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Delivery labor after cesarean section

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Abstract

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 (). 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 (). 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.

Introduction

The number of cesarean sections performed at the U.O. of Obstetrics and Gynecology of San Martino has counted a relevant increase mainly in recent years. One of the main reasons for this increase is certainly due to the many changes in clinical practice.

Another important reason why the numbers of cesarean sections appears to be on the rise is to be found in the famous view of Cragin, who, back in 1916, publicized the statement that if a woman delivered a baby by cesarean section, she would have to deliver any future baby by the same method, a theory that has persisted throughout the century (1). Currently, scientific evidence from numerous clinical studies allows this claim to be considered incorrect or at least overstated.

In the literature, TOLAC (Trial Of Labor After previous Cesarean delivery) is defined as labor that a patient goes through after resorting, in a previous pregnancy, to a cesarean section, and VBAC (Vaginal Birth After Cesarean delivery) is defined as post-cesarean labor that results in vaginal delivery.

From 1985 to 1996, the completion of vaginal births following cesarean section in a previous pregnancy (VBAC) increased from 5% to 28.3%, but in 2006, the percentage of VBACs, compared to previous years, saw a significant reduction to only 8.5% of them (2, 3, 4).

In 2010, during a consensus conference held at the National Institutes of Health in the US, the safety and outcomes of VBAC deliveries on previously cesarized women (TOLAC) were examined. Of note was also trying to understand the reasons why the use of this obstetric practice had declined significantly (3).

The consensus conference affirmed that "labor and delivery (TOLAC) is a reasonable opportunity, to be performed and recommended, for many women with previous cesarean section, and fear of medical-legal litigation is the main reason for hindering the spread of this practice" (5).

There are no randomized clinical trials comparing maternal and neonatal outcomes between women who go through labor and deliver vaginally following cesarean section (TOLAC and VBAC) and those who perform delivery by elective cesarean section (ERCS- Elective Repeat Caesarean Section). Recommendations on the type of delivery to be addressed are derived from observational studies that report the likelihood of vaginal delivery (VBAC) once labor in labor (TOLAC) has begun and compare maternal and neonatal morbidity associated with labor in labor and repeat cesarean section (6,7,8,9,10,11,12).

The positive and negative outcomes of labor after previous cesarean section (TOLAC) should be compared with those possibly present in elective repeat cesarean section (ERCS).

Maternal and neonatal outcomes resulting from a vaginal delivery or a repeat cesarean section performed following a failed labor delivery cannot be compared with the outcomes proper to an elective cesarean section, thus performed outside of labor. It cannot be considered correct since no patient can be guaranteed vaginal delivery a priori, and the consequent and attached risks and benefits may be associated (in a non-proportional way) with failed labor labor (TOLAC).

No repeat elective cesarean section (after previous cesarean section), like no labor labor after previous cesarean section, is free of maternal or neonatal risks.

The main risks are (6,7,8,10,13,14,19,20,):

* If uterine rupture intervenes: the risk of hypoxic ischemic encephalitis is 6.2% (95% CI=1.8-10.6%) and the risk of neonatal death is 1.8% (95% CI=0-4.2%).

Maternal risks	ERCS %	TOLAC %	
		un pregresso TC	2 o più TC
Endometritis	1,5-2,1	2,9	3,1
Surgical injury	0,42-6	0,4	0,4
Blood transfusion	1-1,4	0,7-1,7	3,2
Hysterectomy	0-0,4	0,2-0,5	0,6
Uterine rupture *	0,4-0,5	0,7-0,9	0,9-1,8
Maternal death	0,02-0,04	0,02	0

Neonatal risks (7,15,16,17,18)	ERCS %	TOLAC %
Antepartum death 37-38 weeks >39 weeks	 0,08 0,01	 0,38 0,16
Hypoxic ischemic encephalopathy	0,013	0,08
Neonatal death	0,05	0,08
Perinatal death	0,01	0,13
Admission to intensive care unit	6,0	6,6
Respiratory morbidity	1-5	0,1-1,8
Transient tachypnea	6,2	3,5
Hyperbilirubinemia	5,8	2,2

Most of the maternal morbidity occurs when labor labor goes into complications and results in the need for cesarean section (6,7,8,21).

A vaginal delivery that occurs following a previous cesarean section (VBAC) has fewer complications than performing delivery by repeat elective cesarean section; while failed labor is associated with more complications than elective cesarean section.

The risk, therefore, related to maternal morbidity is directly proportional to the patient's probability of achieving vaginal delivery.

Uterine rupture (uterine muscle rupture that also affects the uterine serosa with possible extension to the bladder and broad ligament) or uterine dehiscence (uterine muscle rupture with uninjured uterine serosa) is the complication, associated with labor labor, that increases, significantly, maternal and neonatal morbidity.

The incidence of this event is highly variable because many studies include true catastrophic uterine ruptures with asymptomatic prior scar dehiscences. Moreover, in many studies, the incidence of this phenomenon is not differentiated in relation to the type of hysterotomic incision made in the previous cesarean section.

Women who have a transverse incision on the lower uterine segment following cesarean section have a clinical uterine rupture risk of 0.5%-0.9% following labor labor (7, 8, 9, 10, 14, 19).

However, it should be considered that successful vaginal delivery (VBAC), in the patient with previous cesarean section, avoids abdominal surgery and results in: less bleeding, less infection, shorter hospitalization times than those resulting from an elective cesarean section (23,24,25) and allows, as well, to avoid the risks and procedures derived from repeated cesarean sections such as hysterectomy, bladder and bowel injuries, infections, need for blood transfusions (26,27), placenta previa and accreta (27,28).

The probability of successful labor is about 72%-76% (7,15,20,29,30,31).

A higher probability of successful labor labor is associated with many clinical factors including:

- previous vaginal delivery (32,33)
- spontaneous onset of labor

In contrast, there are lower chances of success in case of:

- persistence of the indication for the first cesarean section (dystocia in labor) (34,35,36,37,38,39,40)
- advanced maternal age (32,48)
- gestational age greater than 40 weeks (32,44)
- maternal obesity (32,46,47,49,50)
- preeclampsia (52)
- short interval between one pregnancy and the next: <2 years (51)
- suspected fetal macrosomia (32,45)
- need for induction of labor or acceleration of labor (32,41,42,43)

Scoring systems have been adopted to help in the prediction of successful VBAC, but most have been shown to be unreliable (53,54,55,56,57).

In particular, a previous vaginal delivery is associated with an 87%-90% probability of successful VBAC (32,33). If all the unfavorable factors are present, the probability of successful VBAC is reduced to 40%.

Others among the unfavorable factors are: previous preterm cesarean sections, cervical dilatation at entry less than 4 cm, short stature, male sex of the fetus.

Women who have at least a 60%-70% chance of VBAC have equal or lower maternal morbidity trying TOLAC labor than performing an elective cesarean section (58,59).

Women who have less than a 60% chance of VBAC have a higher risk of morbidity than women who perform an elective cesarean section.

Similarly, since neonatal morbidity is higher in the case of failed labor than in the case of successful vaginal delivery, women with a higher probability

of VBAC therefore have less risk of neonatal morbidity.

In fact, it has been shown that neonatal morbidity is the same for both women with high probability of successful vaginal birth (VBAC) who perform labor and those who deliver by repeat elective cesarean section (59).

Scientific evidence suggests that most women with a previous cesarean section with a transverse incision on the lower uterine segment are candidates, and should be encouraged, to deliver vaginally (VBAC), and they should be advised to deliver by labor in labor (TOLAC).

Otherwise those at high risk for complications (e.g., with previous incision on the uterine body or T-incision, previous uterine rupture, etc.) or those in whom vaginal delivery is contraindicated, should not be admitted to labor labor.

In case of previous cesarean section with an incision on the uterine body, the risk of uterine rupture is 200-900/10000 (7). In case, on the other hand, of T-incision the risk of uterine rupture is 190/10000 (7) and in case of previous low vertical incision the risk is 200/10000 (7).

A multivariate analysis of NICHD shows that there is no significant difference in the incidence of uterine rupture in VBAC with two or more previous cesarean sections (9/975 VS 92/10000) compared with a single previous cesarean section (115/16915 VS 68/10000) (13). Only the incidence of hysterectomy or transfusion is higher with two or more previous cesarean sections (60/10000 VS 20/10000 for hysterectomies and 3.2% VS 1.6% for transfusions) (13).

Other studies confirm that VBAC with successful outcome in case of a woman with a history of two previous cesarean sections (62%-75% probability of success) has similar high odds of success as VBAC in case of only one previous cesarean section (60,61,62,63).

Uterine rupture in case of a uterus that has not undergone previous surgery is a very rare event (0.5 -2/10000 deliveries). This complication is mostly present in multiparas (64) and in case of uterus undergoing previous cesarean section this event is much more frequent (74/10000 VBAC). This risk is higher if the patient during the previous cesarean section and hospitalization had both intrapartum and postpartum fever (65).

In case of VBAC there is also a higher risk (1%) of having to have blood transfusions (170/10000 VS 100/10000), endometritis (289/10000 VS 180/10000) (7).

In contrast, there were no statistically significant differences between VBAC and ERCS regarding:
- hysterectomy (23/10000 VS 30/10000)
- thromboembolic disease (4/10000 VS 6/10000)
- maternal death (17/100000 VS 44/100000)

It is important to remember that in developed countries, maternal mortality following uterine rupture during VBAC is a very rare event (<1/100000) (29).

Most adverse events in patients who perform TOLAC occur in case of labor failure (7).

	failded VBAC	successful vbac
Uterine rupture	231/10000	11/10000
Uterine dehiscence	210/10000	14,5/10000
Hysterectomy	46/10000	14,5/10000
Transfusion	319/10000	116/10000
Endometritis	767/10000	116/10000

The additional risk of perinatal death in women with birth-related VBAC is 2-3/10000, but the absolute risk of birth-related perinatal loss is similar to the risk of women having their first birth (7).

	VBAC	ERCS
Mortalità perinatale complessiva	32/10000	13/10000 (RR=2,40, 95%, CI=1,43-4,01)
Mortalità perinatale secondaria a malformazioni	24/10000	9,3/10000 (RR=2,52, 95%, CI=1,37-4,62)

The increased risk of perinatal mortality can be attributed, in the vast majority of cases, to the statistically significant increased risk of antepartum death beyond 37 weeks in the course of VBAC compared with ERCS (19.6/10000 versus 8/10000; RR=2.45, 95%, CI=1.27-4.72) in cases of children without malformations.

About 43% of these fetal deaths, in VBAC cases, occurafter 39 weeks (about 9/10000), and could be prevented by ERCS at 39 weeks.

In the study by Landon et al (NICHD Study) (7), the delivery-related mortality was 4/10000 for VBAC and 1.4/10000 for ERCS.

It can be concluded that VBAC has a 10/10000 risk of antepartum death beyond 39 weeks and a 4/10000 risk of delivery-related perinatal death. These risks may be reduced by repeat elective cesarean section at 39 weeks, but definite and direct scientific evidence for this does not exist; this risk is equal to the risk normally faced by a nullipara (7).

Similarly, the incidence of intrapartum hypoxic-ischemic encephalopathy at term is higher in VBAC (7.8/10000) than in elective cesarean section (7). About 50% of the increased risk comes from the additional risk of hypoxic- ischemic encephalopathy due to uterine rupture (4.6/10000) in vaginal delivery (7).

Severe neonatal metabolic acidosis is present in 33% of uterine ruptures at term (7). There are no data, however, on long-term outcomes such as cerebral palsy associated with vaginal delivery or cesarean section.

In contrast, vaginal delivery (VBAC) reduces the neonatal risk of respiratory disease after birth. In

cesarean section there is, in fact, a risk of 3.5%-3.7% while in vaginal delivery only a risk of 0.5%-1.4% (66,67,68).

According to the NICHD study (7), there is an incidence of respiratory disease, in case of elective cesarean section, of 3.6%, VS 2.6% in case of vaginal delivery (RR=1.40, 95% CI=1.23-1.59).

Beneficial effects are certainly obtained by performing elective cesarean section at least at 39 weeks (66, 67).

The risk of incurring respiratory disease is:
- 11.4% at 37 weeks
- 6.2% at 38 weeks
- 1.5% at 39 weeks (69).

It is inferred that delaying delivery by one week (38 to 39 weeks) reduces the incidence of respiratory morbidity by 5/100, although this delay may unfortunately be associated with 5/10000 increased risk for antepartum fetal death (70,71).

The same study (69) demonstrates a 50% reduction in respiratory morbidity in women given betamethasone who perform cesarean section beyond 37 weeks (2.4% with steroids VS 5.1) and, such therapy, also appears to be beneficial in women who deliver at 39 weeks (0.6% with steroids VS 1.5%) (69). The long-term effects of steroids are obviously not known; it seems safer to delay elective cesarean section until 39 weeks' gestation than to administer steroids at 37-38 weeks.

The anesthesiologic risk is very low (72).

Women who perform cesarean section (elective or urgent) in 93% of cases have regional anesthesia: only in 3% of cases does this anesthesia fail. In these cases, the risk of maternal death is related to anesthesia-related problems such as failed intubation (2.7/100000) (73).

Finally, elective cesarean section increases the risk of complications incase of future pregnancies, and this risk increases with increasing number of repeated cesarean sections.

In the NICHD study (7) the presence of placenta accreta was:
- 0.24% at the 1st cesarean
- 0.31% at 2nd cesarean section
- 0.57% at the 3rd cesarean
- 2.13% at the 4th cesarean
- 2.33% at the 5th cesarean
- 6.74% at 6th or more cesareans (27)

Hysterectomy is performed in:
- 0.65% at the 1st cesarean
- 0.42% at the 2nd cesarean
- 0.90% at the 3rd cesarean
- 2.41% at the 4th cesarean
- 3.49% at the 5th cesarean
- 8.99% at 6th or more cesareans (27)

In patients with placenta previa, the risk for placenta accreta was:
- 3% at 1st cesarean
- 11% at 2nd cesarean
- 40% at 3rd cesarean
- 61% at 4th cesarean
- 67% at the 5th or more cesareans (27)

Just as there was increased risk for bladder injury:
- 0.3% at 1st cesarean
- 0.8% at 2nd cesarean
- 2.4% at the 3rd cesarean
o need for blood transfusions
- 7.2% at 1st cesarean
- 7.9% at 2nd cesarean
- 14.1% at the 3rd cesarean (73).

In the case of more than one previous cesarean section, it must be considered that the studies performed report a risk of uterine rupture between 0.9% and 3.7%, but no firm conclusions have been reached on the magnitude of this risk in those women who had a history of only one previous cesarean section (13, 60).

In the study by Landon et al (13), no increase in the risk of uterine rupture (0.9% VS 0.7%) was established in patients who had undergone a cesarean section in their lifetime compared with those who had more than one previous cesarean section in their history, while in the study by Macones et al (60), the risk of uterine rupture was found to be increased from 0.9% in patients with only one previous cesarean section to 1.8% in patients with two previous cesarean sections. In both studies (13, 60) there is described an increased risk in morbidity among women with more than one previous cesarean section, although the magnitude of the absolute difference in these risks is very low (2.1% VS 3.2%).

What is more, the chance of implementing a vaginal delivery appears to be similar in both women with one previous cesarean section and women with more than one cesarean section.

It seems reasonable to consider patients with two previous cesarean sections with a transverse incision on the lower uterine segment as possible candidates for labor labor (74).

Regarding macrosomia (defined as a birth weight greater than 4000-4500 grams), it must be stated that such patients have a lower probability of achieving vaginal delivery (46,75,76,77) than women with a non-macrosomic fetus (55%-67%).

The same is true for those women with a history of previous cesarean section performed as a result of dystocia: the probability of vaginal delivery is lower than for those who did not have this condition.

The incidence of uterine rupture is increased for women performing labor (after previous cesarean section) without a previous vaginal delivery and neonatal birth weight greater than 4000 grams (77).

The important bias present in these studies, however, turns out to be the fact that the data analyzed refer to neonatal weight rather than estimated fetal weight during pregnancy. This premise therefore prevents us from being able to use these data to make decisions about the mode of delivery before labor arises (78).

It seems reasonable, therefore, to take into account the birth weight of previous infants and the estimated weight in the current pregnancy when deciding to go the labor delivery route, but mere suspicion of macrosomia should be a

contraindication to labor delivery itself.

Vaginal birth (VBAC) is less likely to be successful if 40 weeks of gestation is exceeded (45,79,80,81). But, analyzing the studies performed (81) it can be said that although the probability of successful labor delivery is lower when beyond 40 weeks gestation this element should not be a hindrance to labor delivery.

There are few studies that have examined the effects on labor labor of a previous cesarean section with a low vertical incision. The conclusion of these studies, however, has been that in patients with previous cesarean section with a low vertical incision on the lower uterine segment there is the same likelihood of successful vaginal delivery as in patients with a transverse incision on the lower uterine segment, and there is no evidence of an increased risk of uterine rupture and maternal or perinatal morbidity (82,83,84,85).

In the case of ignoring the type of incision made in the previous cesarean section, there are two clinical studies that have documented that, in such cases, the odds of successful vaginal delivery and uterine rupture are the same as in patients in whom a previous cesarean section with a transverse incision on the lower uterine segment is documented.

Therefore, labor labor is not contraindicated in patients in whom the mode of previous cesarean section is unknown (86,87,88).

Even in the case of twin pregnancy, the outcome of labor labor (after previous cesarean section pregnancy) is similar to patients who perform labor labor (after previous cesarean section) in a single fetus pregnancy.

Women with twin pregnancies are as likely to deliver as women with single pregnancies (65-85%) and there is no increased risk of uterine rupture (30/10000) or maternal or perinatal mortality (89,90).

Preterm patients with a previous cesarean section in their historyhave the exact same chance that their preterm labor will end successfully as full-term patients with a personal history of previous cesarean section and have, likewise, a lower risk of uterine rupture.

The NICHD study shows that (91) the probability of successful vaginal delivery is the same in both preterm and full-term pregnancies (72.8% VS 73.3%), but the probability of uterine rupture (34/10000 VS 74/10000) and dehiscence (26/10000 VS 67/10000) is much lower in preterm patients than in full-term patients.

Perinatal outcomes are similar in preterm patients who deliver vaginally or perform elective cesarean section.

If a subsequent pregnancy occurs within 2 years of the previous one, the risk of uterine rupture is 2-3 times higher, while the risks associated with cesarean section decrease from 32% to 25% (92, 93, 94, 95).

Management of labor labor

It is possible, even in cases of TOLAC, to perform induction of labor labor for maternal or fetal indications.

It has been noted, however, that there is an increased risk of uterine rupture in such situations (7,8,85,96,97,98).

In a study (85) performed on 20095 women who had had a previous cesarean section, a number of uterine ruptures was found to be 0.52% in the case of spontaneously arising labor, 0.77% in the case of induced labor without prostaglandins, and 2.24% in the case of induced labor with prostaglandins.

In a multicenter study (7) of 33699 women in labor labor, labor acceleration or induction was associated with a higher risk of uterine rupture than spontaneously arising labor (0.4% for spontaneous labor, 0.9% for labor induction, 1.1% using oxytocin alone, and 1.4% for induction with prostaglandins with or without oxytocin).

A further analysis of 11778 women with a history of previous low transverse cesarean section demonstrated an increased frequency of uterine rupture only in women who had performed induction and had not had a previous vaginal delivery (1.5% VS 0.8%) (7).

The incidence of uterine rupture is also increased when labor induction is performed with an "unfavorable" cervix compared with that performed with Bishop score above 5 (96).

Another study examined the relationship between maximum dose of oxytocin and risk of uterine rupture. A close relationship was observed between maximum oxytocin dose and increased risk of uterine rupture, but the maximum safe limit of oxytocin to be adhered to in labor labor in childbirth is unknown (99).

In 3 very large studies on the use of prostaglandins for the induction of labor in women with a history of previous cesarean section, one (85) concluded that the risk of uterine rupture was found to be increased, a second (7) found no increased risk of uterine rupture, and in the third (8) found no increased risk of uterine rupture when using only prostaglandins without subsequent use of oxytocin.

Among the various types of prostaglandins, it appears that misoprostol (prostaglandin E1) is associated with an increased risk of uterine rupture in women with previous cesarean section; therefore, its use should be avoided. (100,101,102,103).

Induced labor is less likely to be successful than spontaneous labor (32,43,97,104).

The Bishop score (paramento capable of predicting the success of labor labor induction and assessing a woman's potential to give birth vaginally) appears to be unaltered by the reduced odds of success in achieving a vaginal delivery (after previous cesarean section) that arose following induction, compared with spontaneous labor delivery whether it indicates a favorable condition or an unfavorable cervical maturation. In the latter situation, the probability of success is even lower (96,105,106).

The use of oxytocin for the sole purpose of accelerating labor in childbirth has been widely and extensively investigated.

Some studies have found an association between labor acceleration with oxytocin and uterine rupture (7,98), but in other studies this relationship has not been confirmed (8,107,108).

In the NICHD study (32), the incidence of cesarean section in women performing labor was:
- 36% in induced labor
- 26% in accelerated labor
- 19% in spontaneous labor

There is no definite scientific evidence to indicate what is acceptable or pathological cervical dilatation progression in patients (with previous cesarean section) whose labor is accelerated with oxytocin.

Among women with no history of previous cesarean section, an unfavorable prognostic factor is indicated by the occurrence of no vaginal delivery after 6 to 8 hours of continuous oxytocin infusion (109). The awareness of the increased risk of uterine rupture in case of the presence of a uterine scar due to previous surgery on the uterus justifies a more cautious mode of managing the acceleration of labor with oxytocin and an early diagnosis and related early therapeutic intervention; it seems reasonable to intervene after 2 hours of arrest in the progression of cervical dilatation (110).

Thus, in case of VBAC with use of oxytocin to accelerate labor, it should be considered that:
- although acceleration is not contraindicated it must be preceded by careful obstetric examination and maternal consent;
- ideally, 3-4 contractions in 10 minutes (111);
- it is preferable that obstetrical vaginal examinations to assess the speed of cervical dilation progression should always be performed by the same operator.

When informing the woman about the needs to perform induction (with prostaglandins or other methods) and/or the needs to accelerate labor, it turns out to be of paramount importance to include the woman by explaining the procedure and explaining to her all the potential risks and benefits of the procedure and decisions made.

Studies on mechanical systems of maturing the cervix and inducing labor with a transcervical catheter are retrospective and of limited extent.

According to some there is no increased risk of uterine rupture (97,112), but in others an increased risk is reported compared with patients with spontaneously arising labor (113).

From the data in the literature, it seems that the use of transcervical catheters may be a useful therapeutic aid to induce delivery in a patient with previous cesarean section and a cervix with low Bishop score.

Cephalic version for external maneuvers

The data reported in the literature are very limited, but it appears that a woman with a previous cesarean section and breech presentation at term can perform cephalic version maneuvers with the same chance of

success as women without a previous cesarean section (114,115,116).

Analgesia

Epidural analgesia can be used during labor and delivery.

In the NICHD study (92) data are reported on the performance of vaginal delivery resulting from peridural analgesia . They turn out to be more numerous than deliveries that occurred without epidural analgesia (73.4% VS 50.4%).

the fact that the most representative symptom of a uterine rupture is abnormal fetal heartbeat, there is no reason to think that epidural analgesia hides this condition. Therefore, it can be emphasized that the use of regional analgesia is not a risk factor.

Monitoring of labor

As soon as a diagnosis of active labor in childbirth is made, it is essential to begin monitoring with a continuous EFM.

Routine use of intrauterine catheters to measure intrauterine pressure is not recommended and their use may be associated with multiple risks (117,118,119,120).

In case of uterine rupture, the probability of CTG not being reassuring is 55%/87% (121).

Continuous intrapartum monitoring is necessary for early identification and treatment of uterine scar rupture (124,125,126,127).

Uterine rupture is a sudden event that can be catastrophic. There is no way to identify certain antepartum predictive factors (122,123).

There is not a single pathognomonic symptom of uterine rupture. Nevertheless, there are signs that presume the occurrence of such a dramatic situation:

- Pathologic CTG;
- severe abdominal pain, especially if persistent between contractions;
- chest or shoulder pain; difficulty breathing;
- acute pain at the site of the previous scar;
- abnormal vaginal bleeding or hematuria;
- cessation of uterine contractions;
- maternal tachycardia, hypotension or shock;
- loss of the achieved position; and, ascending into the birth canal of the presented part (127).

If a rupture of the uterine scar limited to the lower uterine segment occurs, the risk of a new rupture or dehiscence in labor is 6% (128). If the rupture includes the upper uterine segment, the risk of rupture is 32 percent (128,129).

Therefore, a woman who has had a uterine rupture should, in the next pregnancy, perform a cesarean section before the onset of labor delivery (about the 38th-39th week of gestation).

In the case of vaginal delivery in women, during the second trimester, with a positive personal history of cesarean section it seems that, although studies are scarce, even with induction of labor with prostaglandins, maternal outcomes (length of labor, failure of induction, complications) are similar to

women without previous cesarean section.

The frequency of uterine rupture after induction of labor is less than 1% (130,131,132,133,134,135,136).

In women, with gestational age greater than 28 weeks, with an endouterine death and previous cesarean section, cervical maturation can be stimulated with a transcervical catheter, which has an equal incidence of uterine rupture in women in whom labor labor arises spontaneously.

Since there are no fetal risks in this situation, labor labor should be encouraged (137,138,139).

Women should know that, in the case of previous cesarean section, surgery to carry out delivery in future pregnancies must be performed in properly equipped delivery rooms with a trained staff. It must be performed in a delivery room where immediate cesarean section and advanced neonatal resuscitation are possible.

Several studies performed in Canada and Scotland show that if the labor of women with at least one cesarean section in their history is performed in low-intensity obstetrical units, there is a two-fold increase in the risk of uterine rupture, but more importantly there is an increased risk of perinatal death resulting from uterine rupture (29, 140).

Final Recommendations.

- Most women with previous cesarean section with a transverse incision on the lower uterine segment should be advised to deliver vaginally and offered labor.
- Epidural analgesia can be given.
- Misoprostol should not be used in the 3rd trimester for cervical ripening or induction of labor in patients with previous cesarean section or surgery on the uterus.
- Women with two prior cesarean sections with a transverse incision on the lower uterine segment may be candidates for labor induction.
- Women with one prior cesarean section with transverse incision on the lower uterine segment who have no other contraindications to twin birth by vaginal delivery may be candidates for labor labor.
- The cephalic version for external maneuvers for breech presentation is not contraindicated in women with a previous cesarean section with transverse incision on the lower uterine segment.
- Women at high risk (previous incision on the body of the uterus or T-incision, previous uterine rupture, or other conditions in which vaginal delivery is contraindicated, such as placenta previa, etc.) should not be admitted to labor labor.
- Induction of labor labor for maternal or fetal indications is an acceptable option for women who are candidates for labor labor.
- Childbirth labor should take place in obstetric units where there is an immediately available and adequate staff to deal with any emergency and where there are all material and organizational resources to perform urgent cesarean section and advanced neonatal resuscitation.
- The final decision, after adequate information and discussion of the possible risks and benefits even in the long term, should be made by the patient in consultation with the physician.

Contraindications

1) Breech presentation of the fetus

2) Macrosomia (estimated weight >4250 g)
3) Longitudinal or "T-shaped" uterine incision in a previous cesarean delivery
4) Twin pregnancy with breech presentation of 1st twin
5) Previous myomectomy with cavity opening
6) Previous rupture of the uterus
7) Refusal of the woman to adhere to a TOLAC.

Related contraindications

1) Post-term pregnancy (>42 weeks)
2) Lack of concrete documentation of a previous cesarean delivery
3) Twin pregnancy with fetuses in cephalic presentation
4) Previous laparoscopic myomectomy with insufficient documentation of the procedure
5) Interval between previous CT scan and fertilization <6 months

Informed consent

Dear Madam,
You have already had a cesarean section in a previous pregnancy. Although this condition involves a slight increase in the risk of uterine rupture in labor compared to cases in which it is not present, it does not constitute an absolute contraindication to an attempt at labor aimed at vaginal delivery.

We therefore feel it is correct to provide you with a range of information regarding this condition, which can be gleaned from the Literature and the Guidelines of the major International Obstetric and Gynecological Societies, so that you can choose the mode of delivery and give your consent to a trial for vaginal delivery.

This information is summarized below and any further clarification can be obtained from the Medical Director who will ask you to sign this consent.

The purpose of this information is to obtain a vaginal delivery under the safest possible conditions for your health and that of your unborn child, knowing that resorting to a new cesarean section would entail a higher risk for you than a vaginal delivery that meets certain safety criteria.

The main fear that characterizes these labor is that of a possible uterine rupture, an event that in trials available in the literature occurs with a frequency of 0.3%-0.8%, in cases of uterine segment incision, in the previous CT, low/transverse.

It is correct to say that this event can also occur in vaginal deliveries without previous CT, in which case the frequency described is 0.1%-0.2%.

TIME INTERVAL SINCE PREVIOUS CESAREAN SECTION

A recurring finding in the Literature indicates a higher frequency of this event when the trial labor occurs at an epoch close to the previous cesarean section, understood as within 24 months of the same.

INDUCTION OF LABOR

It is possible after previous cesarean section to induce labor with oxytocin if necessary; this procedure involves a slight additional increase in the

risk of rupture quantifiable in a probability about 3 times higher than the data described above. Such induction at our Department is implemented only with oxytocin, as the use of prostaglandins in these cases would lead to an increased risk, in our opinion, which is excessive.

The table below gives an idea of these probabilities.

Incidence of Uterus Rupture after Previous CT

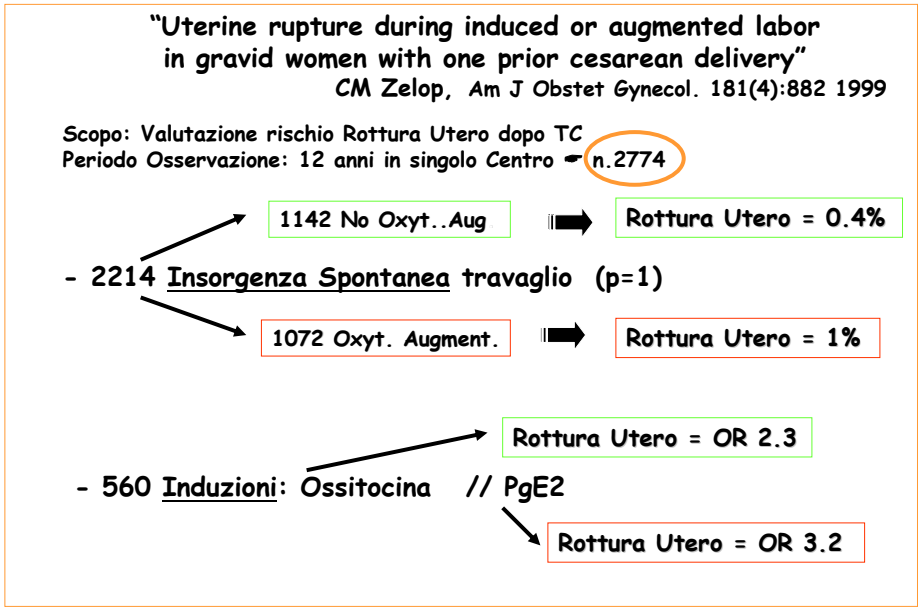
- elective CT…… 1.6/00 (11/6980) RR= 1
- spontaneous VB …… 5.2/00 (56/10789) RR = 3.3
- Induced labor …… 7.7/00 (15/1960) RR =4.9
- induced PgE2 …… 24.5/00 (9/366) RR = 15.6

M.Lyndon-Rochelle NeJMed 2001, 345:3

OXYTOCIN ACCELERATION

It is possible during labor after previous cesarean section to apply OXYTOCIC ACCELERATION, to be clear to administer oxytocin to increase or regularize the necessary uterine contractile activity. This practice also involves a slight increase in the risk of uterine rupture, in our opinion not significant and therefore acceptable.

The table below illustrates the different levels of risk in the various groups of women, with previous cesarean section implementing a trial labor for vaginal delivery.



CONTRAINDICATIONS TO TRIAL LABOR

The Department's clinical staff carefully evaluated her medical history and ruled out the presence of conditions that contraindicate attempted labor by vaginal delivery.

SAFETY CRITERIA

Please be advised that the Delivery Room of the O.U. Obstetric and Gynecologic Clinic is equipped with all safety systems for the performance of an emergency cesarean section, where in case of uterine rupture it is necessary to proceed to rapid surgical completion. The Medical staff is able in this case, to deliver your baby in times that are far less than those considered maximums by major International Societies.

ANALGESIA AND FETAL MONITORING

There are no specific contraindications for the implementation of analgesia in labor after previous C-section (unless other contraindications for this analgesic therapy are present).

For safety reasons it will be necessary during labor to maintain continuous cardiotocographic monitoring.

For similar reasons, a needle-cannula should be applied at the onset of labor.

Final Recommendations

- Most women with previous cesarean section with transverse incision on the lower uterine segment should be advised to deliver vaginally and offered labor.
- Epidural analgesia can be given.
- Misoprostol should not be used in the 3rd trimester for cervical ripening or induction of labor in patients with previous cesarean section or surgery on the uterus.
- Women with a previous cesarean section with a transverse incision on the lower uterine segment who have no other contraindications to twin birth by the vaginal route may be candidates for labor labor.
- The cephalic version for external maneuvers for breech presentation is not contraindicated in women with a previous cesarean section with transverse incision on the lower uterine segment.
- Women at high risk (previous incision on the body of the uterus or T-incision, previous uterine rupture, or other conditions in which vaginal delivery is contraindicated, such as placenta previa, etc.) should not be admitted to labor labor.
- Induction of labor labor for maternal or fetal indications is an acceptable option for women who are candidates for labor labor.
- Childbirth labor should take place in obstetric units where there is an immediately available and adequate staff to deal with any emergency and where there are all material and organizational resources to perform urgent cesarean section and advanced neonatal resuscitation.
- The final decision, after adequate information and discussion of the possible risks and benefits even in the long term, should be made by the patient in consultation with the physician.

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