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Vaginal Birth After Previous Cesarean Delivery

Trial of labor after previous cesarean delivery (TOLAC) provides women who desire a vaginal delivery with the possibility of achieving that goal—a vaginal birth after cesarean delivery (VBAC)[†]. In addition to fulfilling a patient's preference for vaginal delivery, at an individual level VBAC is associated with decreased maternal morbidity and a decreased risk of complications in future pregnancies. At a population level, VBAC also is associated with a decrease in the overall cesarean delivery rate (1, 2). Although TOLAC is appropriate for many women with a history of a cesarean delivery, several factors increase the likelihood of a failed trial of labor, which compared with VBAC, is associated with increased maternal and perinatal morbidity (3–5). Assessment of individual risks and the likelihood of VBAC is, therefore, important in determining who are appropriate candidates for TOLAC. The purpose of this document is to review the risks and benefits of TOLAC in various clinical situations and provide practical guidelines for managing and counseling patients who will give birth after a previous cesarean delivery.*

Background

Between 1970 and 2007, the cesarean delivery rate in the United States increased dramatically from 5% to more than 31% (6, 7). This increase was a result of several changes in the practice environment, including the introduction of electronic fetal monitoring and the decrease in use of vaginal breech deliveries and forceps deliveries (8–10). The increase in cesarean delivery rates was partly perpetuated by the dictum “once a cesarean always a cesarean” (11). In the 1970s, however, some began to reconsider this paradigm, and accumulated data have since supported TOLAC as a reasonable approach in selected pregnancies (4, 5, 12–14).

*The term *trial of labor* refers to a trial of labor in women who have had a previous cesarean delivery, regardless of the outcome.

This change in approach and recommendations favoring TOLAC was reflected in increased VBAC rates (VBAC per 100 women with a prior cesarean delivery) from just more than 5% in 1985 to 28.3% by 1996. The overall cesarean delivery rate decreased to approximately 20% by 1996 (15). Yet, as the number of women pursuing TOLAC increased, so did the number of reports of uterine rupture and other complications during TOLAC (16–18). In part, these reports, and the professional liability pressures they engendered, have resulted in a reversal of VBAC and cesarean delivery trends. By 2006, the VBAC rate had decreased to 8.5% and the total cesarean delivery rate had increased to 31.1% (15, 19, 20). In some hospitals, TOLAC is no longer offered.

[†]The term *vaginal birth after cesarean delivery* is used to denote a vaginal delivery after a trial of labor.

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In a 2010 consensus conference, the National Institutes of Health (NIH) examined the safety and outcome of TOLAC and VBAC and factors associated with decreasing rates. The NIH panel recognized that TOLAC was a reasonable option for many women with a prior cesarean delivery (21) and called on organizations to facilitate access to TOLAC. In addition, the panel recognized that “concerns over liability have a major impact on the willingness of physicians and healthcare institutions to offer TOL [TOLAC]” (21).

Evaluating the Evidence

Data detailing rates of VBAC after TOLAC and attendant maternal and neonatal outcomes associated with TOLAC versus planned repeat cesarean delivery can guide the health care provider and patient when deciding the approach to delivery in women with a prior cesarean delivery. There are currently no randomized trials comparing maternal or neonatal outcomes between women undertaking TOLAC and those undergoing a repeat cesarean delivery. Instead, recommendations regarding the approach to delivery are based on observational data that have reported the probability of VBAC once TOLAC is attempted, and compared the maternal and neonatal morbidities associated with TOLAC and repeat cesarean delivery (3–5, 12–14, 22–29). These data were summarized in the Evidence Report/Technology Assessment that provided background for the 2010 NIH Consensus Conference (30).

Before considering the results of any analysis, it is important to note that the appropriate statistical comparison is by intention to deliver (TOLAC versus elective repeat cesarean delivery). Comparing outcomes from VBAC or repeat cesarean delivery after TOLAC with those from a planned repeat cesarean delivery is inappropriate because no one patient can be guaranteed VBAC, and the risks and benefits may be disproportionately associated with a failed TOLAC.

Clinical Considerations and Recommendations

► What are the risks and benefits associated with a trial of labor after previous cesarean delivery?

Neither elective repeat cesarean delivery nor TOLAC are without maternal or neonatal risk (see Table 1 and Table 2). The risks of either approach include maternal hemorrhage, infection, operative injury, thromboembolism, hysterectomy, and death (4, 5, 13, 22, 31). Most maternal morbidity that occurs during TOLAC occurs when repeat cesarean delivery becomes necessary (3–5, 23).

Thus, VBAC is associated with fewer complications, and a failed TOLAC is associated with more complications, than elective repeat cesarean delivery (3–5, 22). Consequently, risk for maternal morbidity is integrally related to a woman’s probability of achieving VBAC (32).

Uterine rupture or dehiscence* is the outcome associated with TOLAC that most significantly increases the chance of additional maternal and neonatal morbidity. The reported incidence of uterine rupture varies, in part because some studies have grouped true, catastrophic uterine rupture together with asymptomatic scar dehiscence. Additionally, early case series did not stratify rupture rates by the type of prior cesarean incision (ie, low transverse versus classical) (29).

One factor that markedly influences the chance of uterine rupture is the location of the prior incision on the uterus. Several large studies of women with a prior low

Table 1. Composite Maternal Risks from Elective Repeat Cesarean Delivery and Trial of Labor After Previous Cesarean Delivery

Maternal Risks	ERCD (%)	TOLAC (%)	
		One CD	Two or more CDs
Endometritis	1.5–2.1	2.9	3.1
Operative injury	0.42–.6	0.4	0.4
Blood transfusion	1–1.4	0.7–1.7	3.2
Hysterectomy	0–0.4	0.2–0.5	0.6
Uterine rupture	0.4–0.5	0.7–0.9	0.9–1.8
Maternal death	0.02–0.04	0.02	0

Abbreviations: CD, cesarean delivery; ERCD, elective repeat cesarean delivery; TOLAC, trial of labor after cesarean delivery; VBAC, vaginal birth after cesarean.

Data from Landon MB, Hauth JC, Leveno KJ, Spong CY, Leindecker S, Varner MW, et al. Maternal and perinatal outcomes associated with a trial of labor after prior cesarean delivery. National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. *N Engl J Med* 2004;351:2581–9; Landon MB, Spong CY, Thom E, Hauth JC, Bloom SL, Varner MW, et al. Risk of uterine rupture with a trial of labor in women with multiple and single prior cesarean delivery. National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. *Obstet Gynecol* 2006;108:12–20; Macones GA, Peipert J, Nelson DB, Odibo A, Stevens EJ, Stamilio DM, et al. Maternal complications with vaginal birth after cesarean delivery: a multicenter study. *Am J Obstet Gynecol* 2005;193:1656–62; Hibbard JU, Ismail MA, Wang Y, Te C, Karrison T, Ismail MA. Failed vaginal birth after a cesarean section: how risky is it? I. Maternal morbidity. *Am J Obstet Gynecol* 2001;184:1365–71; and Rossi AC, D’Addario V. Maternal morbidity following a trial of labor after cesarean section vs elective repeat cesarean delivery: a systematic review with metaanalysis. *Am J Obstet Gynecol* 2008;199:224–31.

*The terms *uterine rupture* and *uterine dehiscence* are not consistently defined in the literature so as to distinguish them from each other and are often, seemingly, used interchangeably. Although some connotations may suggest that dehiscence is less morbid than rupture, that convention is not used in this document. In this document these terms refer to symptomatic or clinically significant events unless otherwise noted.

transverse uterine incision reported a clinically determined uterine rupture rate of approximately 0.5–0.9% after TOLAC (4, 5, 12–14, 22). As discussed as follows, the risk of uterine rupture is higher in women with other types of hysterotomies.

In addition to providing an option for those who want the experience of a vaginal birth, VBAC has several potential health advantages for women. Women who achieve VBAC avoid major abdominal surgery, resulting in lower rates of hemorrhage, infection, and a shorter recovery period compared with elective repeat cesarean

Table 2. Composite Neonatal Morbidity from Elective Repeat Cesarean Delivery and Trial of Labor After Previous Cesarean Delivery

Neonatal Risks	ERCD (%)	TOLAC (%)	Comment
Antepartum stillbirth* ¹			
37–38 weeks	0.08	0.38	
39 weeks or greater	0.01	0.16	
HIE ¹	0–0.13	0.08	Secondary analysis (Spong, 2007 had three cases of HIE in cesarean delivery group)
Neonatal death ¹	0.05	0.08	Not significant
Perinatal death ²	0.01	0.13	Increase seen due to intrapartum hypoxia
Neonatal admission ³	6.0	6.6	Not significant
Respiratory morbidity ⁴	1–5	0.1–1.8	
Transient tachypnea ⁵	6.2	3.5	
Hyperbilirubinemia ⁵	5.8	2.2	

*Excludes malformations

Abbreviations: ERCD, elective repeat cesarean delivery; HIE, hypoxic ischemic encephalopathy; TOLAC, trial of labor after previous cesarean delivery.

If uterine rupture, risk of HIE 6.2% (95% confidence interval, 1.8–10.6%), risk of neonatal death 1.8% (95% CI, 0–4.2%)

- Landon MB, Hauth JC, Leveno KJ, Spong CY, Leindecker S, Varner MW, et al. Maternal and perinatal outcomes associated with a trial of labor after prior cesarean delivery. National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. *N Engl J Med* 2004;351:2581–9.
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delivery (2, 6, 33). Additionally, for those considering larger families, VBAC may avoid potential future maternal consequences of multiple cesarean deliveries such as hysterectomy, bowel or bladder injury, transfusion, infection (34, 35), and abnormal placentation such as placenta previa and placenta accreta (35, 36).

► **What is the vaginal delivery rate in women undergoing a trial of labor after previous cesarean delivery?**

Most published series of women attempting TOLAC have demonstrated a probability of VBAC of 60–80% (4, 5, 12–14, 22, 23). However, the chance of VBAC for an individual varies based on demographic and obstetric characteristics (see box). For example, women whose first cesarean delivery was performed for an arrest of labor disorder are less likely than those whose first cesarean delivery was for a nonrecurring indication (eg, breech presentation) to succeed in their attempt at VBAC (37–43). Similarly, there is consistent evidence that women who undergo labor induction or augmentation are less likely to have VBAC when compared with those at the same gestational age with spontaneous labor without augmentation (44–47). Other factors that negatively influence the likelihood of VBAC include increasing maternal age, high body mass index, high birth weight, and advanced gestational age at delivery (44, 48–54). A shorter inter-delivery interval and the presence of preeclampsia at the time of delivery also have been associated with a reduced chance of achieving VBAC (55, 56). Conversely, women who have had a prior vaginal delivery are more likely than those who have not to succeed in their TOLAC (44, 57).

Selected Clinical Factors Associated with Trial of Labor After Previous Cesarean Delivery Success

Increased Probability of Success (Strong predictors)

- Prior vaginal birth
- Spontaneous labor

Decreased Probability of Success (Other predictors)

- Recurrent indication for initial cesarean delivery (labor dystocia)
- Increased maternal age
- Non-white ethnicity
- Gestational age greater than 40 weeks
- Maternal obesity
- Preeclampsia
- Short interpregnancy interval
- Increased neonatal birth weight

The probability that a woman attempting TOLAC will achieve VBAC depends on her individual combination of factors. Several investigators have attempted to create scoring systems to assist in the prediction of VBAC, but most have had limited success (46, 58–60). However, one model was developed specifically for women undergoing TOLAC at term with one prior low transverse cesarean delivery incision, singleton pregnancy, and cephalic fetal presentation (61). This model may have utility for patient education and counseling for those considering TOLAC at term (<http://www.bsc.gwu.edu/mfmu/vagbirth.html>).

► ***Who are candidates for a trial of labor after previous cesarean delivery?***

Good candidates for planned TOLAC are those women in whom the balance of risks (low as possible) and chances of success (as high as possible) are acceptable to the patient and health care provider. The balance of risks and benefits appropriate for one patient may seem unacceptable for another. Because delivery decisions made during the first pregnancy after a cesarean delivery will likely affect plans in future pregnancies, decisions regarding TOLAC should ideally consider the possibility of future pregnancies.

Although there is no universally agreed on discriminatory point, evidence suggests that women with at least a 60–70% chance of VBAC have equal or less maternal morbidity when they undergo TOLAC than women undergoing elective repeat cesarean delivery (62, 63). Conversely, women who have a lower than 60% probability of VBAC have a greater chance of morbidity than woman undergoing repeat cesarean delivery. Similarly, because neonatal morbidity is higher in the setting of a failed TOLAC than in VBAC, women with higher chances of achieving VBAC have lower risks of neonatal morbidity. One study demonstrated that composite neonatal morbidity is similar between TOLAC and elective repeat cesarean delivery for the women with the greatest probability of achieving VBAC (63).

The preponderance of evidence suggests that most women with one previous cesarean delivery with a low transverse incision are candidates for and should be counseled about VBAC and offered TOLAC. Conversely, those at high risk for complications (eg, those with previous classical or T-incision, prior uterine rupture, or extensive transfundal uterine surgery) and those in whom vaginal delivery is otherwise contraindicated are not generally candidates for planned TOLAC. Individual circumstances must be considered in all cases, and if, for example, a patient who may not otherwise be a candidate for TOLAC presents in advanced labor, the

patient and her health care providers may judge it best to proceed with TOLAC. Some common situations that may modify the balance of risks and benefits are considered as follows.

More Than One Previous Cesarean Delivery

Studies addressing the risks and benefits of TOLAC in women with more than one cesarean delivery have reported a risk of uterine rupture between 0.9% and 3.7%, but have not reached consistent conclusions regarding how this risk compares with women with only one prior uterine incision (64–68). Two large studies, with sufficient size to control for confounding variables, reported on the risks for women with two previous cesarean deliveries undergoing TOLAC (66, 67). One study found no increased risk of uterine rupture (0.9% versus 0.7%) in women with one versus multiple prior cesarean deliveries (66), whereas the other noted a risk of uterine rupture that increased from 0.9% to 1.8% in women with one versus two prior cesarean deliveries (67). Both studies reported some increased risk in morbidity among women with more than one prior cesarean delivery, although the absolute magnitude of the difference in these risks was relatively small (eg, 2.1% versus 3.2% composite major morbidity in one study) (67). Additionally, the chance of achieving VBAC appears to be similar for women with one or more than one cesarean delivery. Given the overall data, it is reasonable to consider women with two previous low transverse cesarean deliveries to be candidates for TOLAC, and to counsel them based on the combination of other factors that affect their probability of achieving a successful VBAC. Data regarding the risk for women undergoing TOLAC with more than two previous cesarean deliveries are limited (69).

Macrosomia

Women undergoing TOLAC with a macrosomic fetus (defined variously as birth weight greater than 4,000–4,500 g) have a lower likelihood of VBAC (50, 70–72) than women attempting TOLAC who have a nonmacrosomic fetus. Similarly, women with a history of past cesarean delivery performed for the indication of dystocia, have a lower likelihood of VBAC if the current birth weight is greater than that of the index pregnancy with dystocia (73). Some limited evidence also suggests that the uterine rupture rate is increased (relative risk 2.3, $P < .001$) for women undergoing TOLAC without a prior vaginal delivery and neonatal birth weights greater than 4,000 g (72). These studies used actual birth weight as opposed to estimated fetal weight thus limiting the applicability of these data when making decisions regarding mode of delivery antenatally (74). Despite

this limitation, it remains appropriate for health care providers and patients to consider past and predicted birth weights when making decisions regarding TOLAC, but suspected macrosomia alone should not preclude the possibility of TOLAC.

Gestation Beyond 40 Weeks

Studies evaluating the association of gestational age with VBAC outcomes have consistently demonstrated decreased VBAC rates in women who undertake TOLAC beyond 40 weeks of gestation (49, 75–77). Although one study has shown an increased risk of uterine rupture beyond 40 weeks of gestation (76), other studies, including the largest study that has evaluated this factor, have not found this association (77). Although chances of success may be lower in more advanced gestations, gestational age of greater than 40 weeks alone should not preclude TOLAC.

Previous Low Vertical Incision

The limited number of studies that have evaluated TOLAC in women with prior low vertical uterine incisions have reported similar rates of successful vaginal delivery compared with women with a previous low transverse uterine incision (78–81). In addition, there has not been consistent evidence of an increased risk of uterine rupture, or maternal or perinatal morbidity associated with TOLAC in the presence of a prior low vertical scar. Recognizing the limitations of available data, health care providers and patients may choose to proceed with TOLAC in the presence of a documented prior low vertical uterine incision.

Unknown Type of Previous Uterine Incision

The type of uterine incision performed at the time of a prior cesarean delivery cannot be confirmed in some patients. Although some have questioned the safety of offering VBAC under these circumstances, two case series, both from large tertiary care facilities, reported rates of VBAC success and uterine rupture similar to those from other contemporaneous studies of women with documented previous low transverse uterine incisions (82, 83). Additionally, in one study evaluating risk factors for uterine rupture, no significant association was found with the presence of an unknown scar (84). The absence of an association may result from the fact that most cesarean incisions are low transverse, and the uterine scar type can often be inferred based on the indication for the prior cesarean delivery. Therefore, TOLAC is not contraindicated for women with one previous cesarean delivery with an unknown uterine scar type unless there is a high clinical suspicion of a previous classical uterine incision.

Twin Gestation

The studies of women with twin gestations who attempt VBAC have consistently demonstrated that their outcomes are similar to those of women with singleton gestations who attempt VBAC (85–90). In two analyses of large populations, women with twin gestations had a similar chance of achieving VBAC as women with singleton gestations and did not incur any greater risk of uterine rupture or maternal or perinatal morbidity (89, 90). Women with one previous cesarean delivery with a low transverse incision, who are otherwise appropriate candidates for twin vaginal delivery, may be considered candidates for TOLAC.

► How does management of labor differ for patients undergoing vaginal birth after cesarean delivery?

Induction and Augmentation of Labor

Induction of labor for maternal or fetal indications remains an option for women undergoing TOLAC. However, the potential increased risk of uterine rupture associated with any induction, and the potential decreased possibility of achieving VBAC, should be discussed. Several studies have noted an increased risk of uterine rupture in the setting of induction of labor in women attempting TOLAC (4, 5, 81, 91–93). One study of 20,095 women who had undergone prior cesarean delivery (81) found a rate of uterine rupture of 0.52% for spontaneous labor, 0.77% for labor induced without prostaglandins, and 2.24% for prostaglandin-induced labor. This study was limited by reliance on the *International Classification of Diseases, 9th Revision* coding for diagnosis of uterine rupture and the inability to determine whether prostaglandin use itself or the context of its use (eg, unfavorable cervix, need for multiple induction agents) was associated with uterine rupture.

In a multicenter study of 33,699 women undergoing TOLAC, augmentation or induction of labor also was associated with an increased risk of uterine rupture compared with spontaneous labor (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) (4). A secondary analysis of 11,778 women from this study with one prior low transverse cesarean delivery showed an increase in uterine rupture only in women undergoing induction who had no prior vaginal delivery (1.5% versus 0.8%, $P=.02$). Additionally, uterine rupture was no more likely to occur when labor induction was initiated with an unfavorable cervix than with a favorable cervix (91). Another secondary analysis examined the association between maximum oxytocin dose and the risk of uterine rupture (94).

They noted a dose response effect with increasing risk of uterine rupture with higher maximum doses of oxytocin. Because studies have not identified a clear threshold for rupture, an upper limit for oxytocin dosing with TOLAC has not been established.

Studies of the effects of prostaglandins, grouped together as a class of agents, on uterine rupture in women with a prior cesarean delivery have demonstrated inconsistent results. Among three large studies investigating prostaglandins for induction of labor for women with a previous cesarean delivery, one found an increased risk of uterine rupture (81), a second reported no increased rupture risk (4), and a third found no increase risk of rupture when prostaglandins were used alone (with no subsequent oxytocin) (5). Studies of specific prostaglandins are limited in size, but indicate that rupture risk may vary among these agents. Evidence from small studies show that the use of misoprostol (prostaglandin E₁) in women who have had cesarean deliveries is associated with an increased risk of uterine rupture (95–98). Therefore, misoprostol should not be used for third trimester cervical ripening or labor induction in patients who have had a cesarean delivery or major uterine surgery (95–98).

Because data are limited, it is difficult to make definitive recommendations regarding the use of prostaglandin E₂. One large study found an increase in uterine rupture only when oxytocin was used after cervical ripening with prostaglandins (5). Therefore, selecting women most likely to give birth vaginally while avoiding sequential use of prostaglandins and oxytocin appears to have the lowest risks of uterine rupture.

Induced labor is less likely to result in VBAC than spontaneous labor (44, 47, 92, 99). There is some evidence that this is the case regardless of whether the cervix is favorable or unfavorable, although an unfavorable cervix decreases the chance of success to the greatest extent (91, 100, 101). These factors may affect patient and health care provider decisions as they consider the risks and benefits of TOLAC associated with labor induction.

The use of oxytocin for augmentation of contractions, separate from induction of labor, during TOLAC has been examined in several studies. Some have found an association between oxytocin augmentation and uterine rupture (4, 93) whereas others have not (5, 102, 103). The varying outcomes of available studies and small absolute magnitude of the risk reported in those studies support that oxytocin augmentation may be used in patients undergoing TOLAC.

Studies on TOLAC outcomes after mechanical cervical ripening and labor induction with a transcervical catheter are retrospective and have relatively small sample sizes. Two studies showed no increase

in the risk of uterine rupture (92, 104) whereas another reported an increase compared with women in spontaneous labor (105). Similar to other methods of cervical ripening and labor induction, it is unknown whether any increased risk is due to an unfavorable cervix or the method of ripening. Given the lack of compelling data suggesting increased risk with mechanical dilation and transcervical catheters, such interventions may be an option for TOLAC candidates with an unfavorable cervix.

External Cephalic Version

Limited data regarding external cephalic version for breech presentation in a woman with a prior uterine incision suggest that external cephalic version is not contraindicated if a woman is at low risk of adverse maternal or neonatal outcomes from external cephalic version and TOLAC (106–108). The chances of successful external version have been reported to be similar in women with and without a prior cesarean delivery.

Analgesia

Epidural analgesia for labor may be used as part of TOLAC, and adequate pain relief may encourage more women to choose TOLAC (109, 110). No high quality evidence suggests that epidural analgesia is a causal risk factor for an unsuccessful TOLAC (44, 110, 111). In addition, effective regional analgesia should not be expected to mask signs and symptoms of uterine rupture, particularly because the most common sign of rupture is fetal heart tracing abnormalities (24, 112).

Other Elements of Intrapartum Management

Once labor has begun, a patient with TOLAC should be evaluated by her obstetric provider. Most authorities recommend continuous electronic fetal monitoring. No data suggest that intrauterine pressure catheters or fetal scalp electrodes are superior to external forms of monitoring, and there is evidence that the use of intrauterine pressure catheters does not assist in the diagnosis of uterine rupture (113, 114).

Personnel familiar with the potential complications of TOLAC should be present to watch for fetal heart rate patterns that are associated with uterine rupture. Uterine rupture is often sudden and may be catastrophic, and accurate antenatal predictors of uterine rupture do not exist (115, 116). Acute signs and symptoms of uterine rupture are variable and may include fetal bradycardia, increased uterine contractions, vaginal bleeding, loss of fetal station, or new onset of intense uterine pain (25, 84, 112). However, the most common sign associated with uterine rupture is fetal heart rate abnormality, which has been associated with up to 70% of cases of uterine rup-

tures. This supports the recommendation of continuous fetal heart rate monitoring in labor (25, 29, 84).

Delivery

There is nothing unique about the delivery of the fetus or placenta during VBAC. Manual uterine exploration after VBAC and subsequent repair of asymptomatic scar dehiscence have not been shown to improve outcomes. Excessive vaginal bleeding or signs of hypovolemia are potential signs of uterine rupture and should prompt complete evaluation of the genital tract.

► ***How should future pregnancies be managed after uterine rupture?***

If the site of the ruptured scar is confined to the lower segment of the uterus, the rate of repeat rupture or dehiscence in labor is 6% (117). If the scar includes the upper segment of the uterus, the repeat rupture rate has been reported to be as high as 32% (117, 118). Given both these rates, it is recommended that women who have had a previous uterine rupture should give birth by repeat cesarean delivery before the onset of labor. Because spontaneous labor is unpredictable and could occur before the recommended 39 weeks for an elective delivery, earlier delivery should be contemplated with consideration given to amniocentesis to document fetal lung maturity.

► ***How should second trimester delivery or delivery of an intrauterine fetal demise be accomplished in women with a previous cesarean delivery?***

Some women with a history of a cesarean delivery will require delivery during the second trimester in a subsequent pregnancy. Although published series are relatively small, women with a prior cesarean delivery who undergo labor induction with prostaglandins (including misoprostol) have been shown to have outcomes that are similar to those women with an unscarred uterus (eg, length of time until delivery, failed labor induction, and complication rates) (119–124). The frequency of uterine rupture with labor induction in this setting in most series is less than 1% (125–127). For these women, dilation and evacuation as well as labor induction with prostaglandins are reasonable options (124, 125, 127–129).

In patients after 28 weeks of gestation with an intrauterine fetal demise and a prior cesarean scar, cervical ripening with a transcervical Foley catheter has been associated with uterine rupture rates comparable with spontaneous labor (105) and this may be a helpful

adjunct in patients with an unfavorable cervical examination. Because there are no fetal risks to TOLAC in these circumstances, TOLAC should be encouraged, and after the patient and the health care provider weigh the risks and benefits, TOLAC may even be judged appropriate for women at higher risk for cesarean scar complications (eg, prior classical uterine incision).

► ***How should women considering a trial of labor after previous cesarean delivery be counseled?***

The interest in considering TOLAC varies greatly among women, and this variation is at least partly related to differences in the way individuals value the potential risks and benefits (1, 130–132). Accordingly, potential benefits and risks of both TOLAC and elective repeat cesarean delivery should be discussed and these discussions documented. Discussion should consider individual characteristics that affect the chances of complications associated with VBAC and TOLAC so that a patient can choose her intended route of delivery based on data that is most personally relevant.

A discussion of VBAC early in a woman's prenatal care course, if possible, will allow the most time for her to consider options for TOLAC or elective repeat cesarean delivery. Many of the factors that are related to the chance of VBAC or uterine rupture are known early in pregnancy (60, 61, 116). If the type of previous uterine incision is in doubt, reasonable attempts should be made to obtain the patient's medical records. As the pregnancy progresses, if other circumstances arise that may change the risks or benefits of TOLAC (eg, need for labor induction), these should be addressed. Counseling also may include consideration of intended family size and the risk of additional cesarean deliveries, with the recognition that the future reproductive plans may be uncertain or change.

Counseling should consider the resources available to support women electing TOLAC at their intended delivery site, and whether such resources match those recommended for caring for women electing TOLAC (discussed and detailed in the next section). Available data support that TOLAC may be safely undertaken in both university and community hospitals and facilities with and without residency programs (5, 23, 26, 27, 133).

After counseling, the ultimate decision to undergo TOLAC or a repeat cesarean delivery should be made by the patient in consultation with her health care provider. Global mandates for TOLAC are inappropriate because individual risk factors are not considered. Documentation of counseling and the management plan should be included in the medical record.

► ***What resources are recommended for health care providers and facilities offering a trial of labor after previous cesarean delivery?***

Trial of labor after previous cesarean delivery should be undertaken at facilities capable of emergency deliveries. The American College of Obstetricians and Gynecologists (the College) and international guidelines have recommended that resources for emergency cesarean delivery should be “immediately available.” Some have argued that this stipulation and the difficulty in providing required resources—especially in smaller centers with lower delivery volumes—limit women’s access to TOLAC. This may be particularly true in rural areas where the option to travel to larger centers is difficult.

Restricting access was not the intention of the College’s past recommendation. Much of the data concerning the safety of TOLAC was obtained from centers capable of performing immediate, emergency cesarean delivery. Although there is reason to think that more rapid availability of cesarean delivery may provide a small incremental benefit in safety, comparative data examining in detail the effect of alternate systems and response times are not available (134).

Because of the risks associated with TOLAC and that uterine rupture and other complications may be unpredictable, the College recommends that TOLAC be undertaken in facilities with staff immediately available to provide emergency care. When resources for immediate cesarean delivery are not available, the College recommends that health care providers and patients considering TOLAC discuss the hospital’s resources and availability of obstetric, pediatric, anesthetic, and operating room staffs. These recommendations are concordant with those of other professional societies (135, 136). The decision to offer and pursue TOLAC in a setting in which the option of immediate cesarean delivery is more limited should be carefully considered by patients and their health care providers. In such situations the best alternative may be to refer patients to a facility with available resources. Another alternative is to create regional centers where patients interested in TOLAC can be readily referred and needed resources can be more efficiently and economically organized. Health care providers and insurance carriers should do all they can to facilitate transfer of care or comanagement in support of a desired TOLAC, and such plans should be initiated early in the course of antenatal care. However, in areas with fewer deliveries and greater distances between delivery sites, organizing transfers or accessing referral centers may be untenable. Respect for patient autonomy supports the concept that patients should be allowed to accept increased levels of risk, however, patients should

be clearly informed of such potential increase in risk and management alternatives. Evaluation of a patient’s individual chance of VBAC and risk for uterine rupture are central to these considerations. Such conversations and decisions should be documented, including reference to site-specific resources and anticipated risks. Referral also may be appropriate if, after discussion, health care providers find themselves uncomfortable with choices patients have made. Importantly, however, none of the principles, options, or processes outlined here should be used by centers, health care providers, or insurers to avoid appropriate efforts to provide the recommended resources to make TOLAC as safe as possible for those who choose this option. In settings where the staff needed for emergency delivery are not immediately available, the process for gathering needed staff when emergencies arise should be clear, and all centers should have a plan for managing uterine rupture. Drills or other simulation may be useful in preparing for these rare emergencies.

Respect for patient autonomy also argues that even if a center does not offer TOLAC, such a policy cannot be used to force women to have cesarean delivery or to deny care to women in labor who decline to have a repeat cesarean delivery. When conflicts arise between patient wishes and health care provider or facility policy or both, careful explanation and, if appropriate, transfer of care to facilities supporting TOLAC should be used rather than coercion. Because relocation after the onset of labor is generally not appropriate in patients with a prior uterine scar, who are thereby at risk for uterine rupture, transfer of care to facilitate TOLAC, as noted previously, is best effected during the course of antenatal care. This timing places a responsibility on patients and health care providers to begin relevant conversations early in the course of prenatal care.

Summary of Recommendations

The following recommendations are based on good and consistent scientific evidence (Level A):

- Most women with one previous cesarean delivery with a low-transverse incision are candidates for and should be counseled about VBAC and offered TOLAC.
- Epidural analgesia for labor may be used as part of TOLAC.
- Misoprostol should not be used for third trimester cervical ripening or labor induction in patients who have had a cesarean delivery or major uterine surgery.

The following recommendations are based on limited or inconsistent scientific evidence (Level B):

- ▶ Women with two previous low transverse cesarean deliveries may be considered candidates for TOLAC.
- ▶ Women with one previous cesarean delivery with a low transverse incision, who are otherwise appropriate candidates for twin vaginal delivery, may be considered candidates for TOLAC.
- ▶ External cephalic version for breech presentation is not contraindicated in women with a prior low transverse uterine incision who are at low risk for adverse maternal or neonatal outcomes from external cephalic version and TOLAC.
- ▶ Those at high risk for complications (eg, those with previous classical or T-incision, prior uterine rupture, or extensive transfundal uterine surgery) and those in whom vaginal delivery is otherwise contraindicated (eg, those with placenta previa) are not generally candidates for planned TOLAC.
- ▶ Induction of labor for maternal or fetal indications remains an option in women undergoing TOLAC.
- ▶ TOLAC is not contraindicated for women with previous cesarean delivery with an unknown uterine scar type unless there is a high clinical suspicion of a previous classical uterine incision.

The following recommendations are based primarily on consensus and expert opinion (Level C):

- ▶ A trial of labor after previous cesarean delivery should be undertaken at facilities capable of emergency deliveries. Because of the risks associated with TOLAC and that uterine rupture and other complications may be unpredictable, the College recommends that TOLAC be undertaken in facilities with staff immediately available to provide emergency care. When resources for immediate cesarean delivery are not available, the College recommends that health care providers and patients considering TOLAC discuss the hospital's resources and availability of obstetric, pediatric, anesthetic, and operating room staffs. Respect for patient autonomy supports that patients should be allowed to accept increased levels of risk, however, patients should be clearly informed of such potential increase in risk and management alternatives.
- ▶ After counseling, the ultimate decision to undergo TOLAC or a repeat cesarean delivery should be made by the patient in consultation with her health care provider. The potential risks and benefits of

both TOLAC and elective repeat cesarean delivery should be discussed. Documentation of counseling and the management plan should be included in the medical record.

Proposed Performance Measure

Percentage of women who are candidates for TOLAC with whom discussion of the risk and benefits of TOLAC compared with a repeat cesarean delivery has been documented in the medical record

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The MEDLINE database, the Cochrane Library, and the American College of Obstetricians and Gynecologists' own internal resources and documents were used to conduct a literature search to locate relevant articles published between January 1985–February 2010. The search was restricted to articles published in the English language. Priority was given to articles reporting results of original research, although review articles and commentaries also were consulted. Abstracts of research presented at symposia and scientific conferences were not considered adequate for inclusion in this document. Guidelines published by organizations or institutions such as the National Institutes of Health and the American College of Obstetricians and Gynecologists were reviewed, and additional studies were located by reviewing bibliographies of identified articles. When reliable research was not available, expert opinions from obstetrician–gynecologists were used.

Studies were reviewed and evaluated for quality according to the method outlined by the U.S. Preventive Services Task Force:

- I Evidence obtained from at least one properly designed 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 with or without the intervention. Dramatic results in uncontrolled experiments also could be regarded as this type of evidence.
- III Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Based on the highest level of evidence found in the data, recommendations are provided and graded according to the following categories:

- Level A—Recommendations are based on good and consistent scientific evidence.
- Level B—Recommendations are based on limited or inconsistent scientific evidence.
- Level C—Recommendations are based primarily on consensus and expert opinion.

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The American College of Obstetricians and Gynecologists
409 12th Street, SW, PO Box 96920, Washington, DC 20090-6920

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