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Care for Women Desiring Vaginal Birth After Cesarean

American College of Nurse-Midwives

Women with a history of a prior cesarean birth may receive conflicting information regarding options in future pregnancies related to the choice of a trial of labor after a cesarean (TOLAC) or having an elective repeat cesarean delivery (ERCD). The National Institutes of Health Consensus Development Conference on Vaginal Birth After Cesarean (VBAC) addressed questions related to safety and outcomes of having a VBAC compared to ERCD. Summary recommendations included increasing access to health care providers and facilities that care for women who desire a TOLAC yet factors were raised in determining what constitutes best practices. The purpose of this clinical bulletin by the American College of Nurse-Midwives is to offer evidence-based guidelines for midwives who are caring for women who have had a prior cesarean birth. Risk assessment, counseling, and education to support informed choices including considerations related to site of birth are provided.
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INTRODUCTION

For women who have experienced a cesarean birth, neither a subsequent trial of labor after cesarean (TOLAC) nor an elective repeat cesarean delivery (ERCD) is risk free.[1] This bulletin outlines the evidence currently available regarding the safety of vaginal birth after cesarean (VBAC), identifies required infrastructure supports, recommends topics for future research, and lists principles of care necessary to promote optimal outcomes for the woman and her newborn.

Between 1989 and 1996, the VBAC rate increased by 50% (18.9% to 28.3%).[2] However, between 1996 and 2009, this rate decreased 73%. In 2007, only 8.3% of women with a prior cesarean birth experienced VBAC in a subsequent birth.[2] To address this trend, 1 of the objectives of *Healthy People 2010* and the updated *Healthy People 2020* related to maternal-child health is to reduce the rate of subsequent cesarean birth among low-risk women who had a previous cesarean birth.

Multiple factors account for the decline in VBAC rates. The rates of cesarean birth and other childbirth interventions are affected by the model of care provided, resources of the institution providing birthing services, source of payment, risk management policies, and policy statements by professional organizations and accrediting agencies.[3–5]

HISTORY OF VAGINAL BIRTH AFTER CESAREAN IN THE UNITED STATES

From 1970 to 1988, the primary cesarean birth rate in the United States rose from 5.5% to nearly 25%,[6] and this dramatic increase was viewed as a cause for concern. In 1980, the National Institutes of Health (NIH) identified causes for the rise in cesarean birth rates and made recommendations for reversing the trend.[7] Most of the increase was attributed to 2 clinical situations: a rise in cesarean birth in nulliparous women with dystocia and ERCD. Because ERCD was a large component of the overall cesarean rate, VBAC came to be viewed as a major strategy to reduce the national cesarean rate.

During the late 1980s, reports of outcomes in mothers who had successful VBACs seemed to indicate some measure of safety. Large studies at 2 institutions, Kaiser Permanente Health Plan of Southern California and Los Angeles County University of Southern California Medical Center,[8,9] documented an approximate 60% to 80% success rate for VBAC. Uterine rupture, the most catastrophic adverse outcome of concern, occurred in 1% of women with a low transverse uterine scar and 1 prior cesarean.[8,9] Conversely, the overall rate of maternal morbidity was consistently higher in women who experienced an ERCD than those who had a successful VBAC.[10,11] As a consequence, VBAC was promoted, and in some cases mandated, by insurers and health care providers for all women with a previous cesarean birth.

However, as VBAC rates increased, so did safety concerns about uterine rupture. In 1996, McMahon et al[12] reported that the rate of a composite measure of major complications that included uterine rupture, hysterectomy, and operative injury was nearly double in the cohort of women electing TOLAC compared to those who had an ERCD (1.6% vs 0.8%; odds ratio [OR] 1.8; 95% CI, 1.1%–3.0%).[12] Although the reasons for the higher rate of morbidity from these 3 events combined were unclear, the publication of this study dampened enthusiasm for VBAC.

This Clinical Bulletin was developed under the direction of the Clinical Standards and Documents Section of the Division of Standards and Practice, as an educational aid for midwives. This Clinical Bulletin is not intended to dictate an exclusive course of management or to substitute for individual professional judgment. It presents recognized methods and techniques for clinical practice that midwives may consider incorporating into their practices. The needs of an individual patient or the resources and limitations of an institution or type of practice may appropriately lead to variations in clinical care.

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In July 1999, the American College of Obstetricians and Gynecologists reissued its practice bulletin on vaginal birth after previous cesarean delivery.[13] The principal difference between the updated bulletin and the previous one[14] was a change in wording regarding physician availability. While the 1998 version[14] specified that the physician be "readily available" when a woman was undergoing a TOLAC, the 1999 guideline specified that "a physician be immediately available throughout active labor capable of monitoring labor and performing an emergency cesarean delivery."[13] This change in wording has been interpreted by many as a mandate for the presence of in-house obstetric services and, by implication, availability of in-house anesthesia when women undergo TOLAC.[4,5]

A national survey conducted in 2000 to 2001 reviewed the effects of the 1999 American College of Obstetricians and Gynecologists recommendations on midwifery practice.[15] Of the 200 practices that responded to the survey, 94% (n = 188) provided care to women in labor who chose TOLAC. Of the 188 practices that originally provided TOLAC services, 5.8% (n = 11) reported dropping TOLAC care, 58% (n = 110) reported no change in protocols for offering TOLAC, and 44% (n = 83) reported some change in the protocols. Of the 83 practices that continued to provide VBAC and reported on their changes to protocols, increased requirements for physician or anesthesia consultation were the primary changes instituted.

In the last decade, numerous researchers have attempted to identify and quantify the chances of VBAC success in relation to specific clinical and demographic variables, the overall risks of morbidity or mortality associated with TOLAC for mothers and their infants, and the risks of uterine rupture and consequent morbidity relative to specific clinical and demographic variables. In March 2010, the NIH convened a consensus conference to examine the evidence related to TOLAC and VBAC safety and outcomes. Based on this evidence, the NIH panel concluded that TOLAC was still a reasonable alternative for most women.[1] The panel also voiced concerns regarding the decline in access to TOLAC in many regions of the country. The panel acknowledged that liability concerns have played an important role in the reluctance of physicians and hospitals to offer TOLAC.[1]

Rather than attempt to review the extensive literature on this topic, this bulletin summarizes the relevant points needed to help clinicians provide women with appropriate information to support the process of informed consent regarding the option of TOLAC compared to ERCD.[1,16,17]

VARIABLES ASSOCIATED WITH PROBABILITY OF VAGINAL BIRTH AFTER CESAREAN SUCCESS

Researchers have demonstrated that the probability of having a successful VBAC is generally between 60% and 80%,[9–12,17,18] and this rate varies based on demographic factors, obstetric history, and the intrapartum course of the current pregnancy.[9,10,12,17–19] The factors that have been consistently noted to influence the probability of success are listed in Table 1. Although there is significant variability between study designs, results are consistent across studies and demonstrate some measure of risk that can be shared with women who had previous cesarean births and present for care during subsequent pregnancies. The reason for the prior cesarean birth has received especially close scrutiny. In general, subsequent TOLAC has a higher success rate after nonrepeating reasons (eg, breech or other malpresentation, fetal distress) than after repeating reasons (eg, cephalopelvic disproportion, failure to progress, dystocia).[12,16–17]

Table 1. Factors Associated With Probability of Successful VBAC

Factor	Probability of Successful VBAC, %
Prior vaginal birth	
VBAC	90
Any vaginal birth	87
Indication for previous cesarean	
Malpresentation	84
Fetal distress	73
Dystocia	64
Obstetric factors	
Spontaneous labor	81
Oxytocin augmentation	74
Labor induction	67
Admit cervical dilation ≥4 cm	84
Admit cervical dilation <4 cm	67
Medical complication	70
Birth weight <4000 gm	75
Birth weight ≥4000 gm	62
Epidural anesthesia	73
Demographic factors	
White	
Married	
Privately insured	
BMI ≤30	
Interval >2 yrs from previous cesarean	

Abbreviations: VBAC, vaginal birth after cesarean; BMI, body mass index.
Adapted from Landon et al.[23]

Several authors[19–22] have proposed scoring systems to better predict VBAC success, but these systems have had limited clinical value. Factors most likely to be associated with successful VBAC include a prior vaginal birth or VBAC; prior cesarean for breech presentation, malpresentation, or fetal distress; spontaneous labor; and cervical dilation on admission greater than or equal to 4 cm. The following factors weigh against successful VBAC: induction or augmentation; prior cesarean for repeating cause (eg, dystocia, cephalopelvic disproportion, failure to progress); birth weight greater than or equal to 4000 g; or body mass index (BMI) at birth greater than or equal to 30 kg/m^2.

MATERNAL BENEFITS AND HARMS ASSOCIATED WITH VAGINAL BIRTH AFTER CESAREAN AND ELECTIVE REPEAT CESAREAN DELIVERY

Currently, no randomized controlled clinical trials have compared maternal and neonatal outcomes associated with

TOLAC versus ERCD; however, fair- to good-quality observational data related to the risks of both are available. These data were summarized in the Evidence Report[1] generated for the 2010 NIH VBAC Consensus Conference.

There are 3 possible outcomes for women with a prior cesarean birth: a VBAC, an unsuccessful trial of labor resulting in a repeat cesarean, or an ERCD. The overall benefit of a successful VBAC is that it is associated with the lowest risk of complications.[1,9,12,16–18] Conversely, the highest incidence of maternal morbidity occurs with failed TOLAC.[1,9,12,16–18] As such, the risk of maternal morbidity is closely related to the probability that a woman will achieve a successful VBAC.[23–25]

Uterine rupture is the most dangerous and potentially life-threatening complication associated with TOLAC. The reported incidence of uterine rupture varies, partly because the terms *uterine rupture* and *uterine dehiscence* are not consistently defined between studies.[1,16] Uterine rupture is rare, and studies require large sample sizes to detect significant associations. Gregory et al[26] reviewed the hospital discharge summaries of 536,785 women who gave birth in California in 1995 and found a uterine rupture rate of 0.07% in the entire cohort. In the subgroup of women who had a prior cesarean birth, the uterine rupture rate was 1.15% in women who underwent a TOLAC but delivered by cesarean. The uterine rupture rate was 0.15% in those who had a successful VBAC and 0.28% in those who chose an ERCD.[26] Guise et al[16] compared data from 4 studies[12,27–29] that used the same anatomic definition of uterine rupture and were rated as good- or fair-quality research designs. Among a total of 47,202 women, there were 154 uterine ruptures, 148 of which (96%) occurred in the TOLAC group. These 4 studies indicated that the risk of uterine rupture for all women in both groups was 0.3% (95% CI, 0.23%–0.41%). For women undergoing TOLAC, the risk of uterine rupture was 0.47% (95% CI, 0.28%–0.77%), which was significantly higher than for women who had an ERCD (0.03% [95% CI, 0.009%–0.082%]).[16]

At present, there is insufficient evidence to demonstrate a significant difference in *short-term* outcomes between TOLAC and ERCD for hysterectomy, hemorrhage, transfusion, thromboembolism, infection, or operative injury.[16,17] Not surprisingly, however, ERCD is associated with a longer hospital stay than TOLAC. Guise et al[16] found that the overall risk of maternal death, although rare for both TOLAC and ERCD, was significantly greater for ERCD at 13.4 deaths per 100,000 (95% CI, 4.3%–41.6%) than for TOLAC at 3.8 deaths per 100,000 (95% CI, 0.9%–15.5%). Mothers with comorbidities had the highest risk of maternal death.

Several long-term harms are associated with ERCD. Women with multiple prior cesareans are at higher risk for adhesions, chronic pelvic pain, decreased fertility, stillbirth, and abnormal placentation in subsequent pregnancies.[30] Moreover, as the number of cesareans increases, so does the risk for hysterectomy, hemorrhage, transfusion, thromboembolism, or operative injury in subsequent pregnancies.[17–18,31]

In a multicenter cohort study of 30,132 women, Silver et al[30] found that the risk of placenta accreta was 2% in women having their fourth cesarean, and more than 6% in those with 6 or more procedures. Nine percent of women with 6 or more cesareans required hysterectomy. An increased number of prior cesareans also increases the risk of placenta previa combined with an accreta, raising the likelihood of maternal morbidity.[30]

FETAL AND NEONATAL BENEFITS AND HARMS ASSOCIATED WITH TRIAL OF LABOR AFTER CESAREAN AND ELECTIVE REPEAT CESAREAN DELIVERY

While consideration of newborn benefits and risks of either mode of birth have not been extensively investigated, the potential risks of a primary cesarean birth on newborn outcomes provide a context in which to examine this question. Cesarean birth in general has been associated with an increased risk of infant mortality,[32] although these studies have generally been underpowered to adequately address this question.[7] Specifically, investigators have found a higher incidence of transient tachypnea of the newborn, prolonged hospital stays, and lower initiation of breastfeeding in newborns delivered by cesarean.[7]

The current evidence on fetal and neonatal benefits and harms of TOLAC versus ERCD is inconclusive. Although perinatal death is rare regardless of the mode of birth, there is some evidence of a statistically significant increase in perinatal death with TOLAC at 1.3 deaths per 1,000 births (95% CI, 0.6%–3%) versus ERCD at 0.5 deaths per 1,000 births (95% CI, 0.07%–3.8%).[16,33] When estimating neonatal mortality (death in the first 28 days of life), Guise et al[16] found a significantly higher rate in the TOLAC group versus the ERCD group (RR 2.06; 95% CI, 1.35%–3.13%; $P = .001$).

In a multicenter study of 33,899 women, Landon et al[17] reported a statistically significant difference in the incidence of hypoxic-ischemic encephalopathy (HIE) in the TOLAC group (absolute risk, 0.46 per 1000 women at term undergoing a trial of labor compared to 0 cases in the ERCD group). Of the 12 cases of HIE in this cohort, 7 cases were associated with uterine rupture.[17]

Studies of neonatal respiratory morbidity following TOLAC provide conflicting results related to whether VBAC or ERCD results in more transient tachypnea of the newborn.[16] When comparing respiratory outcomes by actual mode of birth, Kamath et al[33] found that the failed VBAC group had the highest respiratory morbidity. In general, however, neonates born by ERCD had higher rates of oxygen resuscitation (41.5% compared to 23.2%, $P < .01$) in the delivery room and higher rates of neonatal intensive care unit (NICU) admission (9.3% compared to 4.9%, $P = .025$) than those born by successful VBAC.[33]

At present, the overall strength of the evidence regarding newborn sepsis, birth trauma, Apgar scores, and impact of induction is insufficient to draw meaningful conclusions regarding the benefit and harm of TOLAC versus ERCD to the infant.[16] Long-term benefits and harms, such as breastfeeding and neurological development, have not been studied in terms of the impact of TOLAC versus ERCD.[16]

INTRAPARTUM MANAGEMENT OF TRIAL OF LABOR AFTER CESAREAN BIRTH

The onset of spontaneous labor at term with a favorable cervix is the most optimal situation for a woman undergoing TOLAC. However, there will be women with the desire and

candidacy for TOLAC for whom induction and/or augmentation of labor is indicated. Although some studies have shown that induction and/or augmentation of labor may increase the risk of uterine rupture during TOLAC,[17,18,35] induction and/or augmentation with oxytocin only does not appear to increase risks for uterine rupture significantly.[1] Therefore, induction and/or augmentation remain an option for women with a previous cesarean birth.[1]

Conflicting evidence exists regarding an increase in uterine rupture with the use of prostaglandins for induction. Lydon-Rochelle et al[35] examined hospital discharge International Classification of Diseases (ICD) code data from Washington state and found that the recorded incidence of uterine rupture was 1.6 to 24.5 per 1,000 women, depending on onset of spontaneous labor, method of induction, and route of birth. The lowest uterine rupture rates occurred with ERCD (0.16%) and spontaneous labor (0.52%). Women who were induced with prostaglandins had the highest rate (2.24%).[35] This study was limited by reliance on ICD coding, which has been shown to inaccurately reflect actual clinical diagnosis.[1]

Other investigators confirmed an increased risk of uterine rupture with both oxytocin and prostaglandins (0.4% for spontaneous labor, 0.9% for augmented labor, 1.1% for oxytocin alone, and 1.4% for induction with prostaglandins with or without oxytocin).[17] Moreover, a secondary analysis from the same multicenter study of women with 1 prior low transverse cesarean birth showed an increase in uterine rupture *only* in women undergoing induction who had not had a previous vaginal birth. There was also no difference in rupture rates when induction was initiated with a favorable versus an unfavorable cervix.[36] In several small studies, the use of misoprostil (prostaglandin E 1) in women with a previous cesarean has been associated with an increased risk of uterine rupture.[37,38]

Conflicting evidence exists regarding the use of oxytocin alone for augmentation of contractions during TOLAC.[17,18,39] Awareness of a possible increased risk justifies a more conservative approach to augmentation in women attempting TOLAC in order to prevent uterine rupture. In a small study of 19 women who had a symptomatic uterine rupture during TOLAC, the researchers used a mathematical model to analyze cervical dilation patterns during labor and used the results to determine optimal intervention criteria.[40] If the cesarean was done when the rate of cervical dilation was below the 10th percentile and dilation was arrested for 2 hours or more, cesarean birth would have prevented 42.1% of the cases of uterine rupture. This would have resulted in an excess 2.6% cesarean rate among women with no previous cesarean birth and an excess 7.9% cesarean rate among women with VBAC.[40]

Where possible when labor must be induced, clinicians may want to use alternate means instead of oxytocin (eg, stripping membranes) to encourage spontaneous labor in term women desiring a trial of labor to avoid the need for labor induction medications and/or the use of mechanical dilators (eg, osmotic dilators, Foley catheters). Stripping of membranes has not been studied in relation to uterine rupture, while the use of Foley catheters for cervical ripening and induction has demonstrated varied results ranging from no association with increased risk for uterine rupture[41] to a 3-fold increase in risk for uterine rupture.[42]

Epidural anesthesia is not contraindicated during TOLAC. In fact, in the Maternal-Fetal Medicine Units (MFMU) multicenter study, epidural use was significantly associated with successful VBAC.[23] Evidence also demonstrates that careful fetal heart rate monitoring provides timely diagnosis of uterine rupture, and regional anesthesia should not be withheld if the woman desires that option for pain relief.[17]

MIDWIFERY CARE FOR CLIENTS CHOOSING VAGINAL BIRTH AFTER CESAREAN

Few studies exist regarding the outcomes of midwifery care for clients electing labor after a prior cesarean birth. Hangsleben et al[43] provided 1 of the first reports of women laboring after previous cesarean, and in this study, 83% (44/53) of the women had a vaginal birth. Maternal and newborn morbidity was low. Inclusion criteria were a strong desire for VBAC and a documented low transverse uterine scar. In a second larger report from the Los Angeles County, University of Southern California Birthing Center, researchers studied a total of 298 women in a retrospective matched cohort study.[44] They achieved a VBAC rate of 98.3%, which was not significantly different from the vaginal birth rate of women in the control group. There was 1 asymptomatic dehiscence. It should be noted that these women gave birth without oxytocin augmentation or epidural anesthesia. One additional factor affecting outcomes was that a high percentage (84%) of women (249/298) in this cohort had a previous successful VBAC. While this study has been criticized for extreme selection bias,[45] it does demonstrate the improved success rate for women who have had a prior VBAC when approaching another TOLAC in a subsequent pregnancy.

In a more recent retrospective study, Avery et al[46] analyzed data from 649 trials of labor managed in multiple midwifery practices. Overall, 72% of women gave birth vaginally. Unlike the previous studies, only 7% of the women had a previous vaginal birth, and 16% had a previous VBAC. There were no uterine ruptures, and only 5.3% of newborns were admitted to the NICU.[46] There were some limitations to this pilot study, as data were only available for one-half to two-thirds of the variables of interest. The authors stressed the need for further research on midwifery care of women with a previous cesarean birth.

SITE OF BIRTH FOR WOMEN CHOOSING VAGINAL BIRTH AFTER CESAREAN

Given the declining availability of VBAC in US hospitals and the increasing number of women seeking TOLAC services, it is important to consider the outcomes for women attempting a TOLAC in an out-of-hospital setting. Two studies of birth centers (1 in the United States and 1 in Germany) and 1 review of home birth midwifery practices are available.[47–49] In the US study, Lieberman et al[47] prospectively collected data from 41 birth centers on the pregnancy outcomes of 1453 women with a previous cesarean who presented to the birth center in labor. Of these women, 93% had 1 previous cesarean birth, and 46% had a previous vaginal birth. Nearly one-fourth (24%) were transferred to the hospital prior to birth, and 37 were coded as emergencies. Median time to arrival at the hospital was 15 minutes, and 90% arrived within 25 minutes. Of the 9

women for whom data were available, the median time from decision to transfer to cesarean was 35 minutes. Of the women who gave birth in the birth center, 20 had neonates who were transferred, primarily for respiratory symptoms. There were 7 perinatal deaths, 2 of which were related to uterine rupture. Among the study participants, a higher rate of adverse outcomes was found among women with more than 1 cesarean birth or who were greater than or equal to 42 weeks' gestation.[47]

In the German study, the authors conducted a retrospective evaluation of prospectively collected data on women who gave birth to their second infants in 1 of 80 freestanding, midwife-led birth centers.[49] Three hundred sixty-four women (5.3%) who had previous cesareans were compared to a control group of 6,448 multiparous women with no previous cesareans. At a $P < 0.05$ level of significance, there was no difference between groups in demographic characteristics, maternal and neonatal mortality (0%), or NICU or postpartum hospital transfers. There were no uterine ruptures, laparotomies, hysterectomies, or maternal or neonatal deaths in the cesarean group; 73.5% had a VBAC. Maternal transfer rates were significantly higher in the cesarean group (41.2%) than in the control group (5.7%). Similar to the findings of Lieberman et al,[47] the main reasons for maternal transfer in the cesarean group were labor arrest and abnormal fetal heart rate. The authors attributed the high transfer rate to "extra vigilance" on the part of the midwives in monitoring and intervening with this group of women.[49]

Alternatively, a closer review of the 2 birth center studies indicates that selection of low-risk women as candidates for TOLAC in those settings resulted in even lower infant mortality rates than those found in the hospital setting for women undergoing TOLAC.[51,52] A comparison of the 2 groups of women undergoing TOLAC in the Lieberman et al[47] and David et al[49] studies indicates that there were women (n = 99) in the Lieberman et al study who had more than 1 prior cesarean section and/or were greater than 42 weeks' gestation. In a comparative review of the 2 subsamples of women undergoing TOLAC in the 2 studies (see Table 2), if women with more than 1 previous cesarean and those who were postdates were removed from the Lieberman sample, the uterine rupture rate would be 2 per 1000 births, and the perinatal death rate would be 2 per 1000 births.[51] These rates are lower than national rates for all women in comparable categories.[1,32] It has been argued that labor management practices within the out-of-hospital birth center setting do not include those associated with increased risk of uterine rupture, such as induction of labor, and are more likely to include those associated with increased success for vaginal birth in general (eg, freedom of movement, continuous labor support).[51,53]

As part of a larger prospective study on the outcomes of planned home births attended by nurse-midwives, Latendresse et al[48] analyzed the data from a subgroup of 57 women with a previous cesarean birth. Fifty-three (93%) had spontaneous vaginal births, 1 had a vacuum-assisted birth, and 3 (5.3%) had a repeat cesarean. Of these 57 women, more than half (56.1%) had previous VBACs, and 31.6% had previous home births. Fifty women (87.7%) successfully gave birth in the home setting. Of the 7 women who were transferred to the hospital, none experienced uterine rupture, and all were reported to be stable on arrival. One woman was transferred to the hospital postpartum for an estimated 900 ml hemorrhage. There was 1 stillborn infant at 42 weeks' gestation whose death was not attributed to uterine rupture or any other factor related to the previous cesarean birth.[48]

Table 2. Studies of TOLAC in Out-of-Hospital Settings

	Lieberman et al[47]	David et al[49]
	N = 1453	N = 364
Variable	n (%)	n (%)
Maternal transfer to hospital during labor	347 (24)	150 (41.2)
Maternal transfer to hospital postpartum	42 (4)	15 (4.1)
Emergency transfer to hospital	37 (11)	10 (2.7)
Mode of birth		
Cesarean birth	189 (13)	80 (22.3)
Vaginal birth in birth center	1106 (76)	214 (58.8)
Vaginal birth in hospital	158 (11)	70 (19.2)
Uterine rupture	6 (0.4)	0
Uterine rupture 1 previous cesarean (n = 1354)	3 (0.2)	0
Uterine rupture > 1 previous cesarean (n = 99)	3 (3)	NA
Maternal mortality	0	0
Perinatal mortality	7 (0.5)	0
Perinatal mortality 1 previous cesarean (n = 1354)	5 (0.3)	0
Perinatal mortality > 1 previous cesarean (n = 99)	2 (2)	NA
Perinatal mortality secondary to uterine rupture, % of all uterine ruptures (n = 6)	2 (33)	0

Abbreviations: NA, not applicable; TOLAC, trial of labor after cesarean.
Adapted with permission from King.[51]

Debate regarding the site of birth is steeped in the controversy regarding the "immediately available" standard.[1,47–49,53,54] Community hospitals without 24 hour obstetric and anesthesia coverage face considerable controversy about offering VBAC.[50] Moreover, the argument has been made that VBAC has been singled out as a high-liability practice, even though the risk of uterine rupture (1%) is similar to the rate of placental abruption or other untoward events with equally adverse outcomes that can happen in labor.[1]

The Northern New England Perinatal Quality Improvement Network VBAC Project offers resources that can help individual practices and institutions provide TOLAC services.[55] The VBAC Project includes patient education; an informed consent form; and a protocol that stratifies the risk for uterine rupture into low, medium, and high risk. The project lists criteria for prenatal management, basic interventions for all VBAC clients, and guidelines for assessing institutional resources as well as recommendations for referring women who

Table 3. Risk Stratification on the Basis of Obstetric History and Labor Characteristics

Low Risk	Medium Risk	High Risk
1 prior low transverse cesarean birth	Mechanical or oxytocin induction of labor	Repetitive nonreassuring FHR abnormalities not responsive to clinical intervention
Spontaneous onset of labor	Oxytocin augmentation	Bleeding suggestive of abruption
No need for augmentation	2 or more previous low transverse cesarean births	2 hours without cervical change in the active phase of adequate labor
No repetitive FHR abnormalities	Fewer than 18 months between prior cesarean birth and current birth	
Previous successful VBAC		

Abbreviations: FHR, fetal heart rate; VBAC, vaginal birth after cesarean.
Adapted with permission from Northern New England Perinatal Quality Improvement Network, VBAC Project.[55]

are at higher risk for uterine rupture to a hospital setting that has obstetric and anesthesia services immediately available (Table 3).[55] Other settings could adopt a similar initiative to increase availability of VBAC in hospital-based birth centers and rural and community hospitals.

IMPLICATIONS FOR PRACTICE

Providers, practices, and institutions should develop protocols that match the resources available in the clinical setting to the client risk status. All women with a previous cesarean birth should be given information about the risks and benefits of both VBAC and ERCD (Table 4). The discussion should occur several times during the pregnancy along with ongoing risk assessment for candidacy. Informed consent should be obtained and well-documented in the client's medical record.[1]

Finally, prevention of a primary cesarean birth is the best approach to avoiding risk in subsequent births. Best care practices and models of care that reduce the incidence of primary cesarean births should receive the highest priority for research funding and policy considerations.

CONCLUSION

In conclusion, most women may safely choose VBAC under the care of a certified nurse-midwife (CNM) or certified-midwife (CM). Based on the evidence to date, the following practice implications are relevant when caring for a woman with a uterine scar, including a previous cesarean birth:

1. Trial of labor is contraindicated for women with a prior classical or T-shaped cesarean incision or other transfundal surgery, a contracted pelvis, and medical or obstetric complications that preclude vaginal birth.
2. Midwifery practices, in collaboration with physicians, institutions, and emergency response systems, should develop patient education materials, informed consent documents, guidelines for practice, and standards for referral.
3. A woman who desires TOLAC should be formally counseled during the prenatal period regarding the risks and benefits of her options for the mode and place of birth. Depending on the desires of the woman, midwife, or physician, patient education and counseling may also include the physician who will perform emergency surgery if needed.
4. Women should be informed of the probability of VBAC success, the risks associated with VBAC trial of labor including uterine rupture, and the risks of emergency cesarean birth as part of the process of seeking informed consent for her choice of TOLAC or ERCD. Women should also be made aware of the fact that the best outcomes for mothers and infants occur when cesarean can be performed within 15 minutes. This discussion should occur prenatally and be repeated when the client presents in labor.
5. The use of a specific informed consent document for VBAC aids in the process of client education and formal documentation and should be included in the prenatal and intrapartum medical record.
6. Fetal heart rate assessment during labor should be obtained by either continuous electronic fetal monitoring or intermittent monitoring as required for high-risk patients (ie, every 15 minutes in active labor and every 5 minutes in second stage). Indication of uterine rupture is usually bradycardia or progressively deeper variable decelerations. Vigilance regarding assessment of fetal well-being is a critical aspect of promoting optimal outcomes, including timely transition to a surgical environment if necessary.
7. The highest VBAC success rate is obtained when labor begins spontaneously and progresses normally. Abnormal labor patterns may be an indication of dystocia, which is associated with a higher risk of uterine rupture.
8. Induction of labor should only be undertaken when the benefits outweigh the risks and only in the hospital setting following consultation with a physician who is available to perform a cesarean.
9. Prostaglandin for cervical ripening is discouraged, and misoprostol is contraindicated in women with scarred uteri.
10. The use of herbal or homeopathic uterotonics is not well supported by any scientific evidence to date, and no data currently exist on the safety of these agents for patients with a uterine scar. Therefore, in light of the knowledge that other uterotonics increase the risk of uterine rupture, their use should be discouraged. If herbal or homeopathic treatments are used, this should only occur following informed consent regarding the lack of standard safety information.

Table 4. Evidence for Risks Associated With TOLAC and ERCD

Risk Statement	Study Type	Grade of Evidence
Probability of success		
Probability of vaginal birth in women who had a prior cesarean birth ranges from 60% to 80%.	II-2	Moderate. Several large prospective and retrospective studies: mostly consistent findings.
The rate of VBAC with induction of labor ranges from 54% to 69%.	II-2	Low. Majority of studies were conducted in large, tertiary care setting, many outside the United States.
Factors that were significantly associated with an increased likelihood of vaginal birth were prior vaginal birth (particularly VBAC), nonrecurrent indication for the prior cesarean birth, spontaneous labor, and favorable cervical factors.	II-2	Moderate. Several large prospective and retrospective studies: mostly consistent findings.
Factors that were significantly associated with a decreased likelihood of vaginal birth were nonwhite ethnicity, increasing maternal age, high body mass index, short interbirth interval, increasing number of prior cesarean births, gestational age > 40 weeks' gestation, birth weight > 4000g, and induction or augmentation of labor.	II-2	Moderate. Several large prospective and retrospective studies: mostly consistent findings.
Maternal morbidity risks		
Maternal death is significantly lower with TOLAC than ERCD.	II-2	High. 12 good- or fair-quality cohort studies.
Hysterectomy rates do not differ between TOLAC and ERCD.	II-2	Moderate. Several large prospective and retrospective studies: mostly consistent findings.
Rates of infection are increased in ERCD vs TOL overall.	II-2	Low. Definitions inconsistent among studies.
Incidence of abnormal placentation increases significantly with each additional cesarean birth.		Moderate. Several large prospective and retrospective studies: mostly consistent findings.
Uterine rupture		
The risk of uterine rupture is significantly higher with TOL (0.47%) than with ERCD (0.026%). Measurement of frequency of occurrence, predictors for what population is at greatest risk, and predictors of poor outcomes is not possible, because of lack of standard case definition.	II-2	Moderate. Cohort studies with inconsistent use of terminology but consistent findings.
Infant morbidity risks		
Sepsis; no difference in TOLAC vs ERCD.	II-2	Low. Insufficient data to evaluate direction of risk.
Hypoxic-ischemic encephalopathy; significantly increased by TOLAC in one observational study.	II-2	Low. Insufficient data to evaluate direction of risk.
Respiratory morbidity.	II-2	Low. Insufficient evidence regarding the effect of route of birth on Apgar score or respiratory morbidity.
Perinatal death		
Significantly increased by TOLAC, although the magnitude of the difference between the 2 groups is small and comparable to the perinatal mortality rate observed among laboring nulliparous women.	II-2	Moderate. Several large prospective and retrospective studies: mostly consistent findings.

Abbreviations: ERCD, elective repeat cesarean delivery; TOLAC, trial of labor after cesarean; VBAC, vaginal birth after cesarean.
Adapted from NIH Consensus Development Conference Statement[1] and Guise et al.[16]

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A literature search was conducted and articles published in English through September 2010 were reviewed. Studies were evaluated for quality using the guidelines recommended by the US Preventative Health Services Task Force in their document titled:

Guidelines for Rating Strength and Quality of Evidence from Research Findings Strength of Recommendation

- **A**: There is good evidence to support that the intervention be adopted.
- **B**: There is fair evidence to support that the intervention be adopted.
- **C**: There is insufficient evidence to recommend for or against the intervention, but recommendations may be made on other grounds.
- **D**: There is fair evidence to support that the intervention be excluded.
- **E**: There is good evidence to support that the intervention be excluded.

Quality of Evidence

- **I**: Evidence obtained from at least one properly randomized controlled trial.
- **II-1**: Evidence obtained from well-designed controlled trials without randomization.
- **II-2**: Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.
- **II-3**: Evidence obtained from multiple time series studies with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence.
- **II-3**: Opinions of respected authorities, based on clinical experience; descriptive studies and case reports; or reports of expert committees.

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