

## OBSTETRICS

# Ultrasonographic Diagnosis of Discordant Growth in Twin Pregnancies

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### ABSTRACT

**Objective** To evaluate the ultrasonographic parameters, estimated fetal weight, biparietal diameter, abdominal circumference, and femur length, in the diagnosis of discordant growth in twin pregnancies.

**Design** Prospective descriptive study.

**Setting** Department of Obstetrics and Gynaecology, Faculty of Medicine, Ramathibodi Hospital, Mahidol University.

**Subjects** The sets of twins were studied with real - time ultrasonography for morphometric measurements in third trimester. The following cut off values were used to indicate abnormal test results: ( biparietal diameter > 6 mm, ( abdominal circumference > 20 mm, ( femur length > 5 mm, and ( estimate fetal weight > 20%. Discordancy was identified when the birth weight difference exceeded 25%.

**Main outcome measures** birth weight difference exceeded 25%.

**Results** Among the 52 sets of twin pregnancies studied, 40 sets fulfilled the study criteria. Eight sets of twins were discordant (20%). The mean gestational age at delivery was 37.15±2.24 weeks (range 28 to 41 weeks). According to ultrasonographic morphometries, the best predictor appeared to be the presence of (estimate fetal weight > 20%, which had the high sensitivity, specificity, and accuracy (75.0%, 71.87%, and 72.5% respectively).

**Conclusion** The real - time ultrasonography for morphometric measurement, especially estimate fetal weight is useful for diagnosis of discordant twins.

**Key words :** twin pregnancy, ultrasonography, discordancy

Discordant growth in twin gestation is associated with a significant increase in perinatal morbidity and mortality.<sup>(1)</sup> Discordant growth can result from placental crowding, twin-to-twin transfusion, a poor placental implantation site, or chromosomal

anomalies.<sup>(1)</sup> At birth, the smaller twin is at an increase risk of neonatal hypoglycemia and impaired intellectual development.<sup>(2,3)</sup> The clinical diagnosis of discordant growth in twin gestation is difficult. The use of intrapair differences in biparietal diameters,

abdominal circumferences, and femur lengths in real - time ultrasonography has been suggested for the identification of discordant growth.<sup>(4-6)</sup> The ultrasonographic estimation of fetal weight has also been useful in making this diagnosis.<sup>(7)</sup> However, most studies are small and have considerable bias of ascertainment. The ability of ultrasonography to predict growth disturbances of twin discordance seems to vary among population, as the prevalence of growth retardation varies.

The purpose of this study was to evaluate the indices of ultrasonography morphometric measurements in the diagnosis of discordant growth in twin pregnancies.

## Materials and Methods

The study population consisted of patients evaluated at the Maternal Fetal Medicine Unit at Ramathibodi Hospital, Mahidol University, Bangkok, Thailand during May 1994 to April 1996. The inclusion criteria included: (1) third trimester twin gestation with both fetuses alive at the time of examination, (2) well documented dates (by reliable menstrual history in agreement with an ultrasonographic examination at 18-20 weeks' gestation), (3) intact membranes and mother not in labor, (4) delivery occurred within 2 weeks of ultrasonographic evaluation, (5) signed consent form. Morphometric measurements were evaluated by a real - time ultrasound (either ATL - Ultramark 9 or Hitachi EUB 415) with 3.5 MHz curvilinear transducer, and included intrapair differences in (1) biparietal diameters -  $\Delta$  BPD, (2) abdominal circumferences -  $\Delta$  AC, (3) femur length -  $\Delta$  FL. These measurements were performed by means of standard techniques and also allowed the calculation of the estimated fetal weights (EFW) (based on AC-FL<sup>(8)</sup>) and the intrapair difference in EFWS (EFW). All ultrasonographic evaluations were performed by two of the authors (AC and PL).

The following cutoff levels were used prospectively to indicate abnormal test results: (1)  $\Delta$  BPD > 6 mm, (2)  $\Delta$  AC > 20 mm, (3)  $\Delta$  FL > 5 mm, (4)  $\Delta$  EFW > 20%.<sup>(4,6,9)</sup>

The intrapair birth weight (BW) difference was

expressed as a percentage of the larger twin's birth weight ( $\Delta$  BW). Discordancy was defined as  $\Delta$  BW > 25%.<sup>(10)</sup> The efficacy of various ultrasonographic parameters were evaluated by sensitivity, specificity, positive and negative predictive values, and accuracy.

## Results

Among the 52 sets of twin pregnancies studied, 12 sets were excluded due to incomplete data and 40 sets of twins met the inclusion criteria and available for analysis. Of the 40 women, 32 (80%) were delivered of concordant twins and 8 (20%) were delivered of discordant twins. The mean birth weight of twin A was  $2371 \pm 479$  gm (range 850 to 3300 gm) and twin B was  $2485 \pm 469$  gm (range 1040 to 3530 gm). There was statistically significant difference in the mean birth weight between the concordant twins ( $2520 \pm 536$  gm) and the discordant twins ( $1787 \pm 395$  gm;  $P < 0.05$ ). The mean maternal age was  $28.13 \pm 4.21$  year (range 20 to 37 years). The mean gestational age at delivery was  $37.15 \pm 2.24$  weeks (range 28 to 41 weeks); there was no difference between the concordant and the discordant pairs. Fifteen of the placentas were monochorionic diamniotic, 22 were dichorionic diamniotic, and 3 were monochorionic monoamniotic.

The sensitivity, specificity, positive and negative predictive values, and accuracy of the test results is shown in Table 1. Overall, the best predictor appeared to be the  $\Delta$  EFW > 20%, which correctly identified 6 of the 8 growth discordant twins (sensitivity 75%, specificity 72%, positive predictive value 40%, negative predictive value 92%, and accuracy 73%). The highest positive predictive value (100%) was noted when using the difference in the femur length but the sensitivity was only 25%.

**Table 1.** Sensitivity, specificity, positive and negative predictive values and accuracy for the test results in diagnosis of discordant twins.

	Sensitivity (%)	Specificity (%)	Positive Predictive Value (%)	Negative Predictive Value (%)	Accuracy (%)
$\Delta$ BPD > 6 mm	25	81	25	81	70
$\Delta$ FL > 5 mm	25	100	100	84	85
$\Delta$ AC > 20mm	63	69	33	88	68
$\Delta$ EFW > 20%	75	72	40	92	73

Abbreviation: BPD, biparietal diameter; FL, femur length; AC, abdominal circumference ; EFW, estimated fetal weight;  $\Delta$ , difference expressed in absolute measurement or percentage.

## Discussion

Twin gestation with divergent growth pattern of fetuses constitutes a high-risk group among twins. If there is weight discordancy, the risk of death of one twin has been reported to be approximately 20%.<sup>(11)</sup> When compared with twins with concordant growth, the risk of perinatal death is increased by a factor of 2.5. The risk is even greater when intrauterine death rates are considered. In discordant twins the risk of fetal death has been reported to be increased 6.5-fold when compared with normally grown twins.<sup>(11)</sup> The high risk of antepartum fetal death has been related mainly to perinatal asphyxia or twin-to-twin transfusion syndrome.<sup>(11,12)</sup> In terms of long term development, Babson and Phillips<sup>(3)</sup> have shown that discordancy in birth weight is also followed by developmental disturbances in the smaller twins.

Ultrasound techniques have recently focused on antenatal detection of discordant fetal growth. The present study assessed the value of the intrapair difference in the commonly used parameters (biparietal diameter, abdominal circumference, femur length, and estimated fetal weight). We found that the best predictor appeared to be the presence of the intrapair difference in EFW > 20% which correctly identified 6 of the 8 discordant sets of twins.

The basic principal of ultrasonography in twin gestation is to screen for and identify early evidence of abnormal growth patterns between twins so that

either further investigation of cause or assessment of adaptation can be initiated. Crane et al were among the first to point out the importance of recognizing twin discordance in predicting fetal outcome. Their report established that discrepancies, exceeding 20% in fetal weight and 10 mm in BPD, were associated with a high incidence of antepartum death.<sup>(12)</sup> A study by Leveno et al suggested that a cutoff value of  $\Delta$  BPD > 6 mm is associated with discordancy and poor fetal outcome.<sup>(13)</sup> In our study, the sensitivity and specificity of  $\Delta$  BPD > 6 mm for predicting discordancy were 25% and 81%, respectively. Like other studies,<sup>(4,12,14)</sup> these results suggest that most discordant twins do not demonstrate significant intrapair differences in BPD. Grumbach et al studied the measurement of BPD, abdominal circumference (AC) and femur length (FL) in twin and singleton gestation for assessing growth and weight. They found that BPD and AC in twin gestation declined significantly in the growth rate after 31 and 32 weeks, respectively.<sup>(15)</sup> Several investigators evaluated the abdominal circumference in discordant twins and reported its sensitivity to range from 53% to 100% and its specificity to range from 77% to 85%.<sup>(4,6,14,16)</sup> In this study the sensitivity and specificity for  $\Delta$  AC > 20mm were 63% and 69%, respectively, which is within the range of those previous studies.

In the third trimester, growth of the fetal femur in twins is not significantly different from that in singleton gestation.<sup>(15)</sup> In our study the sensitivity and specificity

for  $\Delta FL > 5$  mm were 25% and 100%, respectively. These results indicate that  $\Delta FL > 5$  mm is not good parameter for screening of discordant fetal growth. Some investigators reported its sensitivity to range from 28% to 60% and its specificity of 93%.<sup>(4,14)</sup> Our finding is similar with the previous studies.<sup>(4,14)</sup> Several investigators evaluated  $\Delta EFW$  as a predictor of discordant fetal growth and reported its sensitivity to range from 47% to 90% and its specificity to range from 80% to 93%.<sup>(4,7,9,14,16)</sup> In our study the sensitivity and specificity for  $\Delta EFW > 20\%$  were 75% and 72%, respectively. These results were the same as the other reports and not markedly different from those obtained for  $\Delta AC > 20$  mm. This is not surprising because the formulars available for calculating EFW emphasize the abdominal circumference much more than any other variable.

In conclusion , the results of our study indicate that real-time ultrasonography for morphometric measurement especially estimate fetal weight is useful for the diagnosis of discordant twins. The early and accurate diagnosis of discordant fetal growth in twin pregnancies may help to lower the perinatal mortality rate.

## References

1. Blickstein I , Lancet M. The growth discordant twin. *Obstet Gynecol Surv* 1988; 43:509-12.
2. Reiner SH , Forbes AE , Cornblath M. The smaller of twins and hypoglycemia. *Lancet* 1965;1:524-6.
3. Babson SG, Phillips DS. Growth and development in twins dissimilar in size at birth. *N Eng J Med* 1973;289:937-9.
4. Storlazzi E, Vintzileos AM, Campbell WA, Nochimson DJ, Weinbaum PJ. Ultrasonic diagnosis of discordant fetal growth in twin gestations. *Obstet Gynecol* 1987;69:363-7.
5. Secher NJ, Kaern J, Hansen PK. Intrauterine growth in twin pregnancies : prediction of fetal growth retardation. *Obstet Gynecol* 1985;66:63-7.
6. Barnea ER, Romero R, Scott D, Hobbins JC. The value of biparietal diameter and abdominal perimeter in the diagnosis of growth retardation in twin gestation. *Am J Perinatol* 1985;2:221-2.
7. O'Brien WF, Knuppel RA, Scerbo JC, Rattan PK. Birth weight in twins : an analysis of discordancy and growth retardation. *Obstet Gynecol* 1986;67:483-6.
8. Hadlock FP, Harrist RB, Carpenter RJ, Deter RL, Park SK. Sonographic estimation of fetal weight the value of femur length in addition to head and abdomen measurements. *Radiology* 1984;150:535-40.
9. Rodis JF, Vintzileos AM, Campbell WA, Nochimson DJ. Intrauterine fetal growth in discordant gestations. *J Ultrasound Med* 1990;9:443-8.
10. Divon MY , Weiner Z. Ultrasound in twin pregnancy. *Semin Perinatol* 1995;19: 404-12.
11. Erkkola R, Ala-Mello S, Piironen O, Kero P, Sillanpaa M. Growth discordancy in twin pregnancies: A risk factor not detected by measurements of biparietal diameter. *Obstet Gynecol* 1985;66:203-6.
12. Crane JP, Tomich PG, Kopta M. Ultrasonic growth patterns in normal and discordant twins. *Obstet Gynecol* 1980;55:678-83.
13. Leveno KJ, Santos-Ramos R, Duenhoelter JH, Reisoh JS, Whalley PJ. Sonar cephalometry in twin pregnancy : discordancy of the biparietal diameter after 28 weeks' gestation. *Am J Obstet Gynecol* 1980;138:615-9.
14. Divon MY, Girz BA, Sklar A, Guidetti DA, Langer O. Discordant twins - A prospective study of the diagnostic value of real-time ultrasonography combined with umbilical artery velocimetry. *Am J Obstet Gynecol* 1989;161:757-60.
15. Grumbach K, Coleman BG, Arger PH, Mintz MC, Gabbe SV, Mennuti MT. Twin and singleton growth patterns compared using ultrasound. *Radiology* 1986;158: 237-41.
16. Chitkara U, Berkowitz GS, Levine R, Riden DJ, Fagerstrom RM Jr, Chervenak FA, et al. Twin pregnancy: Routine use of ultrasound examinations in the prenatal diagnosis of intrauterine growth retardation and discordant growth. *Am J Perinatol* 1985;2:49-54.