Obstetric management after prior cesarean delivery

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Summary

Due to rising cesarean delivery rates in Germany, expertise in the management of pregnant women after prior cesarean delivery is nowadays mandatory. In addition, the informed consent of the pregnant woman concerning success rates and risks of a trial of labor is necessary. Contraindications such as prior vertical uterine incision, prior uterine rupture and recurrent indications for cesarean delivery have to be excluded. Successful vaginal delivery following cesarean delivery is feasible in approximately 73% of cases.

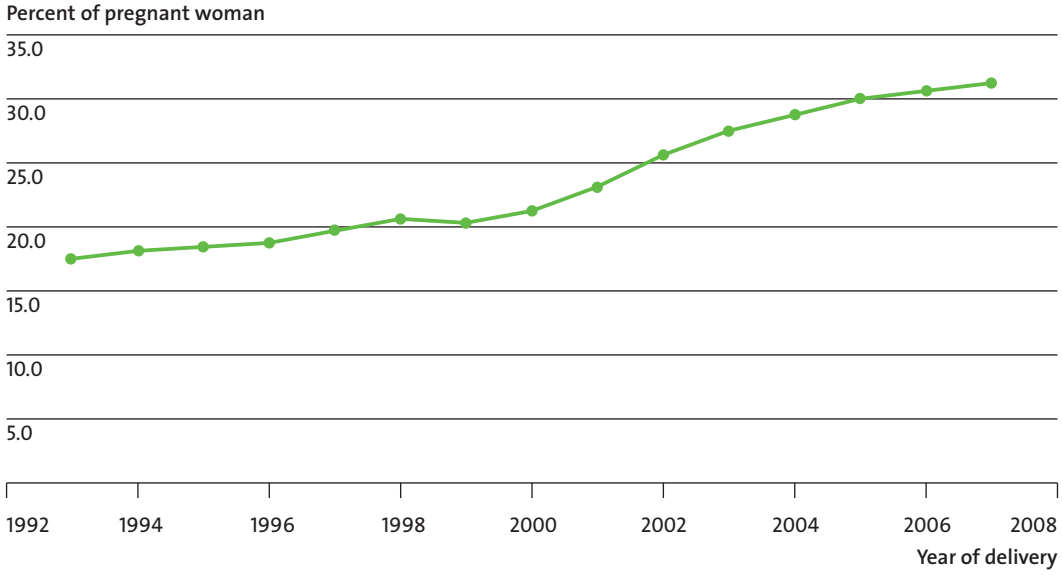

Figure 1: Rate of cesarean deliveries in Bavaria 1993-2007 (Bavarian perinatal survey, Bayerische Perinatalerhebung, BPE)

Introduction

In the last years, the cesarean delivery rate has steadily risen. For instance, in Bavaria in 1991, only 16% of all births were cesarean deliveries (data from the bavarian perinatal survey, BPE, Fig.1), while in 2007, the rate jumped to 31%. Consequently, midwives and obstetricians are routinely confronted with women who have already had at least one cesarean section (13%, referring to BPE 2007). There is no foreseeable end of this trend. Various reasons for the increase in cesarean rates are proposed, such as the women's increased desire for security, malpractice litigation against obstetricians by relatives or health insurances. Another factor to consider is the increase in age of childbearing with the consecutive increase in risk factors such as obesity, hypertension-related pregnancy complications, gestational diabetes, and previous sterility treatment. Furthermore, women are nowadays taking a more active role in their obstetrical care and, in many cases, their great concern for an altered sexual experience due to pelvic floor injury after vaginal delivery explains the women's decision for a cesarean section.

The statement "once a cesarean – always a cesarean" (Cragin 1916) is outdated. In 1992, the German Society for Gynecology and Obstetrics (Deutsche Gesellschaft für Gynäkologie und Geburtshilfe (DGGG)) published a statement according to which vaginal birth after cesarean (VBAC) can be carried out in the majority of cases with only a few exceptions. Even in women who have had two cesarean deliveries, a trial of labor is possible after having considered the pros and cons.

A survey carried out in 176 German gynecological hospitals in 1995 showed that, in average, 79% of the cases qualify for a trial of labor, despite a substantial variation (minimal 27%, maximal 100%). Inspired by the results of this survey with discrepant approaches of German obstetricians, the "recommendation for the mode of delivery after prior

cesarean section" was composed. In 1999, it was published by the "Gesellschaft für maternofetale Medizin" (society for maternofetal medicine) and the "Leitlinienkommission" (guideline commission) of the DGGG. The recommendation was last revised in October 2007 and then published as the S1-guideline "Care for pregnant women and delivery following cesarean section" of the DGGG and the "Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften e.V." (AWMF, society for scientific medical associations).

Risks and complications of VBAC

The following risks and complications that can occur after a prior cesarean have to be considered:

- Intrauterine death (although this aspect has been controversially discussed)
- Placenta praevia (the relative risk increases with the number of prior cesareans, i. e. 4.5 after one cesarean to 43.9 after four cesareans)
- Placenta accreta/increta (the incidence of a placenta accreta is 1 in 2500 births compared to 9.3 % in a placenta praevia)
- Uterine dehiscence/uterine rupture

A complete uterine rupture (separation of all layers of the uterine wall, characterized by a sudden onset of pain, alterations in fetal heart rate, occasionally accompanied by a hypovolemic shock) should be differentiated from the usually asymptomatic uterine dehiscence in which the visceral peritoneum is intact ("incomplete rupture"). Unfortunately, most authors do not differentiate between uterine rupture and dehiscence, and instead apply the term "uterine rupture" in both cases.

The relative risk of a scar dehiscence or rupture during a trial of labor after cesarean section lies at around 0.06 to 2% after a low-transverse uterine incision. This rate corresponds to that of elective repeat cesarean deliveries. The incidence of a complete rupture after cesarean section depends on the localization of the uterine incision, the number of prior cesarean sections, the birth weight and the elapsed time from the prior cesarean.

Following a low-transverse incision, rupture occurs in 0.5% to 1% of cases after one cesarean delivery and the relative risk increases after two cesarean sections, albeit not significantly. In contrast, the incidence of a scar dehiscence (tearing of the uterine scar without a rupture of the visceral peritoneum, usually unaccompanied by blood loss) is slightly higher with a percentage of 5%.

After a vertical uterine incision, the incidence of a uterine rupture is as high as 6% to 12% and the risk increases with fetal weight.

Another important determinant is the elapsed time since the prior cesarean. If the interval is less than 12 months, the probability of a rupture is 4.8%, after 13 to 24 months it lies at 2.7% and after more than 24 months it lies at 0.9%. The most common cause of maternal death after a cesarean section is hemorrhage due to placenta praevia, placenta increta or placenta accreta.

Neonatal morbidity after vaginal deliveries is higher in comparison to elective cesarean deliveries (OR 1.71; 95% CI: 1.28-2.28). This also applies to the occurrence of 5 minute APGAR scores < 7 (OR: 2.24; 95 % CI: 1.29-3.88).

A prospective planning of the mode of delivery should be carried out by the caring obstetrician and the obstetric clinic. The operation report of the previous cesarean section should be studied in order to be familiar with the location of the uterine incision of the prior cesarean.

The concept of informed consent should be followed in time, preferably including the woman's partner, in order to give the pregnant woman enough time to consider the pros and cons of the different modes of delivery (i. e. trial of labor versus elective repeat cesarean delivery). This consultation should be documented in the patient's file.

The above-mentioned risks for a VBAC justify the necessity for specific examinations. In the second or third trimester, it should be excluded that the placenta is located close to the scar. In a positive result however, it is necessary to measure the depth of the insertion in order to detect a placenta increta or percreta. This is best done with abdominal ultrasound (Doppler ultrasound), but also possible with magnet resonance imaging (MRI). Measuring the thickness of the uterine wall at the site of the scar is not sensitive enough to predict the likelihood of a uterine rupture.

The rate of successful vaginal deliveries in women with prior cesarean section varies between 50% and 90% (73% on average), depending on the investigated collective. After two or more cesarean sections, vaginal delivery is successful in 45% to 90% (on average 68%) of cases. Favorable factors for a successful vaginal delivery are:

- Successful vaginal delivery before or after the prior cesarean section
- Prior indication for a cesarean was not a suspected miscorrelation
- Spontaneous onset of labor
- Estimated fetal weight < 4000 g

Arguments against a trial of labor:
- Induction of delivery
- Augmentation of labor
- Obesity (body mass index = BMI ≥ 30 kg/m² and/or weight gain > 20 kg)
- Suspected fetal macrosomia
- Elapsed time since the prior cesarean < 12 months

When determining the delivery mode after a prior cesarean section, the above mentioned aspects that allow an estimation of success as well as the below mentioned risks and contraindications have to be considered.

An increased risk for vaginal delivery after a prior cesarean is present in the following situations:
- previous uterine T-shaped incision
- previously known risks such as miscorrelation or birth weight > 4 250 g
- induction of labor with prostaglandins
- twins, breech presentation

Because of the high probability for complications, VBAC is contraindicated in the following cases:
- missing consent of the woman
- recurrent reason for a cesarean (e. g. hip deformity)
- previous vertical uterine incision or preceding uterine surgery with consecutive insecurity concerning the resilience of the uterine scars (e. g. after enucleation of uterine fibroids)
- previous uterine surgery with opening of the cave
- preceding scar dehiscence or uterine rupture
- foreseeable risks such as placenta praevia or placenta increta/accreta

Delivery after enucleation of uterine fibroids

Obstetricians and midwives are increasingly confronted with pregnant women who have undergone enucleation of uterine fibroids. Prospective-randomized studies about the mode of delivery and the outcome after myomectomy are almost impossible to perform due to the great individual differences (size, number, localization of the resected fibroids, type of operation, i. e. minimal invasive surgery or laparotomy, closure of the myometral defect – one or multilayered). Consequently, no reliable publications concerning this issue exist. Therefore, the decision of the mode of delivery is always an individual one. Knowing the details of the myomectomy operation record is advantageous. However, when in doubt, a cesarean section is preferable as the likelihood of complications is difficult to predict.

Particular aspects in patients with diabetes or suspicion of fetal macrosomia

In pregnant women with gestational diabetes or type 1 diabetes, the success rates of vaginal delivery are usually lower than in metabolically healthy women. However, we have to consider that the indication for a cesarean section in these high-risk pregnancies and especially in the case of suspected fetal macrosomia (accumulated in diabetic metabolism) is often generously set.

With increasing birth weight, the success rate of the trial of labor decreases. With a birth weight of 4 000 g, a repeat cesarean section is necessary in 48% to 64% of cases. A birth weight of 4 250 g and more signifies a higher probability for uterine rupture. When suspecting fetal macrosomia, the imprecision of the ultrasound weight estimation should be taken into account.

Induction of labor after cesarean delivery

After having reached the due date, the planned mode of delivery should be re-evaluated, even if the mother had decided for a vaginal delivery. The estimated weight of the fetus should be taken into account as well as possible other risk factors (i. e. position anomalies, necessity for labor induction in postterm pregnancy). The prerequisites for an induction of labor are listed below:
- Experience with the use of oxytocin and prostaglandins
- Thorough and open discussion on success probability, risks and complications compared to an elective repeat cesarean delivery before induction of labor
- Consent of the patient and documentation in the patient's file
- Continued surveillance of mother and child (CTG)
- Prevention of uterine overstimulation (availability of emergency tocolysis , no simultaneous application of oxytocin and prostaglandins)
- Possibility for an emergency cesarean delivery and laparotomy in case of complications≥

A prior vaginal delivery increases the chances for a successful VBAC. In contrast, the success rate of a vaginal delivery is reduced if the indications for the prior cesarean section were active phase arrest or miscorrelations, an expected birth weight of ≥ 4 000 g or obesity (BMI ≥ 30 kg/m²). Thus, an intensive risk assessment when confronted with diabetes, multiple pregnancies, suspicion of fetal macrosomia has to be carried out urgently before the induction of labor in cases of VBAC.

The success rate of a VBAC lies at a median of 74 % (60% to 85%) – comparable to spontaneous labor. Likewise, women who had succeeded in a vaginal delivery before or after the cesarean section have got a higher probability to succeed than women without a prior vaginal delivery. However, the increased risk for a uterine rupture after induction of labor should be considered.

Referring to the existent data, the risk for a uterine rupture after the use of prostaglandins is higher compared to oxytocin. However, we have to consider that prostaglandins are more often applied if there is an unfavorable cervical score.
Intravenous oxytocin is easy to control and can be used to induce labor in women after prior cesarean section, provided that there is a continuous CTG surveillance and a dilated cervix (Bishop's score ≥ 8). Local prostaglandin-E2-derivatives should only be applied in case of a medical indication to labor induction and after having thoroughly informed the mother about the increased risk for uterine rupture. This consultation should be documented in the patient's file. The certification guidelines (specialist information) concerning the different PG-E2 preparations have to be considered. Referring to these guidelines, only the 1 mg or the 2 mg minprostin-E2-vaginal gel can be used with "special care" for induction of labor in women after cesarean delivery (for relative contraindications see also "guidelines for the use of prostaglandins in obstetrics and gynecology" of the AWMF).

The synthetical prostaglandin analogues (e. g. sulprostone) are contraindicated after a cesarean section. Also the prostaglandin-E2-vaginal insert (Propess®) as well as misoprostol (PG E1, Cytotec®) should not be used because of the increased risk for uterine rupture of 10.2% and 18.8%, respectively.

General remarks

Analgetics during trial of labor can be applied without reservations. Likewise, there are no limitations concerning the indication for an external cephalic version or an epidural. Below, the following interventions are unnecessary during pregnancy and before a trial of labor or after a successful vaginal delivery:

- Pelvimetry
- Ultrasound check-up of the cesarean scar
- Intrauterine pressure measurement
- "Prophylactic" operative vaginal delivery
- Palpation of the cesarean scar after birth (as the accidental discovery of a scar dehiscence does not have any immediate consequences)

The earlier propagated recommendation of sterilization after more than two cesareans has today become obsolete.

Conclusion

In many cases, vaginal birth after cesarean section is achievable and successful. However, the pregnant woman should be thoroughly informed about the chances of success and the risks of a trial of labor. The obstetrician should also indicate the higher probability of complications (e. g. placenta praevia, placenta accreta or increta, uterine rupture – especially after two or more cesarean sections, if the interval to the prior cesarean section is short, after a vertical uterine incision or after induction of labor with prostaglandins). The given consent has to be precisely documented. All foreseeable risks should ideally be diagnosed ante partum, in order to draw the right conclusions for the mode of delivery.

! Due to the relatively low risks of an elective repeat cesarean delivery, the mother has to be thoroughly informed about pros and cons of a trial of labor !

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VBAC = Vaginal birth after cesarean, trial of labor, uterine rupture

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Prof. Dr. Martin Kolben was head of the department of the gynecological clinic of the Technical University of Munich (Technische Universität München, Klinikum rechts der Isar), focusing on operative gynecology, including oncology as well as special obstetrics and prenatal diagnostics. In 2000, he opened up his practice in Gräfelfing. Apart from the ambulant occupation in his practice, he carries out gynecological surgery (general gynecology and gynecological oncology) and births.

In addition, he is a member of the teaching institution of the gynecological clinic of the Technical University of Munich and responsible for the training and examinations of the students. He was called for different examination committees (e. g. Bayerische Landesärztekammer – Bavarian Chamber of physicians: specialist examinations, exams with the emphasis on "gynecological oncology" as well as "special obstetrics and perinatal medicine") and is an active member of different project groups of the "Tumorzentrum München" (cancer center of Munich). Prof. Dr. Martin Kolben is married and father of four sons.

Conflict of interest
The author declares that there is no conflict of interest as defined by the guidelines of the International Committee of Medical Journal Editors (ICMJE; www.icmje.org).

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CME-Continuing Medical Education

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Question 1
Referring to the Bavarian perinatal survey, how high was the rate of cesarean deliveries in the year 2007?
a. 10% to 15%
b. 16% to 25%
c. 26% to 30%
d. 31% to 35%
e. > 35%

Question 2
Which complications cumulate in pregnant women after a prior delivery?
a. Preterm labor
b. Placenta praevia
c. Hypertension-related pregnancy complications
d. Multiple pregnancies
e. Hyperemesis gravidarum

Question 3
A uterine rupture can be characterized by:
a. A tearing of the uterine wall in all layers
b. A sudden onset of pain
c. Alterations in the fetal heartbeat
d. Shock symptoms of the mother
e. All statements are correct

Question 4
The incidence of uterine rupture after a prior cesarean section does *not* depend on
a. Uterine incision
b. The number of prior cesareans
c. The child's birth weight
d. The elapsed time from the last cesarean
e. The mother's age

Question 5
The most probable cause of maternal death after a cesarean section is the consequence of:
a. Hemorrhage due to placenta praevia, placenta accreta or increta
b. Multiple pregnancies
c. Puerperal infection
d. Hemorrhagic shock after uterine rupture
e. Thromboembolic complications

Question 6
The consultation of a pregnant woman after cesarean section concerning the planned mode of delivery should:
a. be directive
b. be open
c. start only after the onset of labor
d. not be carried out in the presence of the partner
e. not consider possible complications

Question 7
Favorable factors for a successful vaginal delivery are:
a. Prior cesarean section carried out because of a suspected disproportion
b. Twins, if both are in cephalic presentation
c. Labor induction with oxytocin
d. Fetal estimated weight < 4 000 g
e. Weight gain of the mother of 20-25 kg

Question 8
A trial of labor after cesarean delivery is contraindicated in:
a. State after transverse uterine incision
b. Missing consent of the mother
c. State after cesarean section more than 5 years ago
d. State after cesarean section because of breech presentation
e. An estimated fetal weight of 2 000-2 500 g

Question 9
In case of a VBAC, induction of labor should be performed
a. preferably 2 weeks before the due date,
b. with synthetic prostaglandin analogues (e. g. sulprostone),
c. with oxytocin in case of a dilated cervix,
d. only when suspecting fetal macrosomia,
e. performed with prostaglandins in case of a dilated cervix.

Question 10
Which of the following statements concerning delivery after cesarean section is correct?
a. A trial of labor after a cesarean section is success ful in 40-50% of cases.
b. Subsequent to a successful vaginal birth after a cesarean section, the scar should always be palpated.
c. An intrauterine pressure measurement during delivery is indispensible.
d. The prophylactic operative vaginal delivery is sensible.
e. An epidural can be used without reservations.