PROBLEMS ENCOUNTERED IN THE EARLY DIAGNOSIS AND MANAGEMENT OF CONGENITAL DISLOCATION OF THE HIP

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This paper reports the results of screening 53 033 infants for congenital dislocation of the hip between 1970 and 1979, and compares them with the results of a similar screening programme between 1960 to 1969. The number of dislocations missed at neonatal examination is unaltered at 0.11 per cent of live births. Operative treatment was needed in a further 0.07 per cent of the recent series even though the dislocations had been diagnosed within 24 hours of birth. The reasons for the failure of neonatal screening are discussed, and suggestions are made which will improve the situation.

Like so many medical “discoveries”, screening tests for congenital dislocation of the hip have been described more than once. Roser (1879), Le Damanay (1912) and Putti (1928) all emphasised the importance of neonatal diagnosis and the ease and success of treatment at this stage, with splints similar to those used today. Ortolani (1937) described a test in which hips were examined for a visible or palpable jerk as the dislocated head slips back into the acetabulum, and Barlow (1962) supplemented this with a test for the dislocatable hip which can be made to move by applying posterolateral pressure to the flexed and abducted femur to make the femoral head slip out of the acetabulum. A combination of these tests is now used routinely throughout the world as part of the standard neonatal examination.

Some paediatricians lay great stress on the importance of distinguishing dislocated from dislocatable hips, but if movement is demonstrable, the hip is clearly abnormal, the clinician is alerted, and the child is treated. We are not convinced that this distinction is of practical value. A dislocatable hip is unstable, and it is a matter of chance whether or not the examiner finds it in the dislocated position. What is far more important, and still not properly appreciated, is that movement is not always demonstrable in the dislocated hip. If the hip does not reduce easily, the only physical sign is limitation of abduction of the flexed hip. Actual movement may be shown only with the child anaesthetised and, occasionally, only after adductor and psoas tenotomy. Not all stiff hips are dislocated, but stiffness may be the only sign of dislocation, and these are the dislocated hips which are particularly liable to be missed.

Widespread screening with splintage of affected infants began in the late 1950s, and Aberdeen started the first Regional Service in 1960. Many extremely optimistic reports have appeared; Seddon (1962) declared “A simple clinical method, easily learned and quickly applied, adding less than a minute to the time of the examination to which every new-born child is entitled, could be used to take the sting out of congenital dislocation of the hip as a crippling disorder”. This simplistic attitude still prevails in the minds of many doctors, but the results of screening have fallen far short of our expectations; children with congenital dislocation of the hip are still coming for treatment long after the neonatal period, and far too many even after starting to walk.

The outlook for these children may indeed be even worse than before screening was started, because family doctors and health workers have a lower suspicion of the condition, feeling secure in the mistaken belief that neonatal screening is totally effective. Walker (1971) has pointed out the medicolegal implications; a parent may seek compensation on behalf of a child passed as normal at birth and later shown to have a dislocated hip.

MATERIAL

The Grampian Health Board covers some 3000 square miles of the north-east of Scotland, including the Orkney and Shetland Islands. Notwithstanding the remoteness of some of the communities and the sparseness of the population of much of the area, virtually all deliveries take place in some hospital; all babies are examined within 24 hours of birth and again before their discharge from the maternity units. Any infant thought to be abnormal is referred to a special hip dislocation clinic when it is about a month old. By then,
half the hips are normal and require no treatment. Some others may still become normal without treatment, but we do not yet have any means of distinguishing these children from those in whom dislocation will persist, and any delay in treatment of the latter will prejudice the result. We therefore compromise, and splint all infants whose hips are still abnormal at one month. We recognise that we are splinting some hips unnecessarily but have no evidence that this does any harm. The situation is fully explained to the mother.

All late cases of congenital dislocation also are referred to this clinic which, since 1960, has been run by a surgeon with a special interest in the subject, thus giving continuity of care. The methods of management used in this clinic and the results of the first 10 years were described in a previous paper (MacKenzie 1972).

This study was undertaken to determine if our results had improved with added experience during the subsequent decade. The value of any screening programme must be judged by its failures—the number of children who slip through the net and require treatment later. It is our policy to operate upon all children who present late. In the decade before 1960 (when our screening programme started) 0.15 per cent of live births needed operation. Between January 1970 and January 1979 this figure rose to 0.18 per cent.

RESULTS

In the area served by the special congenital hip dislocation clinic there were, between 1970 and 1979, 53,033 live births; 2,850 of them (5.37 per cent or nearly 1 in 20) were found to have abnormal hips within 24 hours of birth and were referred to the clinic for re-examination. At four weeks when 1,341 of the hips were considered to be normal, the remaining 1,509 (2.84 per cent of live births) were not normal and were splinted.

In this same decade 97 children (0.18 per cent of live births) were, long after the neonatal period, discovered to have dislocated hips and were operated upon. The mean age at diagnosis was 13.7 months (Fig. 1). These 97 children showed characteristics similar to those in most series of congenital dislocation of the hip. Girls predominated (about six to one), left hip dislocation was commoner than right (almost three to one) and there were more breech deliveries (8.2 per cent) than the average for the Grampian Area (2.5 per cent).

Of the 97 “late” dislocations, 59 (0.11 per cent of live births) had been missed at the original examination and these are referred to as failures of neonatal screening. The remaining 38 (0.07 per cent of live births) were caught in the screening net but still needed operation; these are referred to as failures of management.

The 59 failures of neonatal screening were analysed according to where the examination took place. There are maternity units in several peripheral hospitals in the Grampian Region; in each of these one of the local doctors is encouraged to take a special interest in the problem and do the screening; most of these family doctors have done the screening for many years, and the failure rate in the peripheral hospitals is the lowest in the series. In the Aberdeen Maternity Hospital, screening is done by a succession of registrars; the failure rate is 0.134 per cent. In the “satellite” maternity homes in Aberdeen, where screening is done by one highly trained and dedicated doctor, it is 0.158 per cent; and in the Special Nursery, where all “problem neonates” are treated, the failure rate is 0.160 per cent. The Special

![Fig. 1](image-url)

Age at diagnosis.
Nursery is a purpose-built unit under the charge of the Professor of Paediatrics, equipped with the most modern equipment, and staffed by the most highly trained paediatricians in the area. It deals with infants with gross and often multiple congenital defects who would probably die if they were born in most maternity hospitals in this country. It is not surprising that routine examination of the hips takes second place to saving lives under these circumstances.

The 38 failures of management fell into three groups.

**Diagnostic errors.** In 22 children abnormalities had been noted at neonatal screening, but when they were re-examined at four weeks the hips were thought to be normal. Consequently no splints were applied. The dislocations were discovered when the children were re-examined at three months.

**Splinting errors.** In this group there were 10 children who had abnormal hips at birth which were still abnormal at four weeks, and these children were therefore splinted. In five of them the splints were removed at three months when the hips were considered to be clinically and radiologically normal; but when they were re-examined at six months the hips were dislocated. In the remaining five children, re-examination at three months showed that, despite having been splinted, the hips had remained dislocated.

**Maternal errors.** Six children with abnormal hips at neonatal examination were not treated because their mothers refused treatment, or failed to keep appointments, or left the splints off for long periods.

**DISCUSSION**

It is of course well known that hips which are unstable at birth become stable spontaneously soon afterwards; and that the reported incidence of neonatal stability shows wide demographic variation (Table I). What is so puzzling in our present series is the very high rate (5.37 per cent) of suspected neonatal abnormality referred to our clinic. Ultra-caution might be an explanation, but for the declining rate of referrals (Fig. 2); nor could increasing carelessness be the reason for this decline since the number of missed cases remained steady (Fig. 2).

![Graph of referral and failure rates.](image)

**Table I. Incidence of neonatal instability**

<table>
<thead>
<tr>
<th>Author</th>
<th>Number examined</th>
<th>Instability (per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Von Rosen</td>
<td>1962</td>
<td>24000</td>
</tr>
<tr>
<td>Jones</td>
<td>1977</td>
<td>29000</td>
</tr>
<tr>
<td>Finlay, Maudsley and Busfield</td>
<td>1967</td>
<td>14600</td>
</tr>
<tr>
<td>Williamson</td>
<td>1972</td>
<td>150000</td>
</tr>
<tr>
<td>Fredensborg</td>
<td>1976</td>
<td>59000</td>
</tr>
<tr>
<td>Noble <em>et al.</em></td>
<td>1978</td>
<td>26000</td>
</tr>
<tr>
<td>Barlow</td>
<td>1962</td>
<td>23000</td>
</tr>
<tr>
<td>MacKenzie</td>
<td>1972</td>
<td>76000</td>
</tr>
</tbody>
</table>

The purpose of screening programmes is of course to diagnose dislocation at an age when treatment is easy and the prognosis excellent. We had 97 failures of early diagnosis and Figure 1 shows the age at which these were eventually recognised. The peak at six months corresponds with the time when normal babies undergo a routine developmental examination and also with one of the follow-up appointments we ourselves arrange for all babies thought to be abnormal at birth. However, in almost half the failures (49 per cent) the diagnosis was not made until the child was aged nine months or more; at this age the children are beginning to stand and, as Muller and Seddon (1953) showed, the prognosis is then beginning to be more gloomy.

The most disturbing feature we have to report is that a higher proportion of children need operation now than before we started screening in 1960. At that time all cases were diagnosed "late" (well after the neonatal period and usually after the child had started walking); the incidence of dislocation was 0.15 per cent of live births. Had this percentage remained constant then, from the 53,033 children born between 1970 and 1979, we would have expected 80 cases if there had been no screening. In fact, although 1412 unstable hips were
diagnosed by neonatal screening and successfully treated, there were still 97 children who needed operation for congenital dislocation diagnosed late.

This increase, from 0.15 per cent of live births before screening to 0.18 per cent now, is truly remarkable. Despite screening and splinting we now operate on more children than we would have expected to had no screening been done (Fig. 3). Either the incidence has increased, or we are now treating many children who would previously have remained undiagnosed and untreated until they reached adult life; both explanations might be true.

We have divided our failures (that is, children who needed operation for congenital dislocation diagnosed late) into two groups: failures of neonatal screening, and failures of management. With regard to the first group our figure of 0.111 per cent failures is almost identical to the figure we reported for the first decade (1960 to 1969) in which we used screening (MacKenzie 1972). We have not improved. Our figures are around the middle of the range reported from various centres (Table II). It cannot be too strongly emphasised that screening is difficult. It would be ideal if only one or two doctors, who had mastered the skills, did all the screening. We have considered the possibility of concentrating the screening in the hands of one or two doctors who would do nothing else, and have rejected it. There is no evidence to suggest that the “expert in screening” has fewer failures than the conscientious family doctor, who may see only one case every five years. Another obvious step would be to concentrate special attention upon those newborn children who have a family history of congenital dislocation. And the importance of re-examining every child at six months of age also is clear; the need to institute treatment before the child begins to stand cannot be overestimated.

The failures of management need separate discussion. It is difficult to see how we could have avoided the 22 failures classed as “diagnostic errors”; but in them the error was not serious, because they were diagnosed at three months, when the prognosis is still excellent. In the group labelled “splinting errors”, it is clear that in five children the splint was taken off too soon; on no account should any child be discharged from follow-up until a radiograph shows the femoral capital epiphyses in their correct position. The other five errors of splintage may have resulted from fitting too small a splint; it is important to fit as large a splint as possible, so that the femoral condyles are securely held.

It is tempting to suppose that the 10 failures of splinting represent those in whom acetabular dysplasia is a factor. There is some radiological evidence for this, though we are aware of the argument that dysplasia might be secondary to a failure to maintain concentric reduction. We feel that acetabular dysplasia is a distinct aetiological factor, that it may not be detectable early (Wynne-Davies 1970) and that displacement of the femoral head may not occur until the child has borne weight. Splintage of such cases in the early stages would not necessarily prevent dislocation.

The “maternal errors” (should they perhaps be called “communication errors”?) are understandable. Every mother thinks her baby is perfect and the doctor has difficulty in explaining that an apparently normal baby needs treatment. Time and careful explanation are needed; and explanations need repeating, as we found at our four-week examination. The simple splint we use depends upon maternal co-operation. Noble et al. (1978), aware of this problem, have gone back to using the more bulky rigid splints which can be applied or removed only by trained staff. We used such splints in Aberdeen in the early 1960s, but gave them up because the long travelling distances preclude regular inspection, and some babies developed pressure sores.

Table II. Late diagnosis rate = neonatal screening failures

<table>
<thead>
<tr>
<th>Author</th>
<th>Location</th>
<th>Late diagnosis (per cent of live births)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Von Rosen</td>
<td>Malmo</td>
<td>0.007</td>
</tr>
<tr>
<td>Mitchell</td>
<td>Edinburgh</td>
<td>0.013</td>
</tr>
<tr>
<td>Jones</td>
<td>Norwich</td>
<td>0.058</td>
</tr>
<tr>
<td>Smaill</td>
<td>New Zealand</td>
<td>0.067</td>
</tr>
<tr>
<td>Present series</td>
<td>Aberdeen</td>
<td>0.111</td>
</tr>
<tr>
<td>MacKenzie</td>
<td>Aberdeen</td>
<td>0.112</td>
</tr>
<tr>
<td>Wilkinson</td>
<td>Southampton</td>
<td>0.127</td>
</tr>
<tr>
<td>Williamson</td>
<td>Northern Ireland</td>
<td>0.140</td>
</tr>
<tr>
<td>Bjerkreim</td>
<td>Norway</td>
<td>0.200</td>
</tr>
</tbody>
</table>
CONCLUSIONS

Neonatal screening has not solved the problem of congenital dislocation of the hip; many are still missed. Moreover, the incidence of congenital dislocation may have increased in recent years.

Special attention should be paid to children with a family history of dislocated hips, and to those hips which, at neonatal examination, are not dislocatable but fail to abduct fully, and which may be dislocated hips that are irreducible.

Great vigilance is needed at the clinics where these infants are treated. Splints must not be applied without ensuring that the hips are in correct position; the splints should fit well; and they should not be removed too soon.

The importance of diagnosing congenital dislocation before the child begins to walk cannot be overemphasised. Ideally every child (and not only those with doubtful hips at birth) should, at the age of six months, be examined by an expert.

REFERENCES


