Clinical outcome of congenital talipes equinovarus diagnosed antenatally by ultrasound

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Congenital talipes equinovarus is a common anomaly which can now be diagnosed prenatally on a routine ultrasound scan at 20 weeks of gestation. Prenatal counselling is increasingly offered to parents with affected fetuses, but it is difficult to counsel parents if there is a chance that the fetus may not have talipes. Our study correlates the prenatal ultrasound findings of 14 infants diagnosed as having unilateral or bilateral talipes during their routine 20-week ultrasound scan with their clinical findings at birth and the treatment received.

No feet diagnosed as talipes on the ultrasound scan were completely normal at birth and therefore there were no true false-positive results. One foot graded as normal at 20 weeks was found to have a mild grade-1 talipes at birth, but did not require treatment other than simple stretches. A total of 32% of feet required no treatment and so could be considered functional false-positive results on the scan. Serial casting was required by 13% of feet and surgical treatment by 55%. The severity of the talipes is difficult to establish before birth. A number of patients are likely to need surgical treatment, but a proportion will have talipes so mildly that no treatment will be required. In counselling parents at 20 weeks, orthopaedic surgeons need to know whether or not there is a small chance that the ultrasound diagnosis could be wrong and also that the talipes may be so mild that the foot will not require treatment.

Received 4 January 1999; Accepted 12 March 1999

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THE JOURNAL OF BONE AND JOINT SURGERY
lateral or bilateral talipes during the 18-to-20-week anomaly scan by an obstetrician, a Senior Registrar or Consultant experienced in antenatal ultrasound diagnosis, at one of two Centres for Fetal Medicine. The examinations had been carried out in real time using a 5 MHz transducer on either an Acuson 128XP or an Acuson XP10 ultrasound machine (Acuson Ltd, Uxbridge, UK) by specifically trained ultrasonographers under the supervision of the obstetricians in fetal medicine who provided the follow-up. A detailed ultrasonic examination in each case had found no evidence of other anomalies. Selected still pictures were taken and placed in the patients’ notes. Each mother was then referred to the Orthopaedic Department at St Mary’s Hospital for counselling and all were included in the study. They all continued their pregnancy and within one or two days of delivery the babies were assessed clinically by an orthopaedic surgeon, either a Senior Registrar or a Consultant.

The system described by Harrold and Walker was used to grade the talipes as follows: grade 1, the foot corrects to neutral; grade 2, the foot corrects to 20° or less of equinus and varus; and grade 3, there is a fixed deformity of more than 20° of equinus and/or varus. One baby was treated in a different hospital by another orthopaedic surgeon, but the details of the treatment received were obtained from the mother in response to a written questionnaire.

Results

The results and treatment for each foot individually are shown in Table I. From 14 fetuses, 23 feet were diagnosed as having talipes on the ultrasound scan at 20 weeks (9 bilateral and 5 unilateral). Of these, 21 had talipes at birth.
and the remaining two had a different, more severe congenital abnormality. These two false-positive results were in a child (case 13) who had been diagnosed as having bilateral talipes on the prenatal scan, but was born with bilateral lobster-claw deformities (Fig. 2). No case diagnosed as talipes on the ultrasound scan was completely normal at birth, as judged by the criteria of Harrold and Walker.5

There were five apparently normal feet at 20 weeks and one of these was assessed as having a mild talipes at birth (case 2, L). This was the only false-negative diagnosis. The patient had bilateral talipes grade 1 at birth, but only the right side was diagnosed at 20 weeks. This series did not contain any feet diagnosed as normal on ultrasound at 20 weeks which went on to have severe talipes at birth. The total number of cases of talipes at birth was 22.

Of the 23 feet with talipes detected antenatally, six (26%) did not require any treatment, three (13%) had serial plastering and 14 (61%) required surgery. Two of the last included the feet with lobster-claw deformities. Of the 22 feet diagnosed as having talipes at birth, seven were grade-1, three were grade-2 (13%) and responded to serial plastering only, while the remaining six grade-2 and all grade-3 feet (55%) required serial plastering and surgery.

The still pictures were studied at length and attempts were made to grade the severity of the talipes on the ultrasound scan by measurement of the angle of equinus and varus of the foot on an anteroposterior (AP) view of the lower leg. The variability of the position of the foot and the difficulty in obtaining a true AP view made it impossible to obtain reliable and reproducible measurements. Videos were also examined to try to identify more suitable AP views, but no improvement in the measurements could be achieved.

Discussion

Our study was designed to determine the clinical outcome after an antenatal diagnosis of isolated talipes at 20 weeks. It is limited by the small size of the sample but, nevertheless, conclusions can be drawn. In all patients the abnormalities detected at 20 weeks were present to some degree at birth. It is reassuring that, as with other bony structural anomalies, in this series feet with suspicious ultrasound appearance were never completely normal. It is unlikely that talipes detected on ultrasound will regress fully before birth.

Our study had a sensitivity of 0.95; i.e., 95% of affected feet were detected. The only false-negative result was seen at birth as a mild case, which may be why it was not detected on ultrasound. Alternatively, it may have developed subsequent to the scan.6 Bar-Hava et al3 described six late-onset cases seen on ultrasound at 22 to 24 weeks of

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**Table 1.** Prenatal ultrasound findings, clinical findings at birth and treatment of the 14 patients diagnosed with talipes equinovarus

<table>
<thead>
<tr>
<th>Case</th>
<th>Foot</th>
<th>US findings</th>
<th>Clinical findings</th>
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<th>Treatment</th>
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<td>Talipes</td>
<td>1</td>
<td>None</td>
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<td></td>
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<td>Talipes</td>
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* serial plastering
gestation which were not present on an earlier scan at 13 to 16 weeks. They also detected seven cases of transient talipes, four of which regressed during the course of the same scanning session, two resolved transiently but reappeared at later scans. The final one persisted for four more weeks and later disappeared. This explains why orthopaedic surgeons are still seeing cases of talipes at birth which have not been diagnosed on the antenatal scan. Our study has looked specifically at the clinical outcome of talipes diagnosed on the antenatal scan and has shown that when the appearances are abnormal, a significant abnormality is likely to be present. We have not looked at the clinical outcome of normal feet on antenatal scans, although the possibility of a missed talipes is accepted, as illustrated by case 2 where the foot was normal on the ultrasound scan, but had a mild talipes at birth.

The specificity of the study was 0.66; i.e., 66% of patients who did not have talipes were correctly detected. Two feet which were wrongly diagnosed as having talipes had bilateral lobster-claw deformity and required surgery. The specificity of detecting completely normal feet was 100%, i.e., there were no completely normal false-positive results. The problem of a false-positive diagnosis has occurred in other series with as many as 35% of feet reported as normal on antenatal scans. The incidence of bilateral talipes is normally 50%.1 The higher incidence could indicate that some of the feet which did not require treatment were so mild that, without the antenatal diagnosis, they would have been missed clinically. Antenatally, nine pairs of bilaterally abnormal feet were detected including the lobster-claw deformity. Of these, only one child did not require treatment. At birth, nine pairs of bilateral talipes were detected and two of these children (22%) did not need treatment.

It is now recognised that apparent talipes can resolve subsequent to ultrasound screening and feet which appear normal on earlier scans can be seen later to be deformed.3,4 Our findings are similar to those of Singh et al2 who found that infants diagnosed prenatally with talipes required surgical treatment in 63%, although their series had a limited follow-up. They had one-false positive scan, while we had none in our study.

In Australia, Woodrow et al4 studied 17 fetuses diagnosed as having talipes on a mid-trimester (17-to-22-week) ultrasound scan. They found a false-positive rate of 24%, and if the postural varus deformities were included (because they are functionally normal) this was 35%. Only 18% of these children required surgery, compared with 55% in our study. This may be due to differences in the management of talipes between the countries or it may reflect the varying severity of the talipes in the two groups. It is difficult to compare the severity of the talipes, since this was not recorded in these patients.4

Orthopaedic surgeons will be increasingly involved in counselling parents of children with talipes equinovarus diagnosed prenatally. It is important that they are aware of the reliability and limitations of prenatal ultrasound studies in order to provide a rational basis for counselling.

Can the severity of the talipes be detected from still ultrasound pictures? Orthopaedic surgeons are aware that the clinical classification of talipes is difficult. The method of Harrold and Walker5 is based on the passive correction achievable. Ultrasonographers and obstetricians rely on seeing the whole, three-dimensional dynamic image when reaching diagnostic conclusions for other anomalies. In the absence of a reliable method of measuring the severity of talipes, we recommend that orthopaedic surgeons have moving video images as well as still pictures available when assessing prenatal talipes. We made considerable efforts to measure the severity of the talipes on still pictures, but were unsuccessful. Obstetricians tended to report that the deformity was either mild, moderately severe or severe and this often correlated with the clinical outcome. For example, one patient (case 14) was reported as having moderately severe talipes on both sides and had bilateral grade-2 talipes at birth.

The precision of prenatal ultrasound continues to improve, but there are still a number of difficulties associated with the prenatal diagnosis of anomalies such as talipes. For example, in obese patients with oligohydramnios, visualisation of the fetal limbs is limited. A full-anomaly scan will take an experienced ultrasonographer 30 minutes. It is time-consuming and expensive. Nevertheless, high-resolution images are possible in most patients particularly in specialised referral centres in fetal medicine, to which all mothers with a fetal anomaly diagnosed on ultrasound should be referred. Minute details can be visualised, such as hypoplasia of the middle phalanx of the little finger, considered to be a marker for Down’s syndrome.

This suggests that accuracy in diagnosing talipes can be expected to improve and reliable grading may become possible.

In addition to the reliability and nature of the diagnosis, prenatal counselling also involves discussion of the treatment that the child is likely to receive. In our study, 26% of feet diagnosed antenatally and 32% of those seen to have talipes at birth were so mild that they did not require treatment. This has important implications for prenatal counselling. Antenatal diagnosis of any abnormality normally raises the issue of termination of pregnancy, either on fetal grounds if severe or, if not, for maternal or psychological reasons. If such a step is considered based solely on the ultrasound diagnosis, it is important that these mild forms be distinguished prenatally.

Parents will also want to know the chances of their child requiring an operation. The percentage chance of each foot with talipes requiring surgery was 61% if diagnosed antenatally or 55% if present at birth. Counselling should also note the fact that bilateral cases may be asymmetrical in severity. In this series 69% had bilateral talipes at birth while 64% had bilateral talipes diagnosed on the ultrasound scan. The incidence of bilateral talipes is normally 50%.1 The higher incidence could indicate that some of the feet which did not require treatment were so mild that, without the antenatal diagnosis, they would have been missed clinically. Antenatally, nine pairs of bilaterally abnormal feet were detected including the lobster-claw deformity. Of these, only one child did not require treatment. At birth, nine pairs of bilateral talipes were detected and two of these children (22%) did not need treatment.

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Pediatric surgeons are still seeing cases of talipes at birth which were diagnosed antenatally and have shown that the deformity was either mild, moderately severe or severe and this often correlated with the clinical outcome. For example, in obese patients with oligohydramnios, visualisation of the fetal limbs is limited. A full-anomaly scan will take an experienced ultrasonographer 30 minutes. It is time-consuming and expensive. Nevertheless, high-resolution images are possible in most patients particularly in specialised referral centres in fetal medicine, to which all mothers with a fetal anomaly diagnosed on ultrasound should be referred. Minute details can be visualised, such as hypoplasia of the middle phalanx of the little finger, considered to be a marker for Down’s syndrome.
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References


