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Persistance of adverse obstetric and neonatal outcomes in monochorionic twins after exclusion of disorders unique to monochorionic placentation

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KEY WORDS
Perinatal outcomes in twins
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Objective: This study was undertaken to assess obstetric and neonatal outcomes in dichorionic twins and monochorionic-diamniotic twins after exclusion of twin-to-twin transfusion syndrome and twin reversed arterial perfusion sequence.

Study design: Data from a tertiary center were collected in twin gestations between 1994 and 2002. Chorionicity was defined by standard echographic criteria and placental examination at delivery. Neonatal outcomes were compared between monochorionic and dichorionic gestations.

Results: This study included 503 women: 378 (75%) dichorionic and 125 (25%) monochorionic twin gestations. Monochorionic twin gestations had a higher risk of preterm deliveries between 30 and 34 weeks' gestation than pregnancies with dichorionic twins ($P < .01$). Monochorionic twins had a higher number of birth weight less than 10th percentile ($P < .001$) discordancy 25% or greater ($P < .02$), admission to neonatal intensive care unit ($P < .03$), and intraventricular hemorrhage grade 3 and 4 ($P < .007$) than dichorionic twins even after adjusting for gestational age.

Conclusion: Monochorionic diamniotic twins have a higher risk of perinatal complications than dichorionic twin gestations, even after exclusion of disorders unique to monochorionic placentation.

Twin gestation is associated with increased perinatal morbidity and mortality rates compared with singletons.[1,2] Twins account for 10% of the perinatal mortality, although they represent only 3.0% of the pregnancies.[1,2] The poor perinatal outcome is the result of prematurity,[3] fetal growth restriction,[4] and both structural and chromosomal anomalies.[5,6] The type of placentation appears to influence perinatal morbidity because monochorionic twins have higher perinatal morbidity and mortality than dichorionic twins.[7-11] Disorders unique to monochorionic twins, such as twin-twin transfusion syndrome (TTTS),[12] twin reversed arterial perfusion (TRAP) sequence,[13] and the complications of monoamniocity[14] appear responsible for the poor perinatal outcomes in

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monochorionic twins. Although it has been reported that complications such as prematurity and impaired fetal growth have a role in the outcome of monochorionic and dichorionic twins, previous studies have included either small cohorts or severely discordant twins of various causes.[4,15-18] Therefore, we undertook an observational hospital based cohort study to assess obstetric and neonatal outcomes in twin pregnancies in relation to chorionicity. Monoamniotic twins and complications unique to monochorionic placentation were excluded.

Material and methods

Data were prospectively collected in all twins monitored at our tertiary care center between April 1994 and January 2002. This database review was approved by our ethics board committee. Twin pregnancies complicated by TTTS, chromosomal and structural anomalies, monoamniotic twins, and intrauterine fetal death of 1 co-twin were not included in the analysis as well as any transfer to our center that occurred after 21 week's gestation. The diagnosis of TTTS was made according to Quintero's criteria[19] and the presence of fetal echocardiographic findings suggesting this syndrome.[20] Chorionicity was assessed by standard echographic criteria and by meticulous placental examination at delivery. A detailed level II ultrasound was performed on all patients between 16 to 20 weeks of gestation. From 20 weeks of gestation until delivery, all women had the same prenatal care with clinical visits at 1- to 2-week intervals, cervical examination at each visit after 24 weeks of gestation, and multivitamin supplementation. Serial ultrasound examinations were performed every 2- to 4-week interval depending of fetal growth, for fetal biometry, and amniotic fluid assessment. Doppler studies were undertaken as soon as fetal growth restriction was suspected. Fetal growth restriction was defined as an estimated fetal weight less than the 10th percentile according to the Canadian birth weight growth curve for twins.[21] Discordance was defined as a 25% or greater difference in birth weights and was calculated by using the following formula: larger twin weight – smaller twin weight/larger twin weight $\times$ 100. All women had a maternity work leave from 24 weeks of gestation until delivery. Delivery was indicated between 32 to 34 weeks of gestation when fetal growth restriction less than the third percentile was present in at least 1 co-twin, or at 39 weeks' gestation for postdates or for any standard obstetric indications. Preeclampsia was defined according to the Canadian classification.[22] All pregnant women were screened for gestational diabetes mellitus (GDM) between 24 and 28 weeks'gestation. The screening for GDM was a 1-hour plasma glucose measurement after a 50-g glucose load given at any time of the day. If the 1-hour plasma glucose was 10.3 mmol/L or greater, GDM was confirmed. If the 1-hour plasma glucose was 7.8 to 10.2 mmol/L, a 75-g oral glucose tolerance test (OGTT) was conducted.[23]

Table I Maternal data in MC and DC twins

Variables	DC	MC	*P*
Mean maternal age (y)	30.6 $\pm$ 5.3	29.1 $\pm$ 6.1	.01
Gestational age at 1st US	18.7 $\pm$ 3.6	18.6 $\pm$ 3.7	NS
Elective CS	168/378 (44.4%)	57/125 (45.6%)	NS
Urgent CS on fetus 2	21/210 (10%)	11/68 (16.2%)	.01
Both vaginal deliveries	189/210 (90%)	57/68 (83.8%)	NS
% Preeclampsia	25/378 (6.6%)	12/125 (9.6%)	NS
% Gestational diabetes	53/370 (14.3%)	15/122 (12.3%)	NS

US, Ultrasound; *CS,* cesarean section.

Maternal demographic and obstetric data as well as neonatal data were recorded. Perinatal mortality was reported as the neonatal death in the first month of life. Perinatal morbidity was documented with the following variables: the proportion of deliveries that occurred 34 or less, 32 or less, and 30 or less weeks of gestation, the proportion of twins with a birth weight discordance 25% or greater, a birth weight less than the 10th percentile, and a very low birth weight (VLBW) less than 1500 g. Neonatal morbidity was defined by the proportion of neonates admitted to the neonatal intensive care unit (NICU), the rate of endotracheal intubation, and the rate of intraventricular hemorrhage (IVH) grade 3 or 4. Obstetric morbidity was described in using the following parameters: the rate of elective cesarean section and urgent cesarean section on the second twin. Finally, maternal morbidity was assessed with the prevalences of gestational diabetes requiring insulin and preeclampsia. Perinatal outcomes in monochorionic twins were compared with those of dichorionic twins. Finally, discordant twins were compared according to chorionicity.

Statistical analysis was performed in using unpaired *t* test for continuous variables such as: mean maternal age and gestational age at delivery. The χ^2 test was performed for the following categorical variables: the rates of elective and urgent cesarean section, the rate of both vaginal deliveries, the incidence of preeclampsia and gestational diabetes, the sex of fetuses, the rate of preterm deliveries less than 34 weeks, 32 or less weeks, and 30 or less weeks.

Mixed procedure (SAS version 8.02, SAS Institute, Cary, NC)[24] for repeated measures was used to estimate the differences in birth weight between monochorionic and dichorionic pregnancies taking into account within pair covariance. To compare the rate of discordant (more than 25% discordance) twin pairs, and birth weight less