AMERICAN ACADEMY OF FAMILY PHYSICIANS
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Clinical Practice Guideline:

Planning for Labor and Vaginal Birth After Cesarean

These recommendations are provided only as assistance for physicians making clinical decisions regarding the care of their patients. As such, they cannot substitute for the individual judgment brought to each clinical situation by the patient's family physician. As with all clinical reference resources, they reflect the best understanding of the science of medicine at the time of publication, but they should be used with the clear understanding that continued research may result in new knowledge and recommendations.

American Academy of Family Physicians

AAFP Board Approved May 2014

ABSTRACT.

Purpose. Cesarean deliveries are a common surgical procedure in the United States, accounting for one in three U.S. births. The primary purpose of this guideline is to provide clinicians with evidence to guide planning for labor and vaginal birth after cesarean (LAC/VBAC).

Methods. A multidisciplinary guideline development group (GDG) representing family medicine, epidemiology, obstetrics, midwifery, and consumer advocacy used a recent high quality systematic review by the Agency for Healthcare Research and Quality (AHRQ) as the primary evidence source and updated the AHRQ systematic review to include research published through September 2012. The GDG conducted a systematic review for an additional key question on facilities and resources needed for LAC/VBAC. The GDG developed recommendations using a modified Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) approach.

Results. The panel recommended that an individualized assessment of risks and benefits be discussed with pregnant women with a history of one or more prior cesarean births who are deciding between a planned LAC/VBAC and a repeat cesarean birth.

Conclusions. A planned LAC/VBAC is an appropriate option for most women with a history of prior cesarean birth. Reduction of the overall U.S. cesarean rate and the availability of increased choice for childbearing women and their families requires increased access to providers and facilities capable of managing LAC/VBAC.

ABBREVIATIONS.

Trial of labor after cesarean (TOLAC), labor after cesarean (LAC), vaginal birth after cesarean (VBAC), planned repeat cesarean delivery, elective repeat cesarean delivery, repeat cesarean delivery

Terminology

The GDG used terminology consistent with the ReVITALize initiative[1] to standardize obstetric data definitions whenever possible. Terms used in the guideline are listed below.

Glossary of Terms

Labor after Cesarean: Labor in a woman who has had a previous cesarean delivery.

Repeat Cesarean Delivery: Extraction of the fetus(es) through an abdominal incision in a woman who had a cesarean delivery in a previous pregnancy. This may be planned or unplanned.

Trial of Labor after Cesarean: Prior term used to refer to labor after cesarean inclusive of vaginal birth after cesarean.

*Vaginal Birth after Cesarean: V*aginal delivery by a woman with a history of a previous cesarean delivery.

INTRODUCTION

Guideline Scope and Purpose

This guideline is intended for all clinicians who provide guidance and clinical care to pregnant women. The primary purpose is to provide evidence on short- and long-term health outcomes associated with labor and vaginal birth after cesarean delivery. This information can help clinicians and women understand the benefits and risks of labor after cesarean (LAC) and vaginal birth after cesarean (VBAC) compared to a repeat cesarean delivery (RCD) as well as the factors that may influence the chance of a VBAC.

This guideline is intended to focus on a comprehensive approach to care for women considering LAC/VBAC. The recommendations are not intended to limit or restrict care provided by clinicians based on the assessment of individual patients. A guideline is warranted because of the documented decline in the rate of VBAC and increase in the rate of cesarean deliveries and accompanying maternal morbidity. This guideline was developed to aid and inform family physicians; however, the multidisciplinary panel also hopes that other types of clinicians will find it useful because it is evidence-based, publically available and conforms to recent guideline development standards[2].

This guideline replaces the 2005 Trial of Labor After Cesarean (TOLAC) guideline[3] previously approved by the American Academy of Family Physicians (AAFP) and will be considered current for five years from its publication. If pertinent new evidence becomes available prior to that time, the AAFP's Commission on Health of the Public and Science will review that evidence to determine whether a guideline update is necessary.

Background and history

The national rate of cesarean delivery was first measured at 4.5 percent in 1965.[4] A rapidly increasing rate over the 1970s prompted the convening of a National Institutes of Health (NIH) Consensus Development Conference on Cesarean Childbirth in 1980 which concluded that hospitals with appropriate facilities, resources and staff available for prompt emergency cesarean birth and proper selection of women should permit a safe trial of labor and vaginal birth.[5]

From the early 1980s to the mid-1990s, increasing comfort with the relative safety of LAC and rising managed care pressures to control costs shifted the options for a woman with a single previous low transverse cesarean toward LAC. However, a 1996 study in Nova Scotia raised concerns that LAC increased the likelihood of uterine rupture,[6] and subsequent to that, the American Congress of Obstetricians and Gynecologists (ACOG) published a practice bulletin establishing a standard of immediate physician availability to provide care and emergency delivery during LAC.[7] This resulted in a decrease in the number of VBACs and created controversy regarding the appropriateness of LAC.

This controversy surrounding LAC stimulated the Agency for Healthcare Research and Quality (AHRQ) to publish a systematic evidence review on VBAC in 2003.[8] ACOG's Practice Bulletin Number 54, released in 2004[9], continued to support VBAC and preserved the "immediately available" statement, while the AAFP

guideline released in 2005[3] stated that LAC should not be restricted to facilities with available surgical teams present throughout labor due to insufficient evidence that this improves outcomes.

Cesarean birth rose to an all-time high rate of 32.9% in 2009 and stabilized at 32.8% from 2010 to 2012[10-12]. To address this continuing concern, an updated systematic review of the literature was conducted by AHRQ to inform the 2010 Institute of Medicine VBAC Consensus Development Conference. The report concluded that LAC is a reasonable and safe choice for the majority of women with prior cesarean delivery. It also concluded that there is emerging evidence of serious harms to women who undergo multiple cesareans.[13] These concerns as well as the availability of newer guidelines from ACOG, ACNM and the American Society of Anesthesiologists[14-16] and the updated AHRQ systematic review prompted the AAFP to update its 2005 guideline.

METHODS

Guideline Panel

The AAFP's Commission on Health of the Public and Science appointed a GDG to update its 2005 TOLAC guideline. The GDG was composed of family physician representatives from the AAFP, and representatives from ACOG, the American College of Nurse-Midwives (ACNM), and Childbirth Connection, a national non-profit organization that worked to improve the quality and value of maternity care. The GDG was charged with examining the evidence and developing a clinical practice guideline for pregnant women and their families, maternity care professionals, facilities, and policy-makers.

The panel met by conference calls throughout the guideline development process. Conflicts of interest (COI) were solicited in writing at the beginning of the guideline process and verbally at each subsequent call. No panel member disclosed any COI.

Guideline recommendations were finalized based on consensus of the GDG. The guideline was peer-reviewed and all comments and any modifications based on those comments were documented. The AAFP Commission on Health of the Public and Science and Board of Directors reviewed and approved the final guideline.

Systematic Review

In 2010, the Agency for Healthcare Research and Quality (AHRQ) published its updated evidence report *Vaginal Birth After Cesarean: New Insights Evidence Report/Technology Assessment No.191*.[13] The GDG accepted the AHRQ evidence report No. 191 as the basis for constructing this guideline. The report provides a full description of the methods used for the AHRQ systematic review. Key questions for the evidence report were derived from the work of the Planning Committee for the National Institutes of Health Consensus Development Conference on Vaginal Birth After Cesarean: New Insights.[17] They were as follows:

1. Among women who attempt a trial of labor after prior cesarean, what is the vaginal delivery rate and the factors that influence it?
2. What are the short and long term benefits and harms to the mother of attempting a trial of labor after prior cesarean versus elective repeat cesarean delivery, and what factors influence benefits and harms?

3. What are the short and long term benefits and harms to the baby of maternal attempt at trial of labor after prior cesarean versus elective repeat cesarean delivery and what factors influence benefits and harms?
4. What are the critical gaps in the evidence for decision making, and what are the priority investigations needed to address these gaps?

The GDG reviewed the key questions, determined that they were clinically relevant and decided to use them as the basis for the guideline. The GDG developed a fifth key question based on the needs of AAFP members:[3]

5. What resources should be available when attempting LAC/VBAC?

A search strategy for the additional key question was developed with the assistance of a healthcare librarian and the GDG methodologists. Study inclusion criteria and methodologic quality assessment instruments were consistent with the AHRQ systematic review and are detailed below.

Update of Literature Search

An updated literature search using the same search criteria outlined in the AHRQ EPC report was completed.[13] The updated search resulted in 2932 articles. Two reviewers independently examined citations and abstracts using the same inclusion and exclusion criteria that were used in the AHRQ evidence report.[13] Full-text articles were reviewed if at least one reviewer thought it should be included or reviewers required the full study text to evaluate it for inclusion. This resulted in 71 full-text articles being reviewed. Each relevant study was rated for quality of evidence using the approach used for the AHRQ evidence report. In keeping with the AHRQ methods, studies that were rated as having good or fair quality were included for GDG consideration. However, when only poor-quality studies were available for a topic, they were included. For this updated evidence review, 18 articles were included (see Appendix A). The GDG made the determination that none of these studies substantively changed the conclusions from the original AHRQ evidence report, but did provide further support for the conclusions of the AHRQ review.

Additional Key Question Literature Search

A healthcare librarian conducted a search for the additional key question including literature published from January 2005 to June 2012 and identified 613 citations. Eight articles pertinent to the key question included in the AHRQ review and two articles identified by the GDG were also reviewed. Two reviewers examined the titles and abstracts resulting in 53 full-text articles being selected for review. After full-text review, a total of six articles were included for the additional key question (see Appendix B).

Constructing the Guideline

The GDG used the GRADE[18] system to rate the quality of the evidence for each outcome and the overall strength of each recommendation. Patient-centered outcomes were considered and prioritized, when possible, in the guideline recommendations. The AHRQ report did not provide strength of evidence ratings for prognostic factors so the GDG also rated the strength of evidence for those outcomes according to the methods suggested by the GRADE Working Group.[19,20]

Classification of Evidence-based Statements

The GRADE system provides for two levels of strength of recommendations, "Strong" and "Weak". The GRADE system also provides the opportunity to issue guideline recommendations without a rating when appropriate. Circumstances where these types of recommendations are helpful, but for which no direct evidence is available (e.g., the value of informed consent and counseling for women contemplating LAC/VBAC), were designated as "Good Practice Points" (GPP) according to the recommendation of the GRADE Working Group.[18] Recommendations were worded to indicate the underlying strength of recommendation. Strong GRADE recommendations were worded as "The AAFP strongly recommends . . . " and weak GRADE recommendations were worded as "The AAFP recommends . . ." Good practice points carry the wording of "Clinicians should . . ." Recommendation ratings were decided by consensus among the GDG.

RECOMMENDATIONS

RECOMMENDATION 1: Labor after cesarean is safe and appropriate for most women with a history of one or two prior cesarean births. The AAFP recommends that clinicians counsel, encourage and facilitate planned vaginal birth after cesarean so that women can make informed decisions. (Quality of Evidence: Moderate) If planned vaginal birth after cesarean is not locally available, then women desiring it should be offered referral to a facility and/or clinician who can offer the service.

Labor after cesarean is a reasonable and safe choice for most women with a history of one or two prior cesarean births.[13,21] Clinicians should discuss the possibility of LAC and VBAC, starting early in prenatal care, with all women who have had a prior cesarean delivery. Clinicians should specifically discuss the benefits and harms of LAC/VBAC considering the individual risk factors, values and preferences of each woman.[22] This discussion should include information regarding local resources, access to facilities and clinicians who offer LAC/VBAC.

There is limited evidence to assist counseling women with a history of three or more cesarean births.[23] These women may be candidates for LAC/VBAC, depending on the circumstances of their prior births, their future childbearing plans, local resources and their preferences.

Women with a history of a prior vertical uterine incision (but not a low vertical incision)[14], a vertical upward extension of a transverse incision at the time of prior cesarean surgery or prior transmural uterine surgery (e.g. myomectomy) are at increased risk of uterine rupture. They should be informed that they are not appropriate candidates for LAC/VBAC and should be counseled to have a scheduled cesarean delivery.[13]

RECOMMENDATION 2: The AAFP strongly recommends that clinicians inform women who have had a prior vaginal birth, either before or after a prior cesarean birth, that they have a high likelihood of vaginal birth after cesarean. Unless there are specific contraindications to a vaginal birth, these women should be encouraged to plan a labor and vaginal birth after cesarean and should be offered referral to clinicians and facilities capable of providing this service, if it is not available locally. (Quality of Evidence: High)

Among studies of U.S. women, about 74% who undergo LAC deliver vaginally.[13] A history of at least one prior vaginal birth, either before or after a cesarean, has been consistently associated with increased VBAC rates.[13] Women who have had a vaginal birth after a prior cesarean are more likely to deliver vaginally than those who have not had a prior VBAC (odds ratios from multiple cohort studies range from 3 to 7).[13] One retrospective cohort study found success rates for vaginal birth with subsequent LAC as follows: 65% for women with no history of vaginal delivery, 83% for women with a vaginal birth prior to a cesarean delivery, and 94% for women with a vaginal birth after a cesarean delivery.[17]

RECOMMENDATION 3: There are few data about factors other than prior vaginal birth that strongly influence the rate of vaginal birth after cesarean. Clinicians should discuss the indications for and circumstances surrounding a woman's prior cesarean birth(s) during counseling. (Good Practice Point)

Pre-existing factors such as shorter maternal height, higher BMI, and smoking have been reported to decrease the likelihood of VBAC, but were found to be significant predictors in only one or two studies.[13] Three cohort studies that suggested maternal medical comorbidities (including hypertension, diabetes, asthma, renal disease, thyroid disease, and seizure disorders) are associated with decreased likelihood of VBAC[13] , and a subsequent large retrospective cohort study further supported this finding.[24] However, a large prospective cohort study found no significant association of maternal diabetes, asthma, chronic hypertension, renal disease or heart disease with VBAC.[13] In addition, another large prospective cohort study did not find a significant association for women with diabetes.[25]

Women who had a prior cesarean for breech or other malposition were more likely (75%, range 60-86%) to have a VBAC than women whose prior cesarean was for fetal intolerance of labor (60%, range 49-69%), failure to progress or cephalopelvic disproportion (54%, range 48-60%).[13]

Data on factors such as race, ethnicity, educational attainment and type and location of hospital and their relationship to VBAC are problematic. In four cohort studies, including two large prospective cohort studies, non-Hispanic Caucasian women had a higher rate of VBAC.[13] While race and ethnicity are strong predictors of VBAC for Caucasian women compared to Hispanic and African-American women (adjusted odds ratios ranged from 0.51 to 0.80), many of these studies are likely compromised by unmeasured confounders related to patient selection, underlying motivation and labor care received. [13]

Similarly, women in rural and private hospitals were less likely to have VBAC compared to women in tertiary care centers (57% versus 66%).[13] These findings may represent underlying differences among hospitals in terms of resources, staffing and comfort in dealing with potential complications. Predictive scoring models that assess multiple maternal factors present before and/or during labor can detect women with a high likelihood of vaginal birth. Unfortunately, none are able to accurately detect women who are at increased risk of cesarean delivery and are thus of limited clinical value.[13]

RECOMMENDATION 4: When a woman who has had a prior cesarean birth presents to the hospital in labor, the clinician caring for her should reassess with her the plan for labor and vaginal birth after cesarean or repeat cesarean, considering factors on admission that may affect the risks of labor and the likelihood of vaginal birth. The clinician should discuss, on an ongoing basis during labor, any change of

status affecting the risks of labor and likelihood of vaginal birth for a woman electing labor after cesarean. (Good Practice Point)

Greater progress in labor, as evidenced by more advanced dilation, effacement and station increase the likelihood of VBAC.[13,26] Higher Bishop scores were associated with a two to six times increased likelihood of vaginal birth in two fair quality cohort studies.[13] Induction of labor decreases the likelihood of VBAC, with 63% of women who had an induction of labor delivering vaginally compared to 74% overall.[13] Augmentation of labor with oxytocin is associated with a 68% rate of VBAC.[13] While birth weight may be difficult to estimate accurately, there is a trend for decreased likelihood of VBAC for mothers of infants who weigh 4000 grams or more (OR 0.62, 95% CI 0.54-0.71).[13] The results of two studies examining predicted rather than actual birth weight were less consistent.[13]

RECOMMENDATION 5: The AAFP recommends that induction of labor after cesarean is appropriate for women who have a medical indication for induction of labor and who are planning a vaginal birth after cesarean. The risk of uterine rupture varies by method of induction. Misoprostol should not be used for cervical preparation or induction of labor after cesarean in the third trimester of pregnancy for women with a prior cesarean birth. (Quality of Evidence: Low to Moderate)

While induction of labor after cesarean can be necessary for maternal or fetal indications, it has been associated with uterine rupture. However, these studies vary in terms of indications and induction methods. Induction of labor after cesarean increases the risk of uterine rupture.[13,27-30] [Low quality of evidence] The absolute risk for uterine rupture at term is estimated to be 1.5% (1500 per 100,000) women with induction of labor versus 0.8% (800 per 100,000) women with spontaneous labor.[17] There does not appear to be an increased risk of uterine rupture associated with oxytocin augmentation of labor.[17]

The risk of uterine rupture varies by method of induction, with rates of 1.1% (95% CI 0.9-1.5%) for oxytocin, 2% (95% CI 1.1-3.5%) for prostaglandin E2 and 13% (finding based on one fair quality cohort study) for misoprostol.[13] [Moderate quality of evidence for oxytocin, low quality of evidence for prostaglandin E2 and misoprostol] One cohort study of 3035 women compared the risk of uterine rupture with oxytocin versus prostaglandin E2 for induction and found no increased risk in the prostaglandin E2 only group (0%) compared with the oxytocin group (1.2%) or the group who used both agents (1%).[13] [Low quality of evidence] There are numerous case reports and series linking the third trimester use of misoprostol to uterine rupture and it should not be used in induction of labor for women planning a LAC/VBAC. There were limited data to assess the risk of uterine rupture with mechanical methods of induction of labor. No cases of uterine rupture were reported with the use of a foley catheter for cervical ripening in two retrospective cohort studies, but the total number of exposed women may have been too small to detect this rare event.[13] Furthermore, a subsequent case-control study found that when labor duration is accounted for, induction of labor is not associated with increased risk for uterine rupture in women undergoing LAC.[31]

RECOMMENDATION 6: Clinicians should inform each woman about the specific short-term benefits and harms of planned labor and vaginal birth after cesarean and planned repeat cesarean birth, both for herself and her fetus/infant. (Good Practice Point) Maternal outcomes are equivalent or better with

LAC/VBAC compared with RCD (Quality of evidence varies by outcome), while perinatal mortality is increased with LAC/VBAC compared to RCD. (Quality of Evidence: Moderate))

Like many decisions in maternity care, there are trade-offs of risks and benefits and individual differences in preferences and values. Decisions that lower the risk of harm to the mother may increase the risk for the infant. For many important questions, insufficient data exist to give firm guidance to women and their clinicians. The sections below summarize what is known about the potential benefits and harms of LAC, VBAC, and RCD. Maternal outcomes are presented below, followed by fetal and neonatal outcomes.

Maternal Outcomes

Maternal Mortality

The risk of maternal mortality in the U.S. is low. Women who undergo LAC, regardless of the mode of delivery, have a lower risk of death (4 per 100,000 live births) than women who have an RCD (13 per 100,000).[17] [High quality of evidence]

Hysterectomy

The risk of hysterectomy is not statistically different for women having a LAC/VBAC compared to RCD (157 versus 280 per 100,000).[13,32] [Moderate quality of evidence]

Bleeding

The risk of obstetric hemorrhage is inconsistent across studies included in the AHRQ systematic review, but the general trend is toward greater blood loss with RCD.[13,21] [Low quality of evidence] The risk of needing a blood transfusion is not statistically different for LAC/VBAC versus RCD (900 versus 1,200 per 100,000).[13,17] [Low to moderate quality of evidence]

Infection

Although definitions of infection varied among studies, the AHRQ review reported that women had an incidence of infection that was not significantly higher (6.3% versus 3.9%) with LAC/VBAC compared to RCD.[13] [Low quality of evidence] However, there was actually a statistically significant decrease in the rate of fever among women who labored (6.6%) compared with those who had a planned RCD (10.2%) .[13] [Low quality of evidence]

Uterine Rupture

Studies evaluating the risk of uterine rupture are problematic because they usually report the actual rather than the planned type of birth and often do not distinguish between anatomic uterine ruptures and asymptomatic dehiscence. There were eight cohort studies of fair to good quality that used an anatomic definition of uterine rupture.[13] Of these, four studies (including a total of 47,202 women) compared women who had LAC/VBAC with those who had planned RCDs. The risk of uterine rupture among women included in the four studies was 0.3 percent (95% CI .23-0.40), and 97 percent of the cases of rupture occurred among women who labored (148 of 154 total cases).[13] [Moderate quality of evidence] Among the eight cohort studies there were no maternal deaths related to uterine rupture. [Moderate quality of evidence] Four studies reported the risk of hysterectomy

associated with uterine rupture. There were a total of 12 cases of hysterectomy among 66 incidents of uterine rupture among these studies (14 to 22%).[13] [Moderate quality of evidence]
Uterine rupture is uncommon (3/1000 among women who have had a prior cesarean birth), but it can be catastrophic for both mother and infant. The assessment of short-term benefits and harms of LAC/VBAC should be individualized based on clinically identifiable risk factors for uterine rupture. The presence of a classical uterine scar increases the risk of uterine rupture compared with a prior low transverse incision; however, women with an unknown scar type do not appear to be at increased risk of uterine rupture.[13] One study found that an inter-delivery interval shorter than 18 months was a risk factor for uterine rupture.[33] [Moderate quality of evidence] The AHRQ report[13] found risk of uterine rupture is decreased among women with a prior history of vaginal birth (range odds ratios 0.26-0.82) and two studies from the updated search further supported this finding.[27 29] [Moderate to High quality of evidence] Unfortunately, there are no predictive tools that can accurately estimate a woman's risk of uterine rupture with LAC/VBAC.[13]

Fetal and Neonatal Outcomes

Perinatal Mortality

The rate of perinatal mortality for the fetus and infant (20 weeks of gestation to 28 days of life) are increased with LAC/VBAC compared to RCD (130 per 100,000 versus 50 per 100,000).[17] [Moderate quality of evidence] To put these numbers into perspective, the rate of all-cause infant mortality in the first year of life is 677 per 100,000 and the rate of perinatal mortality is 107 per 100,000.[17] A population-based retrospective cohort study conducted in Scotland examined the risk of delivery-related perinatal death among singleton, cephalic presentation infants born between 37 and 43 weeks' gestational age.[34] The authors found that the overall rate of perinatal death was 129 per 100,000 women with LAC. This was 11 times greater than the risk associated with planned RCD and more than twice the risk of other multiparous women. However, this perinatal mortality was similar to that found for nulliparous women in labor.[34] It is also worth noting that one well-done cohort study found that risk of neonatal mortality is not significantly lower with RCD.[35]
The risk of perinatal death is highest if a uterine rupture occurs. The incidence of perinatal mortality was about 6% among six of the fair to good quality cohort studies of uterine rupture that used an anatomic definition.[13] Given the risk of perinatal death in the event of uterine rupture, the factors that may increase this risk are a key part of counseling for women with a history of prior cesarean birth.

Respiratory Complications

There are higher rates of transient tachypnea of the newborn with planned RCD (42 versus 36 per 1000 live births).[13] [Low quality of evidence] However, other forms of respiratory morbidity, including need for bag and mask ventilation and intubation for meconium were found to be lower among infants of women who had a planned RCD.[13,36] [Low quality of evidence for bag and mask ventilation and moderate strength of evidence for meconium intubation]

Other Outcomes

There were inconsistent data about the risk of hypoxic ischemic encephalopathy/asphyxia, sepsis, birth trauma and NICU admission and no summary estimates could be calculated.[13] [Low quality of evidence for each outcome] There were insufficient data to assess the short term neurologic outcomes and no studies of

breastfeeding initiation or duration comparing infants born to mothers who had LAC to those with planned RCD.[13] One study supported that having a planned RCD before 39 weeks has been a common occurrence and is associated with respiratory distress, admission to the NICU, need for ventilation and prolonged hospitalization.[37]

RECOMMENDATION 7: Clinicians should inform each woman about the specific long-term benefits and harms of planned labor and vaginal birth after cesarean and planned repeat cesarean birth, and individualize care based on patient preferences regarding lifetime plans for childbearing. (Good Practice Point) Compared with vaginal birth after cesarean, a repeat cesarean delivery increases future risks of abnormal placentation (Quality of Evidence: Moderate), hysterectomy (Quality of Evidence: Moderate), and surgical complications (Quality of Evidence: Low).

Maternal Outcomes

The assessment of long-term benefits and harms should be individualized based on the woman's individual risks, values and her lifetime plans for childbearing, recognizing that predicting future childbearing can be difficult and has limited accuracy. While predicting future childbearing is difficult and has limited accuracy. For women aged 40 to 44 the National Survey of Family growth indicates that 50% have one or two children, and 35% have more than two children.[38] Women planning to have a repeat cesarean will incur increasing risks of uterine rupture, abnormal placentation, hysterectomy, and potential surgical complications with each additional future pregnancy.[17] Women with multiple prior cesarean deliveries may also not have access to the option of LAC/VBAC in future pregnancies.

The incidence of placenta previa increases with a history of prior cesarean birth.[17] Placenta previa occurs in 9 per 1000 women with one prior cesarean, 17 per 1000 women with two prior cesareans and 30 per 1000 among those who have had three or more cesarean deliveries.[17] [Moderate quality of evidence] The risk of hysterectomy increases with an increasing number of prior cesarean births (420 per 100,000 for one prior cesarean birth, 900 per 100,000 for two prior cesarean births and rises to 8,990 per 100,000 for five or more prior cesarean births).[17] [Moderate quality of evidence] Placenta accreta, increta and percreta also increase along with the number of prior cesarean deliveries, with an incidence of placenta accreta of about 3, 6 and 24 per 1000 births for women with one, two or three and more prior cesarean surgeries, respectively.[17] [Moderate quality of evidence for all placentation outcomes]

There are insufficient data to assess the risk of chronic pain, ectopic pregnancy, stillbirth, infertility and pelvic floor dysfunction among women who have LAC and VBAC compared to those who have RCD.[17] The NIH Consensus Panel stated that RCD should not be considered protective for stress incontinence or pelvic organ prolapse.[17] While there are no comparative studies assessing the risk of complications related to subsequent surgery, it is widely recognized that increasing numbers of abdominal surgeries are associated with adhesions, bowel and ureteral damage during subsequent repeat cesarean surgery and complications associated with future non-cesarean surgeries.[17,39]

Infant Outcomes

There are insufficient data to assess the long-term outcomes of neonates after LAC and VBAC compared with RCD, including breastfeeding outcomes and the risk of adverse neurologic sequelae.

RECOMMENDATION 8: Limited data show similar outcomes for women undergoing LAC/VBAC regardless of type or location of hospital or birth volume. However, infants delivered longer than 30 minutes after a decision to perform immediate delivery for possible uterine rupture have poorer long-term outcomes compared with those delivered more quickly. (Quality of Evidence: Moderate) All women desiring LAC/VBAC should be counseled about the capabilities of their specific delivery setting, and women determined to be at high risk for complications with either labor and vaginal birth after cesarean or repeat cesarean birth should be referred to facilities capable of effectively treating problems as they develop. (Good Practice Point)

Some women with increased risk factors for uterine rupture or other complications remain LAC/VBAC candidates, but may need to be referred to hospitals with a higher level of readiness for maternal and infant complications. Ideally, women should be directed to facilities that provide a supportive environment for women's decisions for labor after cesarean.

Neither the AHRQ review, nor the additional search completed for this guideline, found sufficient data regarding the appropriateness of LAC/VBAC in different types of hospitals or based on the availability of particular resources. Three cohort studies that addressed the site of birth were identified in the additional key question search. These studies used the same database from 17 community and university hospitals in the Northeastern U.S. Chang [40] did not find differential outcomes based on hospital VBAC volume among 12,844 women with prior cesarean birth who had LAC. DeFranco and colleagues[41] found that the rate of uterine rupture was higher in community (1.2%) versus university (0.6%) hospitals, although the absolute difference was small. However, Macones[42], using a nested case-control design, found no difference in uterine rupture by hospital type. [Moderate quality of evidence for the three studies]

One study[29] compared hospitals with more than 3000 deliveries to those with fewer. Number of deliveries did not affect the uterine rupture rate. Based on the totality of the evidence, there is little information to direct decisions about the site for LAC/VBAC based solely on type or location of hospital or birth volume. [Low-moderate quality evidence]

Holmgren and colleagues reported on neonatal outcomes relative to decision-to-delivery time.[43] They found 36 cases of uterine rupture among 11,195 labors between 2000 and 2009 in nine Intermountain Health Care system hospitals and at the University of Utah, a frequency of 0.32% overall. All infants delivered within 18 minutes of suspected rupture had normal umbilical pH levels (>7.0) or 5-minute Agar scores greater than seven. There were poor long-term outcomes in three infants with decision-to-delivery times greater than 30 minutes (range 31-42 minutes). [Moderate quality evidence]

RECOMMENDATION 9: Hospitals should have institutional guidelines to promote access to labor and vaginal birth after cesarean. Hospitals should actively monitor and endeavor to continuously improve the quality of care for women who choose labor after cesarean. (Good Practice Point)

The GDG recognized that some hospitals and facilities may encounter difficulty implementing this guideline. While some may need to refer women seeking labor after cesarean, there are strategies and tools that have been found effective for practice change. Studies have demonstrated that VBAC rates are associated with professional society practice guidelines, liability concerns among physicians and hospitals and the preferences of women and clinicians; however, the AHRQ review did not report comparative evidence about the effects of having institutional protocols for LAC on the rate of VBAC.[13] We identified one subsequently published systematic review that examined non-clinical interventions related to increased uptake and success of LAC/VBAC.[44] This review found that local institutional guidelines have larger effects than national guidelines on the uptake and/or success of LAC/VBAC.[44] A conservative approach to cesarean birth, giving individualized information to women, using local opinion leaders, and audit and feedback to clinicians were successful strategies. Three studies examined the effect of local guidelines and two of these found increased uptake and rates of VBAC. Uptake of LAC increased from 32% to 84% in one study and 45% to 86% in the other. The VBAC rate increased from 65% to 83% in the first study and 53% to 70% in the second. The third study found a small decline in VBAC rates during a period when they were declining nationally.[44] One randomized controlled trial, included in this review, found that giving women information about outcomes associated with different birth scenarios in the form of a decision analysis helped women to feel less anxiety and have greater knowledge about their planned birth decision than those who got usual care.[45] A subsequent cohort study, found that when subjective preferences based on perceived risk outcomes by the pregnant woman are compared to objective risk outcomes, decision analysis programs recommend planned RCD more often than LAC/VBAC due to women prioritizing minimization of harms to their babies over harms to themselves.[46]

Audit and feedback strategies involved monitoring the uptake and success of LAC/VBAC, with regular reports to clinicians about their performance, often compared to other clinicians or to average performance. Interventions also variably included development of criteria for cesarean delivery and case meetings during which clinicians were asked to defend their decision-making about performing cesarean delivery. The Catling-Paull[44] review located two RCTs and one before-after study of audit and feedback. One of the RCTs did not find an effect on cesarean rates, although VBAC rates increased across that time period. The two other studies did show an increase of approximately 20% in LAC uptake. Actual VBAC rates across these three studies ranged from no increase to a 12% increase.

An RCT by Lomas[47] included in the Catling-Paull[44] systematic review examined the effect of local opinion leaders and found them to be a more successful strategy than audit and feedback. The opinion leader intervention used self-identified physician leaders in Canada who attended a day and a half long training put on by the Society of Obstetricians and Gynecologists of Canada (SOGC). There was ongoing contact from the SOGC over the next year, including expert speakers and educational content to share with colleagues. The use of opinion leaders increased the proportion of women offered LAC by 18% over audit and feedback and 23% over no intervention. The intervention increased the actual rate of LAC by 17% and 10%, respectively and of VBAC by 13% and 11%, respectively.

Websites where materials for hospitals, clinicians and women such as consent forms and patient education forms can be found are included in the references.[48-51]

CONCLUSIONS AND FUTURE RESEARCH

The outcomes of LAC/VBAC and RCD are difficult to quantify because of the lack of controlled clinical trials and prospective observational studies based on the intended, rather than the actual route of delivery. In addition, there is a lack of uniformity and clarity in definitions of maternal and neonatal risks and outcomes. These limitations result in significant knowledge gaps and, result in clinical recommendations based on low to moderate level evidence. Future research should attempt to address the following areas:

1. Clinician perceptions of the risks and benefits of LAC/VBAC versus RCD and how these affect the decision for or against LAC/VBAC.
2. Patient perceptions of the risks and benefits of LAC/VBAC versus RCD before and after interventions to educate regarding these risks and benefits.
3. Clinician perception regarding liability risks of LAC/VBAC and RCD and the actual liability risks.
4. The reasons behind apparent racial and socioeconomic disparities in intent for LAC and rates of VBAC.
5. The facilities, personnel and response time needed to assure maternal and neonatal safety with LAC/VBAC.
6. Long term maternal and neonatal outcomes following 3 or more cesarean sections.
7. Outcomes of LAC with the various indications for induction of labor and the use of different induction methods.
8. The effects of LAC/VBAC and RCD on infant development and health including rates of breastfeeding.
9. The factors that affect the availability of LAC/VBAC including economic, professional, institutional and cultural.
10. The long-term effects of uterine rupture.
11. The complications resulting from LAC/VBAC and RCD including infections, surgical injuries, and neonatal complications.
12. The effectiveness of innovative payment and delivery systems, decision aids, performance measurement and reporting, and other quality improvement strategies for fostering women's informed choice of mode of birth after cesarean.

In spite of these large gaps in knowledge, clinicians and patients need guidance on the topic of LAC/VBAC compared to RCD. This guideline and accompanying background material is intended to meet this need with a transparent assessment of the current available evidence. This should be combined with patient and clinician values and preferences to maximize reproductive options for women while also achieving the best outcomes possible.

GUIDELINE PANEL

Valerie J. King, MD, MPH, FAAFP, Professor, Department of Family Medicine; Director of Research, Center for Evidence-based Policy; Oregon Health & Science University, Portland, Oregon

Patricia L. Fontaine, MD, MS, FAAFP, Senior Clinical Investigator, HealthPartners Institute for Education and Research, Bloomington, MN

Lesley A. Atwood, MD, FAAFP, Clinical Associate Professor of Family Medicine, University of Minnesota; Allina Health, Hastings, MN

Elizabeth Powers, MD, Family Medicine Managing Partner, Rural Health Clinic
Winding Waters Clinic, PC, Enterprise, OR

Lawrence Leeman, MD, MPH, Professor of Family and Community Medicine, Obstetrics and Gynecology, University of New Mexico School of Medicine

Jeffrey L. Ecker, MD, Professor of Obstetrics, Gynecology and Reproductive Biology
Massachusetts General Hospital, Harvard Medical School

Melissa D. Avery, PhD, CNM, FACNM, FAAN, Professor and Director of Midwifery, University of Minnesota, School of Nursing

Carol Sakala, PhD, MSPH, Director of Programs, Childbirth Connection, New York, NY

Doug Campos-Outcalt, MD, MPA, Chair, Department of Family, Community and Preventive Medicine, University of Arizona College of Medicine, Phoenix and Scientific Analyst for the American Academy of Family Physicians

Bellinda Schoof, MHA, CPHQ, Clinical Policies Manager, American Academy of Family Physicians

Michelle Jeffcott-Pera, MA, Clinical Policies Strategist, American Academy of Family Physicians

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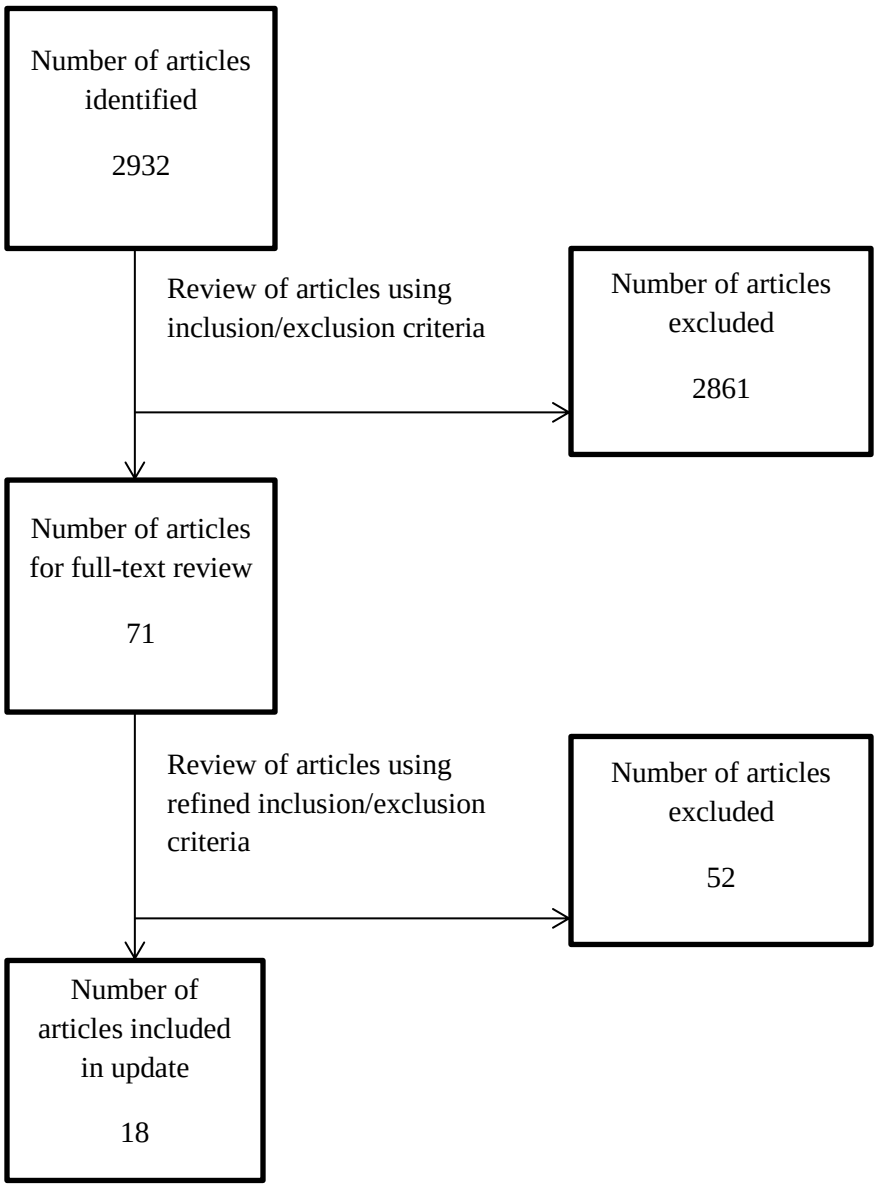
Appendix A: Updated Literature Search Through September 2012



Appendix B: Literature Search for Additional Key Question