

Outcomes in twin pregnancies reduced to singleton pregnancies compared with ongoing twin pregnancies

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OBJECTIVE: Multifetal pregnancy reduction has been shown to improve outcomes in triplet and higher-order multiple pregnancies. The data for fetal reduction of twin pregnancies are limited. The purpose of this study was to compare adverse pregnancy outcomes in ongoing twin pregnancies compared with twin pregnancies reduced to singletons.

STUDY DESIGN: This was a retrospective cohort study comparing dichorionic diamniotic twin pregnancies with dichorionic diamniotic twin pregnancies reduced to singleton gestations between 11 and 24 weeks' gestation in a single maternal-fetal medicine practice over a 9 year period. Adverse pregnancy outcomes after 24 weeks were compared, with a value of $P < .05$ used for significance.

RESULTS: Five hundred one ongoing twin pregnancies and 63 twin pregnancies reduced to singletons were included. Patients with

reductions to singletons had a significantly lower risk of preterm delivery before 37 weeks' gestation (10% vs 43%; $P < .001$) but no difference in the risk of preterm delivery before 34 weeks' or 28 weeks' gestation. Patients with reductions to singletons also had a lower risk of infant birthweight less than the 10% (23% vs 49%; $P < .001$) but no difference in the risk of infant birthweight less than the 5%. There was no difference in the risk of fetal demise after 24 weeks' gestation.

CONCLUSION: Fetal reduction of twin pregnancies decreases the risk of late preterm birth and birthweight less than the 10% but not the risks of more severe complications such as early preterm birth or birthweight less than the 5%.

Key words: multifetal pregnancy reduction, selective reduction, twin pregnancy

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Multifetal pregnancy reduction was developed to reduce higher-order multiple pregnancies to singleton or twin pregnancies in the attempt to improve several pregnancy outcomes but most importantly preterm birth.¹⁻³ With improvements in infertility treatments, the number of triplet and higher-order pregnancies has dropped 9% from 2011

to 2012 and more than a third since its peak in 1998.⁴ Twin births, however, have remained stable over the last several years.⁴ The benefit of fetal reduction from twins to singletons remains controversial.

Compared with singleton pregnancies, twin pregnancies are associated with an increase in fetal, infant, and maternal morbidity. Infant morbidity includes an increased risk of intrauterine growth restriction and preterm delivery with the associated complications of prematurity. Maternal morbidity includes an increased risk of gestational diabetes, hypertension, hemorrhage, and cesarean delivery.⁵

Multifetal reduction from twin pregnancies to singleton pregnancies may be performed for a number of reasons including an increased risk for infant or maternal complications based on maternal or obstetric history, to decrease the known complications of twin pregnancies, or for social reasons. Selective reduction may also be performed

because of a genetic or congenital anomaly in one of the fetuses.

Fetal reduction to singletons in 52 twins by a single operator and 82 twins by multiple operators was shown to decrease the risk of preterm delivery and low birthweight when compared with national databases of ongoing twin pregnancies.^{6,7} However, in one small retrospective study comparing 35 ongoing twin pregnancies with 32 reduced pregnancies in a single unit, the authors found no difference in outcomes between the cohorts.⁸ However, this study was underpowered, given the small numbers in both the study and the control groups used. In addition, fetal reduction is not without risks. In a recent large study, the complete loss rate prior to 24 weeks in pregnancies reduced from 2 to 1 was 2.1%.⁹

The purpose of this study was to compare the risks of adverse pregnancy outcomes between ongoing twin pregnancies and twin pregnancies reduced to singleton pregnancies in a single practice.

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MATERIALS AND METHODS

This study is a retrospective cohort study of dichorionic diamniotic twin pregnancies between 2005 and 2013. Biomedical Research Alliance of New York Institutional Review Board approval was obtained. We compared outcomes between all ongoing dichorionic twin pregnancies and all dichorionic twin pregnancies that underwent fetal reduction to a singleton pregnancy in the first or second trimester. These reductions included both selective terminations (ie, because of a fetal abnormality) and multifetal pregnancy reductions (done solely to reduce the number of fetuses). For selective reductions, the anomalous fetus was reduced, and for multifetal pregnancy reductions, the fetus selected for reduction was chosen based on the technical ease of the procedure.

Pregnancies were excluded if the data on birth outcome were not available. Baseline characteristics and pregnancy outcomes were obtained from the computerized medical record or from the referring physician. All of the ongoing twin pregnancies were managed by one single maternal-fetal medicine practice. The reduced pregnancies were managed either by the same practice or by the referring physician, with ongoing ultrasound and consultative services being provided by the maternal-fetal medicine practice.

Fetal reductions were performed by maternal-fetal medicine attending physicians during the first and second trimesters. The reductions were performed according to standard technique by injecting 3-10 cc of 2 mEq/mL of potassium chloride into the fetal heart or thorax with a 20-gauge spinal needle until asystole was obtained. These were performed under real-time ultrasound guidance. Genetic screening with the first-trimester combined test of nuchal translucency and serum markers or diagnosis with chorionic villus sampling was performed prior to reduction. Patients with ongoing twin pregnancies and those with reduction to singleton pregnancies were managed similarly. Serial growth scans and ultrasounds for cervical length with fetal fibronectin testing were performed.

Baseline characteristics evaluated were age, body mass index, conception with in vitro fertilization, ethnicity, obstetric history, and mullerian anomalies. Pregnancy outcomes evaluated were spontaneous preterm birth, low birthweight percentile,¹⁰ and intrauterine fetal demise after 24 weeks. We did not compare the rate of second trimester loss because outcome data for every ongoing twin pregnancy seen in the second trimester was not available. Therefore, we report loss rates only for the reduction cohort.

Data were compared between ongoing twin pregnancies and twin pregnancies reduced to singletons with χ^2 , Mann-Whitney *U*, or Student's *t* test as appropriate. Logistic regression was performed to control for differences in baseline characteristics between the 2 groups. Incidences and odds ratios were reported with a value of $P < .05$ used for significance.

The primary outcome was a composite outcome of spontaneous preterm birth less than 37 weeks' gestation or a birthweight less than the 10%. Because we planned a priori on including all patients over the course of the study period, the power analysis was performed post hoc.

RESULTS

Between 2005 and 2013, the maternal-fetal medicine practice managed 501 patients with ongoing dichorionic diamniotic twin pregnancies longer than 24 weeks' gestation. All ongoing twin pregnancies had complete data for analysis.

During this same time period, the practice performed 71 fetal reductions from dichorionic-diamniotic twin pregnancies to singleton pregnancies. Seven patients were excluded because outcome data were not available. One patient was not included in the data analysis because termination of the remaining twin was performed for severe intrauterine growth restriction prior to 24 weeks' gestation. In this patient, fetal reduction was performed for a chromosomal anomaly in 1 twin and the severe intrauterine growth restriction

in the remaining twin was initially diagnosed before the procedure but continued to worsen after the procedure.

This left 63 patients with twin pregnancies reduced to singleton pregnancies available for analysis. Twenty-two patients were from our own practice and 41 patients were referred from other providers.

For the patients who underwent fetal reduction, 43 (68.3%) had their procedures performed in the first trimester and the remaining 20 (31.7%) in the second trimester. Approximately half of the procedures performed ($n = 32$, 50.8%) were multifetal pregnancy reductions in which the terminated fetus was chosen randomly or based on the position in the uterus. Six of these 32 patients had a maternal or obstetrical history that contributed to their decision for a fetal reduction, specifically a mullerian anomaly or a prior preterm delivery. The remaining 31 of the reductions (49.2%) were selective terminations. Twenty-five of the 31 patients had a fetus diagnosed with a genetic or congenital anomaly. The other 6 of the 31 patients had a fetus diagnosed with oligohydramnios or intrauterine growth restriction.

There were no losses of the remaining fetus after any of the reductions (0%; 95% confidence interval [CI], 0–5.8%). There were no differences in the adverse pregnancy outcomes evaluated between patients who underwent fetal reduction in the first trimester vs the second trimester (composite outcome of spontaneous preterm birth or low birthweight, 26% vs 35%; $P = .441$) or for multifetal pregnancy reduction vs selective termination (composite outcome, 31% vs 26%; $P = .633$).

The baseline characteristics between the patients with ongoing twin pregnancies and those with reductions to singleton pregnancies are shown in [Table 1](#). Patients with reductions to singleton pregnancies were older (37 years vs 34 years; $P < .001$) and more likely to be of a nonwhite ethnicity (22% vs 12%; $P = .042$). Patients with reductions to singleton pregnancies were also more likely to have a history of

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