



Research on VBAC Compared to Repeat Cesarean

Prepared by Susan Hodges for Midwifery & Legislation Panel
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ICAN has a number of pertinent articles:

<http://www.ican-online.org/vbac/home>

Childbirth Connection www.childbirthconnection.org

The Milbank Report, page 57-58, "The Evidence about Vaginal Birth After Cesarean (VBAC)"

Published papers 2004-2008 that demonstrate the safety of VBAC:

2004 "Absolute risks are low" for "a trial of labor after prior cesarean delivery"

Landon, M.B., J.C. Hauth, K.J. Leveno, C.Y. Spong, S. Leindecker, M.W. Varner, A.H.

Moawad et al. for the National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. 2004. *Maternal and Perinatal Outcomes Associated with a Trial of Labor after Prior Cesarean Delivery*. The New England Journal of Medicine 351(25)2581-89. Available at <http://content.nejm.org/cgi/content/full/351/25/2581>

BACKGROUND The proportion of women who attempt vaginal delivery after prior cesarean delivery has decreased largely because of concern about safety. The absolute and relative risks associated with a trial of labor in women with a history of cesarean delivery, as compared with elective repeated cesarean delivery without labor, are uncertain.

METHODS We conducted a prospective four-year observational study of all women with a singleton gestation and a prior cesarean delivery at 19 academic medical centers. Maternal and perinatal outcomes were compared between women who underwent a trial of labor and women who had an elective repeated cesarean delivery without labor.

RESULTS Vaginal delivery was attempted by 17,898 women, and 15,801 women underwent elective repeated cesarean delivery without labor. Symptomatic uterine rupture occurred in 124 women who underwent a trial of labor (0.7 percent). Hypoxic-ischemic encephalopathy occurred in no infants whose mothers underwent elective repeated cesarean delivery and in 12 infants born at term whose mothers underwent a trial of labor ($P<0.001$). Seven of these cases of hypoxic-ischemic encephalopathy followed uterine rupture (absolute risk, 0.46 per 1000 women at term undergoing a trial of labor), including two neonatal deaths. The rate of endometritis was higher in women undergoing a trial of labor than in women undergoing repeated elective cesarean delivery (2.9 percent vs. 1.8 percent), as was the rate of blood transfusion (1.7 percent vs. 1.0 percent). The frequency of hysterectomy and of maternal death did not differ significantly between groups (0.2 percent vs. 0.3 percent, and 0.02 percent vs. 0.04 percent, respectively).

CONCLUSIONS A trial of labor after prior cesarean delivery is associated with a greater perinatal risk than is elective repeated cesarean delivery without labor, although absolute risks are low. This information is relevant for counseling women about their choices after a cesarean section.

2004 The risk of maternal death from cesarean section is higher than for vaginal birth (in one study, four times higher), the rate of maternal complications is significantly higher with c-sections, and long term risks must be considered.

Zelop & Heffner, *The Downside of Cesarean delivery: Short- and Long-Term Complications* Clinical Obstetrics and Gynecology, Vol 47, No. 2, June 2004, pp. 386-393.

(no abstract)

Conclusion: "Although the debate will likely continue regarding the appropriateness of "cesarean delivery on demand," any discussion of risks and benefits must include the potential of long-term risks of recurrent cesarean delivery, including hysterectomy, fetal death, and even maternal death."

2005 “Women with a prior cesarean should be offered VBAC.”

George A. Macones, Jeffrey Peipert, *et al.*, *Maternal Complications with Vaginal Birth After Cesarean Delivery: A Multicenter Study*, 193 AM. J. OBSTETRICS & GYNECOLOGY 1656 (2005)

Objective: This study was undertaken to determine incidence and risk factors for uterine rupture in women attempting vaginal birth after cesarean delivery (VBAC) in a wide range of hospital settings.

Study design: We performed a case-control study nested within a cohort of women who have had a prior cesarean to determine the incidence and risk factors for uterine rupture in women attempting VBAC.

Results: The incidence rate of uterine rupture in those who attempt VBAC was 9.8 per 1000. A prior vaginal delivery was associated with a lower risk of uterine rupture (adjusted odds ratio [OR] = 0.40, 95% CI 0.20-0.81). Although prostaglandins alone were not associated with uterine rupture, sequential use of prostaglandin and pitocin was associated with uterine rupture (adjusted OR = 3.07, 95% CI 0.98-9.88).

Conclusion: Women with a prior cesarean should be offered VBAC, and women with a prior cesarean and prior vaginal delivery should be encouraged to VBAC. Although other studies have suggested that prostaglandins should be avoided, we suggest that inductions requiring sequential agents be avoided.

2006 The risk of neonatal death from cesarean section was found to be nearly three times higher than from vaginal delivery.

Marian F. MacDorman, Eugene Declercq, *et al.*, *Infant and Neonatal Mortality for Primary Cesarean and Vaginal Births to Women with “No Indicated Risk,”* 33 Birth 175 (2006).

ABSTRACT: Background: The percentage of United States’ births delivered by cesarean section has increased rapidly in recent years, even for women considered to be at low risk for a cesarean section. The purpose of this paper is to examine infant and neonatal mortality risks associated with primary cesarean section compared with vaginal delivery for singleton full-term (37–41 weeks’ gestation) women with no indicated medical risks or complications.

Methods: National linked birth and infant death data for the 1998–2001 birth cohorts (5,762,037 live births and 11,897 infant deaths) were analyzed to assess the risk of infant and neonatal mortality for women with no indicated risk by method of delivery and cause of death. Multivariable logistic regression was used to model neonatal survival probabilities as a function of delivery method, and sociodemographic and medical risk factors.

Results: Neonatal mortality rates were higher among infants delivered by cesarean section (1.77 per 1,000 live births) than for those delivered vaginally (0.62). The magnitude of this difference was reduced only moderately on statistical adjustment for demographic and medical factors, and when deaths due to congenital malformations and events with Apgar scores less than 4 were excluded. The cesarean/vaginal mortality differential was widespread, and not confined to a few causes of death.

Conclusions: Understanding the causes of these differentials is important, given the rapid growth in the number of primary cesareans without a reported medical indication. (BIRTH 33:3 September 2006)

2006 “Vaginal birth after multiple cesarean deliveries should remain an option for eligible women.”

Mark B. Landon, Catherine Y. Spong, *et al.*, *Risk of Uterine Rupture With a Trial of Labor in Women With Multiple and Single Prior Cesarean Delivery*, *Obstet Gynecol* 2006;108:12–20

Available at <http://www.greenjournal.org/content/vol108/issue1/>

OBJECTIVE: To determine whether the risk for uterine rupture is increased in women attempting vaginal birth after multiple cesarean deliveries.

METHODS: We conducted a prospective multicenter observational study of women with prior cesarean delivery undergoing trial of labor and elective repeat operation. Maternal and perinatal outcomes were compared among women attempting vaginal birth after multiple cesarean deliveries and those with a single prior cesarean delivery. We also compared outcomes for women with multiple prior cesarean deliveries undergoing trial of labor with those electing repeat cesarean delivery.

RESULTS: Uterine rupture occurred in 9 of 975 (0.9%) women with multiple prior cesarean compared with 115 of 16,915 (0.7%) women with a single prior operation ($P = .37$). Multivariable analysis confirmed that multiple prior cesarean delivery was not associated with an increased risk for uterine rupture. The rates of hysterectomy (0.6% versus 0.2%, $P = .023$) and transfusion (3.2% versus 1.6%, $P < .001$) were increased in women with multiple prior cesarean deliveries compared with women

with a single prior cesarean delivery attempting trial of labor. Similarly, a composite of maternal morbidity was increased in women with multiple prior cesarean deliveries undergoing trial of labor compared with those having elective repeat cesarean delivery (odds ratio 1.41, 95% confidence interval 1.02–1.93).

CONCLUSION: A history of multiple cesarean deliveries is not associated with an increased rate of uterine rupture in women attempting vaginal birth compared with those with a single prior operation. Maternal morbidity is increased with trial of labor after multiple cesarean deliveries, compared with elective repeat cesarean delivery, but the absolute risk for complications is small. Vaginal birth after multiple cesarean deliveries should remain an option for eligible women.

2007 The risks of severe maternal morbidity associated with planned cesarean delivery are higher than those associated with planned vaginal delivery.”

Shiliang Liu, Robert M. Liston, *et al.*, *Maternal Mortality and Severe Morbidity Associated with Low-Risk Planned Cesarean Delivery Versus Planned Vaginal Delivery at Term*, Canadian Medical Association. Journal. Ottawa: Feb 13, 2007. Vol. 176, Iss. 4; pg. 455,

BACKGROUND: The rate of elective primary cesarean delivery continues to rise, owing in part to the widespread perception that the procedure is of little or no risk to healthy women.

METHODS: Using the Canadian Institute for Health Information's Discharge Abstract Database, we carried out a retrospective population-based cohort study of all women in Canada (excluding Quebec and Manitoba) who delivered from April 1991 through March 2005. Healthy women who underwent a primary cesarean delivery for breech presentation constituted a surrogate "planned cesarean group" considered to have undergone low-risk elective cesarean delivery, for comparison with an otherwise similar group of women who had planned to deliver vaginally.

RESULTS: The planned cesarean group comprised 46,766 women v. 2,292,420 in the planned vaginal delivery group; overall rates of severe morbidity for the entire 14-year period were 27.3 and 9.0, respectively, per 1000 deliveries. The planned cesarean group had increased postpartum risks of cardiac arrest (adjusted odds ratio [OR] 5.1, 95% confidence interval [CI] 4.1-6.3), wound hematoma (OR 5.1, 95% CI 4.6-5.5), hysterectomy (OR 3.2, 95% CI 2.2-4.8), major puerperal infection (OR 3.0, 95% CI 2.7-3.4), anesthetic complications (OR 2.3, 95% CI 2.0-2.6), venous thromboembolism (OR 2.2, 95% CI 1.5-3.2) and hemorrhage requiring hysterectomy (OR 2.1, 95% CI 1.2-3.8), and stayed in hospital longer (adjusted mean difference 1.47 d, 95% CI 1.46-1.49 d) than those in the planned vaginal delivery group, but a lower risk of hemorrhage requiring blood transfusion (OR 0.4, 95% CI 0.2-0.8). Absolute risk increases in severe maternal morbidity rates were low (e.g., for postpartum cardiac arrest, the increase with planned cesarean delivery was 1.6 per 1000 deliveries, 95% CI 1.2-2.1). The difference in the rate of in-hospital maternal death between the 2 groups was nonsignificant ($p = 0.87$).

INTERPRETATION: Although the absolute difference is small, the risks of severe maternal morbidity associated with planned cesarean delivery are higher than those associated with planned vaginal delivery. These risks should be considered by women contemplating an elective cesarean delivery and by their physicians.

2007 "...the risk of uterine rupture and adverse perinatal outcome for women with a singleton and prior cesarean delivery is low regardless of mode of delivery..."

Catherine Y. Spong, Mark B. Landon, *et al.*, *Risk of Uterine Rupture and Adverse Perinatal Outcome at Term After Cesarean Delivery*, *Obstet Gynecol* 2007;110:801–7 “the risk of uterine rupture and adverse perinatal outcome for women with a singleton and prior cesarean delivery is low, regardless of the mode of delivery.”

OBJECTIVE: Current information on the risk of uterine rupture after cesarean delivery has generally compared the risk after trial of labor to that occurring with an elective cesarean delivery without labor. Because antepartum counseling cannot account for whether a woman will develop an indication requiring a repeat cesarean delivery or whether labor will occur before scheduled cesarean delivery, the purpose of this analysis was to provide clinically useful information regarding the risks of uterine rupture and adverse perinatal outcome for women at term with a history of prior cesarean delivery.

METHODS: Women with a term singleton gestation and prior cesarean delivery were studied over 4 years at 19 centers. For this analysis, outcomes from five groups were studied: trial of labor, elective repeat with no labor, elective repeat with labor (women presenting in early labor who subsequently underwent cesarean delivery), indicated repeat with labor, and indicated repeat without labor. All cases of uterine rupture were reviewed centrally to assure accuracy of diagnosis.

RESULTS: A total of 39,117 women were studied. In term pregnant women with a prior cesarean delivery, the overall risk for uterine rupture was 0.32% (125 of 39,117), and the overall risk for serious adverse

perinatal outcome (stillbirth, hypoxic ischemic encephalopathy, neonatal death) was 106 of 39,049 (0.27%). The uterine rupture risk for indicated repeat cesarean delivery (labor or without labor) was 7 of 6,080 (0.12%); the risk for elective (no indication) repeat cesarean delivery (labor or without labor) was 4 of 17,714 (0.02%). Indicated repeat cesarean delivery increased the risk of uterine rupture by a factor of 5 (odds ratio 5.1, 95% confidence interval 1.49–17.44). In the absence of an indication, the presence of labor also increased the risk of uterine rupture (4 of 2,721 [0.15%] compared with 0 of 14,993, $P < .01$). The highest rate of uterine rupture occurred in women undergoing trial of labor (0.74%, 114 of 15,323).

CONCLUSION: At term, the risk of uterine rupture and adverse perinatal outcome for women with a singleton and prior cesarean delivery is low regardless of mode of delivery, occurring in 3 per 1,000 women. Maternal complications occurred in 3–8% of women within the five delivery groups.

2008 “Labor before the primary cesarean delivery can decrease the risk of uterine rupture in a subsequent trial of labor.”

Charles S. Algert, MPH, et al., *Labor Before a Primary Cesarean Delivery Reduced Risk of Uterine Rupture in a Subsequent Trial of Labor for Vaginal Birth After Cesarean*. *Obstetrics & Gynecology* 2008;112:1061-1066

OBJECTIVE: To estimate the effect of the onset of labor before a primary cesarean delivery on the risk of uterine rupture if vaginal birth after cesarean (VBAC) is attempted in the next pregnancy.

METHODS: Longitudinally linked birth records were used to follow women from a primary cesarean delivery to a trial of labor at term for their next birth. The effects of characteristics of both the trial of labor and primary cesarean deliveries on the risk of uterine rupture were examined.

RESULTS: Of 10,160 women who had a trial of labor, 39 (0.38%) had a uterine rupture. Women who were induced or augmented for their trial of labor had a greater relative risk (RR) of uterine rupture (crude RR 4.24, 95% confidence interval [CI] 2.23–8.07). Women whose primary cesarean delivery was planned or followed induction of labor also had an increased risk of uterine rupture (crude RR 2.61, 95% CI 1.24–5.49), and this risk remained after adjustment for other factors. Women with a history of either spontaneous labor or vaginal birth had one uterine rupture for every 460 deliveries; women without this history who required induction or augmentation to proceed with a VBAC attempt had one uterine rupture for every 95 deliveries.

CONCLUSION: Labor before the primary cesarean delivery can decrease the risk of uterine rupture in a subsequent trial of labor. A history of primary cesarean delivery preceded by spontaneous labor is favorable for VBAC.

2008 “Women with prior successful VBAC attempts are at low risk for maternal and neonatal complications during subsequent VBAC attempts”

Brian M. Mercer, MD, et al. *Labor Outcomes With Increasing Number of Prior Vaginal Births After Cesarean Delivery*, *Obstet Gynecol* 2008;111:285–91

OBJECTIVE: To estimate the success rates and risks of an attempted vaginal birth after cesarean delivery (VBAC) according to the number of prior successful VBACs.

METHODS: From a prospective multicenter registry collected at 19 clinical centers from 1999 to 2002, we selected women with one or more prior low transverse cesarean deliveries who attempted a VBAC in the current pregnancy. Outcomes were compared according to the number of prior VBAC attempts subsequent to the last cesarean delivery.

RESULTS: Among 13,532 women meeting eligibility criteria, VBAC success increased with increasing number of prior VBACs: 63.3%, 87.6%, 90.9%, 90.6%, and 91.6% for those with 0, 1, 2, 3, and 4 or more prior VBACs, respectively ($P < .001$). The rate of uterine rupture decreased after the first successful VBAC and did not increase thereafter: 0.87%, 0.45%, 0.38%, 0.54%, 0.52% ($P = .03$). The risk of uterine dehiscence and other peripartum complications also declined statistically after the first successful VBAC. No increase in neonatal morbidities was seen with increasing VBAC number thereafter.

CONCLUSION: Women with prior successful VBAC attempts are at low risk for maternal and neonatal complications during subsequent VBAC attempts. An increasing number of prior VBACs is associated with a greater probability of VBAC success, as well as a lower risk of uterine rupture and perinatal complications in the current pregnancy.