Ultrasound examination of neonatal hip: correlation of twin pregnancy and congenital dysplasia

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Twin pregnancy is considered to be a risk factor for congenital dysplasia of the hip. From 1987 until 1996, the hips of 4476 (2260 male, 2216 female) newborn babies were examined by ultrasound according to Graf’s technique and classification in our hospital. In this study, we compare the results of twins and singletons for this risk factor. Of the newborns, 97 (2.2%) were twins (40 male, 57 female); 39 pairs of twins (10 male/male, 19 female/female, 10 male/female) and 19 individual twins (6 male, 13 female) were investigated. Hips of type Ia, Ib and IIa (α ≥ 55°) are not pathologic; hips of type IIa (α < 55°) need an early control examination; and hips of type IIc, D, IIIa, IIIb and IV require therapy. Types Ia, Ib, and IIa (α ≥ 55°) were found in 4207 (94.0%) of all newborns, in 4112 (93.9%) of the singletons, and in 95 (97.9%) of the twins. Early control examination and/or therapy (indicated for types IIa (α < 55°), IIc, D, IIIa, IIIb, and IV) were necessary in 269 (6.0%) of all cases, in 267 (6.1%) of singletons and in 2 (2.1%) of twins. Twins with additional factors such as breech position birth, hip dysplasia in the family or premature birth did not show the types of hip IIa (α < 55°), IIc, D, IIIa, IIIb, and IV. We did find these hips in two (3.5%) of the female twins, but not at all in the male twins. Statistically, twins with or without other risk factors that are known before birth did not show significantly more of type hip IIa (α < 55°), IIc, D, IIIa, IIIb, IV (P > 0.05). Twin Research (2000) 3, 7–11.

Keywords: Ultrasound, screening, congenital dysplasia of hip, risk factors, twins

Introduction

The risk of developing hip dysplasia or luxation has been discussed in the literature in connection with various risk factors. A fundamental point raised by several authors is that ultrasound screening of the hips of newborn babies should only be carried out if risk factors are involved and that, in general, screening of all babies is considered unnecessary. 1–12 Due to the frequent familiar occurrence of dysplasia, much of the work presented in the literature shows the genetically determined component to be an essential risk factor. 1–12 Breech-position births 2–6,8,10–16 and the presence of deformities at birth such as foot deformities, muscular wyneck, newborn scoliosis etc 3,7,11 have been thought by many to be closely connected with simultaneously existing hip dysplasia. Of the postulated clinical signs such as leg length discrepancies, abduction impediment and asymmetry, duplication asymmetry and Ortolani phenomena, only the latter can be recognised as justified and this only with decentred hips. The other clinical signs indicate a large number of incorrect positive and negative results, particularly regarding dysplasia with centred hips. 5,17–20 With reference to prematurely born babies, there is a higher rate of undeveloped hip joints without any increased sonographical pathology, indicating that the general statements of some authors do not necessarily apply to a specific risk group. 6,13,18

With twin pregnancies there is a high probability of breech presentation and an increased intrauterine pressure, suggesting that twins have a greater risk of hip dysplasia formation. 6

Most of the articles on the subject do not cover in detail the correlation between twin pregnancy and hip dysplasia. In this study, the results of an instituted sonographic hip screening programme including a twin cohort, are presented, with special regard to the following questions. Do twins have a higher rate of hip congenital dysplasia than singletons? Is there an effect among twins due to prematurity, breech delivery and cases of dysplasia in their families?

Materials and methods

We examined the hips of newborn babies of the department of gynaecology and obstetrics at Hannover Medical School.
Between July 1987 and March 1996, 13,864 babies were born; 4,476 of them (2,260 male, 2,216 female) underwent an ultrasound examination of the hips performed by 19 different physicians of the orthopaedic department. All available newborns except those already discharged or those absent due to treatment in intensive care, for example, were examined as an unselected group. The investigations took place every second day, with 95% of the newborns being examined within 5 days of birth. No special inclusion or exclusion criteria were determined.

Ninety-seven (2.2%) of the newborns (40 male, 57 female) were twins. Thirty-nine pairs (10 male/male, 19 female/female, 10 male/female) of twins and 19 individual twin members (6 male, 13 female) were examined. The relation between identical and non-identical twins was not considered.

The ultrasound examinations and diagnosis into hip type were performed according to Graf's technique and classification, using a 5.0 MHz (Siemens SL-1; Siemens AG, Erlangen, Germany) or 7.5 MHz (Picker LSC 7500; Picker International GmbH, Hofheim-Wallan, Germany) linear transducer.

Available and complete documentation, including data of the newborn, anamnesis, clinical and sonographic findings, consecutive therapy and procedure, was analysed retrospectively and statistically evaluated using the χ² test.

To reduce variation in assessment and to improve inter-observer agreement, all sonograms and forms were additionally checked immediately after the investigation by an experienced ultrasound examiner and, if necessary, corrected. According to Graf, types Ia, Ib and IIa (α ≥ 55°) are not pathologic, type IIa (α < 55°) needs an early control examination, and types IIc, D, IIIa, IIIb, IV require therapy. These classifications of ultrasound examination of the hip and the related consequences are summarised in Table 1.

### Results

We found types Ia, Ib, IIa (α ≥ 55°) in 4,207 (94.0%) of all newborns, in 4,112 (93.9%) of the singletons, and in 95 (97.9%) of the twins. Early control examinations and/or therapy (tyepella (α < 55°), IIc, D, IIIa, IIIb, IV) were necessary in 269 (6.0%) cases overall, specifically in 267 (6.1%) singletons and two (2.2%) twins (Table 2).

### Table 1 Ultrasound examination. Definition of types of hip according to Graf’s technique and classification. Consequences for the particular types of hip

<table>
<thead>
<tr>
<th>Type of hip</th>
<th>Definition</th>
<th>Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ia, Ib</td>
<td>normal joint</td>
<td>no control investigation</td>
</tr>
<tr>
<td>IIa +</td>
<td>physiologically immature hip, appropriate for age</td>
<td>type IIa, alpha ≥ 55°: control investigation after 6 weeks</td>
</tr>
<tr>
<td>IIa –</td>
<td>maturation deficiency exceeds tolerable degree</td>
<td>type IIa, alpha &lt; 55°: control investigation within 4 weeks</td>
</tr>
<tr>
<td>IIIc</td>
<td>partial dislocation (subluxation)</td>
<td>Pavlik harness accompanying physiotherapy</td>
</tr>
<tr>
<td>IV</td>
<td>dislocation (luxation)</td>
<td>Pavlik harness or extension accompanying physiotherapy</td>
</tr>
</tbody>
</table>

### Table 2 Comparison of results of all newborns, singletons and twins, statistical analysis (χ² test)

<table>
<thead>
<tr>
<th>Type of hip</th>
<th>All newborns n = 4476</th>
<th>Singletons n = 4379</th>
<th>Twins n = 97</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ia, Ib, IIa (≥ 55°)</td>
<td>4207 (94.0%)</td>
<td>4112 (93.9%)</td>
<td>95 (97.9%)</td>
</tr>
<tr>
<td>IIa (&lt; 55°), IIc, D, IIIa, IIIb, IV</td>
<td>269 (6.0%)</td>
<td>267 (6.1%)</td>
<td>2 (2.2%)</td>
</tr>
</tbody>
</table>

### Table 3 Comparison of results of female and male newborns of the entire group and the twins (χ² test)

<table>
<thead>
<tr>
<th>Type of hip</th>
<th>Boys n = 2260</th>
<th>Girls n = 2216</th>
<th>Male twins n = 40</th>
<th>Female twins n = 57</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ia, Ib, IIa (≥ 55°)</td>
<td>2185 (96.7%)</td>
<td>2022 (91.2%)</td>
<td>40 (100%)</td>
<td>55 (96.5%)</td>
</tr>
<tr>
<td>IIa (&lt; 55°), IIc, D, IIIa, IIIb, IV</td>
<td>75 (3.3%)</td>
<td>194 (8.8%)</td>
<td>0</td>
<td>2 (3.5%)</td>
</tr>
</tbody>
</table>

### Statistical analysis

- Type of hip IIa (alpha < 55°) to IV: significantly more often in girls (P < 0.05)
Incomplete development of the hips leading to dysplasia did not occur more frequently in twins than in non-twins, despite a high number of breech presentations (8.3%) in twins.

With twin pregnancies there is increased intrauterine pressure and frequency of breech presentation. The connection between hip luxation and breech position has been acknowledged for some time, with reports of 12.3% to 25.0% of the number of children with congenital hip luxation born in breech position. The majority of authors have deduced from their sonographical investigations that hip dysplasia is more frequent in children born in breech position. M organ stated in 1964 that 5.8% of all births in breech position were twins; Roth found in 1961 that 21% of all twins are born in breech position. Our team found that 8.3% of the twins were born in breech position.

The assumption that twins born in breech position demonstrate a higher likelihood of dysplasia and luxation was refuted by Fettweiss in 1992. He suggested that breech presentations of twins are different from those of non-twins. Breech births in singletons are usually straightforward breech presentations, i.e., the legs extended at the knee are stretched upwards to the side of the child’s abdomen (Figure 1). The breech position with flexed hips and fully extended knees represents a special high-risk group for congenital dysplasia of the hip, because the prolonged tension of the ischiocrural musculature mechanically exerts a pressure on the posterior and superior acetabular rim. Depending on the form of the spatial narrowing and length of time in this position, hip dysplasia and/or dislocation can occur. Breech position is usually occupied by singletons long before birth takes place, since in most cases spontaneous turning of the foetus (up to the 32nd week of gestation) does not take place from the breech position into the physiological vertex presentation.

Fettweiss suggests that for twins, the footling presentation usually prevails with folded legs and parallel positioned feet (Figure 2), i.e., legs positioned as for a vertex presentation. This statement refers to the work of Wilkinson from 1972, who investigated...
the configuration of newborn babies immediately following birth.

According to Fettweiss, one can also conclude indirectly from the work of Isigkeit in 1931 and Idelberger in 1951 that breech presentation alone is not the sole cause of hip dysplasia for twins. Both stated that there was no increase in the occurrence of muscular wrynecks in twins which is closely associated with breech presentations. Also, in the case of twins as opposed to non-twins, the breech position is usually taken on during or just before birth, resulting in a shorter duration of mechanical strain for the hip. Our group demonstrated that there was a higher percentage of twins born before the 37th week of gestation period (37.1%), as opposed to singletons (4.6%) but no increased rate of hip dysplasia was demonstrated in the twins. Dorn found in 1990 that correct assessment of recorded scans depends on the experience of the observer. To obtain a high degree of inter-observer agreement, it is necessary to have substantial training, attention to detail in the technique, and meticulous evaluation of results. To reduce variation in assessment and to improve inter-observer agreement, all our scans and documentation forms were additionally checked after the investigation by an experienced ultrasound examiner and, if necessary, corrected. Each examiner had participated in several instruction courses, with at least the first 50 recordings of scans performed under guidance.

The most important factor for avoiding bias in using Graf’s technique is the identification of the anatomic structures and the proper selection of the standard plane, including correct anatomic representation of os ileum and labrum acetabulare. The description of morphology is followed by angular measurement.

In conclusion, twins with or without additional risk factors that are known before birth did not show a significant higher rate of hip dysplasia manifested as types IIa (α < 55°) and worse according to Graf’s classification.

References


