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Vaginal Birth After Previous Cesarean Delivery

A trial of labor after previous cesarean delivery has been accepted as a way to reduce the overall cesarean delivery rate (1). Although vaginal birth after cesarean delivery (VBAC) is appropriate for most women with a history of a low-transverse cesarean delivery, several factors increase the likelihood of a failed trial of labor, which in turn leads to increased maternal and perinatal morbidity. The purpose of this document is to review the current risks and benefits of VBAC in various situations and provide practical management guidelines.

This Practice Bulletin was developed by the ACOG Committee on Practice Bulletins—Obstetrics with the assistance of T. Flint Porter, MD and Carolyn M. Zelop, MD. The information is designed to aid practitioners in making decisions about appropriate obstetric and gynecologic care. These guidelines should not be construed as dictating an exclusive course of treatment or procedure. Variations in practice may be warranted based on the needs of the individual patient, resources, and limitations unique to the institution or type of practice.

Background

Between 1970 and 1988, the cesarean delivery rate in the United States increased dramatically from 5% to nearly 25% (1–3). The rapid growth was likely a result of increased pressure that discouraged physicians from performing vaginal breech deliveries and midpelvic forceps deliveries. At the same time, increasing reliance on continuous electronic monitoring of fetal heart rate and uterine contraction patterns led to an increase in the number of cesarean deliveries performed for presumed fetal compromise and dystocia, respectively. With few exceptions, major improvements in newborn outcomes as a result of the increased cesarean delivery rate are yet to be proved (4).

Changing Concepts

The dictum "once a cesarean, always a cesarean," which dominated obstetric practice in the United States for nearly 70 years (5), began changing gradually approximately 30 years ago as improvements in obstetric care made a trial of labor after a previous cesarean delivery safer for both the woman and the fetus. Based on the findings of several large series that documented the relative safety of a trial of labor after a previous cesarean delivery (6–9), organizations such as the National Institutes of Health and the American College of Obstetricians and

Gynecologists enthusiastically embraced VBAC as a way to decrease the cesarean delivery rate in the United States.

The national enthusiasm for VBAC led to a decrease in the cesarean delivery rate, which reached 20.7% in 1996 (10). During the same period (1989–1996), the VBAC rate increased from less than 18.9% to 28.3%. Some third-party payers and managed care organizations even mandated that all women who had previous cesarean deliveries undergo trials of labor (11, 12). Many physicians were pressured into offering VBAC to unsuitable candidates or to women who wanted to have a repeat cesarean delivery. As the VBAC rate increased, so did the number of well-publicized reports of uterine rupture and other complications during trials of labor after previous cesarean deliveries (11, 13, 14). As a result, many physicians and hospitals have discontinued the practice altogether. This abrupt change in practice has contributed to the cesarean delivery rate in the United States increasing again, reaching an all-time high of 26.1% in 2002, while the VBAC rate has decreased by 55% to 12.6% (15).

Supportive Evidence

Despite thousands of citations in the world's literature, there are currently no randomized trials comparing maternal or neonatal outcomes for both repeat cesarean delivery and VBAC. Instead, VBAC recommendations have been based on data from large clinical series suggesting that the benefits of VBAC outweigh the risks in most women with a previous low-transverse cesarean delivery (6–9, 16–18). Most have been conducted in university or tertiary-level centers with full-time in-house obstetric and anesthesia coverage (19). Only a few studies have documented the relative safety of VBAC in smaller community hospitals or facilities where resources may be more limited (17, 20–22). Furthermore, the early series of women attempting a trial of labor after a previous cesarean delivery focused on successful VBAC and maternal mortality. It has become apparent that women who fail a trial of labor are at risk for several maternal complications, including uterine rupture, hysterectomy, the need for transfusion, and endometritis (16, 19, 23), as well as perinatal morbidity and mortality (24, 25).

Clinical Considerations and Recommendations

▶ *Who are candidates for a trial of labor?*

The preponderance of evidence suggests that most patients who have had a low-transverse uterine incision from a previous cesarean delivery and who have no contraindications for vaginal birth are candidates for a trial of labor. Following are selection criteria useful in identifying candidates for VBAC:

- One previous low-transverse cesarean delivery
- Clinically adequate pelvis
- No other uterine scars or previous rupture
- Physician immediately available throughout active labor capable of monitoring labor and performing an emergency cesarean delivery
- Availability of anesthesia and personnel for emergency cesarean delivery

Based on the findings from several retrospective studies, it may be reasonable to offer a trial of labor to women in the following other specific obstetric circumstances.

More Than One Previous Cesarean Delivery

Women who have had 2 previous low-transverse cesarean deliveries have traditionally been considered candidates for a trial of labor. However, the few studies that address this issue report a risk of uterine rupture ranging between 1% and 3.7% (9, 26, 27). In the only study that controlled for other potential confounding variables, the risk of uterine rupture during labor was nearly 5 times greater for women with 2 previous cesarean deliveries when compared with women who had 1 previous cesarean delivery (27). Women with a previous vaginal delivery followed by a cesarean delivery were only approximately one fourth as likely to sustain uterine rupture during a trial of labor (27). Therefore, for women with 2 prior cesarean deliveries, only those with a prior vaginal delivery should be considered candidates for a spontaneous trial of labor.

Macrosomia

Although macrosomia (usually birth weight greater than 4,000 g or 4,500 g, regardless of gestational age) is associated with a lower likelihood of successful VBAC (28–31), 60–90% of women attempting a trial of labor who give birth to infants with macrosomia are successful (30, 31). The rate of uterine rupture appears to be increased only in those women without a previous vaginal delivery (31).

Gestation Beyond 40 Weeks

Awaiting spontaneous labor beyond 40 weeks of gestation decreases the likelihood of successful VBAC, but the risk of uterine rupture does not increase (32, 33). In one study of more than 1,200 women attempting a trial of labor after 40 weeks of gestation, only labor induction was associated with an increased risk of uterine rupture (33).

Previous Low-Vertical Incision

In 1 case series and 4 retrospective studies, women with a previous low-vertical uterine incision were just as likely to have successful VBAC as women with a previous low-transverse uterine incision (34–37). In addition, there was no increase in maternal or perinatal morbidity.

Unknown Uterine Scar Type

The type of uterine incision performed at the time of a prior cesarean delivery cannot be confirmed in some patients. Many authorities question the safety of offering VBAC under these circumstances; others suggest that the uterine scar type usually can be inferred based on the indication for the prior cesarean delivery. Two case series, both carried out at 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 (38, 39). In one small, randomized controlled trial (n = 197) comparing labor augmentation with no intervention in women with a previous cesarean delivery and unknown scar, 5 uterine scar disruptions occurred in the group that received labor augmentation while no scar disruptions occurred in the group without augmentation (40).

Twin Gestation

The safety of VBAC in women with twin gestations has been examined in small case series and 2 small, retrospective studies (41–44). In the 2 trials, which included a total of only 45 women with twin gestations, the rates of successful VBAC and uterine rupture did not differ significantly between study subjects and women with singleton gestations who also were attempting VBAC.

▶ *What is the success rate for trials of labor?*

Most published series of women attempting a trial of labor after a previous cesarean delivery indicate that 60–80% have successful vaginal births (17, 23, 45–48). The earliest studies usually included only those subjects who met strict inclusion criteria, excluding those who were not felt to be appropriate VBAC candidates. However, in a population-based study of nearly 40,000 women from hospitals throughout California, 61.4% of women who attempted VBAC were successful (17).

There is no completely reliable way to predict whether a trial of labor will be successful in an individual patient (49–52). Generally, success rates for women whose first cesarean delivery was performed for a nonrecurring indication are similar to those of patients who have not undergone a previous cesarean delivery (46, 53, 54). Most women who have undergone a cesarean delivery because of dystocia also can have a successful VBAC, but the percentage may be lower (50–80%) than for those with nonrecurring indications (75–86%) (46, 55–58). If the prior cesarean delivery for dystocia was performed before complete cervical dilation (5–9 cm), 67–73% of VBAC attempts are successful compared with only 13% if the prior cesarean delivery was performed after complete cervical dilation (56). Other aspects of obstetric history also influence the likelihood of a successful VBAC. Women who have given birth vaginally at least once are 9–28 times more likely to have a successful trial of labor than women who have not undergone vaginal delivery (14, 59). If the most recent delivery was a successful VBAC, the likelihood of failure is reduced by 30–90% (52, 60). Factors that negatively influence the likelihood of successful VBAC include labor augmentation and induction (52, 61, 62), maternal obesity (63, 64), gestational age beyond 40 weeks (33), birth weight greater than 4,000 g (30), and interdelivery interval of less than 19 months (65).

▶ *What are the risks and benefits associated with VBAC?*

Neither elective repeat cesarean delivery nor VBAC is without risk. Generally, successful VBAC is associated with shorter maternal hospitalizations, less blood loss and fewer transfusions, fewer infections, and fewer thromboembolic events than cesarean delivery (8, 16, 23, 25). However, a failed trial of labor may be associated with major maternal complications, such as uterine rupture, hysterectomy, and operative injury (16, 18, 23, 25, 48), as well as increased maternal infection and the need for transfusion (23). Neonatal morbidity also is increased with a failed trial of labor, as evidenced by the increased incidence of arterial umbilical cord blood gas pH levels below 7, 5-minute Apgar scores below 7, and infection (25, 47, 66). However, multiple cesarean deliveries also carry maternal risks, including an increased risk of placenta previa and accreta (67, 68). Based on these risks, one decision model analysis found it is reasonable to consider a trial of labor if the chance of success is 50% or greater, and the desire for future pregnancy after cesarean delivery is at least 10–20% (67).

The incidence of maternal death with VBAC is extremely low. In a recent meta-analysis, only 3 maternal deaths were reported among the more than 27,000 women who attempted a trial of labor after a prior cesarean delivery (25). Although the incidence of perinatal death is low (generally less than 1%), it is more likely to occur during a trial of labor than an elective

repeat cesarean delivery (18, 25, 47, 69). Uterine rupture has been associated with fetal death, as well as severe neonatal neurologic injury (24, 70–72).

Uterine rupture during a trial of labor after a previous cesarean delivery is a life-threatening complication that has been directly attributed to attempted VBAC. In most cases, the cause of uterine rupture is unknown, but poor obstetric outcomes can result even in women who are appropriate candidates for VBAC. The exact incidence of uterine rupture is difficult to determine because reports in the literature have sometimes grouped true, catastrophic uterine ruptures together with asymptomatic scar dehiscences. Additionally, early case series included ruptures in the absence of labor as well as ruptures during labor in women with previous classical incisions (24). The rate of uterine rupture is largely dependent on the type and location of the previous incision. Uterine rupture rates in women with previous classical incisions and T-shaped incisions range between 4% and 9% (73). Although uterine rupture occurs more often in women undergoing a trial of labor than women who elect repeat cesarean delivery, rupture rates during attempted VBAC generally are less than 1% (17, 18, 25).

The risk of uterine rupture also is influenced by obstetric history. A previous vaginal birth significantly reduces the risk of uterine rupture (74). The risk of uterine rupture appears to be inversely related to the length of time between deliveries, ie, the longer the interval between deliveries, the lower the risk of rupture (75–77). Women who attempt VBAC who have interdelivery intervals of less than 24 months have a 2–3-fold increased risk of uterine rupture when compared with women who attempt VBAC more than 24 months after their last delivery (76). Finally, the findings of one nonrandomized trial suggest that compared with a double layer closure, a single layer closure of the hysterotomy incision in the primary cesarean delivery may increase the risk of uterine rupture 4-fold during a subsequent trial of labor (78).

Common signs of uterine rupture are a nonreassuring fetal heart rate pattern with decelerations or bradycardia (18). Other findings are more variable and include uterine or abdominal pain, loss of station of the presenting part, vaginal bleeding, and hypovolemia.

▶ *What factors should be taken into consideration when evaluating the cost-effectiveness of a trial of labor after a previous cesarean delivery and an elective repeat cesarean delivery?*

A true analysis of the cost-effectiveness of VBAC should include hospital and physician costs, the method of reimbursement, potential professional liability expenses, and the probability that a woman will continue with childbearing after her first attempt at VBAC (79). Higher costs may be incurred by a hospital if a woman has a prolonged labor or has significant complications or if the newborn is admitted to a neonatal intensive care unit. Additionally, evidence suggests that cost savings are not achieved unless at least 70% of women who attempt a trial of labor are successful (80–82).

▶ *Should women with a previous cesarean delivery undergo induction or augmentation of labor?*

Spontaneous labor is more likely to result in a successful VBAC rather than labor induction or augmentation (52, 61, 62). A meta-analysis of studies published before 1989 found no relationship between the use of oxytocin and rupture of the uterine scar (83). In contrast, several more recent large studies have shown an increased risk (37, 61, 62, 84). In one large retrospective study of more than 20,000 women, uterine rupture was nearly 5 times more common among women undergoing labor induction with oxytocin compared with those who had an elective repeat cesarean delivery (37). However, uterine rupture occurred in less than 1% of women in both groups. Furthermore, among the women attempting VBAC, the rate of uterine rupture was not different between those who received oxytocin and those who labored spontaneously.

There is considerable evidence that cervical ripening with prostaglandin preparations increases the likelihood of uterine rupture (37, 61, 85–87). In a review of Washington State birth records, the rate of uterine rupture during labor induced with prostaglandin was 24.5 in 1,000, which was 15-fold higher than that of women electing to have a repeat cesarean delivery (37). Likewise, misoprostol has been associated with an unacceptably high rate of uterine rupture in women with a previous cesarean delivery (88–91). Therefore, the use of prostaglandins for induction of labor in most women with a previous cesarean delivery should be discouraged.

▶ *How should midtrimester delivery be accomplished in women with a previous cesarean delivery?*

Some women with a history of a cesarean delivery will require delivery during the midtrimester in a subsequent pregnancy, usually because of fetal demise or the presence of anomalies. The published data on midtrimester VBAC are limited to single cases and small case series that report both successful and failed VBAC, as well as uterine rupture during a trial of labor (92–94). The induction agents in these reports are typically prostaglandin preparations, including misoprostol. A second-trimester

hysterotomy is associated with its own risks, and the decision to attempt a trial of labor in the midtrimester should probably be based on individual circumstances, including but not limited to the number of previous cesarean deliveries, gestational age, placentation, and the woman's desire to preserve reproductive function.

▶ *What are contraindications for VBAC?*

A trial of labor is not recommended in patients at high risk for uterine rupture. Circumstances under which a trial of labor should not be attempted are as follows:

- Previous classical or T-shaped incision or extensive transfundal uterine surgery
- Previous uterine rupture
- Medical or obstetric complication that precludes vaginal delivery
- Inability to perform emergency cesarean delivery because of unavailable surgeon, anesthesia, sufficient staff, or facility
- Two prior uterine scars and no vaginal deliveries

In addition, a combination of factors that would not ordinarily constitute a compelling case to proceed with a primary cesarean delivery might be considered sufficient to choose repeat cesarean delivery instead of VBAC in some situations.

▶ *How should patients be counseled?*

The enthusiasm for VBAC varies greatly among patients and physicians. It is reasonable for women to undergo a trial of labor in a safe setting, but the potential complications should be discussed thoroughly and documented. If the type of previous incision is in doubt, attempts should be made to obtain the patient's medical records. After thorough counseling that weighs the individual benefits and risks of VBAC, the ultimate decision to attempt this procedure or undergo a repeat cesarean delivery should be made by the patient and her physician. Global mandates for a trial of labor after a previous cesarean delivery are inappropriate because individual risk factors are not considered. It should be recognized that there are repeat elective cesarean deliveries that are clinically indicated (95). The informed consent process and the plan of management should be documented in the medical record.

▶ *How does management of labor differ for patients undergoing VBAC?*

Despite extensive data on VBAC, there is relatively little information on how labor should be conducted. Management of labor varies in different situations.

External Cephalic Version

There are limited data about external cephalic version for breech presentation and VBAC. The data suggest that it may be as successful in VBAC candidates as in women who have not undergone a previous cesarean delivery (96).

Analgesia

Vaginal birth after cesarean delivery is not a contraindication to epidural anesthesia, and adequate pain relief may encourage more women to choose a trial of labor (97, 98). Success rates for VBAC are similar in women who do and do not receive epidural analgesia, as well as in those women who receive other types of pain relief (99, 100). Epidural analgesia rarely masks the signs and symptoms of uterine rupture.

Intrapartum Management

Once labor has begun, a patient attempting VBAC should be evaluated promptly. Most authorities recommend continuous electronic monitoring. However, no data suggest monitoring with intrauterine pressure catheters is superior to external monitoring. Personnel who are familiar with the potential complications of VBAC should be present to watch for nonreassuring fetal heart rate patterns and inadequate progress in labor.

Augmentation

The safety of oxytocin for augmentation of contractions during a trial of labor after a previous low-transverse cesarean delivery has been examined in several studies. Reported uterine rupture rates vary widely in the early studies (0.4–8%), which may reflect the inadvertent inclusion of asymptomatic scar dehiscence among cases of catastrophic uterine rupture (83, 101, 102). Nevertheless, in a recent study of 1,072 patients receiving oxytocin augmentation, the rate of symptomatic uterine rupture was 1% compared with 0.4% in those who labored spontaneously (84). In a nested case–control study, there was no association between uterine rupture and oxytocin dosing intervals, total oxytocin received, and mean duration of oxytocin administration (103).

Delivery

There is nothing unique about the delivery of the fetus during a trial of labor. The need to explore the uterus after a successful vaginal delivery is controversial. Most asymptomatic scar dehiscences heal well, and there are no data to suggest that future pregnancy outcome is better if the dehiscence is surgically repaired. Excessive vaginal bleeding or signs of hypovolemia at delivery

require prompt and complete assessment of the previous scar and the entire 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% (104). If the scar includes the upper segment of the uterus, the repeat rupture rate is 32% (104, 105). Therefore, women who have had a previous uterine rupture should give birth by repeat cesarean delivery before the onset of labor.

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 VBAC and should be counseled about VBAC and offered a trial of labor.
- Epidural anesthesia may be used for VBAC.

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

- Women with a vertical incision within the lower uterine segment that does not extend into the fundus are candidates for VBAC.
- The use of prostaglandins for cervical ripening or induction of labor in most women with a previous cesarean delivery should be discouraged.

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

- Because uterine rupture may be catastrophic, VBAC should be attempted in institutions equipped to respond to emergencies with physicians immediately available to provide emergency care.
- After thorough counseling that weighs the individual benefits and risks of VBAC, the ultimate decision to attempt this procedure or undergo a repeat cesarean delivery should be made by the patient and her physician. This discussion should be documented in the medical record.
- Vaginal birth after a previous cesarean delivery is contraindicated in women with a previous classical uterine incision or extensive transfundal uterine surgery.

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The MEDLINE database, the Cochrane Library, and ACOG's own internal resources and documents were used to conduct a literature search to locate relevant articles published between January 1985 and March 2004. 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 1 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 1 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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