. Cases were classified into resolving or established groups.

Faculty of Medicine, Southampton University, Southampton SO9 4XY

JOHN C CATFORD, MRCP, MFCM, specialist in community medicine
GEORGE C BENNET, FRCS, lecturer in orthopaedic surgery (now consultant in orthopaedic surgery, Royal Hospital for Sick Children, Glasgow)
JOHN A WILKINSON, MCh, FRCS, consultant orthopaedic surgeon

Resolving cases were those diagnosed in the first year of life that had returned to normality by the first birthday. Established cases were defined as those in children who had persistent hip displacement after the age of 1 year. This group included cases diagnosed at any age, and the severity would be such that hospital admission would normally be required.

A list of 178 cases in babies born between 1965 and 1978 to mothers resident in the Southampton health district was obtained from the Southampton register of congenital dislocation of the hip. This had been set up by JAW in 1965, who with the agreement of his colleagues had managed all the cases in the district. In addition, 62 established cases were obtained from Hospital Activity Analysis by computer searching of the 1975-79 files for all admissions of Southampton district residents over the age of 12 months who had been admitted with the International Classification of Diseases diagnosis No 755.6. This was to determine the validity of an alternative method of obtaining a diagnostic listing of established cases in the absence of a register. These cases were a subset of the register cases. Hospital case notes and other medical records were then abstracted for (a) confirmation of diagnosis; (b) neonatal examination result and tester; (c) age at diagnosis by orthopaedic surgeon; (d) evidence of previous medical contacts; and (e) history of presentation. The number of live births in Southampton health district from 1965 to 1978 was obtained from the registrar general.

VALIDITY

As all the cases had been managed by the same consultant orthopaedic surgeon, there was no change in diagnostic criteria or indications for surgical treatment over the period of study. In view of the special interest that had been taken in the disease the validity of the register and case notes was thought to be very high.

In the birth cohort group of cases from the Southampton register it is highly likely that all established cases in babies born between 1967 and 1977 who were then resident in the Southampton district would have been included as there was a general policy to refer all cases to the same orthopaedic surgeon. As at 31 December 1981 some very late cases for birth cohorts in 1977 and 1978 may have been undetected. Since, however, the vast majority present before the third birthday, any further additions to these cohorts will not alter the results significantly.

In the cross-sectional group of cases from Hospital Activity Analysis files hospital notes were subsequently inspected and a few misclassified cases excluded. Omissions in the files of true cases were not ascertained and therefore the frequency of established cases using this method may have been underestimated. There is no reason, however, why earlier diagnosed cases should be omitted from the Hospital Activity Analysis files in preference to later diagnosed ones since the records are processed in exactly the same way. Therefore, comparison of the proportion of cases diagnosed at different ages is justified.

Children who had been born in Southampton but had moved out of the district before diagnosis were not included in the study. As such migration has been small the incidence will therefore be only slightly underestimated.

Results

The reported incidence of resolving and established cases is shown in table I for 1965 to 1978. In fig 1 the data are presented in five-year moving averages to smooth out the small number effect. When established cases were subdivided into three groups by age of diagnosis five-year moving averages indicated an increasing trend in each group. It is evident therefore that the incidence of congenital dislocation of the hip has been increasing over this period, although variation about this general trend is considerable (Kendall's rank correlation coefficient: rate of all cases against individual year, $T = 0.47$, $p < 0.05$). This increase is mostly due to a threefold rise in established cases from around 0.7/1000 in the late 1960s to 2.2/1000 10 years later. The sharpest upturn in the number of established cases appeared to occur after 1971. This coincided with a change in the management of neonatal cases from rigid splinting to the use of double nappies. There was, however, still a sustained rise after then when the method of treatment remained constant. The incidence of resolving cases declined during the early 1970s and then rose subsequently towards the level of the late 1960s.

The percentage of established cases by age of diagnosis for these groups of cases is shown in fig 2. Overall about two-thirds were diagnosed before the first birthday and four out of five by the age of 18 months. The results of the Hospital Activity Analysis group of cases mirrored those of the birth cohort 1972-78, which is to be expected as many cases are represented in both groups. The origin of referrals is shown in table II; 61% of all cases and 31% of established cases were diagnosed through screening procedures chiefly in the neonatal period. Thirty per cent of all cases and 55% of established cases, however, presented because of parental concern. Of these, all had been examined for congenital dislocation of the hip in the neonatal

TABLE 1—Incidence of cases of congenital dislocation of the hip per 1000 live births: source, Southampton register. (Number of cases are given in brackets)

Year of birth	Resolving cases	Established cases by age of diagnosis			
		< 2 ms	2 ms-< 1 y	1-< 5 y	All cases
1965..	0.31(2)	0(0)	0(0)	0.62(4)	0.94(6)
1966..	0.78(5)	0(0)	0(0)	0.47(3)	1.25(8)
1967..	0.97(6)	0(0)	0.48(3)	0.32(2)	1.79(11)
1968..	1.83(11)	0(0)	0.82(5)	0(0)	2.65(16)
1969..	1.68(10)	0.16(1)	0(0)	0.33(2)	2.19(13)
1970..	1.7(10)	0.34(2)	0.34(2)	0.17(1)	2.55(15)
1971..	0.68(4)	0.17(1)	0.51(3)	0.51(3)	1.87(11)
1972..	0.55(3)	0.18(1)	0(0)	0.18(1)	0.91(5)
1973..	0.37(2)	0.56(3)	0.75(4)	0.37(2)	2.06(11)
1974..	0.81(4)	0.40(2)	0(0)	1.01(5)	2.22(11)
1975..	1.46(7)	1.67(8)	0.62(3)	0.42(2)	4.16(20)
1976..	0.87(4)	0.65(3)	0.44(2)	0.22(1)	2.18(10)
1977..	1.59(7)	1.13(5)	1.36(6)	1.13(5)	5.22(23)
1978..	1.09(5)	0.87(4)	0.87(4)	1.09(5)	3.92(18)
1965-78	1.04(80)	0.39(30)	0.42(32)	0.47(36)	2.32(178)

FIG 1—Incidence of congenital dislocation of the hip in five-year moving averages.

FIG 2—Percentage of established cases of congenital dislocation of the hip by age of diagnosis.

TABLE II—Origin of referral of cases of congenital dislocation of the hip to orthopaedic surgeon (Southampton register)

Referral source	%, Of all cases (n = 178)	%, Of established cases (n = 98)
Asymptomatic cases:		
Screening programmes		
Age < 2 months ..	56	31
Age ≥ 2 months ..	5	0
Other medical contact ..	5	9
Symptomatic cases:		
Clinical presentation ..	30	55
Not known ..	3	5

period, and over 90% had had several contacts with medical and nursing services before diagnosis. For those diagnosed over the age of 1 year there had been at least one health service contact between the ages of 6 and 12 months when the diagnosis could have been made. This contact was usually for immunisation. Reasons for self-referral were parental concern because the child was limping or had limited abduction.

Of the 106 cases known before diagnosis to be at high risk of congenital dislocation of the hip (because of breech delivery, caesarean section for breech, twins, first-degree relative affected), 76% were successfully diagnosed in the first two months of life. Only 26% of the 72 low-risk cases were, however, diagnosed in this period.

Discussion

This is one of the largest series of cases of congenital dislocation of the hip reported. It is also one of the few that is truly population based, involving community and hospital births followed up carefully for many years. The epidemiology of the defect is complicated because (a) diagnostic criteria between clinicians are not standard, especially for those cases detected in the neonatal period (b) many neonatal cases resolve completely with little or no treatment; and (c) if only high-severity groups are studied, such as established cases persisting over the age of 1 year, then the apparent incidence is affected by the successes and failures of screening and treatment in the first year of life.

Despite these difficulties our data suggest that the true incidence of congenital dislocation of the hip is increasing. It is true that the treatment of neonatal cases in this series was changed in 1971 (from rigid splinting to the less effective but less damaging method of prone lying with double nappies). Accordingly the incidence of established cases diagnosed in the neonatal period increased with an associated decline in neonatal cases which resolved. Nevertheless, the overall trend between 1965 and 1978 for all groups has been upwards. We have no reason to think that the standards of neonatal screening have deteriorated during this period. The observation of a rising incidence is supported by a reported increase in hospital admission rates for congenital dislocation of the hip in England and Wales, especially among girls.¹⁷ Workers in Israel¹⁸ and the USA¹⁹ have also reported a rise. The cause for this is as yet unknown.

The results clearly show that despite the introduction of neonatal screening in the early 1960s in Southampton we have failed to make a substantial impact on avoiding the late diagnosis of cases. There is some evidence, however, that the proportion of established cases diagnosed before the first birthday has increased in recent years. This gives no cause for complacency because one in three cases are still first diagnosed after 12 months of age and one in five over the age of 18 months.

The failure of neonatal screening in Southampton is likely to be partly attributable to the inappropriate application of tests. Studies have shown that false-negative results can be reduced if examinations are performed by more senior staff who have had considerable experience with congenital dislocation of the hip.²⁰ In Southampton most of the neonatal screening

was carried out by recently qualified doctors or general practitioners. Some cases may be very difficult to diagnose by the standard tests in the neonatal period, especially when the dislocations are irreducible. JAW reported²¹ that late cases were found to have a limbus associated with contracture of the anterior capsule. This soft tissue deformation might account for the lack of the characteristic "clunk" of reduction and hence the negative result on neonatal screening.

Although it may be understandable to overlook some cases of congenital dislocation of the hip within two months of birth, it is a matter of concern that so many present symptomatically after the first birthday. There were opportunities for much earlier diagnosis in our opinion, but these were missed as the hips were not examined. The deficiency lies therefore not with lack of parental interest in preventive medicine (for example, over 90% attended for immunisations) but rather with a lack of awareness, motivation, and application of skills among health professionals. It can be argued from our data that children attending for immunisation during the first year of life run a higher risk from undiagnosed congenital dislocation of the hip than they do from catching severe whooping cough.

The Hospital Activity Analysis method of obtaining a diagnostic listing provided a useful alternative method of studying some aspects of screening for congenital dislocation of the hip. The results for age of diagnosis compared favourably with the relevant birth cohort results. There is no reason therefore why districts without special diagnostic registers should not review their own performance.

We recommend that: (a) more experienced medical staff should examine hips in the first 48 hours of life; if senior house officers have to be used for this work their results should be checked for an initial period; (b) all health professionals concerned with the care of young children should receive continuing education on congenital dislocation of the hip and particularly should be taught to avoid a false sense of security from a negative result on neonatal screening; (c) all health professionals who come into contact with children in the first year of life should examine the hips as part of normal practice; midwives, nurses, or health visitors have an important contribution to make and hip examination should not be seen as a medical monopoly (if, for instance, immunisations were routinely given in the buttock rather than the shoulder it would only take a matter of seconds to check the hips); and (d) districts should regularly review their own performance at detecting cases; sophisticated diagnostic registers are not necessary and simple listings from Hospital Activity Analysis are sufficient; all cases diagnosed after the first birthday should be carefully scrutinised and the results, rendered anonymous, should be made widely available in an attempt to promote better awareness of the problem and to increase vigilance.

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References

- 1 Von Rosen S. Further experience with congenital dislocation of the hip in the newborn. *J Bone Joint Surg* 1968;**50B**:538-41.
- 2 MacKenzie I. Congenital dislocation of the hip. *J Bone Joint Surg* 1972;**54B**:18-39.
- 3 Jones D. An assessment of the value of examination of the hip in the newborn. *J Bone Joint Surg* 1977;**59B**:318-22.
- 4 Muller GM, Seddon HJ. Late results of treatment of congenital dislocation of the hip. *J Bone Joint Surg* 1953;**35B**:342-62.
- 5 Harrold A. Problems in congenital dislocation of the hip. *Br Med J* 1977;*i*:1071-3.
- 6 Gibson PH, Benson MKD. Congenital dislocation of the hip: review at maturity of 147 hips treated by excision of the limbus and derotation osteotomy. *J Bone Joint Surg* 1982;**64B**:169-75.
- 7 Ortolani M. Un segno poco noto e sua importanza per la diagnosi precoce di premassazione congenita dell'anca. *Pediatrics (Napoli)* 1937;**45**:129-36.

- ⁸ Von Rosen S. Early diagnosis and treatment of congenital dislocation of the hip joint. *Acta Orthopaedica Scandinavica* 1956;**26**:136-40.
- ⁹ Barlow TG. Early diagnosis and treatment of congenital dislocation of the hip. *J Bone Joint Surg* 1962;**44B**:292-310.
- ¹⁰ Coleman S. Diagnosis of congenital dysplasia of the hip in the newborn infant. *JAMA* 1956;**162**:548-52.
- ¹¹ Palmén K. Diagnosis of congenital dislocation of the hip-joint in Sweden during 1948-1960. *Acta Paediatrica Scandinavica* 1961;**50**, suppl:129.
- ¹² Anonymous. Detecting the dislocated hip. *Lancet* 1977;ii:909-10.
- ¹³ Freidensborg N. The effect of early diagnosis of congenital dislocation of the hip. *Acta Paediatrica Scandinavica* 1976;**65**:323-8.
- ¹⁴ Bjerkreim I. Congenital dislocation of the hip joint in Norway. *Acta Orthopaedica Scandinavica* 1974; **157** Suppl.
- ¹⁵ Royal College of General Practitioners. Trends in national morbidity. *J R Coll Gen Pract* 1976;**26**:Occasional paper No 3.
- ¹⁶ Wilkinson JA, Howell CJ. Management of infants with congenital displacement of the hip. *Proc R Soc Med* 1973;**66**:239-40.
- ¹⁷ Macfarlane A. Congenital dislocation of the hip—an epidemiological conundrum. *J Mat Child Health* 1980;**5**:13-5.
- ¹⁸ Khingberg MA, Chen R, Chemke J, Levin G. Rising rates of congenital dislocation of the hip. *Lancet* 1976;ii:298.
- ¹⁹ Center for Disease Control. *Congenital malformations surveillance report*. Atlanta, Georgia: Center for Disease Control, 1975.
- ²⁰ Lehman ECH, Street DG. Neonatal screening in Vancouver for congenital dislocation of the hip. *Can Med J* 1981;**124**:1003-8.
- ²¹ Wilkinson JA. A post-natal survey for congenital displacement of the hip. *J Bone Joint Surg* 1972;**54B**:40-9.

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Admission after mild head injury: benefits and costs

A D MENDELOW, D A CAMPBELL, R R JEFFREY, J D MILLER, C HESSETT, J BRYDEN, B JENNETT

Abstract

Large numbers of patients are admitted to hospital in Britain after mild head injury in the hope of anticipating complications. Investigation of 1442 consecutive admissions with head injury to the Edinburgh Royal Infirmary yielded 56 intracranial haematomas. Of 865 patients who were alert and orientated in the accident and emergency department after having been briefly knocked out but who had no skull fracture, no focal neurological signs, and no history of headache or vomiting, only one developed an intracranial haematoma. In deciding which patients should be admitted a skull fracture is a much more important risk factor than is a history of brief unconsciousness. If criteria for admission took account of this fewer patients would be admitted and the savings would be considerable.

Introduction

Head injury is common in Britain. More than a million patients attend accident and emergency departments each year; most of these patients are sent home, but more than 100 000 a year are admitted to hospital.¹ The number of admissions for head injury has been increasing since 1961 although the number of fatal and serious injuries has been falling since 1968.² The additional admissions are patients with mild injuries who are discharged within two days. Only 5% of patients admitted to hospital after head injury in England and Wales reach a regional neurosurgical unit, usually by secondary transfer; however, this proportion

varies from 0.5% to 35% in different places.³ The purpose of initial admission, and also of subsequent transfer, is to reduce avoidable morbidity and mortality, which is mainly due to delayed recognition and treatment of acute intracranial haematomas.⁴ It has been suggested that more of the admitted patients should be transferred to neurosurgical units, especially since computed tomography has become available,⁵ and that they should be sent there sooner. It has also been proposed that fewer of the patients presenting at accident and emergency departments after head injury need be admitted.⁶

For some years in Edinburgh patients with mild head injuries have been dealt with differently from the rest of Britain in that they are admitted directly to a ward which is under the care of neurosurgeons. We report here a consecutive series of admissions with head injury to the Edinburgh head injury unit, review admission policies for mild injuries, and comment on some aspects of the costs incurred.

Patients and methods

The hospital records of patients discharged from the head and spinal injury unit at the Edinburgh Royal Infirmary in 1979 were reviewed. Of 1593 admissions, 1442 had head injuries. Most (1297, 90%) had been admitted directly from the accident and emergency department of the Royal Infirmary; the remainder were referred secondarily from outside hospitals. This report deals mainly with the group of direct admissions, which correspond to patients who are admitted to primary surgical wards elsewhere. Cases were assigned to five broad diagnostic categories which were mutually exclusive: (a) haematoma—any intracranial haematoma requiring operation; (b) severe head injury—head injury producing confusion and amnesia lasting >24 hours but not due to an intracranial haematoma; (c) concussion—patients with post-traumatic amnesia lasting <24 hours, including patients who were alert and orientated on admission; (d) other cases of skull fracture, linear or depressed, of the vault or the base (not already in categories (a), (b), or (c)); and (e) other head injuries.

Results

The 1297 patients admitted directly to the Edinburgh unit had similar characteristics to patients admitted to other primary surgical wards in Scotland (table I); there were, however, fewer children in the Edinburgh unit and the Glasgow general hospital since both of these areas are served by independent children's hospitals. Also, multiple injuries were less frequently admitted to the Edinburgh unit.

Head and Spinal Injury Unit, Department of Neurology, Edinburgh Royal Infirmary, Edinburgh EH3 9YW

A D MENDELOW, PHD, FRCS, senior lecturer in neurosurgery
D A CAMPBELL, FRCS, senior registrar in neurosurgery
R R JEFFREY, FRCS, senior registrar in accident and emergency surgery
J D MILLER, MD, FRCS, professor of surgical neurology

MRC Head Injury Research Programme, Department of Neurosurgery, Institute of Neurological Sciences, Glasgow G51 4TF

C HESSETT, BSC, MSC, research assistant
J BRYDEN, FRCM, MSC, consultant epidemiologist
B JENNETT, MD, FRCS, professor of neurosurgery