OBSTETRICS

The impact of chorionicity on maternal pregnancy outcomes

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OBJECTIVE: Women carrying twin pregnancies often receive similar counseling, regardless of chorionicity, with the notable exception of twin-twin transfusion syndrome (TTTS); however, little is known about whether the presence of 1 vs 2 placentas confers dissimilar maternal risks. We sought to determine differences in maternal and neonatal outcomes based on chorionicity.

STUDY DESIGN: This was a retrospective cohort study of all twin pregnancies at our institution undergoing routine second-trimester ultrasound for anatomic survey from 1990 through 2010. Secondary outcomes included other adverse maternal and neonatal outcomes. Relative risks and adjusted odds ratios (aORs) were calculated. Cluster analysis was used to account for nonindependence of twin pairs.

RESULTS: Of 2301 pregnancies, 1747 (75.9%) were dichorionic and 554 (24.1%) were monochorionic. Rates of preeclampsia, gestational diabetes, placental abruption, placenta previa, preterm labor, and preterm premature rupture of membranes (PPROM) were not significantly different in dichorionic vs monochorionic pregnancies. Early preterm delivery less than 34 weeks (aOR, 1.47; 95% confidence interval [CI], 1.17—1.86) and less than 28 weeks (aOR, 2.58; 95% CI, 1.58—4.20) were more likely in monochorionic twins, as was neonatal intensive care unit admission (aOR, 1.41; 95% CI, 1.12—1.78). Monochorionic twins delivered earlier at a mean gestational age of 34.2 weeks vs 35.0 weeks for dichorionic twins ($P < .001$). Hospital length of stay was significantly longer for monochorionic twins with a mean of 13.7 days vs 10.8 days for dichorionic twins ($P = .01$).

CONCLUSION: There are no significant differences in maternal outcomes by chorionicity; however, monochorionicity is associated with increased fetal risks. This information may be helpful in guiding more targeted counseling to expectant parents of twins that, although the presence of an additional placenta does not confer additional maternal risks, monochorionic infants tend to deliver earlier and require longer hospital stays.

Key words: chorionicity, pregnancy outcomes, twins

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The increased perinatal risks of monochorionic (MC) compared with dichorionic (DC) twin pregnancies are well established. In addition to twin-twin transfusion syndrome (TTTS), monochorionicity imparts greater risk of perinatal mortality, stillbirth, intrauterine death after 32 weeks, neonatal intensive care unit (NICU) admission, and preterm delivery compared with DC twins.[1-11] As a result, women carrying twin pregnancies receive extensive antenatal counseling on fetal risks, but less is known about whether the presence of 1 vs 2 placentas confers dissimilar maternal risks.

Studies comparing mothers of twins with mothers of singletons have shown an increased risk of gestational diabetes (GDM), gestational hypertension, preeclampsia and eclampsia, postpartum hemorrhage, puerperal endometritis, and cesarean delivery rate,[12-16] but the incidence of these outcomes is less clearly defined with respect to chorionicity. The aim of this study was to estimate differences in pregnancy outcomes in monochorionic vs dichorionic pregnancies to appropriately counsel women about both fetal and maternal risks. We hypothesized that perinatal risks are higher in monochorionic pregnancies, whereas maternal risks are higher in women with dichorionic pregnancies because of the presence of 2 placentas.

Materials and Methods

This was a retrospective cohort study of all twin pregnancies undergoing routine second-trimester (15—22 weeks) ultrasound for anatomic survey at a single tertiary care center from 1990 through 2010. Institutional review board approval was obtained from Washington University School of Medicine. A standardized form was given to all patients undergoing second trimester ultrasonography requesting information regarding baseline characteristics, pregnancy complications, and maternal and neonatal outcomes. Outcome forms for patients who delivered at an outside facility were completed and returned after delivery. The coordinator contacted patients if the forms were not returned within 4 weeks of the delivery date, and the referring physician was contacted if the patient could not be reached. These

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TABLE 1
Baseline maternal characteristics by chorionicity

Characteristic	Dichorionic (n = 1747)	Monochorionic (n = 554)	*P* value
Maternal age (y), mean (SD)	31.4 (5.9)	29.9 (6.3)	< .0001[a]
Advanced maternal age >35 y, n (%)	479 (27.4)	127 (22.9)	.04[a]
Age <18 y, n (%)	15 (0.9)	9 (1.6)	.12
Race, n (%)			.18
Black	408 (23.4)	109 (19.7)	
White	1067 (61.1)	358 (64.6)	
Other	272 (15.6)	87 (15.7)	
Chronic hypertension, n (%)	63 (3.61)	7 (1.26)	.01[a]
Preexisting diabetes, n (%)	21 (1.2)	5 (0.9)	.56
BMI (kg/m^2), mean (SD)	26.1 (7.1)	25.2 (6.4)	.01[a]
Parity, median (interquartile range)	2 (1–3)	2 (1–3)	.51
Multiparity, n (%)	1010 (57.8)	334 (60.3)	.30
Prior cesarean delivery, n (%)	238 (13.6)	82 (14.8)	.48
Prior preterm birth, n (%)	126 (7.2)	27 (4.9)	.05
Current smoking use, n (%)	168 (9.7)	69 (12.5)	.06
Alcohol exposure, n (%)	206 (11.87)	81 (14.73)	.08

BMI, body mass index.

[a] Denotes significant values with $P < .05$.

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data have been validated with a review of 10% of medical records with greater than 90% accuracy in maternal reporting.

Patients with a confirmed viable twin gestation were included in this study. The diagnosis of TTTS was made according to the criteria of Quintero et al[17] and the presence of fetal echographic findings suggesting this syndrome. Chorionicity was diagnosed at the earliest ultrasound examination available by standard echographic criteria. An attending physician dedicated to obstetric ultrasound made the final assignment of chorionicity. A research nurse coordinator documented chorionicity on the pathology report for each twin pregnancy and compared this with the assignment prenatally. Discrepancies were corrected using the pathology report as the gold standard.

Gestational age was determined either by the known last menstrual period consistent with ultrasound (within 7 days of a first-trimester ultrasound or 14 days of a second-trimester ultrasound) or by the earliest ultrasound if the last menstrual period was unknown or inconsistent with ultrasound.

The primary study outcome was preeclampsia, defined by the new onset of hypertension with systolic blood pressure of 140 mm Hg or greater or diastolic of 90 mm Hg or greater on 2 occasions at least 6 hours apart and associated with proteinuria (>300 mg in 24 hours or a urine dipstick >1+ when a 24 hour urine sample was not available) after 20 weeks of gestation. Other maternal outcomes included gestational diabetes, placental abruption, placenta previa, preterm labor, preterm premature rupture of membranes (PPROM), and cesarean delivery.

GDM was defined by either clinical criteria (the term gestational diabetes written in the patient chart by a clinical provider) or laboratory criteria (glucose loading test greater than 140 and at least 2 abnormal values on a 100 g glucose tolerance test using the National Diabetes Group criteria).[18]

Placental abruption was diagnosed by clinical criteria (obstetric provider writing the term abruption in the medical record at the time of delivery), and placenta previa was defined by the placenta covering the cervical os on the last ultrasound prior to delivery.

Preterm labor was defined as regular contractions resulting in cervical change starting before 37 weeks of gestation, and any patient with a clinically confirmed rupture of membranes prior to 37 weeks was defined as PPROM. Perinatal outcomes were small for gestational age (birthweight less than the 10th percentile for gestational age), discordance with intertwin birthweight difference greater than 20%, delivery before 34 and 28 weeks, NICU admission, intrauterine fetal demise, neonatal demise, and neonatal length of hospital stay.

Infant birthweight was defined by the value listed in the delivery record. Discordance was calculated by taking the difference between birthweights and dividing by the birthweight of the larger twin. For the purposes of this study, intrauterine fetal demise was defined as fetal death after the first trimester (14 weeks' gestational age). Neonatal death was defined as death during the first 28 days of life. Length of stay was calculated by subtracting the day of birth from the day of discharge.

A sensitivity analysis excluding pregnancies complicated by monoamnionicity, TTTS, structural anomalies, or selective reduction was performed.

Data analysis was performed with descriptive and bivariate statistics using an unpaired Student *t* test or Mann-Whitney *U* test for continuous variables and a χ^2 or Fisher exact test for categorical variables as appropriate.

We developed multivariable logistic regression models to better estimate the impact of chorionicity on maternal and neonatal outcomes while adjusting for potential confounders. Clinically relevant covariates for inclusion in the initial multivariable statistical models were chosen based on the biological plausibility and the results of the