Wolters Kluwer

Trial of labor after cesarean delivery: Intrapartum management

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INTRODUCTION — Intrapartum management of patients undergoing a trial of labor after cesarean (TOLAC) is similar to that in patients with an unscarred uterus, with some unique considerations, such as choice of cervical ripening/induction agent, intensity of cardiotocography, and required resources. This topic will discuss the intrapartum management of TOLAC. Choosing the mode of delivery after a previous cesarean is reviewed separately. (See "Choosing the route of delivery after cesarean birth".)

FACILITY RESOURCES — Facilities in which women attempt TOLAC should have the resources necessary to perform emergency cesarean delivery given the increased risk of uterine rupture in this setting. These resources include the following:

- Physicians capable of monitoring labor and performing an emergency cesarean delivery
- Clinicians capable of providing obstetric anesthesia for emergency cesarean delivery
- Nursing personnel to assist with emergency cesarean delivery
- Clinicians capable of providing neonatal resuscitation
- Equipment necessary for personnel to provide these services

In situations in which such resources are not readily available, the provider and patient need to discuss implications of the limited resources at the selected delivery facility and available options. (See "Choosing the route of delivery after cesarean birth", section on 'Facility resources for offering tolac'.)

PATIENT PREPARATION

Documentation of informed consent — Upon admission, we obtain consent for both TOLAC and repeat cesarean delivery. Consent for the latter is important in the event an intrapartum cesarean delivery becomes necessary. Ideally, women have been thoroughly counseled about the risks and benefits of TOLAC versus planned repeat cesarean delivery during the course of prenatal care. (See "Choosing the route of delivery after cesarean birth", section on 'Outcomes of TOLAC versus PRCD' and "Choosing the route of delivery after cesarean birth", section on 'Candidates for TOLAC'.)

In the author's practice, the patient is asked to sign an informed consent document that describes the risk of uterine rupture and the risks of serious maternal and neonatal morbidity and mortality if rupture occurs. For women with one prior low-transverse cesarean delivery, the risk of uterine rupture is approximately 0.5 to 0.9 percent [1-6]. If new factors have developed since the decision for TOLAC was made that either modify the likelihood of vaginal birth after cesarean (eg, active phase of labor) or should be considered in decision making (eg, macrosomia), then the potential effects of these factors are discussed with the patient, her desire

Admission laboratory tests — We obtain a baseline hemoglobin or hematocrit measurement and blood type and screen. Women undergoing TOLAC can be considered at moderate risk of receiving a postpartum blood transfusion (2 percent rate of transfusion at term in Maternal-Fetal Medicine Units Network studies [7]). Type and screen enables rapid cross-matching of blood products if needed in an emergency. (See "Management of normal labor and delivery", section on 'Laboratory tests'.)

Intravenous access — We recommend placement of intravenous access at admission in case cesarean delivery and/or blood product administration become necessary.

Anesthesia evaluation — Evaluation by the anesthesia team at admission is prudent in case cesarean delivery becomes necessary, as well as for reviewing options for labor analgesia. (See "Neuraxial analgesia for labor and delivery (including instrumented delivery)" and "Anesthesia for cesarean delivery".)

Neuraxial analgesia may be used to provide adequate pain relief during labor [8]. It does not appear to reduce the chances of vaginal birth after cesarean (VBAC) or mask the signs and symptoms of uterine rupture [9]. Whether it is associated with an increased risk of uterine rupture is unclear as available data are conflicting [10,11]. If a neuraxial anesthetic is in place, general anesthesia may be avoided if an emergency cesarean delivery is performed.

Cardiotocography — Most experts recommend continuous monitoring of uterine activity and fetal heart rate during TOLAC given an increased risk of uterine rupture in women undergoing TOLAC [8]. Abnormal uterine contraction and fetal heart rate patterns can be predictive of uterine rupture. (See "Uterine rupture after previous cesarean delivery".)

External fetal heart rate monitoring is as reliable as internal monitoring in most cases, but internal fetal heart rate monitoring is preferable when the externally derived tracing is difficult to obtain or interpret because of poor technical quality. (See "Intrapartum fetal heart rate assessment".)

External uterine contraction monitoring is adequate; intrauterine pressure monitoring offers no advantages for early diagnosis of uterine rupture [12,13]. As in any labor, intrauterine pressure catheters can and should be used when needed to evaluate the adequacy of the uterine contraction pattern. (See "Use of intrauterine pressure catheters".)

LABOR MANAGEMENT — Many aspects of labor management are the same for women with and without a scarred uterus. (See "Management of normal labor and delivery".)

The major differences are issues related to cervical ripening and labor induction. (See 'Induction of labor' below.)

Assessment of labor progress — We assess labor progress by the same standards as in women without a scarred uterus. (See "Normal and abnormal labor progression".)

Although clinicians generally have a lower threshold for diagnosing failure to progress in women undergoing TOLAC than in women with an unscarred uterus, available evidence suggests that labor progress is similar in both groups:

- In a secondary analysis of Consortium on Safe Labor data, labor progress between 4 and 7 cm in women undergoing TOLAC with no previous vaginal births was slightly longer than that in nulliparous women in spontaneous labor; however, this difference disappeared after adjustment for oxytocin dosing, suggesting that the slower progress may have been related to more conservative use of oxytocin in TOLAC patients [14]. The analysis was limited to women with term, cephalic singletons with a normal

durations for the first stage of labor (4 to 10 cm) among women undergoing TOLAC and women with no history of cesarean delivery (TOLAC patients 3.0 hours and non-TOLAC patients 2.8 hours) [15], suggesting that the same labor curve standards should be applied in the setting of TOLAC.

Prolonged latent phase — Women with a prolonged latent phase of labor can be offered therapeutic rest, oxytocin, and/or amniotomy to assist with transition to active phase, similar to the management of women without a scarred uterus. (See "Latent phase of labor", section on 'Management of latent phase'.)

Prolonged second stage — An observational study that included over 4500 women undergoing TOLAC who reached the second stage of labor noted that 7.8 percent had a second stage ≥3 hours [16]. Likelihood of vaginal delivery decreased with an increasing duration of the second stage: from 91 to 97 percent within the first 2 hours to 78 percent at 2 to <3 hours, 62 percent at 3 to <4 hours, and 46 percent at ≥4 hours. The frequency of uterine rupture or dehiscence significantly increased over time: from 0.7 percent at <1 hour to about 1.5 percent at 1 to <3 hours, to 3 percent at ≥3 hours. In contrast to other studies, the risk of adverse neonatal outcomes did not differ significantly by second-stage length.

These data are subject to the limitations of observational studies but suggest that decision-making regarding management of the second stage does not need to be modified in women undergoing TOLAC. However, there should be a low threshold for operative delivery if maternal vital signs or symptoms or if fetal heart rate monitoring suggest uterine rupture.

Induction of labor — For women who require delivery before the onset of spontaneous labor, we agree with the American College of Obstetricians and Gynecologists (ACOG) that induction is a reasonable option in women with no standard contraindications to vaginal delivery [8].

Risks and outcome — Two concerns about inducing labor in women with a prior cesarean delivery are the potentially lower probability of vaginal birth after cesarean (VBAC) and increased risk for uterine rupture. The following data should be considered in shared decision-making regarding induction versus planned repeat cesarean delivery when prelabor delivery is indicated.

The benefits and harms of planned repeat cesarean delivery versus induction of labor have not been evaluated by randomized trials [17]. In at least two retrospective cohort studies, when women undergoing TOLAC induction were compared with those managed expectantly (the appropriate control group as opposed to women in spontaneous labor), induction actually reduced the odds of cesarean delivery at term, but was associated with a higher risk of uterine rupture [18,19]. In one of these studies, the absolute rates of these outcomes with induction at 39 weeks versus expectant management were VBAC 74 versus 61 percent (odds ratio [OR] 1.31, 95% CI 1.03-1.67) and uterine rupture 1.4 versus 0.5 percent (OR 2.73, 95% CI 1.22-6.12) [19].

While there is no conclusive evidence that induction of women with a prior cesarean delivery increases the risk of uterine rupture, these and other epidemiologic studies suggest that this may be the case [1,19-24]. However, factors that attenuate the risk of rupture in these women should also be considered. Women with a prior vaginal delivery and/or a favorable cervix do not appear to be at increased risk of uterine rupture with induction [25,26]. Avoidance of a prostaglandin for cervical ripening is also important.

Methods of cervical ripening — In the author's practice, cervical ripening, when indicated in the setting of TOLAC, is accomplished with a 60 mL transcervical balloon, transitioning to oxytocin and/or amniotomy when the cervix is favorable.

Options for induction of labor in women with a TOLAC include mechanical ripening with a transcervical balloon, amniotomy, and oxytocin. Misoprostol (prostaglandin E1) and other prostaglandins should be

used for induction of labor with a scarred uterus because they may be more effective than other methods, the risk of rupture is low, cesarean delivery is associated with more maternal morbidity than VBAC, and the fetal outcome is not affected by the mode of delivery [8].

Procedures for cervical ripening and induction, risk of rupture, and supporting evidence are discussed in detail separately. (See "Cervical ripening and induction of labor in women with a prior cesarean delivery".)

Labor pattern during induction — Induced labor in women undergoing TOLAC follows a pattern similar to that in induced labor of women without a previous cesarean delivery. In a retrospective cohort study of 473 women undergoing TOLAC that compared women who were induced with those in spontaneous labor, induction was associated with slower progression from 3 to 7 cm (primarily latent phase), but an equivalent labor course after 7 cm (active phase) [23]. (See "Normal and abnormal labor progression", section on 'Normal progression in induced labors'.)

Oxytocin augmentation — We manage women whose labors do not follow generally accepted standards of labor progress in the active phase with oxytocin augmentation or repeat cesarean delivery, as clinically appropriate (see "Normal and abnormal labor progression"). ACOG supports use of oxytocin for augmentation of labor in women with a previous cesarean delivery [8].

Data regarding the risk of uterine rupture from oxytocin augmentation of labor during TOLAC are conflicting. Three large observational studies reported an increased risk for uterine rupture with labor augmentation (OR 2.3 to 14, actual rate of rupture 0.9 to 1.9 percent) [1,28,29], and two others did not find an increased risk [2,30]. Small numbers of uterine ruptures and use of prostaglandin analogues for cervical ripening prior to augmentation of labor prevent definitive conclusions based on these findings.

It is unclear whether oxytocin regimens should be modified or an upper dose limit should be set to reduce the risk of rupture in women undergoing TOLAC. Observational studies have suggested an association between oxytocin doses >20 milliunits/minute, tachysystole, and uterine rupture [17,20,31]. The low incidence of uterine rupture limits the power of these studies to detect small differences in dose-related risk of rupture. Given the limited available evidence, ACOG has not made any recommendations for oxytocin dosing in TOLAC [8].

Signs and symptoms of uterine rupture — Monitoring for evidence of uterine rupture is a critical component of intrapartum management of TOLAC. Signs and symptoms of uterine rupture may include fetal heart rate abnormalities, weakening contractions, loss of fetal station, abdominal pain, suprapubic pain at the level of the hysterotomy, need for frequent epidural dosing, vaginal bleeding, maternal hemodynamic instability, and hematuria. Clinical vigilance and careful evaluation are especially warranted in women with persistent complaints of pain despite neuraxial anesthesia or need for frequent anesthetic redosing to achieve adequate pain control. (See "Uterine rupture after previous cesarean delivery".)

Amnioinfusion for management of variable decelerations — There are sparse data on amnioinfusion in women undergoing TOLAC [32-35]. Although not a first-line approach, amnioinfusion can be used to relieve umbilical cord compression in women undergoing TOLAC, similar to women without a scarred uterus. An examination to ensure that there are no other signs or symptoms of uterine rupture should be performed before beginning the infusion since fetal heart rate decelerations may be sign of rupture. (See "Management of intrapartum category I, II, and III fetal heart rate tracings", section on 'In utero resuscitation' and "Management of intrapartum category I, II, and III fetal heart rate tracings", section on 'Variable decelerations without loss of variability or accelerations'.)

We suggest monitoring the amount of fluid instilled and draining from the vagina to prevent over distention of the scarred uterine cavity (see "Amnioinfusion"). Uterine ruptures have been reported in these patients [33-

other vaginal delivery. (See "Management of normal labor and delivery", section on 'Management of the second stage of labor' and "Management of normal labor and delivery", section on 'Management of the third stage of labor'.)

Operative vaginal delivery — The indications, contraindications, prerequisites, and procedure for operative vaginal delivery are the same as in women without a scarred uterus. (See "Operative vaginal delivery".)

A secondary analysis of data from the Maternal-Fetal Medicine Units Network (MFMU) Cesarean Registry demonstrated that operative vaginal delivery was associated with similar maternal and neonatal outcomes as cesarean delivery for women undergoing TOLAC with complete dilation and a fetus with descent to at least +2 station [36].

Management of a retained placenta — The third stage of labor should be managed as per usual practice for any vaginal delivery. If the placenta is retained (ie, does not deliver with gentle cord traction for over 30 minutes), consideration should be given to the possibility of abnormal placentation (placenta accreta spectrum [PAS]) and appropriate preparations made. (See "Retained placenta after vaginal birth".)

Bedside ultrasound can be used to determine whether the placenta is merely trapped or still adherent, and if adherent, whether signs of PAS are present. A prudent approach in TOLAC patients is to evaluate the placenta sonographically prior to manual removal and to only attempt manual removal in the operating room so that hysterectomy can be performed rapidly if PAS is unexpectedly encountered. (See "Management of the placenta accreta spectrum (placenta accreta, increta, and percreta)".)

Uterine exploration — We do not routinely explore the uterus after a vaginal birth after cesarean (VBAC). No data support routine intrauterine examination to identify asymptomatic uterine dehiscence after a spontaneous vaginal delivery. If there is clinical suspicion that uterine rupture occurred during the second stage of labor, then manual uterine exploration should be performed. In postpartum women, uterine rupture that occurred during delivery is characterized by pain and persistent vaginal bleeding despite use of uterotonic agents. Hematuria may occur if the rupture extends into the bladder.

However, exploration of the lower uterine segment to evaluate for uterine rupture is prudent after an operative vaginal delivery for a terminal bradycardia, even in the absence of excessive vaginal bleeding or abdominal pain. This is not necessary if operative vaginal delivery is performed for another indication.

Clinical findings and management of uterine rupture are reviewed in more detail separately. (See "Uterine rupture after previous cesarean delivery", section on 'Clinical findings of uterine rupture' and "Uterine rupture after previous cesarean delivery", section on 'Management'.)

SOCIETY GUIDELINE LINKS — Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "Society guideline links: Cesarean delivery".)

SUMMARY AND RECOMMENDATIONS

- Facilities in which women attempt a trial of labor after cesarean (TOLAC) should have the resources (personnel and equipment) necessary to perform emergency cesarean delivery given the increased risk of uterine rupture in this setting. (See 'Facility resources' above.)
- Upon admission for anticipated TOLAC, women should be consented for both TOLAC and repeat cesarean delivery. Informed consent for TOLAC should include a discussion of the risk of uterine rupture. (See 'Documentation of informed consent' above.)

- Evaluation by the anesthesia team at admission is prudent in case cesarean delivery becomes necessary, as well as for reviewing options for labor analgesia. Neuraxial anesthesia has not been found to mask the symptoms of uterine rupture or decrease the likelihood of vaginal birth after cesarean. (See 'Anesthesia evaluation' above.)

- We perform continuous monitoring of uterine activity and the fetal heart race tracing. Signs and symptoms of uterine rupture may include fetal heart rate abnormalities, weakening contractions, loss of fetal station, abdominal pain, suprapubic pain at the level of the hysterotomy, need for frequent epidural dosing, vaginal bleeding, maternal hemodynamic instability, and hematuria. Clinical vigilance and careful evaluation are especially warranted in women with persistent pain despite neuraxial anesthesia or need for frequent redosing to achieve adequate pain control. (See 'Cardiotocography' above and 'Signs and symptoms of uterine rupture' above.)

- Available evidence suggests that labor progress is similar in women undergoing TOLAC and those with an unscarred uterus. (See 'Assessment of labor progress' above.)

- Both induction and augmentation are reasonable options for women undergoing TOLAC. Clinical vigilance is warranted in these settings as some observational studies have reported an increased risk of uterine rupture with labor induction, and possibly with oxytocin augmentation. Women with a prior vaginal delivery and/or a favorable cervix do not appear to be at increased risk of uterine rupture with induction. (See 'Induction of labor' above and 'Oxytocin augmentation' above.)

- Transcervical catheters, oxytocin and amniotomy are reasonable options for cervical ripening and labor induction in TOLAC. Misoprostol (PGE1) and other prostaglandins should be avoided given the increased risk of uterine rupture in observational studies. (See 'Methods of cervical ripening' above.)

- Routine uterine exploration at the time of delivery to evaluate for uterine rupture is unnecessary. If there is clinical suspicion that uterine rupture occurred during the second stage of labor (pain and persistent vaginal bleeding despite use of uterotonic agents), then manual uterine exploration should be performed. Exploration of the lower uterine segment to evaluate for uterine rupture is prudent after an operative vaginal delivery for a terminal bradycardia, even in the absence of excessive vaginal bleeding or abdominal pain. (See 'Uterine exploration' above.)

- The indications, contraindications, prerequisites, and procedure for operative vaginal delivery are the same as in women without a scarred uterus (see "Operative vaginal delivery"). Outcomes are similar to those with cesarean delivery in the second stage of labor. (See 'Operative vaginal delivery' above.)

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