Outcomes of trial of labor following previous cesarean delivery among women with fetuses weighing >4000 g

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OBJECTIVE: To compare outcomes at term of a trial of labor in women with previous cesarean delivery who delivered neonates weighing >4000 g versus women with those weighing ≤4000 g.

STUDY DESIGN: We reviewed medical records for all women undergoing a trial of labor after prior cesarean delivery during a 12-year period. The current analysis was limited to women at term with one prior cesarean and no other deliveries. The rates of cesarean delivery and symptomatic uterine rupture for women with infants weighing >4000 g were compared to the rates for women with infants weighing ≤4000 g. Logistic regression was used to control for the potential confounding by use of epidural, maternal age, labor induction, labor augmentation, indication for previous cesarean, type of uterine hysterotomy, year of delivery, receiving public assistance, and maternal race. Adjusted odds ratios and 95% confidence intervals were calculated.

RESULTS: Of 2749 women, 13% (365) had infants with birth weights >4000 g. Cesarean delivery rate associated with birth weights ≤4000 g was 29% versus 40% for those with birth weights >4000 g ($P = .001$). With use of logistic regression, we found that birth weight >4000 g was associated with a 1.7-fold increase in risk of cesarean delivery (95% CI, 1.3-2.2). The rate of uterine rupture for women with infants weighing ≤4000 g was 1.0% versus a 1.6% rate for those with infants weighing >4000 g ($P = .24$). Although the logistic regression analysis revealed a somewhat higher rate of uterine rupture associated with birth weights of >4000 g (adjusted OR, 1.6; 95% CI, 0.7-4.1), this difference was not statistically significant. The rate of uterine rupture was 2.4% for women with infants weighing >4250 g, but this rate did not differ significantly from the rate of uterine rupture associated with birth weights ≤4250 g ($P = .1$).

CONCLUSION: A trial of labor after previous cesarean delivery may be a reasonable clinical option for pregnant women with suspected birth weights of >4000 g, given that the rate of uterine rupture associated with these weights does not appear to be substantially increased when compared to lower birth weights. However, some caution may apply when considering a trial of labor in women with infants weighing >4250 g. In these women with infants weighing >4000 g, the likelihood of successful vaginal delivery, although lower than for neonates weighing ≤4000 g, is still 60%. (Am J Obstet Gynecol 2001;185: 903-5.)

Key words: Large-for-gestational-age fetuses, trial of labor, uterine rupture

The most recent American College of Obstetricians and Gynecologists practice bulletin to examine vaginal birth after cesarean (VBAC)[1] suggests that gravidas with fetuses suspected of weighing >4000 g can be offered a trial of labor after a previous cesarean delivery. However, this recommendation was tempered by the stipulation that because there are so few data available, continuing analysis of the risk of abnormal outcomes is necessary before a trial of labor becomes routine practice in this subset of patients.

Several investigators have examined the question of VBAC for women with fetuses suspected of weighing >4000 g.[2-6] Although many of these studies had small sample sizes, the results showed successful vaginal delivery in a majority of the trials of labor. In the largest previous study to date, Flamm et al[2] examined the feasibility of a trial of labor after previous cesarean delivery in a cohort of 301 women with neonates weighing >4000 g. These investigators reported no difference between the rates of uterine rupture for women with neonates weighing >4000 g and women with infants weighing ≤4000 g. Although there was a statistically significant difference in the rate of vaginal delivery between the birth weight groups (55% for >4000 g vs 78% for ≤4000 g), most neonates weighing >4000 g were delivered vaginally. However, interpretation of the results is complicated by the fact that the study population included patients with pre-

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vious vaginal deliveries, a factor that is protective against uterine rupture and increases the success of a trial of labor.[7-8]

Therefore, we sought to further evaluate the outcomes at term of a trial of labor after previous cesarean delivery for gravidas who delivered neonates with birth weights >4000 g versus those who delivered neonates weighing ≤4000 g.

Material and methods

The medical records of all gravidas with a history of previous cesarean delivery who were admitted to Brigham and Women's Hospital over a 12-year period from July 1984 through June 1996 to undergo a trial of labor at or after 24 weeks' gestation were identified retrospectively. Specific details regarding the identification of the study cohort and the abstraction of data from the charts have been reported previously.[9] For the current analysis, the study population was limited to women with term pregnancies who had one prior cesarean delivery and no other deliveries. We included patients with low transverse (Kerr), low vertical (Kronig), and unknown hysterotomies. The rates of uterine rupture and cesarean delivery were analyzed according to birth weight: >4000 g versus ≤4000 g. The number of pregnant women with pre-gestational diabetes is small and we estimate that this group is likely to represent <1% of the total population.

Outcomes of interest were symptomatic uterine rupture and rate of cesarean delivery. Uterine rupture was defined as a complete disruption of the layers of the uterus in association with one of the following: intraperitoneal or vaginal hemorrhage, need for hysterectomy, bladder injury caused by uterine scar disruption, extrusion of any portion of the fetal-placental unit, or cesarean for nonreassuring fetal heart tracing or suspected uterine rupture. Secondary outcomes included Apgar scores of <7 at 5 minutes and rate of endometritis.

Statistical significance for comparisons of categorical variables was evaluated by using χ^2 or Fisher exact test.

Multiple logistic regression was used to examine the association of birth weight with uterine rupture and cesarean rate while controlling for potential confounders including use of epidurals, maternal age and race, receiving public assistance, year of delivery, indication for previous cesarean delivery, and type of cesarean hysterotomy.

Categories for indications for prior cesarean delivery were breech, failure to progress, nonreassuring fetal status, and *other* indication.

The study was approved by the institutional review board at the Brigham and Women's Hospital.

Results

Of 2749 gravidas at term with one prior cesarean delivery and no other deliveries, 13%(365) had infants with birth weights >4000 g. Maternal age and rate of epidural use did not differ between the two populations. However, gravidas with infants weighing >4000 g were more likely to be Caucasian and less likely to be receiving public assistance. In addition, women whose infants had birth weights of >4000 g had a higher rate of induction and were more likely to have Kerr hysterotomies. (See Table I.)

Table I. Clinical characteristics of study population with one prior cesarean and no other deliveries

	Birth weight		
Characteristic	*≤4000 g (n = 2384)*	*>4000 g (n = 365)*	*P value*
Caucasian	61	74	.001
Receiving public assistance	14	10	.04
Maternal age (≥31 y)	58	59	.7
Kerr hysterotomy	78	83	.03
Epidural use	73	77	.09
Induction	18	24	.04

Data are percentages.

The cesarean rate for women with infants weighing >4000 g was 40% versus 29% for those with infants ≤4000 g ($P = .001$). In a logistic regression model controlling for birth weight, maternal age, epidural use, indication for prior cesarean delivery, year of delivery, type of hysterotomy, maternal race, receiving public assistance, induction of labor, and augmentation of labor, birth weight of >4000 g was associated with a 1.7-fold increase in the rate of cesarean delivery (95% CI, 1.3-2.2). The indication for repeat cesarean was failure to progress in 85% of those women with infants weighing >4000 g and 77% in those women with infants weighing ≤4000 g ($P = .02$).

Among the 2749 gravidas there were 29 symptomatic uterine ruptures (1.1%). There were no maternal mortalities or intrapartum fetal deaths associated with uterine rupture. The rate of uterine rupture for women with infants weighing >4000 g was 1.6% versus 1.0% for infants with birth weights of ≤4000 g ($P = .24$). Although logistic regression analysis that controlled for the same variables used for the cesarean model revealed a somewhat higher rate of uterine rupture for birth weights of >4000 g (adjusted OR, 1.6; 95% CI, 0.7-4.1), this difference was not statistically different.

To explore whether the highest birth weights might be associated with an increased risk of uterine rupture, we further examined the group with birth weights >4000 g. The rate of uterine rupture for birth weights >4000 g and ≤4250 g was 1% (2/197), whereas the rate of uterine rupture associated with birth weights >4250 g was 2.4% (4/168). The rate of uterine rupture among women with infants weighing >4250 g did not differ significantly from the rate associated with birth weights ≤4250 g ($P = .1$).

Secondary outcome variables included Apgar scores of <7 at 5 minutes and rate of endometritis. For neonates with birth weights >4000 g, Apgar scores of <7 at 5 minutes occurred in 0.8%, compared to 1.3% in neonates weighing ≤4000 g ($P = .6$). The rate of endometritis was 0.6% in women delivering neonates weighing >4000 g and 1.1% in women delivering neonates ≤4000 g ($P = .6$).

Comment

The American College of Obstetricians and Gynecologists has indicated that pregnant women with fetuses suspected of weighing >4000 g and who have had a prior cesarean delivery are appropriate candidates for a trial of labor.[1] However, they have also indicated the need for further study to evaluate this recommendation before designating it as a standard of care. Our study is the largest to date to examine the outcomes of a trial of labor at term after previous cesarean delivery for gravidas with infants weighing >4000 g. In addition, we limited our study population to women who had no prior vaginal delivery, a factor that increases the success of a trial of labor and decreases the risk of uterine rupture.

Our study has several important clinical implications for guiding the selection of appropriate VBAC candidates. The results appear to indicate that, overall, pregnant women with infants who weigh >4000 g have a rate of uterine rupture similar to that of gravidas with infants weighing ≤4000 g. However, our data also suggest that although there is no increase in risk of uterine rupture for gravidas with infants weighing from 4000-4250 g, the risk of uterine rupture for gravidas with infants weighing >4250 g may be higher. Given the relatively small number of pregnancies at birth weights >4250 g, our study lacked the power (33%) to adequately evaluate the difference in the observed rates (1% vs 2.4%). Further study is required to examine the rate of uterine rupture for pregnant women with infants weighing >4250 g.

Although the likelihood of a vaginal delivery was lower among gravidas with infants weighing >4000 g, overall, a 60% success rate was achieved. The decreased likelihood of success of vaginal delivery may attribute to true dystocia, however, it may also reflect a lower threshold to perform repeat cesarean delivery. The retrospective format of our study does not allow us to assess the real reason for the lower rate of success for vaginal delivery.

Another limitation of our study is the use of birth weights instead of estimated fetal weights, which is what the clinician is faced with when counseling the patient for possible VBAC. Problems with the accuracy of prenatal detection of the large-for-gestational-age fetus have been considered, with some studies[10] citing errors in excess of 20% of actual birth weight. It is unfortunate that estimated fetal weights were not available for many of our study patients.

For nondiabetic women with no history of previous cesarean delivery, the current policy of the American College of Obstetricians and Gynecologists does not support elective cesarean for the large-for-gestational-age fetus unless the estimated fetal weight is at least 5000 g.[11] Different cut-off fetal weights may apply for gravidas who have undergone previous cesarean delivery. Although our data does not indicate an increased risk of uterine rupture overall for women whose fetuses weigh >4000 g, some caution may be necessary when considering vaginal delivery after previous cesarean section for women whose fetuses weigh >4250 g.

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