Twin Birth Study: 2-year neurodevelopmental follow-up of the randomized trial of planned cesarean or planned vaginal delivery for twin pregnancy

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BACKGROUND: The Twin Birth Study randomized women with uncomplicated pregnancies, between $32^{0/7}$-$38^{6/7}$ weeks' gestation where the first twin was in cephalic presentation, to a policy of either a planned cesarean or planned vaginal delivery. The primary analysis showed that planned cesarean delivery did not increase or decrease the risk of fetal/neonatal death or serious neonatal morbidity as compared with planned vaginal delivery.

OBJECTIVE: This study presents the secondary outcome of death or neurodevelopmental delay at 2 years of age.

STUDY DESIGN: A total of 4603 children from the initial cohort of 5565 fetuses/infants (83%) contributed to the outcome of death or neurodevelopmental delay. Surviving children were screened using the Ages and Stages Questionnaire with abnormal scores validated by a clinical neurodevelopmental assessment. The effect of planned cesarean vs planned vaginal delivery on death or neurodevelopmental delay was quantified using a logistic model to control for stratification variables and using generalized estimating equations to account for the nonindependence of twin births.

RESULTS: Baseline maternal, pregnancy, and infant characteristics were similar. Mean age at assessment was 26 months. There was no significant difference in the outcome of death or neurodevelopmental delay: 5.99% in the planned cesarean vs 5.83% in the planned vaginal delivery group (odds ratio, 1.04; 95% confidence interval, 0.77—1.41; $P = .79$).

CONCLUSION: A policy of planned cesarean delivery provides no benefit to children at 2 years of age compared with a policy of planned vaginal delivery in uncomplicated twin pregnancies between $32^{0/7}$-$38^{6/7}$ weeks' gestation where the first twin is in cephalic presentation.

Key words: cesarean vs vaginal delivery, neurodevelopmental outcome, twin pregnancies

Introduction

Twin pregnancies occur more frequently now than in the past and are reported to complicate 2-3% of all births.[1-3] Cohort studies have shown a reduced risk of adverse perinatal outcomes for both twins, or for the second twin, when twins at or near term were delivered by means of an elective cesarean delivery.[4-6] This approach has led to increased rates of elective cesarean delivery for twins in North America and worldwide.[7-9]

The Twin Birth Study was a multicenter, international randomized controlled trial that enrolled and randomized women with uncomplicated twin pregnancies, between $32^{0/7}$-$38^{6/7}$ weeks' gestation, to a policy of planned cesarean or planned vaginal delivery.[10] The primary analysis showed that planned cesarean delivery did not increase or decrease the risk of fetal or neonatal death or serious neonatal morbidity as compared with a planned vaginal delivery. A secondary outcome for the trial was a composite of death or neurodevelopmental delay of the children at 2 years of age. This report presents the 2-year outcomes of the children in the Twin Birth Study.

Materials and Methods

Initial study

Women were enrolled in the Twin Birth Study if they were between $32^{0/7}$-$38^{6/7}$ weeks of gestation, the first twin was in the cephalic presentation, and both twins were alive with an estimated weight between 1500-4000 g, confirmed by ultrasonography within 7 days of randomization. Exclusion criteria included monoamniotic twins, fetal reduction at ≥13 weeks of gestation, the presence of a lethal fetal anomaly, contraindication to labor or vaginal delivery (eg, fetal compromise, second twin substantially larger than the first twin, fetal anomaly or condition that might cause mechanical problems at delivery, and previous vertical uterine incision or >1 previous lower-segment cesarean delivery), and prior participation in the Twin Birth Study.

Randomization took place from Dec. 13, 2003, through April 4, 2011; women were randomly assigned to planned cesarean delivery or planned vaginal delivery. Randomization was centrally controlled at the Center for Mother, Infant, and Child Research at the Sunnybrook Health Sciences Center in Toronto with the use of a computerized randomization program stratified according to parity (0 vs ≥1) and gestational age ($32^{0/7}$-$33^{6/7}$ weeks, $34^{0/7}$-$36^{6/7}$ weeks, or $37^{0/7}$-$38^{6/7}$ weeks), and used random blocks of varying sizes.

Data were abstracted from the medical records at participating centers by trained study staff and were recorded, after delivery, on standardized data-collection forms. Participating centers assessed fetal growth and well-being with the use

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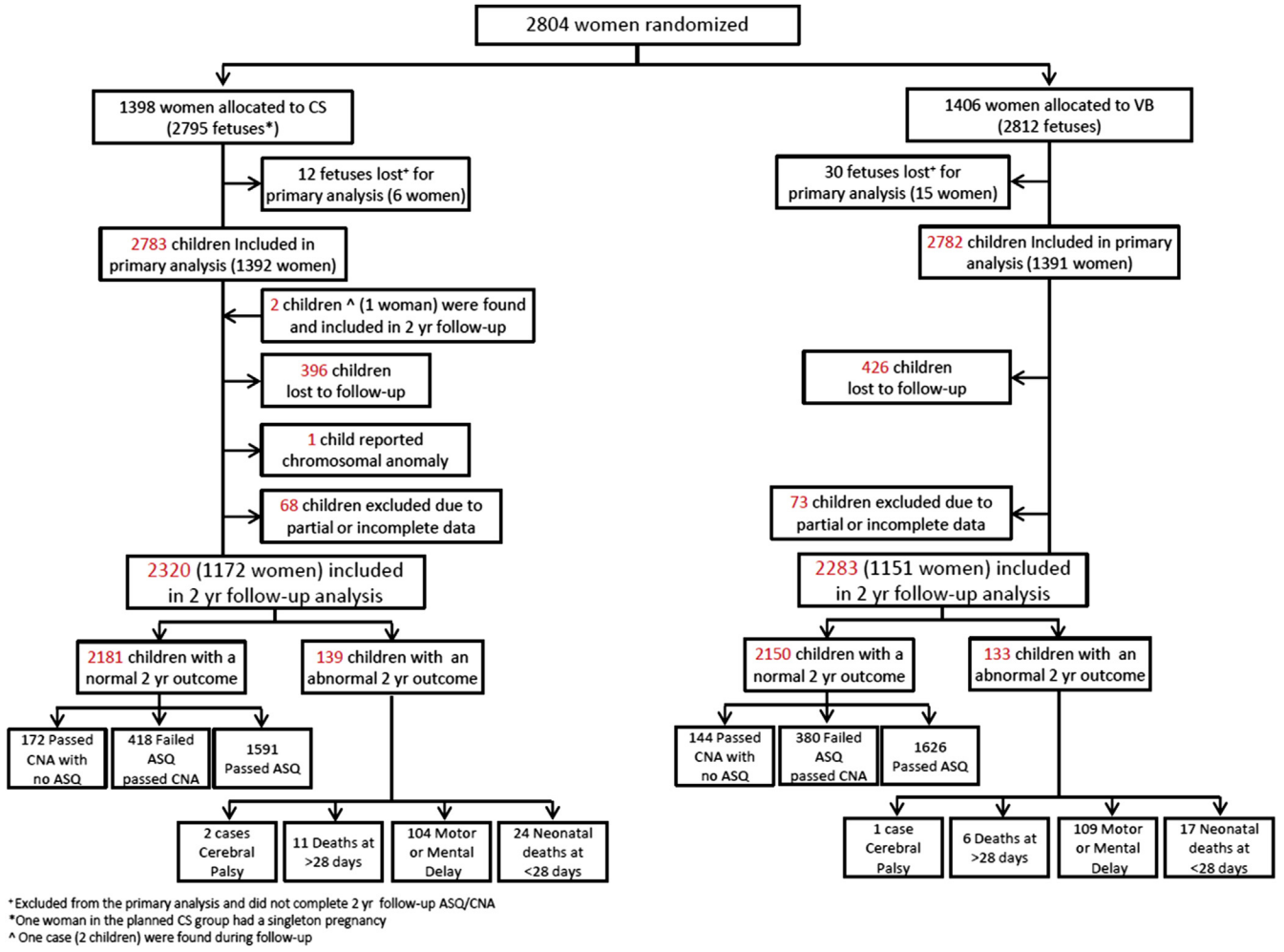
FIGURE
Study profile of children who contributed to analysis



Study profile of children who contributed to analysis.

ASQ, Ages and Stages Questionnaire; *CNA*, clinical neurodevelopmental assessment; *CS*, cesarean delivery; *VB*, vaginal birth.

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of ultrasonography at least every 4 weeks and with the use of nonstress or biophysical profile tests twice weekly if needed; were prepared to perform a cesarean delivery within 30 minutes if necessary; and had anesthetic, obstetrical, and nursing staff available in the hospital at the time of planned vaginal delivery.

Elective delivery by means of either cesarean delivery (for women in the planned cesarean delivery group) or labor induction (for women in the planned vaginal delivery group) was planned between $37^{5/7}$-$38^{6/7}$ weeks of gestation.

Two-year neurodevelopmental follow-up

When the children reached 23-25 months of age, corrected to estimated date of confinement if born <37 weeks' gestation, the parental caregivers were asked to complete an Ages and Stages Questionnaire (ASQ).[11] The ASQ is a parent/parental caregiver-administered structured questionnaire that includes questions on 5 domains of development: communication, gross motor skills, fine motor skills, problem-solving skills, and personal-social skills. The ASQ has become widely administered and has been utilized and validated in a variety of neurodevelopment monitoring settings worldwide.[12-14] If the ASQ could not be completed in the 23- to 25-month window, the caregiver was asked to complete a 30-month ASQ at 29-32 months of age.

The scores of each domain were summed up centrally at the coordinating center, and if the score for any 1 of the 5 domains was below the specific cutoff for the domain, the ASQ was considered abnormal. If the ASQ was deemed abnormal, a clinical neurodevelopmental assessment (CNA) was undertaken by an individual trained to assess children for developmental delay at the center. If an ASQ could not be