INTERIM UPDATE

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INTERIM UPDATE: This Practice Bulletin includes a limited, focused update to align with Committee Opinion No. 764, *Medically Indicated Late-Preterm and Early-Term Deliveries*, regarding delivery for previous uterine rupture.

Vaginal Birth After Cesarean Delivery

Trial of labor after cesarean delivery (TOLAC) refers to a planned attempt to deliver vaginally by a woman who has had a previous cesarean delivery, regardless of the outcome. This method provides women who desire a vaginal delivery 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 as well as a decrease in the overall cesarean delivery rate at the population level (1–3). However, although TOLAC is appropriate for many women, several factors increase the likelihood of a failed trial of labor, which in turn is associated with increased maternal and perinatal morbidity when compared with a successful trial of labor (ie, VBAC) and elective repeat cesarean delivery (4–6). Therefore, assessing the likelihood of VBAC as well as the individual risks is important when determining who is an appropriate candidate for TOLAC. Thus, the purpose of this document is to review the risks and benefits of TOLAC in various clinical situations and to provide practical guidelines for counseling and management of patients who will attempt to give birth vaginally after a previous cesarean delivery.

Background

Between 1970 and 2016, the cesarean delivery rate in the United States increased from 5% to 31.9% (7, 8). This dramatic increase was a result of several changes in the practice environment, including the introduction of electronic fetal monitoring and a decrease in operative vaginal deliveries and attempts at vaginal breech deliveries (8–11). The dictum "once a cesarean always a cesarean" also partly contributed to the increase in the rate of cesarean deliveries (12). However, in the 1970s, some investigators began to reconsider this paradigm, and accumulated data have since supported TOLAC as a reasonable approach in select pregnancies (5, 6, 13–15).

Recommendations favoring TOLAC were reflected in increased VBAC rates (VBAC per 100 women with a prior cesarean delivery) from slightly more than 5% in 1985 to 28.3% by 1996. Concomitantly, the overall cesarean delivery rate decreased from 22.8% in 1989 to approximately 20% by 1996 (16). Yet, as the number of women pursuing TOLAC increased, so did the number of reports of uterine rupture and other complications related to TOLAC (17–19). These reports, and the professional liability pressures they engendered, contributed in part to a reversal of the VBAC and cesarean delivery trend, and by 2006, the VBAC rate had decreased to 8.5% and the total cesarean delivery rate had increased to 31.1% (16, 20, 21). Some hospitals stopped offering TOLAC altogether (22).

In 2010, the National Institutes of Health convened a consensus conference to examine the safety and outcomes of TOLAC and VBAC as well as factors associated with their decreasing rates. The National Institutes of Health panel recognized that TOLAC was a reasonable option for many women with a prior cesarean delivery (23) 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 trial of labor" (23).

Evaluating the Evidence

Data comparing the rates of VBAC, as well as maternal and neonatal outcomes, after TOLAC to those after planned repeat cesarean delivery can help guide obstetricians or other obstetric care providers and patients when deciding how to approach delivery in women with a prior cesarean delivery. However, no randomized trials comparing maternal or neonatal outcomes between women attempting TOLAC and those undergoing a repeat cesarean delivery exist. Instead, recommendations regarding the approach to delivery are based on observational studies that have examined the probability of VBAC once TOLAC is attempted and the maternal and neonatal morbidities associated with TOLAC compared with repeat cesarean delivery (4–6, 13–15, 24–31). These data were summarized in the Evidence Report/Technology Assessment that provided background for the 2010 National Institutes of Health Consensus Conference (32).

Before considering the results of any analysis, it is important to note that the appropriate clinical and 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 failed TOLAC.

Clinical Considerations and Recommendations

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

In addition to providing an option for those who want to experience a vaginal birth, VBAC is associated with several potential health advantages for women. For example, women who achieve VBAC avoid major abdominal surgery and have lower rates of hemorrhage, thromboembolism, and infection, and a shorter recovery period than women who have an elective repeat cesarean delivery (2, 3, 7, 9, 33). Additionally, for those considering future pregnancies, VBAC may decrease the risk of maternal consequences related to multiple cesarean deliveries (eg, hysterectomy, bowel or bladder injury, transfusion, infection, and abnormal placentation such as placenta previa and placenta accreta) (34–36).

However, elective repeat cesarean delivery and TOLAC are associated with maternal and neonatal risk (see Table 1 and Table 2). The risks of either approach include maternal hemorrhage, infection, operative injury, thromboembolism, hysterectomy, and death (5, 6, 14, 24, 37). Most maternal morbidity related to TOLAC occurs when repeat cesarean delivery becomes necessary (4–6, 25). Thus, VBAC is associated with fewer complications than elective repeat cesarean delivery, whereas a failed TOLAC is associated with more complications (4–6, 24). Consequently, the risk of maternal morbidity is integrally related to a woman's probability of achieving VBAC (38).

Uterine rupture or dehiscence associated with TOLAC results in the most significant increase in the likelihood of additional maternal and neonatal morbidity. It should be noted that the terms "uterine rupture" and "uterine dehiscence" are not consistently distinguished from each other in the literature and often are used interchangeably. Furthermore, 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 (eg, low transverse versus classical) (31).

Table 1. Composite Maternal Risks From Elective Repeat Cesarean Delivery and Trial of Labor After Previous Cesarean Delivery in Term Patients

Maternal Risks	ERCD (%) [One CD]	TOLAC (%)
Infectious morbidity	3.2	4.6
Surgical injury	0.30–0.60	0.37–1.3
Blood transfusion	0.46	0.66
Hysterectomy	0.16	0.14
Uterine rupture	0.02	0.71
Maternal death	0.0096	0.0019

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

Surgical Injury: Defined differently and variably reported on in trials. Rate of surgical injury may be increased with TOLAC but definitive studies are lacking.

Infectious Morbidity: Defined as fever, infection, endometritis, and chorioamnionitis

Data from Guise JM, Eden K, Emeis C, Denman MA, Marshall N, Fu R, et al. Vaginal birth after cesarean: new insights. (Archived) Evidence Report/Technology Assessment No.191. AHRQ Publication No. 10-E003. Rockville (MD): Agency for Healthcare Research and Quality; 2010.

Table 2. Composite Neonatal Morbidity From Elective Repeat Cesarean Delivery and Trial of Labor After Previous Cesarean Delivery in Term Infants

Neonatal Risks	ERCD (%)	TOLAC (%)
Antepartum stillbirth	0.21	0.10
Intrapartum stillbirth	0–0.004	0.01–0.04
HIE	0–0.32	0–0.89
Perinatal mortality	0.05	0.13
Neonatal mortality	0.06	0.11
NICU admission	1.5–17.6	0.8–26.2
Respiratory morbidity	2.5	5.4
Transient tachypnea	4.2	3.6

Abbreviations: ERCD, elective repeat cesarean delivery; HIE, hypoxic ischemic encephalopathy; NICU, neonatal intensive care unit; TOLAC, trial of labor after cesarean delivery.

Hypoxic Ischemic Encephalopathy: The strength of evidence on the HIE of the infant for ERCD versus TOLAC is low because of the lack of consistency in measurement and few studies. It is not possible to know the true relationship because of the low strength of overall evidence.

Perinatal Mortality: Includes infants less than 28 days of age and fetal deaths of 20 weeks or more of gestation.

Neonatal Mortality: Death in the first 28 days of life.

Neonatal Intensive Care Unit Admission: The overall strength of evidence on the effect of route of delivery on NICU admission is low because of the inconsistent measures and lack of defined criteria for admission.

Respiratory Morbidity: Defined as the rate of bag-and-mask ventilation.

Data from Guise JM, Eden K, Emeis C, Denman MA, Marshall N, Fu R, et al. Vaginal birth after cesarean: new insights. (Archived) Evidence Report/Technology Assessment No.191. AHRQ Publication No. 10–E003. Rockville (MD): Agency for Healthcare Research and Quality; 2010.

Although some connotations may suggest that dehiscence is less morbid than rupture, that convention is not used in this document, and both terms refer to symptomatic or clinically significant events unless otherwise noted.

One factor that markedly influences the likelihood of uterine rupture is the location of the prior incision on the uterus. For example, several large studies of women with a prior low-transverse uterine incision reported a clinically determined uterine rupture rate after TOLAC of approximately 0.5–0.9% (5, 6, 13–15, 24). As discussed below, the risk of uterine rupture is higher in women with other types of hysterotomies, with the exception of low vertical incision (a vertical incision performed in the lower uterine segment).

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

Stratification of Candidates

Most published series examining women attempting TOLAC have demonstrated a vaginal delivery rate of 60–80% (5, 6, 25). However, the likelihood of achieving VBAC for an individual varies based on her demographic and obstetric characteristics. For example, women whose first cesarean delivery was performed because of an arrest of labor disorder are less likely to succeed in their attempt at VBAC than those whose first cesarean delivery was for a nonrecurring indication (eg, breech presentation) (39–44). Similarly, there is consistent evidence that women who undergo labor induction or augmentation are less likely to achieve VBAC than women with fetuses of the same gestational age in spontaneous labor without augmentation (45–48). Other factors that negatively influence the likelihood of VBAC include increasing maternal age, high body mass index (BMI, calculated as weight in kilograms divided by height in meters squared), high birth weight, and advanced gestational age at delivery (more than 40 weeks) (45, 49–55). Moreover, a shorter interdelivery interval (less than 19 months) and the presence of preeclampsia at the time of delivery also have been associated with a reduced chance of achieving VBAC (56, 57). Conversely, women who have had a prior vaginal delivery are more likely than those who have not to have a VBAC if they undergo TOLAC (45, 58).

The Role of Vaginal Birth After Cesarean Delivery Prediction Models

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 methodologic limitations and have not been used widely (47, 59–61). 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 (62). This model uses information that is available at the first prenatal visit to generate the predicted probability that a VBAC will be achieved if TOLAC is undertaken. Predicted probability for VBAC is based on a multivariable logistic regression model that includes maternal age, BMI, race, prior vaginal delivery, history of a VBAC, and indication for prior cesarean delivery. The predicted probability of VBAC has been shown to reflect the actual probability in the original study population as well as in many other populations, including those in the United States, Canada, Europe, and Asia

(63–67). This model (as well as one that provides the probability of VBAC after TOLAC using information that is not available until the admission for delivery) may have utility for patient education and counseling for those considering TOLAC at term (64). Examples of calculators are listed on the American College of Obstetricians and Gynecologists' (ACOG) For More Information web page. Although such a calculator may provide more specific information about the chance of VBAC, which can be used by health care providers and their patients to further the process of shared decision making, no prediction model for VBAC has been shown to result in improved patient outcomes.

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

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 and offered TOLAC. Conversely, those at high risk of uterine rupture (eg, those with a 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. However, individual circumstances must be considered in all cases. For example, if a patient who may not otherwise be a candidate for TOLAC presents in advanced labor, the patient and her obstetrician or other obstetric care provider may judge it best to proceed with TOLAC.

Good candidates for planned TOLAC are those women in whom the balance of risks (as low as possible) and chances of success (as high as possible) are acceptable to the patient and obstetrician or other obstetric care provider. However, the balance of risks and benefits appropriate for one patient may be unacceptable for another. Delivery decisions made during the first pregnancy after a cesarean delivery will likely affect plans in future pregnancies. For example, maternal morbidity increases with increasing number of cesareans, and a dose–response relationship has been documented between placenta accreta and number of prior cesareans, especially in the setting of placenta previa (34). Therefore, decisions regarding TOLAC should ideally consider the possibility of future pregnancies.

Although there is no universally agreed upon discriminatory point, evidence suggests that women with at least a 60–70% likelihood of achieving a VBAC who attempt TOLAC experience the same or less maternal morbidity than women who have an elective repeat cesarean delivery (68, 69). Conversely, women who have a lower than 60% probability of achieving a VBAC who attempt TOLAC are more likely to experience morbidity than women who have an elective repeat cesarean delivery (69). 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. For example, one study demonstrated that composite neonatal morbidity was similar between women who attempted TOLAC and women who had an elective repeat cesarean delivery if the probability of achieving VBAC was 70% or greater (69). However, a predicted success rate of less than 70% is not a contraindication to TOLAC. The decision to attempt TOLAC is a preference-sensitive decision, and eliciting patient values and preferences is a key element of counseling.

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 (6, 70–73). Two large studies with sufficient size to control for confounding variables reported on the risks for women with two previous cesarean deliveries undergoing TOLAC (72, 74). One study found no increased risk of uterine rupture (0.9% versus 0.7%) in women with one versus multiple prior cesarean deliveries (72), 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 (74). 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 small (eg, 2.1% versus 3.2% composite major morbidity in one study) (74). Additionally, retrospective cohort data have suggested that the likelihood of achieving VBAC appears to be similar for women with one previous cesarean delivery and women with more than one previous 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. Similar to that of women with one cesarean, the calculated predicted probability of a VBAC can be obtained using a web-based calculator that has been validated in women with two previous cesarean deliveries (75). Data regarding the risk for

women attempting TOLAC with more than two previous cesarean deliveries are limited (76).

Macrosomia

Women attempting TOLAC who have macrosomic fetuses (historically defined as a birth weight greater than 4,000 g or 4,500 g) have a lower likelihood of VBAC (50, 77–79) than women attempting TOLAC who have nonmacrosomic fetuses. Similarly, women with a history of cesarean delivery performed because of dystocia have a lower likelihood of VBAC if the current birth weight is greater than that of the index pregnancy with dystocia (80). However, studies examining the incidence of uterine rupture during TOLAC with neonatal birth weights greater than 4,000 g have shown mixed results. Three studies have reported no association (49, 77, 81), whereas a fourth has suggested an increased risk of uterine rupture for women undergoing TOLAC who have not had a prior vaginal delivery (relative risk [RR], 2.3; $P<.0001$) (79). However, these studies used actual birth weight as opposed to estimated fetal weight, limiting the applicability of these data for antenatal decision making regarding mode of delivery (82). Nonetheless, it remains appropriate for the obstetricians or other obstetric care providers and patients to consider past birth weights and current estimated fetal weight when making decisions regarding TOLAC. Suspected macrosomia alone should not preclude offering 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 (50, 83–85). Although one study has shown an increased risk of uterine rupture beyond 40 weeks of gestation (84), other studies, including the largest study evaluating this factor, have not found this association (85). Thus, although the likelihood of success may be lower in more advanced gestations, gestational age greater than 40 weeks alone should not preclude TOLAC.

Previous Low-Vertical Incision

The few studies evaluating 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 (86–89). 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, the obstetrician or other obstetric care provider and patient may choose to proceed with TOLAC in the presence of a documented prior low-vertical uterine incision.

Unknown Type of Prior 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 TOLAC under these circumstances, two case series, both from large tertiary care facilities, reported rates of VBAC success and uterine rupture similar to those of women with documented prior low-transverse uterine incisions (90, 91). Additionally, in one study evaluating risk factors for uterine rupture, no significant association was found with the presence of an unknown scar (81). The absence of an association may result from the fact that most cesarean incisions are low transverse, and the uterine scar type often can be inferred based on the indication for the prior cesarean delivery. Therefore, women with one previous cesarean delivery with an unknown uterine scar type may be candidates for TOLAC, unless there is a high clinical suspicion of a previous classical uterine incision such as cesarean delivery performed at an extremely preterm gestational age.

Twin Gestation

Studies have consistently demonstrated that the outcomes of women with twin gestations who attempt TOLAC are similar to those of women with singleton gestations who attempt TOLAC (92–97). Moreover, two analyses of large populations found that women with twin gestations had a similar likelihood of achieving VBAC as women with singleton gestations. These studies also found that women with twin gestations did not incur any greater risk of uterine rupture or maternal or perinatal morbidity than those with a singleton gestation (96, 97). Women with one previous cesarean delivery with a low-transverse incision, who are otherwise appropriate candidates for twin vaginal delivery, are considered candidates for TOLAC.

Obesity

Increasing BMI consistently has been shown to have an inverse association with the likelihood of achieving VBAC (52, 62, 98, 99). For example, in one large cohort study, 85% of normal weight (BMI of 18.5–24.9) women achieved VBAC whereas only 61% of morbidly obese (BMI of 40 or more) women achieved VBAC (98). Nevertheless, a high BMI alone should not be considered an absolute contraindication to TOLAC because this is just one factor in determining the chance of VBAC and obstetric morbidity in the setting of TOLAC. Additionally, women with a greater BMI have higher rates of complications with an elective repeat cesarean delivery

as well. Women who have a BMI of 30 or greater may be candidates for TOLAC, depending on their other characteristics (eg, having had a prior vaginal delivery), and their care should be individualized.

▶ ***How does management of labor differ for patients attempting trial of labor after cesarean delivery?***

Induction and Augmentation of Labor

Induction of labor 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 considered. Several studies have noted an increased risk of uterine rupture in the setting of induction of labor in women attempting TOLAC (5, 6, 89, 100–102). One study of 20,095 women who had undergone prior cesarean delivery (89) 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*, Ninth Revision, coding for diagnosis of uterine rupture and was unable to determine whether prostaglandin use itself or the context of its use (eg, an unfavorable cervix or need for multiple induction agents) was associated with uterine rupture.

A large multicenter study of women attempting TOLAC (n=33,699) also showed that augmentation or induction of labor was associated with an increased risk of uterine rupture when compared with spontaneous labor (1.4% for induction with prostaglandins with or without oxytocin, 1.1% for oxytocin alone, 0.9% for augmented labor, and 0.4% for spontaneous labor). (5). 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%, $P=.02$). This study also showed that uterine rupture was no more likely to occur when labor was induced with an unfavorable cervix than when labor was induced with a favorable cervix (100). Another secondary analysis examining the association between the maximum oxytocin dose and the risk of uterine rupture (103) noted a dose–response effect between increasing risk of uterine rupture and higher maximum doses of oxytocin. However, studies have not identified a clear threshold for rupture, and an upper limit for oxytocin dosage with TOLAC has not been established.

Most studies examining induction in the setting of a prior cesarean (including those above) have compared the outcomes of women undergoing induction with those in spontaneous labor. This comparison is misleading because the actual clinical alternative to labor induction is not spontaneous labor (which may or may not occur) but expectant management. One observational study comparing induction to expectant management in women with a prior cesarean delivery found that induction of labor was associated with a greater relative risk of uterine rupture, whereas another study did not (104, 105).

Moreover, when compared with spontaneous labor, induced labor is associated with a lower likelihood of achieving VBAC (45, 48, 101, 106), and some evidence suggests that this is the case whether the cervix is favorable or unfavorable (although an unfavorable cervix further decreases the chance of success) (100, 107, 108). However, these results have not been clearly demonstrated when women undergoing induced labor are compared with those undergoing expectant management. For example, data from retrospective observational cohort studies have shown that, when compared with expectant management, labor induction is associated with lower odds of cesarean delivery at 39 weeks of gestation (adjusted odds ratio [AOR], 0.81; 95% CI, 0.71–0.91), at 40 weeks of gestation (AOR, 0.72; 95% CI, 0.66–0.79), and at 41 weeks of gestation (AOR, 0.70; 95% CI, 0.62–0.79) (109). Similarly, in another large cohort, the rate of VBAC was higher among women undergoing induction of labor at 39 weeks compared with expectant management (73.8% versus 61.3%, $P<.001$) (104).

The use of oxytocin for augmentation of contractions, separate from induction of labor, during TOLAC has been examined in several studies. Some studies have found an association between oxytocin augmentation and uterine rupture (5, 102), whereas others have not (6, 110, 111). Therefore, given that the results of these studies vary and that the absolute magnitude of the risk reported in these studies is small, oxytocin augmentation may be used in women attempting TOLAC.

Cervical Ripening

Studies regarding TOLAC outcomes related to specific cervical ripening agents in the setting of labor induction have generally been small and difficult to use for definitive conclusions. Randomized controlled trials of methods of induction of labor for women with a previous cesarean delivery are underpowered to detect clinically relevant differences for many outcomes (112). Reports that have evaluated a mechanical method of cervical ripening, such as the transcervical Foley catheter, have shown mixed results. Two retrospective cohort studies demonstrated no increase in the risk of uterine rupture

(101, 113), whereas another retrospective cohort study reported an increase compared with women in spontaneous labor (114). Similar to other methods of cervical ripening and labor induction, with mechanical cervical ripening it is unknown whether any increased risk is because of an unfavorable cervix or the method of ripening. Given the lack of compelling data suggesting an increased risk of uterine rupture with mechanical dilation and transcervical catheters, such interventions may be an option for TOLAC candidates with an unfavorable cervix.

Studies examining the effects of prostaglandins (grouped together as a class of agents) on uterine rupture in women with a prior cesarean delivery also have demonstrated inconsistent results. For example, among three large studies investigating prostaglandins for induction of labor in women with a previous cesarean delivery, one found an increased risk of uterine rupture (89), another reported no increased rupture risk (5), and a third found no increased risk of rupture when prostaglandins were used alone (with no subsequent oxytocin) (6). Although studies of specific prostaglandins are limited in size, the results indicate the risk of rupture may vary among these agents. For example, evidence from these small studies shows that the use of misoprostol (prostaglandin E_1) in women with a prior cesarean delivery is associated with an increased risk of uterine rupture (115–118). Therefore, misoprostol should not be used for cervical ripening or labor induction in patients at term who have had a cesarean delivery or major uterine surgery. Prostaglandins can be considered if delivery is indicated in the second trimester (see detailed discussion in the "How should second-trimester preterm delivery or delivery after a fetal death be accomplished in women with a previous cesarean delivery?" section). Because data are limited, it is difficult to make definitive recommendations regarding the use of prostaglandin E_2.

External Cephalic Version

Limited data suggest that external cephalic version for breech presentation is not contraindicated in women with a prior low-transverse uterine incision who are candidates for external cephalic version and TOLAC (119–121). Moreover, the likelihood of successful external cephalic version has been reported to be similar in women with and without a prior cesarean delivery

Analgesia

No evidence suggests that epidural analgesia is a causal risk factor for unsuccessful TOLAC (14, 45, 122). Therefore, epidural analgesia for labor may be used as part of TOLAC, and adequate pain relief may encourage more women to choose TOLAC (14, 123). However, epidural analgesia should not be considered necessary. In addition, effective regional analgesia should not be expected to mask signs or symptoms of uterine rupture, particularly because the most common sign of rupture is fetal heart tracing abnormalities (45, 124).

Anticipated Labor Curve

Studies have shown that women attempting TOLAC seem to have labor patterns similar to those who have not had a prior cesarean delivery. For example, a case–control study demonstrated that women with a prior cesarean delivery and no prior vaginal delivery had labor patterns similar to nulliparous women, whereas women with a prior cesarean as well as a prior vaginal delivery had labor patterns similar to multiparous women (125). Similarly, a 2015 study utilizing data from the Consortium on Safe Labor found that women at term in spontaneous labor who had a vaginal delivery with one prior cesarean had a labor curve that was similar to nulliparous women (126). Thus, similar standards should be used to evaluate the labor progress of women undergoing TOLAC and those who have not had a prior cesarean delivery.

Diagnosis of Uterine Rupture

Once labor has begun, a patient attempting TOLAC should be evaluated by an obstetrician or other obstetric care provider. Most authorities recommend continuous electronic fetal monitoring. There are no data to suggest that intrauterine pressure catheters or fetal scalp electrodes are superior to external forms of continuous monitoring. In addition, there is evidence that the use of intrauterine pressure catheters does not help in the diagnosis of uterine rupture (127, 128).

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 often is sudden and may be catastrophic, and no accurate antenatal predictors of uterine rupture have been identified (129, 130). 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 (27, 81, 124). However, the most common sign indicative of uterine rupture is fetal heart rate abnormality, which has been associated with up to 70% of cases of uterine ruptures. Therefore, continuous fetal heart rate monitoring during TOLAC is recommended (27, 31, 81).

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 may indicate uterine rupture and should prompt a 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% (131). If the scar includes the upper segment of the uterus, the repeat rupture rate is reported to be as high as 32% (131, 132) with the most recent report estimating the rate of recurrence to be 15% (133). Given these rates, it is recommended that women who have had a previous uterine rupture give birth by repeat cesarean delivery before the onset of labor. In addition, because spontaneous labor is unpredictable and could occur before 39 weeks of gestation (the earliest recommended time for an elective delivery), similar to a history of a prior classical cesarean, the suggested timing of delivery between 36 0/7 weeks and 37 0/7 weeks of gestation should be considered but can be individualized based on the clinical situation (134).

▶ *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 weigh potential risks and benefits (1, 135–137). Accordingly, potential risks and benefits of both TOLAC and elective repeat cesarean delivery should be discussed, and these discussions should be documented. Discussion should consider individual characteristics that affect the likelihood of complications associated with TOLAC and elective repeat cesarean delivery so that a woman can choose her intended route of delivery based on data that are most personally relevant. A VBAC calculator may be used to provide more specific information about the chance of VBAC, which can be used to further the process of shared decision making.

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 (61, 62, 130). 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 may change.

Counseling should address 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 below in What resources are recommended for obstetricians or other obstetric care providers and facilities offering a trial of labor after previous cesarean delivery?). Available data confirm that TOLAC may be safely attempted in both university and community hospitals and in facilities with or without residency programs (6, 25, 28, 29, 138).

After counseling, the ultimate decision to undergo TOLAC or a repeat cesarean delivery should be made by the patient in consultation with her obstetrician or other obstetric 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. Checklists are helpful guides for documentation of counseling and management. Information is available on ACOG's For More Information web page. Global mandates for TOLAC are inappropriate because individual risk factors are not considered.

▶ *How should second-trimester preterm delivery or delivery after a fetal death be accomplished in women with a previous cesarean delivery?*

Some women with a history of a cesarean delivery will require delivery of a subsequent pregnancy during the second trimester. 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) (139–144). Moreover, most series show that the frequency of uterine rupture with labor induction in this setting is less than 1% (145–147). For these women, dilation and evacuation as well as labor induction with prostaglandins are reasonable options (144, 145, 147–149).

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 (106, 114, 150, 151), 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 obstetrician or other obstetric care provider weigh the risks and benefits, TOLAC may be judged appropriate for women at higher risk of cesarean scar complications (eg, prior classical uterine incision).

▶ *What resources are recommended for obstetricians or other obstetric care providers and facilities offering a trial of labor after previous cesarean delivery?*

Trial of labor after previous cesarean delivery should be attempted at facilities capable of performing emergency deliveries. The American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine's jointly developed Obstetric Care Consensus document, Levels of Maternal Care (which introduced uniform designations for levels of maternal care), recommends that women attempting TOLAC should be cared for in a level I center (ie, one that can provide basic care) or higher (152). Level I facilities must have the ability to begin emergency cesarean delivery within a time interval that best considers maternal and fetal risks and benefits with the provision of emergency care (152).

The American College of Obstetricians and Gynecologists and international guidelines have recommended that resources for emergency cesarean delivery be immediately available. However, some have argued that this stipulation and the difficulty in providing required resources limit women's access to TOLAC especially in smaller centers with lower delivery volumes. This may be particularly true in rural areas where traveling to larger centers is difficult.

Restricting access was not the intention of this recommendation, but much of the data concerning the safety of TOLAC is from centers capable of performing a timely emergency cesarean delivery (31, 81). 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 (153).

Because of the risks associated with TOLAC, and because uterine rupture and other complications may be unpredictable, ACOG recommends that TOLAC be attempted in facilities that can provide cesarean delivery for situations that are immediate threats to the life of the woman or fetus. When resources for emergency cesarean delivery are not available, ACOG recommends that obstetricians or other obstetric care providers and patients considering TOLAC discuss the hospital's resources and availability of obstetric, pediatric, anesthesiology, and operating room staff. These recommendations are concordant with those of other professional societies (154). The decision to offer and pursue TOLAC in a setting in which the option of emergency cesarean delivery is limited should be carefully considered by patients and their obstetricians or other obstetric 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. Obstetricians and other obstetric care providers and insurance carriers should do all they can to facilitate transfer of care or comanagement in support of a desired TOLAC, and these procedures should be initiated early in the course of antenatal care. However, in areas with few deliveries and long distances between delivery sites, organizing transfers or accessing referral centers may be untenable.

Consistent with the principle of respect for patient autonomy, patients should be allowed to accept increased levels of risk; however, patients should be clearly informed of the potential increases in risk and management alternatives. Evaluation of a patient's individual likelihood of VBAC and risk of uterine rupture are central to these considerations. Such conversations and decisions should be documented and should include reference to anticipated risks and site-specific resources. Referral may be appropriate if, after discussion, obstetricians or other obstetric care providers find themselves in disagreement with the choice the patient has made. Moreover, because of the unpredictability of complications requiring emergency medical care, home birth is contraindicated for women undergoing TOLAC. However, none of the principles, options, or processes outlined here should be used by centers, obstetricians or other obstetric care providers, or insurers to avoid appropriate efforts to provide the recommended resources to make TOLAC available and as safe as possible for those who choose this option. In settings where the resources 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 simulations may be useful in preparing for these emergencies.

Respect for patient autonomy also dictates 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 the obstetrician or other obstetric care provider, or facility policy, or both, careful explanation and, if appropriate, transfer of care to facilities supporting

TOLAC should be used. Coercion is not acceptable (155). Because relocation after the onset of labor is generally not appropriate in patients with a prior uterine scar, who are thereby at risk of 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 obstetricians and other obstetric care providers to begin relevant conversations early in the course of prenatal care.

Summary of Recommendations and Conclusions

The following recommendations and conclusions 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 and offered TOLAC.
- Misoprostol should not be used for cervical ripening or labor induction in patients at term who have had a cesarean delivery or major uterine surgery.
- Epidural analgesia for labor may be used as part of TOLAC.

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

- Those at high risk of uterine rupture (eg, those with previous classical uterine incision 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.
- 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.
- Women with one previous cesarean delivery with an unknown uterine scar type may be candidates for TOLAC, unless there is a high clinical suspicion of a previous classical uterine incision such as cesarean delivery performed at an extremely preterm gestation age.
- Women with one previous cesarean delivery with a low-transverse incision, who are otherwise appropriate candidates for twin vaginal delivery, are considered candidates for TOLAC.
- Induction of labor remains an option in women undergoing TOLAC.
- External cephalic version for breech presentation is not contraindicated in women with a prior low-transverse uterine incision who are candidates for external cephalic version and TOLAC.
- Continuous fetal heart rate monitoring during TOLAC is recommended.

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

- After counseling, the ultimate decision to undergo TOLAC or a repeat cesarean delivery should be made by the patient in consultation with her obstetrician or obstetric 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.
- Trial of labor after previous cesarean delivery should be attempted at facilities capable of performing emergency deliveries.
- Women attempting TOLAC should be cared for in a level I center (ie, one that can provide basic care) or higher.
- Because of the risks associated with TOLAC, and because uterine rupture and other complications may be unpredictable, ACOG recommends that TOLAC be attempted in facilities that can provide cesarean delivery for situations that are immediate threats to the life of the woman or fetus. When resources for emergency cesarean delivery are not available, ACOG recommends that obstetricians or other obstetric care providers and patients considering TOLAC discuss the hospital's resources and availability of obstetric, pediatric, anesthesiology, and operating room staffs.
- Because of the unpredictability of complications requiring emergency medical care, home birth is contraindicated for women undergoing TOLAC.

For More Information

The American College of Obstetricians and Gynecologists has identified additional resources on topics related to this document that may be helpful for ob-gyns, other health care providers, and patients. You may view these resources at www.acog.org/More–Info/VBAC.

These resources are for information only and are not meant to be comprehensive. Referral to these resources does not imply the American College of Obstetricians and Gynecologists' endorsement of the organization, the

organization's website, or the content of the resource. These resources may change without notice.

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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 2001–June 2017. 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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