

# The lambda sign at 10–14 weeks of gestation as a predictor of chorionicity in twin pregnancies

W. Sepulveda, N. J. Sebire, K. Hughes, A. Odibo and K. H. Nicolaidis

Harris Birthright Research Centre for Fetal Medicine, King's College Hospital Medical School, London, UK

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## ABSTRACT

*Chorionicity was prospectively determined in 369 twin pregnancies by ultrasound at 10–14 weeks of gestation. Pregnancies were classified as monochorionic if there was a single placental mass in the absence of the lambda sign at the inter-twin membrane–placental junction, and dichorionic if there was a single placental mass but the lambda sign was present, or the placentas were not adjacent to each other. In 81 (22%) cases, the pregnancies were classified as monochorionic and in 288 (78%) as dichorionic. Pregnancy outcome was available in 279 cases and all 63 of these pregnancies classified as monochorionic resulted in the delivery of same-sex twins. Similarly, all 100 different-sex pairs were correctly classified as dichorionic. These findings demonstrate the high reliability of ultrasound examination at 10–14 weeks of gestation in determining chorionicity in twin pregnancies.*

## INTRODUCTION

In monochorionic twin pregnancies, the prevalence of antenatal and perinatal complications is much higher than in dichorionic twins<sup>1–3</sup>. Prenatal determination of chorionicity by ultrasound, usually performed in the second and third trimesters, relies on the assessment of fetal gender, number of placentas and characteristics of the dividing membrane<sup>4–9</sup>. Different-sex twins are dizygotic and therefore dichorionic, but, in about two-thirds of twin pregnancies, the fetuses are of the same sex and these may be either monozygotic or dizygotic. Similarly, if there are two separate placentas, the pregnancy is dichorionic, but in the majority of cases the two placentas are adjacent to each other and there are often difficulties in distinguishing between dichorionic–fused and monochorionic placentas. Several studies have proposed that the inter-twin membrane is thicker and more echogenic in dichorionic than in monochorionic pregnancies, but this is a somewhat subjective

criterion<sup>4–7</sup>. One study reported that dichorionicity is associated with an inter-twin septum thickness of 2 mm or more<sup>8</sup>, but the reproducibility of this measurement is poor and is dependent on such technical aspects as the angle of insonation and gestational age<sup>10</sup>.

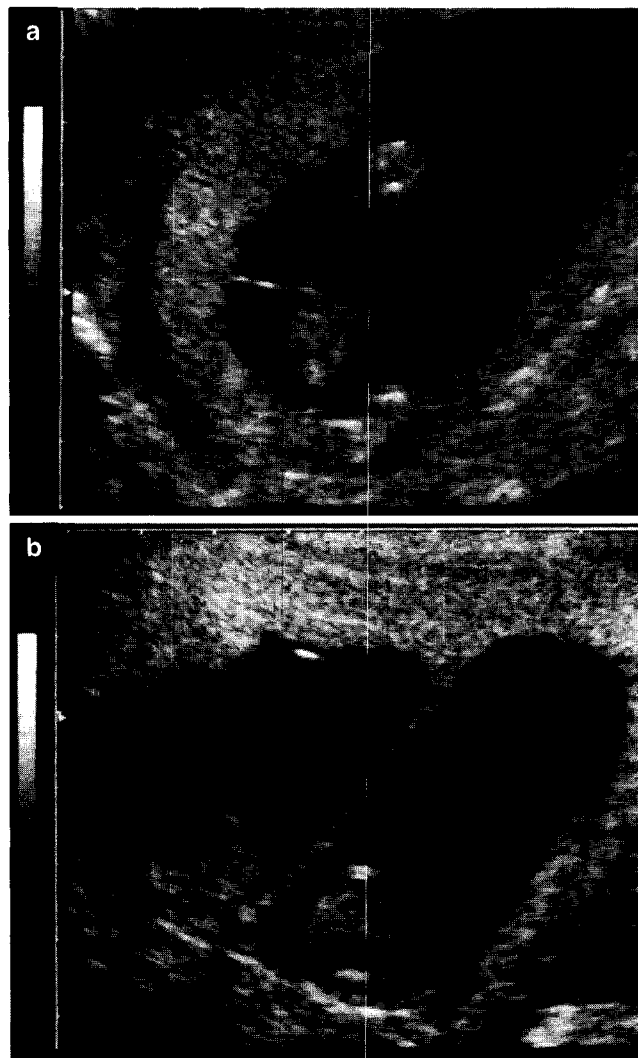
Another feature of dichorionicity is the extension of placental tissue into the base of the inter-twin membrane, referred to as the twin peak sign or lambda sign<sup>11,12</sup>. Bessis and Papiernik<sup>11</sup> noted the lambda sign in 20 of 24 dichorionic pregnancies, but in none of six monochorionic pregnancies. More recently, Finberg<sup>12</sup> examined 15 twin pregnancies in which the lambda sign was demonstrated at 14–35 weeks of gestation and confirmed to be dichorionic by histology of the placenta, or different sex at birth. However, this author did not examine the sensitivity of this sonographic feature in the prediction of monochorionicity.

The aim of the present study was to examine the value of the lambda sign at 10–14 weeks of gestation in determining chorionicity in twin pregnancies. This gestational range was selected because this is the time at which ultrasound examination is carried out routinely in our center, for measurement of fetal nuchal translucency, as a method of screening for chromosomal defects<sup>13,14</sup>.

## MATERIALS AND METHODS

The Harris Birthright Research Centre for Fetal Medicine is a tertiary referral center for high-risk pregnancies, but from 1992 we have been carrying out a transabdominal ultrasound screening study on self-referred patients for calculation of risk for trisomies by measurement of fetal nuchal translucency thickness at 10–14 weeks of gestation<sup>13,14</sup>. Demographic details, obstetric history and ultrasound findings are entered into a computer database at the time of the examination. Pregnancy outcome and results of fetal karyotype, in those cases that had this investigation performed, are obtained from the referring hospitals or the patients and are also entered into the computer.

Chorionicity was prospectively determined in twin pregnancies at 10–14 weeks of gestation during an 18-month period in which, at the time of the ultrasound scan, both fetuses were alive. They were classified as monochorionic if there was a single placental mass in the absence of the lambda sign at the inter-twin membrane–placental junction (Figure 1a), and dichorionic if there was a single placental mass but the lambda sign was present (Figure 1b) or the placentas were not adjacent to each other. The fetal sex was determined either at delivery or from fetal karyotyping in those cases that had prenatal diagnosis. Weinberg's formula<sup>15</sup> was used to calculate the expected number of dizygotic twins, which is assumed to be double the number of different-sex pairs. The  $\chi^2$  test was used to determine the significance of differences in the observed and expected number.



**Figure 1** Transabdominal ultrasound scans at 12 weeks of gestation in twin pregnancies with a single placental mass. In monochorionic placentation (a) there is a thin inter-twin membrane and absent lambda sign at the membrane–placental junction. In dichorionic placentation (b) there is a thick inter-twin membrane and lambda sign present at the level where the placentas fuse

## RESULTS

During an 18-month period, 369 twin pregnancies were evaluated at 10–14 weeks, with both fetuses alive at the time of the examination. The median gestational age at examination was 12 weeks (range 10–14) and the median maternal age was 35 years (range 19–44). In 81 (22%) of the cases, the pregnancies were classified as monochorionic and in 288 (78%) as dichorionic. Conception was spontaneous in 258 (70%) and the prevalence of monochorionicity in this group was 29% ( $n = 76$ ), compared to 5% ( $n = 5$ ) in the 111 cases in which pregnancy occurred after the use of assisted reproduction techniques (57 *in vitro* fertilization and embryo transfer, and 54 other techniques).

In the 279 completed pregnancies, 63 were monochorionic and 216 were dichorionic. All 63 monochorionic pregnancies resulted in same-sex twins and all 100 different-sex twins were correctly classified as dichorionic. Based on our observed prevalence of different-sex twins, the expected number of dizygotic pregnancies according to Weinberg's formula would be 200 ( $2 \times 100$ ). In order to calculate the expected number of monochorionic and dichorionic pregnancies, we assumed that one-third of monozygotic pregnancies are dichorionic<sup>16</sup>. Therefore, 26 of the 79 presumed monozygotic twins according to Weinberg's rule would be dichorionic, giving an expected number of dichorionic pregnancies of 226 (200 dizygotic plus 26 monozygotic pregnancies), with a prevalence of 81% (226 of 279). This expected number is not significantly different from the 216 cases observed in our study (Yates corrected  $\chi^2 = 0.88$ ,  $p = 0.35$ ).

## DISCUSSION

The findings of this study demonstrate that chorionicity in twin pregnancies can be reliably determined by ultrasound at 10–14 weeks of gestation by looking for the presence or absence of the lambda sign. All pregnancies classified as monochorionic resulted in the delivery of same-sex twins and all different-sex pairs were correctly classified as dichorionic. The main limitation of our study was that validation of the antenatal findings was based on sexing of the babies rather than postpartum histological examination of the placenta. However, such examination is not performed routinely in the majority of hospitals where the patients included in our study had their antenatal care and delivery.

The use of Weinberg's formula<sup>15</sup> to calculate zygosity has been examined in large clinical studies and correlated well with zygosity based on sex, fetal membranes and hematological markers<sup>17,18</sup>. Because it is not possible to determine zygosity by prenatal ultrasound examination in same-sex dichorionic twins, we used the information derived from Weinberg's formula for further validation of the sonographic findings at 10–14 weeks of gestation to predict chorionicity. In the present study, the observed prevalence of monochorionic pregnancies was similar to that expected on the basis of Weinberg's formula. All pregnancies in which there was a single placental mass and

absent lambda sign, and which were therefore classified as monochorionic on the basis of the sonographic findings, resulted in the delivery of same-sex twins. The implication is that these were monozygotic–monochorionic pregnancies. Similarly, all different-sex twin pairs, with conclusive evidence of dizygosity and therefore of dichorionicity, were correctly identified as dichorionic at the 10–14-week scan.

In twin pregnancies prenatal diagnosis of chorionicity is important, because chorionicity rather than zygosity is the main factor determining pregnancy outcome<sup>1–3</sup>. In monochorionic twins perinatal morbidity and mortality is twice as high as in dichorionic twins, and this increase in risk has been attributed to complications arising from the shared placental circulation which is confined to monochorionic twins. Conditions unique to monochorionic placentation include twin–twin transfusion syndrome, twin reversed arterial perfusion syndrome and conjoined twins. In addition, the death of a monochorionic fetus is associated with a high chance of sudden death or severe neurological impairment in the co-twin<sup>19,20</sup>.

Prenatal determination of chorionicity is also important in the management of pregnancies at high risk for genetic disorders and chromosomal abnormalities. In monochorionic twin pregnancies, during the undertaking of invasive diagnostic tests such as amniocentesis or chorionic villus sampling, it may be unnecessary to sample both fetuses, since they are monozygotic and, therefore, have identical genetic compositions. However, before such a policy becomes widespread it would be necessary to confirm by larger studies that all pregnancies with a single placental mass and absent lambda sign are always monozygotic. In the management of twin pregnancy discordant for a major fetal defect, one of the options is selective fetocide, which is usually carried out by intracardiac injection of potassium chloride<sup>21</sup>. In monochorionic twins this procedure should be avoided, because both fetuses could die or the survivor could suffer severe neurological impairment.

Ultrasound examination at 10–14 weeks of gestation for measurement of fetal nuchal translucency thickness is the most sensitive method of screening for chromosomal defects<sup>13,14</sup>. The findings of this study demonstrate that an ultrasound scan at this gestation is also useful for accurate diagnosis of chorionicity in multiple pregnancies.

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