Published in final edited form as:

Obstet Gynecol. 2008 October ; 112(4): 748–752. doi:10.1097/AOG.0b013e318187ccb2.

Cesarean Delivery for the Second Twin

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Abstract

Objective—To examine maternal and infant outcomes after a vaginal delivery of twin A and a cesarean delivery of twin B, and to identify whether the second twin experienced increased short-term morbidity as part of a combined route of delivery.

Methods—Between January 1, 1999 and December 31, 2000, a prospective cohort study of all cesarean deliveries was conducted at 13 university centers. This secondary analysis was limited to women with twin gestations who experienced labor and underwent cesarean delivery. We compared outcomes of the second twin in women who had vaginal delivery of the first twin and a cesarean delivery of the second twin to those who had cesarean delivery of both twins.

Results—One-thousand twenty-eight twin pregnancies experienced labor and underwent cesarean delivery, 179 (17%) had a combined vaginal/cesarean delivery. Gestational age at delivery was 34.6 weeks in both groups ($p = 0.97$). The rupture of membranes to delivery interval was longer in the combined group (3.2 vs 2.3 hrs, $p < 0.001$). Endometritis and culture proven sepsis in the second twin were more common in the combined group, respectively ($n=24$, OR 1.6, 95% CI, 1.0 – 2.7), ($n=15$, OR 1.8, 95% CI, 1.0 – 3.4). These differences were not significant after logistic regression analysis. There were no statistically significant differences in an arterial cord pH of less than 7.0, Apgar less than or equal to 3 at 5 minutes, seizures, grade 3 or 4 IVH, HIE or neonatal death.

Conclusion—Combined twin delivery may be associated with endometritis and neonatal sepsis when compared to a twin delivery where both are delivered by cesarean in twin pregnancies

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Financial Disclosure: The authors have no potential conflicts of interest to disclose.

experiencing labor. More serious neonatal sequelae including hypoxic ischemic encephalopathy and death were not affected by the route of delivery of the second twin.

Introduction

The optimal route of delivery for the twin gestation is not known. While vaginal delivery is common when both twins are vertex and of similar size, cesarean delivery is typically performed when the first twin is breech and in many cases when the first twin is vertex and the second is malpositioned. Cesarean is resorted to in these cases out of concern for the morbidity that, in some, but not all studies has been associated with the second twin that includes birth trauma due to increased manipulation during delivery, cord prolapse, premature placental separation, and a prolonged second stage for the second twin as compared to the first. Most studies documenting an increased morbidity in the second twin are retrospective as randomized controlled trials are difficult to perform in this group of patients.^{1–7} Indeed, the only published randomized trial to date was small and did not show an increased morbidity of the second twin.⁸

The *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) Maternal-Fetal Medicine Units Network (MFMU) network performed a 2-year prospective observational study of cesarean delivery and included twin gestations.⁹ Using data from this cesarean registry, we compared outcomes of the second twin when both twins delivered by cesarean to those where the first twin delivered vaginally and the second by cesarean. Our objective was to identify whether the second twin experienced increased short-term morbidity as part of a combined route of delivery.

Materials and Methods

This is a secondary analysis of a prospective cohort study designed to assess several issues related to cesarean delivery. The study was performed by the NICHD MFMU Network, and details of the data collection and study design have been previously published.⁹ Briefly, between January 1, 1999 and December 31, 2000, all women undergoing a cesarean delivery at one of the 13 participating centers were prospectively ascertained. Each center's institutional review board approved the study protocol. This secondary analysis was limited to laboring women to provide comparable groups for analysis as all combined twin deliveries experience labor while only a proportion of the pregnancies when both twins delivered by cesarean experience labor.

Maternal and neonatal outcomes were compared in those twin pregnancies where the first twin was delivered vaginally and the second twin by cesarean to those pregnancies where both were delivered by cesarean. Maternal demographics, gestational age, and birthweight were compared as well as labor characteristics in the two groups. Maternal complications were also examined. Comparison of neonatal outcomes in the two groups was limited to the second twin.

Continuous variables were compared using the Wilcoxon rank-sum test. Categorical variables were compared with the use of the χ^2 or Fisher's exact test, where appropriate. Logistic regression analysis was performed adjusting for differences in demographics and labor characteristics looking at infection outcomes in the mothers and infants. Unless otherwise noted, the response rate for the variables was 95% or greater. Nominal two-tailed P values are reported with statistical significance considered as a P value of $< .05$. No adjustment was made for multiple comparisons. Statistical analysis was performed with SAS (SAS Institute, Cary, NC).

Results

There were 1,887 twin pregnancies in the cesarean registry, of which 1,028 experienced labor, and are included in this analysis. Cesarean delivery of both twins occurred in a total of 849 pregnancies and 179 (17%) delivered the first vaginally and underwent a cesarean delivery of the second twin. Table 1 shows demographic characteristics including gestational age and birthweight of the two groups. There were fewer nulliparous and more African-American women in the combined delivery group.

Labor characteristics are shown in Table 2. The combined group experienced more labor augmentation and a longer duration of rupture of membranes to delivery. The indication for cesarean was different in the two groups (all $p < 0.001$) with the combined group being more likely to undergo cesarean for a non reassuring fetal heart rate tracing (37 vs 13%), abnormal presentation (53 vs 38%), and less likely to undergo cesarean for labor dystocia (3 vs 14%). Other indications for cesarean included abruption (1.5%), previa with hemorrhage (.3%), and presence of a herpetic lesion (<.1%). In the combined group, 8.9% of the second twins had a failed operative vaginal delivery.

As shown in Table 3, endometritis was more common in the combined group. Chorioamnionitis and wound complications were similar in the two groups as was the need for blood transfusion. Logistic regression analysis was performed adjusting for the impact of the indication for cesarean delivery, intrapartum antibiotic use, nulliparity, race, and the length of time of rupture of membranes to delivery on endometritis. After adjustment the OR was 1.3 (0.7–2.2).

Table 4 shows neonatal outcomes in the two groups. Culture proven neonatal sepsis was more common in the combined delivery group ($p = 0.048$). Serious neonatal sequelae including hypoxic ischemic encephalopathy (HIE), intraventricular hemorrhage grade III or IV (IVH III or IV), necrotizing enterocolitis (NEC), seizures, and death were similar in the two groups. Logistic regression analysis was performed looking at the impact of the indication for cesarean delivery, intrapartum antibiotic use, nulliparity, race, and the time from membrane rupture to delivery on culture proven neonatal sepsis. The relationship between neonatal sepsis and type of delivery was no longer significant after this adjustment (OR 1.5, 0.7 – 3.3). To examine whether the condition of Twin A impacted the condition of Twin B, the following neonatal outcomes were compared: cord pH < 7.0, a 5-minute Apgar of 3 or less, confirmed seizure and proven sepsis. There was no statistically significant difference between Twin A and Twin B in the incidence of these outcomes when compared individually or as part of a composite, all $p > 0.05$.

Discussion

In this study of combined twin delivery, infectious morbidity was increased in those pregnancies where the first twin underwent vaginal delivery and the second twin underwent a cesarean delivery as compared to those where both twins delivered by cesarean. Endometritis was increased in the combined group from 9 to 13% and neonatal sepsis was increased from 5 to 9% as compared to the group where both twins delivered by cesarean. These findings were not significant however when the indication for cesarean delivery, the length of labor, the use of intrapartum antibiotics and demographic differences were adjusted for. More serious morbidity or mortality to the second twin was not seen in the combined group, including poor condition at birth as determined by cord pH, Apgar score, neurologic injury including HIE, seizure, IVH, and death. Although these results suggest morbidity is increased in those twins where vaginal delivery of both is unsuccessful, this

morbidity is limited to infection related to labor and the reason for the cesarean, and does not appear to result in poor condition at birth or translate to adverse neurologic outcome.

The safety of vaginal delivery for twins has long been questioned due to concerns over increased morbidity and mortality in the second twin. Most of the studies performed to date are retrospective in design due to the difficulties of performing a randomized trial on route of delivery. These studies have provided conflicting information on the safety of vaginal delivery of twins. Hogle et al performed a systematic review and meta-analysis to pool the existing data and determine whether a policy of planned cesarean for twins improves neonatal outcomes.⁴ They identified 67 articles, but were only able to include 4 due to methodologic limitations of the other 63. Three of the four studies included were not randomized. In the 1,932 infants reported on in the resulting meta-analyses, no increased morbidity or mortality was seen in the twins who underwent vaginal delivery. Sheay et al showed increased perinatal mortality of the second twin in a cohort of 293,788 fetuses identified through data assembled by the National Center for Health Statistics and the CDC.⁶ This morbidity was limited to stillbirths, that is, the risk of neonatal mortality excluding stillbirths was not increased in the second twin regardless of the route of delivery. A recent retrospective study of 1,377 births in England, North Ireland, and Wales found different results than these prior studies.⁵ Although there was no association between birth order and risk of death overall, there was when the analysis was limited to term births. The risk of death was increased in those twins undergoing vaginal compared to cesarean delivery. The accompanying editorial suggested that the clinician balance the potential for increased neonatal mortality with the increased risks to the mother of cesarean delivery. They pointed to the importance of completing a randomized trial(s) prior to recommending routine cesarean delivery for all twins.¹⁰ To date, there has been one published randomized trial of the route of delivery in twin gestations. This trial was small, enrolling only 54 twins, 27 of which received a cesarean delivery and 27 of which underwent a vaginal delivery. No difference was seen in neonatal outcomes; however maternal morbidity was greater in the cesarean group due to infection. Our study is consistent with these findings.

The MFMU Cesarean Registry afforded us the opportunity to look at a specific aspect of twin delivery involving the second twin, that is, what increased risk if any does the second twin face if an attempt at vaginal delivery results in a combined delivery. We expected that the second twin of a combined delivery may be at particular risk of adverse outcome. Our findings show that combined twin delivery is associated with an increased risk of infection. This appears to be secondary to an increased time in labor, the indication for cesarean, and possibly the vaginal manipulation that occurs with failed vaginal delivery of the second twin, something not addressed in our study. We are reassured that we did not find more serious adverse outcomes including death of the second twin. In the absence of more definitive data our study suggests that an attempt at vaginal delivery should not be avoided due to the fear of an unexpected cesarean delivery of the second twin.

Acknowledgments

The authors thank Elizabeth Thom, Ph.D. for protocol/data management and statistical analysis, and Francee Johnson, BSN, and Julia Gold, BSN/APN, for protocol development and coordination between clinical research centers.

Supported by grants from the National Institute of Child Health and Human Development (HD21410, HD21414, HD27860, HD27861, HD27869, HD27905, HD27915, HD27917, HD34116, HD34122, HD34136, HD34208, HD34210, and HD36801).

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Table 1

Demographic characteristics.

Characteristic	Combined delivery n = 179	Both cesarean n = 849	P value
Maternal age, yrs	27 (22, 32)	27 (23, 32)	0.59
Race:			<0.001
Caucasian	61 (34)	417 (49)	
African-American	89 (50)	268 (32)	
Hispanic	24 (13)	131 (15)	
Other	5 (3)	33 (4)	
Nulliparous	48 (27)	359 (42)	<0.001
Gestational age at delivery, wks	34.6 (30.5, 37.4)	34.6 (31.8, 36.7)	0.97
Birthweight, gms	2145 (1387, 2585)	2150 (1600, 2628)	0.18

Data presented as n (%) or median (1st and 3rd quartile).

Table 2

Labor characteristics.

Characteristic	Combined delivery n = 179	Both cesarean n = 849	P value
Induction of labor	27 (15)	123 (14)	0.84
Augmentation of labor	54 (30)	63 (7)	<0.001
Intrapartum antibiotic use	158 (88)	726 (86)	0.33
Rupture of membranes to delivery, hrs	3.2 (1.0, 8.4)	2.3 (0, 10.3)	<0.001
Onset of labor to delivery, hrs*	7.6 (4.2, 14.1)	7.9 (3.9, 16.1)	0.63

Data presented as n (%) or median (1st and 3rd quartile).

* Data for onset to delivery was missing for 17.0% of the participants, 15.6% (28) in the combined group, 17.3% (147) in the both cesarean group.

Table 3

Maternal complications.

Characteristic	Combined delivery n = 179	Both cesarean n = 849	OR (95% CI)
Chorioamnionitis	8 (4)	54 (6)	0.7 (0.3 – 1.5)
Endometritis	24 (13)	73 (9)	1.6 (1.0 – 2.7)
Wound complication	2 (1)	14 (2)	0.7 (0.2 – 3.0)
Infection	2 (1)	7 (0.8)	
Seroma	0	4 (0.5)	
Hematoma	0	7 (0.8)	
Dehiscence	0	2 (0.2)	
Blood transfusion	7 (4)	50 (6)	0.7 (0.3 – 1.5)

Data presented as n (%).

Table 4

Neonatal outcomes.

Characteristic	Combined delivery n = 179	Both cesarean n = 849	OR (95% CI)
Arterial cord pH < 7.0*	0	4 (1)	P > 0.99
Apgar ≤ 3 at 5 minutes	7 (4)	27 (3)	1.3 (0.5 – 3.0)
Seizures	2 (1)	15 (2)	0.6 (0.1 – 2.8)
NEC [†]	3 (2)	20 (3)	0.8 (0.2 – 2.6)
IVH grade III or IV [†]	6 (4)	19 (2)	1.6 (0.6 – 4.2)
HIE	0	2 (0.2)	P > 0.99
Neonatal death	4 (2)	32 (4)	0.6 (0.2 – 1.7)
Proven sepsis	15 (9)	40 (5)	1.8 (1.0 – 3.4)
Fetal injury	3 (2)	10 (1)	1.4 (0.4 – 5.2)

Data presented as n (%).

* Data on arterial cord pH was missing for 61.4% of the participants, 68.7% (123) in the combined group, 59.8% (508) in the both cesarean group.

[†] Data on NEC and IVH was missing for 7.8% of the participants, 13.4% (24) in the combined group, 6.6% (56) in the both cesarean group.