

NCT EVIDENCE BASED BRIEFING

Vaginal Birth After Caesarean (VBAC) - part 2

By Cynthia Clarkson, Co-chair NCT Research Networkers' Panel,
with Mary Newburn, NCT's Head of Policy Research.

Introduction

This is the second of a three-part briefing on vaginal birth after caesarean section (VBAC).¹ The briefing reviews the evidence relating to the options for pregnant women who have already had one or more caesarean births. The benefits and risks of caesarean birth for both mothers and babies have been reviewed separately.² Part 1 of this briefing included the history of caesarean section and subsequent modes of birth; the incidence of VBAC, and the conditions which influence VBAC in women planning a vaginal birth after a caesarean. Part 2 compares planned VBAC with planned repeat caesarean.

As the debate in the clinical literature is largely conducted in terms of comparative risks, the available evidence tends to be presented in these terms and this part of the briefing reflects that. It includes:

- the risks associated with planned repeat caesarean for the mother
- the risks of planned repeat caesarean for the baby
- the short-term and long-term risks of planned VBAC for the mother
- the risks of planned VBAC for the baby and any future siblings
- factors that influence the rate of uterine rupture.

The benefits of a planned repeat caesarean are often seen as the avoidance of the risks associated with planned VBAC, and vice versa, which is all rather limiting and negative. Part 3 will discuss women's views about VBAC and planned repeat caesarean section. It will provide an opportunity to consider comparative benefits and a wider range of factors that may influence women's preferences and choices. It will also summarise and discuss the recommendations of the National Institute of Clinical Excellence (NICE) Caesarean Section Guideline and those of the Expert Advisory Group on Caesarean Section in Scotland.

Risks associated with planned caesarean for the mother

The risks for the mother of planned repeat caesarean are the same as any caesarean and include an increased chance of thromboembolism, haemorrhage, hysterectomy, damage to the bladder and ureters, urinary infection, wound infection, endometritis and a longer hospital stay.² However, if care is managed according to best practice the additional risks are small. The extent of these additional risks is described below. There are, in addition, some further risks involved in repeat caesarean surgery and these are also explored.

Fever, blood transfusion and hysterectomy

Women, when comparing planned repeat caesarean with planned VBAC, have been found to have significantly

more febrile morbidity, defined as a fever above 38.1°C for more than six hours (5.4% vs. 4.3%), greater need for blood transfusion (1.7% vs. 1.1%), and twice the rate of emergency hysterectomy (0.4% vs. 0.2%).³

Subfertility or infertility

In the longer term, there may be increased subfertility or infertility.⁴⁻⁶ Jolly et al. followed a cohort of first-time mothers and found that, over a five-year period, those who had had a caesarean section were less likely than those who had an unassisted vaginal birth to have had a second baby. A quarter of the women who had had a caesarean (26%) and 10% of women who had a normal vaginal birth were 'still afraid' about future childbirth. Of the women who had no further children, 30% of the caesarean group, compared to 16% of the normal vaginal group, said they had 'involuntary' infertility (i.e. not of their choice).⁷

Increased risks of repeat caesarean surgery

As the number of caesareans an individual woman has had increases, so does the quantity of severe adhesions, which can be dense or cause fusion of the uterine surface with the abdominal wall, bladder or bowel. This increases operating time, with a corresponding blood loss and need for transfusion and increases the likelihood of injuring the bladder.⁸⁻¹¹

A history of prior caesarean birth increases the risk in subsequent pregnancies of multiple placental abnormalities that include placental abruption, placenta praevia and abnormally adherent formation of the placenta as placenta accreta, placenta increta and placenta percreta.¹² Placenta accreta, placenta increta and placenta percreta occur, respectively, when the placenta grows, develops into, and through, the muscle wall of the uterus. This can cause difficulties with delivering the placenta, often giving rise to severe haemorrhage. Women with known anterior placenta praevia and a history of a caesarean birth should have access to a hospital that has facilities for embolisation, major surgery, blood transfusion and intensive care.¹³

Placenta praevia increases independently with both the number of pregnancies and caesareans,¹⁴ and so does placenta praevia accreta.^{15,11,16} In a study of the clinical records of 3,191 women from a single hospital in Saudi Arabia, analysis was carried out on those 170 women having a fifth caesarean. Among this group, 16 had placenta praevia, and placenta accreta coexisted with it in 50% of cases.⁸ A key recommendation for individual practitioners in *Why mothers die 2000-2002* states: 'Placenta praevia, particularly in a woman with a previous uterine scar, may be associated with uncontrollable uterine haemorrhage at delivery and caesarean hysterectomy may be necessary. A consultant must be in attendance'.¹³

continued overleaf...

...continued from previous page

As the incidence of surgical complications increases with each repeat caesarean section, it has been a common practice in the developed world to offer sterilisation after a third caesarean. However, various studies, including one retrospective study from Finland of 64 women who had had a total of 149 fourth or subsequent caesareans (range 4-10), have shown that there is no definitive upper limit to the number of caesareans an individual woman can have, though quality of obstetric care for these high-risk women is likely to be extremely important.^{9,8,10} Juntunen and colleagues, who provided intensive obstetric care, found eight cases of placenta praevia, four of which resulted in hysterectomy. There were no differences in post-operative complications or perinatal outcome.⁹ Makoha and colleagues found that the third caesarean did not define a threshold of increased risk to the mother. Morbidity did, however, rise with successive caesareans and compared with the third, was significantly increased with the fifth, and much worse with the sixth for placenta praevia, (Odds ratio (OR) 3.8 [95% Confidence Interval (CI) 1.9-7.4]) placenta accreta (OR 6.1 [95%CI 2.0-18.4]) and hysterectomy (OR 5.9 [95% CI 1.5-24.4]).⁸

Maternal mortality

In a retrospective cohort of 308,755 pregnant Canadian women who had previously had a caesarean between 1988 and 2000, the in-hospital maternal death rate was higher in the planned repeat caesarean group (5.6/100,000) than in the planned VBAC group (1.6/100,000). This was not thought to be due to confounding by indication, as the excess remained after extensive exclusion of women with various complications, but was not statistically significant.¹⁷

Risks of planned repeat caesarean for the baby

The risks for the baby are those of any caesarean birth, namely an increase in respiratory distress syndrome and transient tachypnoea (rapid, shallow breathing due to retained lung fluid) of the newborn.¹⁸⁻²⁰ Morrison and colleagues have shown that the risk of neonatal respiratory morbidity can be reduced fourfold by waiting until 39 weeks to carry out a caesarean, compared with 37 weeks.²¹ With caesarean birth, the baby may also be cut accidentally during the operation (1.5%),²² the baby's mother may be in pain and have difficulty in establishing breastfeeding, and there may be an adverse impact on bonding.²³

While some of these additional risks might be linked to an underlying problem that gave rise to the decision to have a caesarean section, and some risks can be minimised by careful management, including avoiding caesarean birth before 39 weeks, there remain some additional risks. The rate of respiratory distress is greater for those babies born by caesarean than those born vaginally at the same gestational age.²¹ Very occasionally, severe neonatal respiratory failure occurs after planned repeat caesarean without evidence of prematurity. Some 18% of babies referred to two major neonatal intensive care units (NICUs) for extracorporeal oxygenation (ECMO) therapy were born by planned repeat caesareans at term.²⁴

Risks of planned VBAC for the mother

There are also risks for the mother associated with a planned VBAC. Vaginal birth, and assisted vaginal birth in particular, involve some additional risks compared with a planned caesarean, including more anal sphincter and pudendal nerve damage, more fecal and urinary incontinence (though incontinence is also known with planned caesarean), and more sexual problems, particularly in the first six months after the birth.^{25,2} However, the most frequently encountered risk to the mother is that the planned VBAC will result in an emergency caesarean birth. An emergency caesarean, compared to a planned caesarean, has an increased risk of infection, though prophylactic antibiotic is used to reduce the chance of this occurring;^{26,17} hysterectomy;^{27,28,17} haemorrhage and transfusion;²⁶ as well as uterine rupture, which is discussed in detail below.^{26,3,17}

Complications for unplanned surgery are undoubtedly greater than those following planned surgery. Despite the additional chance of having unplanned surgery when a VBAC is planned, any additional risks for the woman are small in absolute terms. For example, in the meta-analysis involving 47,682 women (comparing planned VBAC with planned repeat caesarean birth), although there were three maternal deaths that all occurred in women who planned a VBAC and had an emergency caesarean in labour, this difference was not statistically significant (OR 1.52; 95% CI 0.36-6.38).³ Planned VBAC is, however, associated with a doubling of the uterine rupture rate compared with planned repeat caesarean, but the occurrence is not frequent; 0.4% vs. 0.2%.³

The decision to have an emergency caesarean tends to be attributed to dystocia (lack of progress/failure to progress), or suspected fetal distress, or (much less frequently) suspected or symptomatic uterine rupture. Much of the literature on VBAC focuses on suspected and symptomatic uterine rupture and the factors that influence its occurrence. Uterine rupture will be discussed below.

Risks of planned VBAC for the baby

A variety of indicators have been used to compare the effects of different modes of birth for babies, including measures of relative well-being, such as Apgar scores, umbilical cord pH and admission to SCBU or NICU, as well as measures of serious adverse outcomes including perinatal mortality and major morbidity. There has also been debate about which kinds of hospital environments are most suitable for VBAC. The effects of decisions taken in one pregnancy often have an impact on the next, particularly when a caesarean section is undertaken or avoided. The effects are not only for the mother but also for any future babies. Each of these factors is addressed in turn.

Apgar scores

In a meta-analysis pooling seven studies (3,313 women), the incidence of five-minute Apgar score < 7 was significantly more frequent in those babies born to women who had planned a VBAC (2.2%) than those who had a

planned repeat caesarean (0.94%).³ The way the VBAC labours were managed, however, is not stated. One of the prospective studies included in the review compared babies born by planned VBAC with those born by planned repeat caesarean.¹⁸ While there was no significant difference in five-minute Apgar scores <7, babies in the planned VBAC group required significantly more active resuscitation in the delivery room, so it is possible for there to be similar Apgar scores but significant differences in treatment. Another weakness of using Apgar scores as a measure of comparative well-being is that they do not have a clear long-term predictive value.

Sepsis

Hook and colleagues also examined the incidence of sepsis and found that an increase in suspected (5% vs. 2%) and proven (1% vs. 0.1%) sepsis occurred in babies that were born after a planned VBAC, compared with those born by planned repeat caesarean.¹⁸ Those babies born by VBAC had similar outcomes to babies born vaginally to mothers who had never had a caesarean, but there was an excess of sepsis in those who planned a VBAC yet had a caesarean during labour. Overall, VBAC was beneficial to the babies in this study; being born by emergency caesarean birth after a planned VBAC was no worse than being born by planned repeat caesarean.

Long-term neurological outcomes

Unfortunately, long term neurological outcomes for the baby have never been adequately studied and many important questions will remain unanswered until well designed prospective trials, with long-term follow up, are carried out.²⁹ One prospective four-year observational study, in 19 academic medical centres in the US, looked at the incidence of hypoxic-ischaemic encephalopathy (a form of brain injury). It found that there were 12 affected babies among those whose mother had planned a VBAC (15,801 women), and no cases in babies whose mother had a planned repeat caesarean (17,898 women). Seven of these cases, including two neonatal deaths (an absolute risk of 0.46/1000 women at term, planning a VBAC) followed uterine rupture.³⁰ Greene, in the accompanying editorial, noted that there would need to be 588 planned repeat caesareans to prevent one poor perinatal outcome.³¹ He noted that some people would consider this number of caesareans to prevent one severe adverse outcome for the baby a reasonable number, whereas others would consider the perinatal risks associated with planned VBAC small and well worth taking for the benefits of a vaginal birth.

Perinatal deaths

Although there are limited data on severe long-term morbidities, there are more data available about absolute and relative risks of perinatal deaths. The results of a meta-analysis (including nine studies and over 30,000 women) which excluded unpreventable deaths (intrauterine death before onset of labour, lethal anomalies and prematurity), suggest that fetal and neonatal deaths seem to be significantly more frequent among babies born to women who have a planned a VBAC (0.2%) than those who have a planned repeat caesarean (0.1%).³ The relative risk is greater by a factor of two, but the absolute risk is still extremely small.

A different kind of study, a large population-based retrospective cohort study from Scotland, also noted that

the relative risk of perinatal death associated with planned VBAC was significantly higher (11 times) than with a planned repeat caesarean. However, once again the absolute risk of perinatal death associated with planned VBAC was extremely small (12.9/10,000 or 0.1%).³² This risk was similar to the risk of perinatal death in first-time mothers at term.³² In this paper, the risk due to mechanical causes, such as uterine rupture, was 4.5/10,000 or around 0.05%. However, the paper exaggerates the actual risk of planned VBAC to the baby at term because of the way the analysis was carried out. The authors included in the 'trial of labour' group not only those women having a planned VBAC in normal circumstances but also all unplanned (emergency) caesareans after 37 weeks. As a result, this group included women who had an emergency caesarean performed prior to labour for uterine rupture, placental abruption eclampsia or other reasons as well as those who went into labour for a planned VBAC.^{33,34} In this study, therefore, the apparent risks of VBAC at term are exaggerated, though still very small in absolute terms.

A systematic review, based on a mainly US population produced broadly similar findings. The review concluded that for women planning VBAC the additional risk of perinatal death from rupture of uterine scar was 1.4 (95% CI 0 to 9.8) per 10,000.³⁵

Place of birth

The place of birth may play a part in determining the safety for the baby whose mother has previously had a caesarean. In the population-based retrospective cohort study in Scotland, discussed above, which included 35,854 women, the risk of perinatal death due to uterine rupture was found to be three times higher if the birth took place in a hospital with < 3,000 births per year than if it took place in one with >3,000 births per year.³⁶ It has been suggested that additional medical facilities available in large obstetric units reduce the risk of perinatal death in the event of uterine rupture.³⁶ Flamm,²⁴ commenting on care in the US, makes a similar point, noting that most large VBAC studies are conducted in medical centres with 24-hour in-house obstetricians and anaesthetists. It should be remembered, he says, that while the incidence of uterine rupture may be similar in smaller hospitals, in those without 24-hour staffing across all medical specialties and full resuscitation equipment, response times may be slower and outcomes for the baby may be less favourable.

Following publication of the Landon article³⁰ and Greene editorial,³¹ Smith and Pell reanalysed their data of births complicated by uterine rupture to determine neonatal survival after a five-minute Apgar score of less than 4, varied in relation to hospital volume. They concluded that in high-volume centres, such as those studied by Landon and colleagues, repeat planned caesarean may protect against hypoxic-ischaemic encephalopathy; while in low-volume centres, repeat planned caesarean may protect primarily against perinatal death.³⁷ However, the absolute risks of VBAC are very low, and these differences are very small.

Effects for subsequent babies

So far, this comparative review of the outcomes for babies born by planned VBAC or planned repeat caesarean section has focused on the baby of the current pregnancy.

continued overleaf...

...continued from previous page

However, increasing evidence is emerging to show that decisions taken about mode of delivery affect future pregnancies and the current baby's future siblings. Smith and colleagues found a doubling of the antepartum stillbirth rate in second-time mothers from 0.9/1,000 in women who had had a previous vaginal birth to 1.8/1,000 in women with a previous caesarean birth. Because of the small increased risk of stillbirth following a previous caesarean, they advocated not only avoiding primary caesarean section but also avoiding planned VBAC, on the basis that a planned caesarean would reduce stillbirths for women with a scarred uterus, compared with later spontaneous labour.³⁸ Commentators have cautioned against adopting a less liberal policy on VBAC on the basis of this single observational study³⁹. There is undoubtedly a growing interest in researching and taking account of the long-term as well as the short-term effects of obstetric decisions.

Uterine rupture

Uterine rupture, which can be life threatening to both the mother and her baby, is at the heart of the debate about VBAC. If the risks of uterine rupture could be reduced - by identifying those who are more at risk during pregnancy and offering repeat caesarean to them, and by ensuring expert care and alertness to any developing complications during VBAC labours so as to detect ruptures when they start to happen - the anxieties about VBAC would be minimised. This section looks at evidence around the incidence and outcomes associated with uterine dehiscence and uterine rupture, and decision making during pregnancy.

Definition

Uterine rupture refers to a complete separation throughout the uterine wall with clear symptoms of rupture, resulting in fetal distress and maternal haemorrhage requiring immediate surgery. The literature does not always clearly define uterine rupture and sometimes extends its use to include dehiscence, thinning or 'windowing' of a previous caesarean scar, where asymptomatic separation occurs and is usually only discovered during a caesarean. This muddling of definitions often causes confusion and disagreement.

Symptoms include prolonged slowing of the baby's heart rate, the most common sign of uterine rupture, which is present in nearly 70% of ruptures. Other signs include abdominal pain (7%-10%), vaginal bleeding (3%-5%), lowered maternal blood pressure (5%-10%) and recession of the presenting part of the baby (<5%).⁴⁰ Some professionals monitor women's pulses in order to try to identify rupture early, but research has failed to include this in any studies.

Rates of uterine rupture

Uterine rupture is said to occur in 0.4% of mothers planning VBAC and 0.2% of those having a planned repeat caesarean in Mozurkewich.³ However, the rate, quoted in the American College of Obstetrics and Gynaecology (ACOG)⁴¹ practice bulletin,⁴² includes both women who have had a previous low transverse incision (0.2%-1.5%) and those who have had a previous low vertical incision (1%-7%), for whom the rates vary considerably, and includes women with induced and augmented as well as spontaneous labours. In a review

of the literature from 1989 to 2001, it was noted that there was a higher rate of uterine rupture reported from US hospitals than other countries (0.68% vs. 0.47% of planned VBACs).⁴³

Using population-based data from the Scottish birth registry, a rate of 0.35% was quoted for all planned VBACs after 37 weeks.³⁶ The same rate of 0.35% in women planning a VBAC is quoted in the NICE Caesarean section guideline.⁴⁴ A systematic review of studies found a somewhat lower rate of 0.27%.³⁵ The authors of the systematic review concluded - despite limitations in the literature, including imprecise and inconsistent definitions - that 370 (95% CI 213 to 1,370) planned repeat caesareans would need to be performed to prevent one symptomatic rupture.

Minimising the adverse effects of uterine rupture

When uterine rupture occurs, rapid response is critical. In 1999, ACOG⁴² changed their guidelines to say that a physician capable of performing a caesarean delivery should be 'immediately available' when a woman having a VBAC was in labour; whereas previously the term 'readily available' had been used. The revised guideline also stated that a contraindication for VBAC is 'inability to perform emergency caesarean delivery because of unavailable surgeon, anesthesia, sufficient staff or facility'; the implication being that all staff needed for an emergency caesarean should be in the hospital, or the very close vicinity for every VBAC labour. However, this focus on the risks of VBAC seemed out of proportion relative to other obstetric risks. Placental abruption, cord prolapse and many other indications for emergency caesarean can occur in any labour, leading to one author emphasising that 'if a hospital is unsafe for VBAC then it isn't safe for any woman to labour there'.⁴⁵ Enkin and colleagues also noted that any obstetrics department that is prepared to look after women with much more frequently encountered conditions, such as placenta praevia, abruption placenta, prolapsed cord and acute fetal distress, should be able to manage a planned vaginal birth safely after a previous lower segment caesarean.⁴⁶

The results of the national study of VBAC in US birth centres, concluded that despite a high rate of vaginal births (87%) and few uterine ruptures (0.4%) among women planning VBAC and using a birth centre, a caesarean-scarred uterus was associated with increases in complications that required hospital management. It recommends that all women have access to in-hospital care for planned VBACs provided by midwife and obstetrician teams.⁴⁷ Others have argued that if all women with a uterine scar are referred to hospitals, the majority of mothers with prior caesareans will be condemned to repeat caesareans, such is the nature of care in most obstetric units, though most of the caesareans are unnecessary.⁴⁸

Two case-controlled studies have examined the association between response time and death or asphyxia in the baby related to uterine rupture. The first and largest found no cases of death or asphyxia if the time between prolonged slowing of the baby's heart rate and birth did not exceed 18 minutes.⁴⁹ A smaller, more thorough study (23 babies), however, did not come to the

same conclusion, and two babies born after 15 and 16 minutes had hypoxic ischaemic encephalopathy (a form of brain injury).⁵⁰ A non-reassuring fetal heart rate pattern, occurring prior to the estimated time of uterine rupture, further decreases the amount of time available before death or permanent damage to the baby occurs.⁵¹

Factors that influence the rate of uterine rupture

Scar tissue: The rate of uterine rupture is affected by the previous incision in the uterus. Estimated rupture rates are as follows:

- Classical uterine scar, longitudinally through the body of the uterus 4%-9%.
- Inverted T-shaped incision reaching into the body of the uterus 4%-9%.
- Low vertical incision 1%-7%.
- Low transverse incision 0.2%-1.5% .⁴²

There is also an increased rate of rupture in women with a congenitally malformed uterus, e.g. bicornuate uterus.²⁶

Number of previous caesareans: The risk of uterine rupture increases as the number of previous caesarean births increases.⁴² A large retrospective cohort study (20,175 women with one previous caesarean and 3,970 women with two previous caesareans) found a higher rupture rate after two previous caesareans (1.8%) than after one (0.9%).⁵² Some 16 of the 19 ruptures in the two previous caesarean group had had the labour induced or augmented. VBAC rates were similar, at 74.6% and 75.5% respectively. The authors concluded that the absolute rupture rate is small and planned VBAC is a reasonable option in appropriately counselled and managed women with two prior caesareans.

Birth spacing: The length of time between pregnancies also seems to make a difference. In an observational cohort study over 13 years, (with 393 women in the <or=24 month birth interval and 1,134 women in the >24 months birth interval), rupture was greater with a space of <or= 24 months (2.8%) compared with an interdelivery interval of > 24 months (0.9%).⁵³ This finding is consistent with a previous study which showed that inter-pregnancy interval was inversely associated with the likelihood of uterine scar failure during subsequent labour.⁵⁴

Suturing: Single-layer closure of the caesarean incision gained acceptance after several series demonstrated comparable short-term morbidity and shorter operating times compared with double-layer closure.⁵⁵ Potential morbidity in a subsequent pregnancy was not, however, addressed.

In a more recent observational cohort analysis of 1,980 women, having a planned VBAC, those with single-layer closure of a lower segment caesarean had a significantly higher rate of uterine rupture: 15/485 (3.1%) compared with those with a double-layer closure 8/1491 (0.54%).⁵⁶ In a letter, Cruikshank commented that variation in outcomes may be due to the type of stitching used, rather than the number of layers stitched.⁵⁷ A retrospective study of 768 women found fewer infections after single-layer closure, and the technique was not associated with increased uterine rupture or other

adverse outcomes, though an increase in uterine 'windows' was observed when caesarean sections were performed.⁵⁸ The Caesar Trial is currently seeking to recruit 3,500 women from 30 UK hospitals to investigate the short-term and long-term effects of single versus double-layer closure of the uterus.⁵⁹

Post partum fever: Developing a fever after a caesarean is associated with an increased risk of uterine rupture during a subsequent planned VBAC. This was demonstrated by a study in which all women using one US tertiary hospital who had a VBAC and a symptomatic uterine rupture over a 12-year period (n=21) were compared with four planned VBAC controls from the same institution. The cases were matched for year of delivery, number of previous caesareans, prior vaginal births and induction in the index pregnancy. There were different rates of fever following the previous caesarean: for those with uterine rupture 38% (8/21) and for the controls 15% (13/84).⁶⁰

Increased maternal age: The rate of uterine rupture is greater in older women. Among women with only one previous caesarean and no previous vaginal births, the incidence of uterine rupture was:

- 0.5% for women younger than 30 years old (5/1,065).
- 1.4% for women aged 30 or older (27/1,950).⁶¹

Twins: A report of 92 women who had a planned VBAC with twins observed no uterine ruptures and no increase in mortality or morbidity for either mothers or babies.⁶²

Induction and augmentation: The effect of using oxytocic drugs and prostaglandins has been investigated in several large population studies. In a study from Switzerland, 17,613 women planning a VBAC had 70 uterine ruptures. Women in the rupture group had increased rates of induced labour (24.3%) compared with the women in the non-rupture group (13.9%)²⁸. In a study of 20,095 women from Washington state, rates of rupture varied between three groups of women planning VBAC:

- those who had a spontaneous start of labour 0.52% (56 women)
- those who were induced without prostaglandins 0.77% (15 women)
- those induced with prostaglandins 2.45% (9 women).⁶³

The definition of uterine rupture in this study may not have been entirely consistent as it was based on International Classification of Diseases discharge codes and may have included asymptomatic ruptures or windows and extensions to the uterine incision as well as true ruptures. The study did not have information on the different types and dosages of prostaglandins used, but misoprostol could have been used in the last year of the study, despite the ACOG advice against its use in women who have had previous uterine surgery. Subsequent to this paper, the ACOG issued a document discouraging the use of prostaglandins for cervical ripening or the induction of labour in women planning VBAC.⁴¹

A large VBAC study of 35,854 women from Scotland found that induction without prostaglandins did not increase the rate of uterine rupture (Relative risk (RR)1.1 (95%CI 0.6-2.0)), but that induction with prostaglandins did increase the rate (RR3.3 (95% CI 2.2-4.8)).³⁶

continued overleaf...

...continued from previous page

A study of 130 women with a previous caesarean induced with prostaglandins, in a large UK teaching hospital, found no cases of uterine rupture 50% and 11% of these women had, respectively, a spontaneous and an assisted vaginal birth.⁶⁴ The authors conclude that prostaglandins are safe for inducing women with a previous caesarean, but should be administered with caution.

Previous vaginal birth: Having had a previous vaginal birth as well as a previous caesarean increases the chance of the planned VBAC concluding with a vaginal birth and seems also to reduce the risk of rupture. A five-year retrospective review of 250 women who had their labour induced, with a history of one lower segment caesarean, found that all four cases of uterine rupture and one dehiscence occurred in women who had had no previous vaginal delivery, but the results were not statistically significant.⁶⁵

In the VBAC study of 35,854 women from Scotland,³⁶ the rupture rate for women who had not previously given birth vaginally, who were induced with prostaglandins, was 1.41% and without prostaglandin induction 0.47%. For those women who had a previous vaginal birth and were induced with prostaglandins, it was 0.57% and without prostaglandin induction 0.19%. The accompanying editorial noted that association is not causation.⁶⁶ Several factors may act as confounders, such as differences between women induced with prostaglandins and those who were not, and possible differences in monitoring vigilance. For example, an unfavourable cervix is associated with a prolonged and more difficult labour, so different outcomes for women who had prostaglandins may have been affected by differences in the labour itself.

A cohort study, comparing 310 women with a previous low transverse caesarean, whose labour was induced, with a control group of 1,011 similar women in spontaneous labour, from a university hospital in Italy, found that an induction of labour is associated with similar rates of uterine rupture (0.3%) as occur in spontaneous labour, providing that a specific protocol for induction of labour is implemented.⁶⁷ This protocol allowed up to 40 hours for cervical ripening, with a longer interval between prostaglandin administrations than is usual elsewhere, did not allow oxytocin to be administered on an unripe cervix, Misoprostol was not used for induction, and there was a strict definition of dystocia ('failure to progress') requiring emergency repeat caesarean.

Summary and discussion

For pregnant women who have previously had a caesarean section, there are some additional risks for them and their babies compared with women who have had a baby before and had a vaginal birth. However, to put this in perspective, the risks are often similar to those for women having a first baby. The two alternatives for the next birth, planning for a VBAC or planning a caesarean birth, will appeal in different ways to different women, and they also each involve a range of benefits and some risks. Factors that may influence women's preferences and choices about VBAC and planned repeat caesarean section, will be discussed in part 3.

The evidence comparing planned VBAC with planned repeat caesarean is complex, as well as currently limited and open to a range of interpretations. All the retrospective cohort studies, for example, tend to concentrate on the risks, rather than the benefits of planned or actual VBAC. They have compared maternal morbidity and the death of babies in women who experienced uterine rupture and those who did not.²⁹ Decision making about planned mode of birth must, however, take into account long-term effects as well as immediate ones. A repeat caesarean increases the risks of abnormal implantation of the placenta in subsequent pregnancies and increased adhesions, risks which increase progressively with each successive caesarean.

Further prospective research must use standardised measures to identify more accurately the extent of risk for different women.⁶⁶ However, in addition to better quality information about risks, there is a need for broader, more exploratory, research on processes of care that maximise opportunities for women who have had a previous caesarean to experience an uncomplicated labour and a straightforward vaginal birth.

Key points

- A caesarean in the 21st century is a very safe procedure, but neither planned repeat caesarean nor planned VBAC is risk free. For women, a repeat caesarean section involves increased risks of fever, blood transfusion, hysterectomy, reduced fertility and life-threatening complications, including complications associated with placental abnormalities. These risks increase with the number of previous caesarean sections.
- For the baby, the risks of any caesarean birth are an increased chance of developing respiratory distress syndrome, transient tachypnoea (rapid, shallow breathing due to retained lung fluid), lacerations and less chance of receiving early breastmilk. Any benefits to the baby may also be off-set by an increase in stillbirth for future siblings.
- Planned VBAC also involves some risks, particularly if the scar tissue breaks down or the birth involves forceps or the need for an emergency caesarean. Additional risks compared with a planned caesarean, include more anal sphincter and pudendal nerve damage, more fecal and urinary incontinence, more sexual problems in the first six months after the birth and an increased risk of uterine rupture.
- The risks for the baby of planned VBAC are very, very small, including the risks of death and long-term neurological impairment.
- Some women are more at risk of uterine rupture, depending on factors such as kind of uterine scar, the number of previous caesareans, interval since the last birth, method of suturing, fever after original caesarean, previous vaginal birth, age, and induction or augmentation of labour.

References

1. Clarkson C, Newburn M. NCT Evidence based briefing: vaginal birth after caesarean (VBAC) - part 1. *New Digest* 2005; (31): 19-22.
2. National Childbirth Trust. NCT Evidence based briefing: caesarean section - part 2. *New Digest* 2002; 20: 9-11.
3. Mozurkewich EL, Hutton EK. Elective repeat caesarean

- delivery versus trial of labour: a meta-analysis of the literature from 1989 to 1999. *Am J Obstet Gynaecol* 2000; 183 (5): 1187-97.
4. Hall MH, Campbell DM, Fraser C, et al. Mode of delivery and future fertility. *Br J Obstet Gynaecol* 1989; 96 (11): 1297-303.
 5. Bahl R, Strachan B, Murphy DJ. Outcome of subsequent pregnancy three years after previous operative delivery in the second stage of labour: cohort study. *BMJ*. 2004; 328 (7435): 311-4.
 6. Murphy DJ, Stirrat GM, Heron J. The relationship between caesarean section and subfertility in a population-based sample of 14 541 pregnancies. *Hum Reprod* 2002; 17 (7): 1914-7.
 7. Jolly J, Walker J, Bhabra K. Subsequent obstetric performance related to primary mode of delivery. *Br J Obstet Gynaecol* 1999; 106 (3): 227-32.
 8. Makoha FW, Felimban HM, Fathuddien MA, et al. Multiple caesarean section morbidity. *Int J Gynaecol Obstet* 2004; 87 (3): 227-32.
 9. Juntunen K, Makarainen L, Kirkinen P. Outcome after a high number (4-10) of repeated caesarean sections. *BJOG* 2004; 111 (6): 561-3.
 10. Rashid M, Rashid RS. Higher order repeat caesarean sections: how safe are five or more? *BJOG* 2004; 111 (10): 1090-4.
 11. Dodd JM, Crowther CA, Huertas E, Guise JM, and Horey D. Planned elective repeat caesarean section versus planned vaginal birth for women with a previous caesarean birth (Cochrane Review). In: *The Cochrane Library, Issue 4, 2004*. Available from: www.nelh.nhs.uk/cochrane
 12. Zelop C, Heffner LJ. The downside of caesarean delivery: short- and long-term complications. *Clin Obstet Gynaecol* 2004; 47 (2): 386-93.
 13. Lewis G, Drife J. Why mothers die 2000 - 2002: the sixth report of the Confidential Enquiries into Maternal Deaths in the United Kingdom. London: RCOG Press; 2004. Available from: www.cemach.org.uk/publications/WMD2000_2002_executive_summ.pdf
www.cemach.org.uk/publications/WMD2000_2002_midwifery_summ.pdf
 14. Gilliam M, Rosenberg D, Davis F. The likelihood of placenta previa with greater number of caesarean deliveries and higher parity. *Obstet Gynaecol* 2002; 99 (6): 976-80.
 15. Khouri J, Sultan M. Previous caesarean section and the rising incidence of placenta praevia and placenta accreta. *J Obstet Gynaecol* 1994; 14: 14-6.
 16. Wu S, Kocherginsky M, Hibbard JU. Abnormal placentation: twenty-year analysis. *Am J Obstet Gynaecol* 2005; 192 (5): 1458-61.
 17. Wen SW, Rusen ID, Walker M, et al. Comparison of maternal mortality and morbidity between trial of labour and elective caesarean section among women with previous caesarean delivery. *Am J Obstet Gynaecol* 2004; 191 (4): 1263-9.
 18. Hook B, Kiwi R, Amini SB, et al. Neonatal morbidity after elective repeat caesarean section and trial of labour. *Pediatrics* 1997; 100 (3 Pt 1): 348-53.
 19. Levine EM, Ghai V, Barton JJ, et al. Mode of delivery and risk of respiratory diseases in newborns. *Obstet Gynecol*. 2001; 97 (3): 439-42.
 20. Fogelson NS, Menard MK, Hulsey T, et al. Neonatal impact of elective repeat caesarean delivery at term: a comment on patient choice caesarean delivery. *Am J Obstet Gynaecol* 2005; 192 (5): 1433-6.
 21. Morrison JJ, Rennie JM, Milton PJ. Neonatal respiratory morbidity and mode of delivery at term: influence of timing of elective caesarean section. *Br J Obstet Gynaecol* 1995; 102 (2): 101-6.
 22. Weiner JJ, Westwood J. Fetal lacerations at caesarean section. *J Obstet Gynaecol* 2002; (22): 23-4.
 23. Rennie J. The Rising Caesarean Rate - a public health issue. Conference proceedings 23rd November 1999: London: National Childbirth Trust; 1999
 24. Flamm BL. Vaginal birth after caesarean (VBAC). *Best Pract Res Clin Obstet Gynaecol*. 2001; 15 (1): 81-92.
 25. National Childbirth Trust. NCT Evidence based briefing: caesarean section - part 1. *New Digest* 2002; 19: 27-9.
 26. Hibbard JU, Ismail MA, Wang Y, et al. Failed vaginal birth after caesarean section: how risky is it? 1. Maternal morbidity. *Am J Obstet Gynaecol* 2001; 184 (7): 1365-73.
 27. McMahon MJ, Luther ER, Bowes WA, Jr., et al. Comparison of a trial of labour with an elective second caesarean section. *N Engl J Med* 1996; 335 (10): 689-95.
 28. Rageth JC, Juzi C, Grossenbacher H. Delivery after previous caesarean: a risk evaluation. Swiss Working Group of Obstetric and Gynaecologic Institutions. *Obstet Gynaecol* 1999; 93 (3): 332-7.
 29. Biswas A. Management of previous caesarean section. *Curr Opin Obstet Gynaecol* 2003; 15 (2): 123-9.
 30. Landon MB, Hauth JC, Leveno KJ, et al. Maternal and perinatal outcomes associated with a trial of labour after prior caesarean delivery. *N Eng J Med* 2004; 351 (25): 2581-9.
 31. Greene MF. Vaginal birth after caesarean revisited. Editorial. *N Engl J Med* 2004; 351 (25): 2647-9.
 32. Smith GC, Pell JP, Cameron AD, et al. Risk of perinatal death associated with labour after previous caesarean delivery in uncomplicated term pregnancies. *JAMA* 2002; 287 (20): 2684-90.
 33. Goer H. A consumer viewpoint: "spin doctoring", the research. *Birth* 2003; 30 (2): 124-9.
 34. Guise JM, Berlin M, McDonagh M, et al. Safety of vaginal birth after caesarean: a systematic review. *Obstet Gynaecol* 2004; 103 (3): 420-9.
 35. Guise JM, McDonagh M, Osterweil P, et al. Systematic review of the incidence and consequences of uterine rupture in women with previous caesarean section. *BMJ* 2004; 329 (7456): 19-23.
 36. Smith GC, Pell JP, Pasupathy D, et al. Factors predisposing to perinatal death related to uterine rupture during attempted vaginal birth after caesarean section: retrospective cohort study. *BMJ* 2004; 329 (7462): 375-7.
 37. Smith GC, Pell JP. Outcomes associated with a trial of labour after prior caesarean delivery. Correspondence. *N Engl J Med* 2005; 352 (16): 1718-20.
 38. Smith GC, Pell JP, Dobbie R. Caesarean section and risk of unexplained stillbirth in subsequent pregnancy. *Lancet* 2003; 362: 1779-84.
 39. Kurinczuk JJ, Gray R, Brocklehurst P. Risk of stillbirth after previous caesarean section. *Lancet*. 2004; 363 (9406): 402.
 40. Bucklin BA. Vaginal birth after caesarean delivery. *Anesthesiology*. 2003; 99 (6): 1444-8.
 41. Committee on Obstetric Practice. Induction of labour for vaginal birth after caesarean delivery. ACOG committee opinion. *Int J Gynaecol Obstet* 2002; 77 (3): 303-4.
 42. American College of Obstetricians and Gynaecologists. ACOG practice bulletin: vaginal birth after caesarean delivery. Number 5 July 1999. *Int J Gynaecol Obstet* 1999; 66 (2): 197-204.
 43. Chauhan SP, Martin JN, Henrichs CE, et al. Maternal and perinatal complications with uterine rupture in 142,075 patients who attempted vaginal birth after caesarean delivery: A review of the literature. *Am J Obstet Gynaecol* 2003; 189 (2): 408-17.
 44. National Collaborating Centre for Women's and Children's Health. Caesarean section: clinical guideline. London: RCOG Press; 2004. Available from: www.nice.org.uk/pdf/CG013NICEguideline.pdf;
www.nice.org.uk/pdf/CG013fullguideline.pdf
 45. Goer H. VBAC and the New England Journal of Medicine. *Birth* 2002; 29 (2): 150-1.
 46. Enkin M, Keirse MJ, Neilson J et al. A guide to effective care in pregnancy and childbirth. 3rd edition. Oxford: Oxford University Press; 2000.
 47. Lieberman E, Ernst EK, Rooks JP, et al. Results of the national study of vaginal birth after caesarean in birth centers. *Obstet Gynaecol*. 2004; 104 (5): 933-42.
 48. Hodges S. Results of the national study of vaginal birth after caesarean in birth centres. *Obstet Gynaecol* 2005; 105 (4): 897.
 49. Leung AS, Leung EK, Paul RH. Uterine rupture after

continued overleaf...

...continued from previous page

- previous caesarean delivery: maternal and fetal consequences. *Am J Obstet Gynaecol* 1993; 169 (4): 945-50.
50. Bujold E, Gauthier RJ. Neonatal morbidity associated with uterine rupture: What are the risk factors? *Am J Obstet Gynaecol* 2002; 186 (2): 311-4.
 51. O'Brien-Abel N. Uterine rupture during VBAC trial of labour: risk factors and fetal response. *J Midwifery Womens Health* 2003; 48 (4): 249-57.
 52. Macones G, Cahill A, Pare E, et al. Obstetric outcomes in women with two prior caesarean deliveries: is vaginal birth after caesarean delivery a viable option? *Am J Obstet Gynaecol* 2005; 192 (4): 1223-9.
 53. Bujold E, Mehta SH, Bujold C, et al. Interdelivery interval and uterine rupture. *Am J Obstet Gynaecol* 2002; 187 (5): 1199-202.
 54. Esposito MA, Menihan CA, Malee MP. Association of interpregnancy interval with uterine scar failure in labour: a case-control study. *Am J Obstet Gynaecol* 2000; 183 (5): 1180-3.
 55. Hauth JC, Owen J, Davis RO. Transverse uterine incision closure: one versus two layers. *Am J Obstet Gynaecol* 1992; 167 (4 Pt 1): 1108-11.
 56. Bujold E, Bujold C, Hamilton EF, et al. The impact of a single-layer or double-layer closure on uterine rupture. *Am J Obstet Gynaecol* 2002; 186 (6): 1326-30.
 57. Cruikshank DP. The impact of a single- or double-layer closure on uterine rupture. *Am J Obstet Gynaecol* 2003; 188 (1): 295-6.
 58. Durnwald C, Mercer B. Uterine rupture, perioperative and perinatal morbidity after single-layer and double-layer closure at caesarean delivery. *Am J Obstet Gynaecol* 2003; 189 (4): 925-9.
 59. National Perinatal Epidemiology Unit. Caesarean section surgical techniques. Available from: www.npeu.ox.ac.uk/caesar/
 60. Shipp TD, Zelop C, Cohen A, et al. Post-caesarean delivery fever and uterine rupture in a subsequent trial of labour. *Obstet Gynaecol* 2003; 101 (1): 136-9.
 61. Shipp TD, Zelop C, Repke JT, et al. The association of maternal age and symptomatic uterine rupture during a trial of labour after a prior caesarean delivery. *Obstet Gynaecol* 2002; 99 (4): 585-8.
 62. Miller DA, Mullin P, Hou D. Vaginal birth after caesarean section in twin gestation. *Am J Obstet Gynaecol* 1996; 175 (1): 194-8.
 63. Lydon-Rochelle M, Holt VL, Easterling TR, et al. Risk of uterine rupture during labour among women with a prior caesarean delivery. *N Engl J Med* 2001; 345 (1): 3-8.
 64. Chilaka VN, Cole MY, Habayeb OM, et al. Risk of uterine rupture following induction of labour in women with a previous caesarean section in a large UK teaching hospital. *J Obstet Gynaecol* 2004; 24 (3): 264-5.
 65. Kayani SI, Alfirevic Z. Uterine rupture after induction of labour in women with previous caesarean section. *BJOG* 2005; 112 (4): 451-5.
 66. Guise JM. Vaginal delivery after caesarean section: determining thresholds for risks requires more than uterine rupture rates. *BMJ* 2004; 329 (7462): 359-60.
 67. Locatelli A, Regalia AL, Ghidini A, et al. Risks of induction of labour in women with a uterine scar from previous low transverse caesarean section. *BJOG* 2004; 111 (12): 1394-9.

Statistics Digest: Wales

Welsh Maternity Statistics have been published for the year ending 31 March 2004.

Key points

- 27,854 babies were born in hospital in Wales in 2003-04.
- Just under 3% of births took place at home or elsewhere; most babies (97%) were born in a hospital setting.
- The caesarean section rate has dropped to 23.8% from a high in 2002-03 of 25.1%. At 10.7%, Wales has a higher elective caesarean section rate than either England (9.6%) or Scotland (9%), though at 13.1% the emergency caesarean rate is the same as in England (13.1%) and lower than Scotland (15.4%).
- 76% of mothers under 20 years old had unassisted deliveries, 14% caesarean sections and 10% instrumental deliveries. For mothers aged 40 years old and over, 59% had unassisted deliveries, 32% caesarean sections and 9% instrumental deliveries.
- 73% of mothers had a total length of stay in hospital, including both antenatal and postnatal stay, of between one to three days, whilst 27% had a length of stay of four days and over.
- It is not possible currently to calculate a normal birth rate for Wales (defined as 'spontaneous onset, spontaneous birth with no general or regional anaesthesia') because the necessary information about anaesthesia (such as epidurals) is not available.

Live births - mode of delivery

Unassisted	65.9%
Induced	21.0%
Emergency caesarean section	13.1%
Elective caesarean section	10.7%
Vacuum extraction	6.7%
Forceps	2.3%

Note: In comparison to births data from other sources, it is likely that some births in maternity units in Swansea NHS Trust are omitted from Patient Episode Database for Wales (PEDW) due to a backlog in data processing.

Sources

- Maternity Statistics: Method of Delivery, 1995-2004. www.wales.gov.uk/keypubstatisticsforwalesheadline/content/health/2005/hdw200503312-e.htm
- www.birthchoiceuk.com/Professionals/