Papers and Originals

Dislocatable Hip and Dislocated Hip in the Newborn Infant

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Congenital dislocation of the hip produces, if untreated, an obvious and tragic disability. The results of treatment are profoundly affected by the age at which the condition is first diagnosed. In recent years increasing emphasis has been placed on routine examination of newborn infants in order to detect those conditions of the hip that might precede established dislocation. It is claimed that if such hips were splinted in abduction for the first few weeks of life established dislocation would be largely or entirely prevented. These claims were vigorously prophesied by Roser in 1879, though his own wide experience of dislocated hips was confined to infants over the age of 1 year. We began a study of the problem in 1961, and now report the findings.

Ortolani (1937) focused attention on the fact that instability of a child's hip joint could be detected on clinical examination, though Roser (1879) had noted that there were older infants with loose hip joints which could be dislocated by adducting the thighs and which could be reduced again by abduction. Andrén and Borglin (1960) thought that this instability might result from laxity of the hip capsule produced by maternal hormones, as they had found that analysis of urine from newborn infants with congenital dislocation of the hip indicated a disorder of oestrogen metabolism. Andrén (1960) also showed that the pubic symphysis may share in this laxity.

Starting in 1952, von Rosen (1962, 1963), of Malmö, found 68 cases of clinically diagnosed "congenital hip-joint dislocation" among a total of 31,200 newborn infants—an incidence of 2.2 per 1,000. Of those, 53 were girls and 15 were boys. He showed that the routine splinting of such hips in abduction for some weeks resulted in normal joints. He further claimed that, as a consequence of such splinting, established cases of congenital hip dislocation were no longer appearing in the community where he worked.

Coleman (1956), in Salt Lake City, examined the hips of 3,500 newborn infants during a period of 10 months, and found 30 babies with "congenital dysplasia" of the hip on physical examination alone, by showing either a "jerk of exit" or persistent and unequivocal limitation of abduction of the flexed hip.

Palmén (1957, 1961), in Sweden, reported the application of the Ortolani test to 12,394 newborn infants he had examined from 1950 to 1960. From 1956 onwards this test was complemented with a "subluxation provocation." In all, 70 cases with positive signs were diagnosed and were treated immediately with fixation in abduction on a wooden board. In most cases the infants were examined on one occasion between the first and fourth days of life. At a re-examination in 1961, out of 39 infants abnormal at birth, who were by then at least 3 years old, one had dysplastic changes and two showed the results of capital necrosis. Palmén had instigated in 1953 the routine examination of the hips of all newborn infants

at the majority of obstetric clinics in Sweden having paediatric consultants. Up to and including 1960 the survey had covered approximately 415,500 newborn infants, representing 49.5% of all children born alive in Sweden during this period.

Later Barlow (1962, 1963, 1966), of Salford, was able to confirm von Rosen's work. He started his series in 1957. Examining the babies within a week of birth, he found 357 abnormal hips out of a total of 19,625 infants. Of these, 168 were frankly dislocated hips and the remaining 189 dislocatable. Only six of the abnormal hips in the series occurred among the infants weighing less than 5 lb. (2,270 g.) at birth. Barlow also claimed that of the children whose hips were regarded as normal when examined at birth only three had later been found to have a dislocated hip.

Among 6,000 newborn infants examined from 1958 to 1962 Stanisavljevic (1964) found a positive Ortolani sign in 29. Ten had bilateral and 19 unilateral signs. Four of these babies were not treated for 6 to 10 months after birth, and none improved spontaneously. Twenty were treated with Frejka pillows immediately after birth until the age of 3 months, and at 6-8 months the hips of all these babies were found to be normal on clinical and radiographic examination.

Writing from Tel-Aviv, Weissman and Salama (1966) reported that the Ortolani sign was present in 45 out of 16,841 infants born alive during the three years 1962-4. The average and practically constant incidence for the whole period was 2.7 per 1,000.

Present Investigation

In the Duchess of Kent Maternity Wing at Hillingdon Hospital in the summer of 1961 we began a survey of all the newborn live infants, who were examined to determine the state of the hip joints. A separate survey sheet was filled in for each infant. All the initial examinations were carried out by members of the paediatric team, so that there was some uniformity in the assessment. Virtually all the initial examinations took place within 36 hours of birth.

Method of Examination

The examination was performed in a manner similar to the method described by Barlow (1961). The infant was examined lying supine in the cot. The bedclothes were always spread completely flat. The hands were warmed and the infant was approached gently in an effort to obtain general muscular relaxation. The position of the head of the femur was first carefully noted with the infant at rest and before the hip was passively moved. The infant's knee was acutely flexed, and this enabled the head of the femur to be grasped between the examiner's thumb anteriorly and his fingers posteriorly. An attempt was now made to move each femoral head in turn gently forwards into or backwards out of the acetabulum. After

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the peculiar clonking sensation of the femoral head clearly jolting in and out of the acetabulum had once been experienced by the examiner, this sign of instability of the hip joint became quite unmistakable and case-finding much more reliable.

The child's femora were then gently abducted simultaneously. During the first two days of life maximum abduction usually approaches 90° from the vertical, and this degree normally decreases slightly over the next few days. Abduction is markedly impaired in the case of an established dislocation of the hip of the teratological type. It is also impaired in cases of dislocated hip with lax capsule, but the act of abduction itself readily tends to reduce such a joint. Thus the abduction test in the newborn infant has severe limitations diagnostically, and it must be sensitively carried out.

It must be stressed that in all these manoeuvres the head of the femur was grasped in the manner described and the knees were not held at all. This safely reduces the leverage effect, when combined with gentle handling and lack of hurry. It is common during the first few hours after birth to find that, with the baby lying supine, this manoeuvre may initiate regurgitation of stomach contents with choking, so that mucus suction may be necessary.

Classification

The widely differing statistics from different observers may be partly due to race, climate, and other factors, but are also due to the differing criteria of what constitutes "dislocation." Some are based on Ortolani's test or its modifications. Some, such as "dysplasia," are based on radiological criteria.

Dexterity in examination may detect a larger percentage of dislocatable hips. Each hip of an infant may fall into differing groups at the time of examination, and, owing to progressive changes taking place over the first few days of life, a hip joint may fall into one group one day and into another on the next day. The terms "slack hip," "lax hip," or "unstable hip" may not mean precisely the same entity to different observers.

The following classification of the clinical state of the hip joint in the newborn infant is suggested as a means of comparing accurately the findings in different centres.

Newborn Infant's Hip—A Classification

Normal Hip : Group A

Group A1 : Stable and Abducts Fully.—The hip joint is stable and abducts fully.

Group A2 : Stable with Lack of Abduction but no Dislocation.—The hip joint is stable, but shows a moderate limitation of abduction. The radiograph is normal and the adductor tightness apparently bears no relation to dislocation in these cases. Stanisavljevic (1964) found nine such infants with limited abduction in a series of 395 newborn babies. Without treatment, at the age of 14 months a clinical and x-ray follow-up showed no abnormality.

Group A3 : Crepitant or with Ligamentous Click.—The hip joint is stable but on attempting to dislocate the head backwards out of the acetabulum a clicking noise may be heard, or a slight crepitant, crunching, or grating sensation felt by the examiner. This has been termed "the crepitation of ligamentous origin" (Parkkulainen and Solonen, 1959), and arises from a flattened or oval-sectioned ligamentum teres rotating under the femoral head or from other tendons moving over each other in the region of the greater trochanter (Barlow, 1966). Such cases are so common that they must be regarded as within normal limits. Unfortunately infants in this group

may erroneously be thought to have the "clicking sign," and for this reason the term should be abandoned.

Group A4 : Lax but not Dislocatable.—There is more laxity of the capsule than usual, with increased mobility of the femoral head, which, however, cannot be completely moved out of the acetabulum. We have splinted four such cases, probably unnecessarily. Such hips we now regard as within normal limits. It is clear that this intermediate group—deliberately placed within the normal group—represents a minor degree of the same condition found in the dislocatable group. Certain infants may have one hip in this group while the other may be dislocatable or dislocated.

Unstable Hip : Group B

Group B1 : Dislocatable but in Normal Position at Rest.—This hip lies in a normal position at rest, but is dislocatable. The femoral head can readily be dislocated out of the acetabulum by pressing the femoral head backwards so that the characteristic clonk is felt. Full abduction can always be obtained. Infants in this group during the first day or two after birth may then pass into the lax but not dislocatable group A4. If untreated, probably the majority would remain in the normal position.

Group B2 : Dislocated at Rest but can be Reduced.—The hip lies in the dislocated position at rest, but can be reduced, readily in most instances, by pressing the femoral head forwards. On gently abducting the femur the range of abduction is limited up to the point when reduction is made to occur and then full abduction can be attained. The joint capsule is lax and the femoral head can readily be dislocated backwards again. If untreated, there is a considerable risk of the dislocation persisting. The dislocatable and this dislocated group again represent differing severities of the same condition.

Pathological Hip : Group C

Group C1 : Dislocated but Not Reducible by Palpation and Not Associated with Other Congenital Abnormalities.—This group corresponds to the older infants with established, untreated dislocation. Partly because the infants in our series were examined so soon after birth we encountered no neonatal example of this type, but in one case of dislocated hip of unstable type we were able to reduce the joint only with some difficulty.

Group C2 : Teratological Dislocation.—There are gross lack of abduction and the classical signs of dislocation of the hip. The femoral head cannot be readily replaced in the acetabulum, and such cases cannot be controlled by the Barlow or modified von Rosen type of splint. There is an association with arthrogryposis or other congenital abnormalities. As well as being clinically distinct, the majority in this group are also likely to be entirely separate aetiologically. These cases have been termed "teratological" by several writers.

Group C3 : Dislocation Associated with Meningomyelocele.—The hip joint is dislocated in association with a meningo-myelocele. These cases merit a separate group as they present in a distinct way, and the hip-joint dislocation is usually the least of the child's disabilities.

Radiographs

Andrén and von Rosen (1958) showed that, if radiographs of the hip joint were taken with the femora internally rotated and abducted to at least 45°, dislocation of the unossified head could be demonstrated by the alignment of the femoral shaft in the newborn infant with an unstable hip. This technique has been used and commended by Jacobs (1966), who reported

the radiographic findings in a Birmingham series. Only during the early part of the investigation did we routinely take radiographs of children whose hip joints were thought to be abnormal in the newborn period, since we soon appreciated that the diagnosis in the unstable groups was basically a clinical one and radiographs had not added to our information in these groups. Palmén (1961) also regarded as unnecessary the x-ray examination of these cases before beginning treatment. Radiographs have proved most helpful in other groups. We have more recently preferred to avoid exposure to radiation in the unstable groups except for follow-up control.

Even during the follow-up examinations interpretation of the radiographs has sometimes proved difficult, especially during the months until the femoral head has become clearly ossified. A slight degree of pelvic tilt or rotation can produce a misleading radiological view of the hip joint.

Treatment

The first cases of unstable hip which we discovered were treated initially by full hip abduction, using several layers of napkins secured by a pin at each side until a Frejka pillow or suitable splint was provided. This thick napkin method proved unsatisfactory, as it did not have a sustained effect, and, indeed, gave a false sense of security.

For the last three years of the series the von Rosen splint in a modified form (see Illustration) was routinely applied within four days of birth, and we now have three sizes available even for the neonate. Various slight modifications have been made from time to time. The metal framework of duralumin must satisfy the twin needs of strength and correct malleability. The rubber covering formerly used has now been replaced by a white washable vynide covering which is less irritating to the skin of some infants. The seams of this covering have been specially sited away from pressure points. By angulating the crossbar so that it has a shallow vertical groove in the midline, pressure on the spine can be avoided. The shoulder pieces of the splint must be set at an optimum angle, while the leg extensions must not abrade the medial skin of the thigh above each knee.

Modified type of von Rosen splint used in present series

This splint is reasonably well tolerated and has enabled us to maintain satisfactory abduction. Inevitably both hips are affected by the splint. The child is not removed from the splint, except for adjustments, for a period of three months. In a few of our cases, particularly the small premature infants, the application of the splint had to be postponed owing to poor general condition after birth.

We now regard all the infants in our group A as requiring no treatment.

Results of Present Neonatal Study

During the latter part of 1961 the results of routine hip examinations in our unit were difficult to determine because of uncertainty in examination techniques.

In the five-year period 1962–6 a total of 14,594 infants were born alive in the unit. The hips of all were examined, except in the few instances when death occurred very soon after birth. Apart from two cases of dislocated hip of teratological type (born in 1964 and 1965 respectively), and all cases of meningocele, a total of 60 children were discovered who had a clearly dislocatable or dislocated hip (Table I). Of these 60, 13 were male and 47 female. In 21 instances the hips were bilaterally affected, but in several of these one hip was dislocatable while the other was dislocated at rest. In six infants the right hip only was affected, and in 33 the left hip only. Breech presentation and/or a history of version accounted for 13 (22%) out of the 60 cases. The overall breech delivery rate in the unit was 4%.

TABLE I.—*Infants with Dislocatable or Dislocated Hips of Unstable Type, 1962–6*

Year	Total Live Births	Total with Dislocatable or Dislocated Hips of Unstable Type	Male	Female	Right Only	Left Only	Bilateral	Birth Weight above 5½ lb. (2,500 g.)	Birth Weight 5½ lb. (2,500 g.) or Less	Breech or History of Version
1962	2,791	8	0	8	1	5	2	8	0	1
1963	2,975	10	4	6	2	7	1	8	2	2
1964	3,047	12	3	9	1	4	7	12	0	4
1965	2,786	14	3	11	2	8	4	13	1	2
1966	2,995	16	3	13	0	9	7	14	2	4
Total	14,594	60	13	47	6	33	21	55	5	13

The series includes three singleton siblings, all from the same Indian family—in each instance the initial examiner was not at the time aware of the family history. The mother of another affected infant had been operated on at the age of 2 years for congenital dislocation of the hip.

The more detailed findings on initial examination of the 30 cases seen during the last two years of the study are set out in Table II. In 15 of these infants one or both hips were dislocated; in 20 infants one or both hips were dislocatable. During the last two years these 30 cases represent an incidence of 1 in 193 infants—that is, 5 per 1,000 live births.

TABLE II.—*Findings on Neonatal Examination of 30 Cases of Dislocatable or Dislocated Hips Seen in 1965–6*

Both dislocated	..	..	2
Right dislocated and left dislocatable	..	..	2
Left dislocated and right dislocatable	..	..	3
Right dislocated and right stable	..	..	1
Left dislocated and right stable	..	..	7
Both dislocatable	..	..	4
Right dislocatable and left lax but not dislocatable	..	..	1
Right dislocatable and left stable	..	..	0
Left dislocatable and right lax but not dislocatable	..	..	1
Left dislocatable and right stable	..	..	9

We have excluded from the series those newborn babies with abnormal hips who were not actually born in the unit.

Follow-up Study

Of the 60 cases in the series, two died during the neonatal period and two failed to attend as outpatients.

The remaining 56 were followed up in the orthopaedic clinic, either at our hospital or, in the case of eight babies, at some stage at other hospitals. In four children born during 1962–3 dislocation was not prevented, and these required further attention—two of these were premature infants with birth weights of 4 lb. 2 oz. and 3 lb. 6 oz. (1,870 g. and 1,530 g.) respectively.

At the end of the series all the patients still living locally were asked to attend for a detailed follow-up survey, and 37 were seen. Those born in 1966 who attended were over the age of 6 months when examined. The radiographs were studied particularly for evidence of dysplasia or necrosis of the femoral head. In one child born in 1963, and aged 3½ years when examined, the affected hip showed no clinical or radiological evidence of dislocation, but there was an irregularity of the trabecular pattern of the upper femoral metaphysis.

In two cases the question of dislocation remained radiologically doubtful for several months, but the hips were radiologically normal on final follow-up examination.

The overall results of the follow-up, which includes information received from other hospitals, are summarized in Table III.

TABLE III.—Overall Follow-up Study of 60 Infants with Dislocatable or Dislocated Hips of Unstable Type

Year	Total	Died in Neonatal Period	Not Available for Follow-up Beyond the Neonatal Period	Dislocation Persisted and Further Treatment Required	Satisfactory and Followed up but not Seen Beyond Age 6 Months	No Clinical or Radiological Evidence of Dislocation on Follow-up Beyond Age 6 Months
1962	8	1	0	1	1	5
1963	10	0	0	3	0	7
1964	12	1	1	0	2	8
1965	14	0	0	0	1	13
1966	16	0	1	0	1	14
Total	60	2	2	4	5	47

Six months after the last child in our series was born we obtained the active co-operation of 134 family doctors who replied to our letters of inquiry about cases of hip dislocation, and whose practices lay partly or wholly in the area surrounding the hospital. This inquiry brought to light one female infant, born in our unit in 1962, whose hips were passed as normal when examined on the day after birth. At the age of 11 months a diagnosis of benign congenital hypotonia was made at another hospital. At the age of 2 years and 9 months the left hip was found to be frankly dislocated, and an open reduction was later successfully carried out.

So far we have been unable to trace any patients with established dislocation of the hip unassociated with other disease who had been born in our unit during the period 1962–6 and whose hips had been passed as normal on neonatal examination.

Discussion

Careful examination of the hip joints in all newborn infants is already being widely carried out in this country. The results are of great interest, but it is important to assess their value critically, as there are still those who are sceptical. From a purely statistical point of view it is unfortunate that the natural incidence of established congenital dislocation of the hip is so low. Firm conclusions are difficult to reach unless large numbers of newborn infants are available for study. The differing criteria of various clinicians have in the past made comparison difficult.

Such routine examinations would be justified if it could be shown that the majority, if not all, of the potential cases of congenital dislocation of the hip were included within the unstable groups with either dislocatable or dislocated hips—a conclusion strongly suggested by our inquiries and follow-up studies.

It is also most desirable that a large number of babies should not be subjected to unnecessary splinting, for, though the splint is kept on for an average of only three months, it creates considerable parental anxiety and concern as well as some discomfort for the infant. There is a potential risk of inhalation of feeds, and breast-feeding may be made more difficult.

In addition there is the question whether such apparently simple routine treatment may cause damage to the joint. Allen

(1962) reviewed the radiographs and records of 150 children who had been seen during a period of 10 years with an original diagnosis of “hip dysplasia,” based on the finding of an acetabular angle greater than 30° as seen radiologically. No dislocation was demonstrated at any time in these patients. Some were left untreated, some were treated with Frejka pillows, and others were manipulated and then held in 90° abduction casts or apparatus. Radiological evidence of ischaemic necrosis had developed subsequently in 14 children—each of these had been treated with a 90° cast except one who was in a 90° apparatus without plaster. Allen pointed to the danger of making a cripple out of a normal child. This has not been our experience. It is only fair to add that Denis Browne (1961) thought that so-called fragmentation of the head of the femur or avascular necrosis were terms used to describe a purely temporary effect which occurs fairly often in cases treated by controlled movement.

It is not easy to assess accurately the number of established cases which would have resulted in our series if no treatment had been given. That certain races have a higher incidence of congenital dislocation of the hip than others is well known. There were 148 cases among children born in Birmingham in the years 1942–52. This gives an incidence of 0.65 per 1,000 live births. Though this may be slightly below the true value it is probably acceptable as an estimate of incidence among children who survived infancy (Record and Edwards, 1958). Many would accept an incidence of 0.7–1 per 1,000 for Great Britain up until 10 years ago.

Out of the total number of infants examined 10.5% were the children of Indian immigrants. Out of the 60 cases of unstable hip of either dislocatable or dislocated type eight were Indian, but this figure includes three siblings all in the same Indian family. We can assume that within the 14,594 infants born during the period under our study there would finally have resulted at least 12 cases of established dislocation of the hip (including those of teratological type). This means that possibly three or four children were being subjected to unnecessary splinting for every one child who was saved from the development of established dislocation.

Over the last two years of the series, when the neonatal incidence was 5 per 1,000, four out of every five children were in retrospect unnecessarily splinted. What is needed is some means of differentiating those cases with unstable hips in the neonatal period which are most at risk. It is tempting to suggest a policy of “wait and see”—to re-examine abnormal hips at the age of 1 week and splint only those that are still abnormal. The history of our unsuccessful cases does not encourage us in this view.

Sayle-Creer and Barlow (1960) made a careful distinction between dislocatable hips and dislocated hips, though to some extent it may be fortuitous, depending largely on the position of the legs, whether the hip is in or out of joint at the time of the neonatal examination. We have encountered several infants with a dislocatable hip within 24 hours of birth who within two days showed such a rapid lessening of joint laxity that they fell into the lax but not dislocatable group. It might be logical to splint those in the dislocatable group for a shorter period—for example, two months—than those in the already dislocated group—for example, three months.

As there is a tendency for unstable hip joints to become progressively more stable during the first 10 days of life, the earlier the infants are examined in a series the higher will be the incidence of unstable hips discovered. It is stressed that in our series virtually all the infants were first examined within 36 hours of birth, and the majority within 24 hours. Barlow (1962), reporting the first 9,000 newborn infants in his series examined at a weekly clinic, found that the half that were under 3½ days old produced 100 babies with 112 abnormal hips. In the half who were 3½ to 7 days old he found only 39 with 47 abnormal hips.

The tendency of the neonatal hip joint to become progressively more stable is one of several reasons for considering that groups A4, B1, B2, and C1 indicate advancing degrees of joint capsule laxity. In almost all infants the degree of joint laxity already present apparently decreases from the hour of birth. On theoretical grounds, mild laxity would be expected to disappear with the joint in correct position, but pronounced initial laxity would carry a greater risk of the joint remaining in the dislocated position. This accords with the fact that the earlier cases with pronounced instability are splinted with the hip joint in its correct position the better are the results.

The possibility should be borne in mind that repeated clinical examination may itself produce changes in the joint. We have personally examined a few of the infants with a readily dislocatable hip, and then carried out re-examination within a few hours, only to find in some an almost stable joint showing a moderate degree of palpable periarticular thickening. This suggests that the manipulation involved in testing the joint may on occasion produce a local reactive oedema. When this occurs it is important that the joint should not be left in the dislocated position—a valid reason for applying a splint without delay once the diagnosis is made.

The part played by the position of the child in utero is emphasized by the number with breech presentation, and also by the significantly small proportion of cases showing involvement of the right hip alone.

It is of interest to compare our findings in a series at risk with those of Record and Edwards (1958), who studied a large series of cases of established dislocation of the hip in the city of Birmingham. The sex ratio in their series was 85% female—in the present series it was 78%; including their bilateral cases, the left hip was affected in 80% of the cases—in the present series 90%; 17% were associated with breech deliveries—in the present series 22%. Only 4.2% of their series had associated defects of the nervous system. The incidence among their children born in the winter was double that of children born in the summer, and the risk of a subsequent child being affected was about 5%. Such a series would also include those presenting neonatally as teratological in type, with various other malformations. Von Rosen (1963) in fact excluded two such cases from his neonatal series.

The term "congenital hip dysplasia" was introduced by Hilgenreiner, of Prague, in 1925. A review of the literature shows that in the past this label has embraced many infants whose hips we would regard as entirely within normal limits.

The series published by Coleman (1956), Palmén (1961), Barlow (1963), and Stanisavljevic (1964) are of particular value, as the newborn infants in each series were personally examined by the same individual. In our own experience there is no doubt that our case-finding of abnormal hips would have been higher if carried out in this way, instead of by a trained team with careful checking by one of us of abnormalities found. Nevertheless, our figures give some idea of what may be attained by the routine examination of the hips as standard practice by a paediatric team in a neonatal unit.

We have excluded from our series cases of congenital dislocation of the hip associated with meningomyelocele. For the purpose of comparing findings in the newborn infants with those in established untreated cases, it is wise to exclude also those in the special teratological group, though the latter are usually included in published series referring to older children.

Summary

In the five-year period 1962–6 a total of 14,594 infants were born alive in a single maternity department. Except in the few instances when death occurred very soon after birth, the hips of all were examined within 36 hours of birth. The condition of the hip joint was specifically noted on a survey

sheet in each case. All the examinations were carried out as a routine by a member of the paediatric team. Excluding two cases of dislocation of the teratological type and all cases of meningomyelocele, 60 infants with clearly dislocatable or dislocated hips were discovered. The female preponderance was nearly 4 to 1. Approximately one-third were bilaterally affected, and in the remainder the left hip was 5.5 times more often involved than the right. In 22% of the cases there had been a breech delivery. During the last two years of the study the incidence of neonates with dislocatable or dislocated hips of unstable type was 5 per 1,000, and in half of these infants the hip was dislocated.

A clinical classification of the state of the hip joint in the newborn infant is suggested, with reasonably clear-cut groups as a mean of comparing accurately the findings in different centres.

The technique of clinical examination of the hip joints within 36 hours of birth is given in detail, and should be a routine procedure, as it can lead to the prevention of established dislocation, at least in the great majority. At present this involves the splinting of approximately four cases which would spontaneously stabilize for every one case which would finally remain dislocated. The implications of this are discussed. Splinting of the hips in abduction should be carefully confined to infants who are at real risk, and in these the splint should be applied within four days of birth if possible. In our series a von Rosen type splint proved satisfactory, and it was kept on the infant for an average period of three months.

Details are given of the follow-up investigation carried out on the children with abnormal hips. Two infants died in the neonatal period and two were not available for follow-up. Owing to inadequate or late splinting in the earlier cases of the series, four cases of dislocation were not prevented, and these required further attention.

We wish to thank all members of the paediatric team who assisted in this survey, and we greatly appreciate the co-operation of the local family doctors.

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