Vaginal birth after caesarean section in Zimbabwe and the Netherlands

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Chapter 4

General Discussion
**Why have caesarean section rates increased?**

Since the 1970s, caesarean section rates have increased world wide (Figure 1.4). The major contributors to this increase, as mentioned in chapter one, are the safety of the operation, fear for litigation, increasing age of women at the time of their first born, introduction of electronic fetal monitoring, more often diagnosing failure to progress, change in management of breech deliveries and last but not least repeat caesarean section without trial of labour (1-8). It is felt that the rising caesarean section rates are a cause for concern. As described in section 1.4.1, there is an increased maternal mortality of three to seven times compared to vaginal delivery (9;10). But also short-term and long-term morbidity of the mother like haemorrhage, thrombo-embolic disorders, placenta praevia and accreta are increased after caesarean section, compared to vaginal delivery (11-15). Neonatal morbidity has been reported to be higher after (elective) caesarean section than after vaginal delivery (16-18).

It is likely that a caesarean section rate of 3.6 to 6.5% (median 5.4%) is needed to address obstetric complications, and that a rate of 2% is an absolute minimum (19;20). In our survey in Mberengwa (section 2.4), we observed a caesarean section rate of 2.4% together with a symphysiotomy rate of 0.6% (21). Nowadays, caesarean section rates around the lower benchmark of 5% are found in developing countries only, where often rates are even much lower than 5%, which may indicate an unmet need for obstetric interventions for maternal indication (19;20). The lack of access to adequate emergency obstetric services leads to high maternal mortality and morbidity. In west Africa one woman in twelve dies from maternal causes, compared to 1 in 4,000 in Northern Europe (22). Many suffer from obstetric morbidity like vesicovaginal fistulae and infertility after complicated childbirth. Of course, higher caesarean section rates do not guarantee that all women who are in need of a caesarean section have access to this intervention. In fact, many caesarean sections may be performed unnecessarily. Latin America, with caesarean section rates up to 40%, is an extreme example (23). But also in Zimbabwe, the institutional caesarean section rates in private hospitals in Gweru and Zvishavane were 34.5% and 27.1% respectively in 1999 (24).

The debate on the increase of caesarean sections found its way in the editorials and formed the impetus for "An Evaluation of Cesarean Delivery" in the USA and the "National Sentinel Caesarean Section Audit Report" in the United Kingdom (3;8;25-29). In 1985, the World Health Organisation concluded that there were no additional health benefits associated with a caesarean section rate above 10 to 15% (30-32). Even these rather high targets, being a compromise between countries with low and high caesarean section rates, have been
challenged by Sachs et al. in 1999 when he wrote "setting a target rate is an authoritarian approach to health care delivery" (33). Recently, Matthews et al. stated that hospitals with high caesarean section rates have a different attitude towards obstetric intervention, resulting in lower perinatal mortality for all women giving birth in these institutions. He also opposes "desirable targets" like 10 -15 % as a maximum for caesarean section rates, but prefers a discussion on caesarean section rates based on "facts" (34). From the "National Sentinel Caesarean Section Audit Report" by Thomas et al. we know that about one fifth of the obstetricians in the United Kingdom were not bothered by the caesarean section rate in their institute, even if it was above 20% (8).

How do doctors cope with "facts" obtained from randomised controlled trials (RCTs)? Pare wrote a paper on "what determines clinical acceptance or rejection of results of RCTs by doctors?". Technologies which are simple to apply and have a single endpoint, show concordance between trial results and clinical use, e.g. the use of administering antenatal corticosteroids to the mother during preterm labour in order to minimise respiratory distress postpartum. Results of RCTs on this subject have been accepted and implemented by almost all obstetricians. But a more complex intervention, like fetal blood sampling in addition to a non-reassuring fetal heart rate, was poorly implemented. This technique is inconvenient to doctors and technically more difficult to apply (35). Thus, even "facts" originating from RCTs are not easily put into action. What will happen when doctors face the complexity of an continuously increasing caesarean section rate? Nowadays, in leading peer reviewed journals, research is published on elective primary caesarean section, on the right of prevention of pelvic floor damage and on prevention of urinary incontinence (36-39). These publications pave the way for accepting caesarean section as a better alternative to vaginal delivery. Caesarean section, being a clear endpoint, will be more easily accepted by doctors each time when "new evidence" against vaginal delivery arises. An example of inconsistent decision-making by many obstetricians is the immediate acceptance of caesarean section as the golden standard after the "term breech trial". The evidence of this trial was not unchallenged, but the clear endpoint did suit doctors (7;40;41).

In the USA, trial of labour and VBAC increased up to 28.6% by the year 1996 (42). Encouraging VBAC has been considered a key method of reducing the caesarean rate universally, and in the USA in particular (43). However, concern for maternal and neonatal morbidity, especially among patients who have a failed TOL, reversed the upward VBAC trend in the USA (Figure 1.5). Of course, the reported increased maternal morbidity and neonatal mortality after (failed) TOL is statistically significant, but how clinically relevant is a
uterine rupture rate of 0.4% compared to 0.2%, or a perinatal mortality of 1.3 per 1,000 compared to 0.11 per 1,000 (44-47)? From daily practice and common sense we know that expectant mothers want to have a birth that is "safest for her baby", which was confirmed by the National Sentinel Caesarean Section report (8). Surprisingly however, in the same report 50% of obstetricians thought an elective caesarean section was the safest option for a baby to be born! In an editorial, convinced by "the evidence" about the reported dangers of VBAC, Green supported elective repeated caesarean section instead of trial of labour, because "a woman wants the safest thing for her baby"; a policy that may suit many doctors (48). In many countries, the remuneration of (repeat) caesarean section is higher than of vaginal birth, and elective repeat caesarean section will decrease the disutility of working hours.

**What is the use and effectiveness of African maternity waiting homes, especially with respect to previous caesarean section?**

The economic situation in sub-Saharan Africa is deteriorating and, as a result, access to healthcare is decreasing. Buekens et al. mentioned caesarean section rates in Africa ranging from 1 to 6% (section 1.5.1). In 1999, the caesarean section rate in Zimbabwe was 3.1%. The percentage of births delivered in health institutions varied from 54% in Cameroon to 18% in Niger (19;24). These observations are far from the aim to have 85% of all births attended by skilled attendants by 2015 (49). Our study on maternity waiting homes in Mberengwa district, Zimbabwe, showed an institutional delivery rate of 78% (section 2.4) (21). A survey among women in Gutu district, a comparable area with maternity waiting homes in Zimbabwe's Masvingo province, reported 85% institutional deliveries (50). Thus, when accessibility to health care is poor, the alternative of a maternity waiting home seems a reasonable option. Risk perception and selection, once being the corner stone of the safe motherhood initiative, played a minor role for pregnant women in Mberengwa. Women with risk factors like previous perinatal death and previous postpartum haemorrhage were not using MWHs more frequently. Maternity waiting homes were accepted by the community as an answer to poor transport facilities. Fifty-nine of all women who delivered during the survey in Mberengwa stayed at one of the MWHs (Table 2.7). Previous caesarean section and primi parity were identified as risk factors and strongly associated with the use of maternity waiting homes and hospital birth (Table 2.12). One of the main reasons mentioned by women for giving birth at home was lack of money (Table 2.9). Only one woman with a previous caesarean section gave birth at home (Table 2.12). The VBAC rate in the MWH survey was 25/39 (64%). The
willingness of women with a previous caesarean section to use maternity waiting homes is in contradiction with an earlier report from the provincial hospital of the Midlands in Gweru (Zimbabwe, Figure 2.2). This report describes that women with a previous caesarean section were reluctant to attend the antenatal clinic. They came to the hospital in a more advanced stage of labour than women with no previous caesarean section and did not turn up for an elective caesarean section, often opting for an unsupervised home delivery (51). In Mberengwa district, trial of labour after previous caesarean section has been the policy for many years, which can explain the difference with Gweru hospital. Namely, an advantage of having a more liberal approach to a trial of labour after previous caesarean section is that women may be more likely to return to hospital for supervision of subsequent labour. The approach of promoting vaginal birth after caesarean section, with low elective repeat caesarean section rates, can only be achieved in a health care setting where maternity waiting homes are integrated into the regional maternal health care system.

Nevertheless, the resources of a community determine the use of maternity waiting homes (52). It can be expected that the use of maternity waiting homes will decrease during economic and social hardship; in Mberengwa, one third of the women who gave birth at home indicated "lack of money" as the main reason (Table 2.9). At the moment, unemployment in Zimbabwe is estimated at 60%, 25% of Zimbabwe's inhabitants are HIV positive and the political situation is unstable (53). Surviving has become priority number one, and gold panning along the rivers in Mberengwa will again be one of the main strategies in surviving the economic constraints, carried out by both men and women (54). Consequently, rural women, living under poor hygienic conditions, will have no time for antenatal care and no time to spend at maternity waiting homes. Women in a low income country like Zimbabwe are very well aware of which road leads to safe motherhood. This road, however, is often blocked by poverty.

Is a trial of labour after previous caesarean section safe for mother and child in rural Africa?

How should women with a previous caesarean section be managed in a developing country? Our study in Mberengwa (section 2.5) reported a VBAC rate of 56% after one previous caesarean section (55). Women with more than one previous caesarean section and women with a previous caesarean section for dystocia had VBAC rates of 11% and 18% respectively. After a previous caesarean section labour was not induced or augmented. We observed a
perinatal mortality of 43% and one maternal death. From our district survey on maternity waiting homes in Mberengwa, we calculated a caesarean section rate of 2.6% and a symphysiotomy rate of 0.6% (21). Data from our study are comparable to other studies from Zimbabwe. De Muylde r and Thistle et al. reported VBAC rates of 59% and 66% respectively (56;57). In a meta-analysis by Boulvain et al., reporting on 4,500 women with a previous caesarean section in sub-Saharan Africa, the VBAC rate was 48%, with a success rate after TOL of 71%; perinatal mortality was 58%; maternal mortality was 190 per 100,000 (58). The reported maternal mortality by Boulvain et al. is less than the estimated maternal mortality of 110 – 180 per 100,000 due to caesarean section in Africa, and also less than the reported maternal mortality of 360 - 610 per 100,000 live births in the general obstetric population of this region (59-63). Our study together with data from Boulvain, De Muylde r and Thistle support the relative safety of (a trial of) vaginal birth after caesarean section in rural Africa.

In our survey in Mnene, we offered a trial of labour to all women with one or more previous caesarean sections (55). Clinical judgement, however, was very strict. Due to contracted pelves, cephalopelvic disproportion is often more outspoken in Africa, which will influence the decisions of doctors during a trial of labour. After a known previous caesarean section for CPD or after more than one previous caesarean section, a TOL will be more easily converted to a repeat caesarean section. This might explain the lower VBAC rates after previous CPD (18%) and after more than one previous caesarean section (11%) compared to Western studies (Table 1.1 and 1.2).

The risk of uterine rupture in sub-Saharan Africa was 2.1% in the largest available meta-analysis (58). Why not offer elective repeat caesarean section to women with a high probability of a failed trial of labour instead of offering all women a trial of labour? In high income countries, morbidity after failed trial of labour is higher than after elective caesarean section. For example in Nova Scotia, Canada, the need for hysterectomy, uterine rupture, laceration of one or both uterine arteries, laceration of the bladder, ureter or bowel were reported to be 0.8% after elective repeat caesarean section (n=2,889) and 3.8% after failed trial of labour (n=1,287) (64). In Africa the situation is different; an elective caesarean section risks preterm delivery if estimates of gestational age are wrong, and without the technology of ultrasound this will be a common problem. The risk of dying due to caesarean section is 11 - 18% (range 6% to 50%) in Africa, compared to 0.06% (range 0.01% to 0.22%) in the USA (60;63;65;66). Major complications like life-threatening anaesthetic problems, surgical injury to the bladder or to the bowel, severe lacerations of the uterus, inverted T incision of the
uterus, postoperative shock, re-laparotomy for bleeding or abscess, burst abdomen or peritonitis were reported to be 11% by De Muylder in Gweru hospital among 230 elective repeat caesarean sections (67). In sub-Saharan Africa, caesarean section remains a major operation with substantial morbidity and mortality. In addition, a potential late risk of recurrent caesarean section is an increased incidence of placenta praevia and placenta accreta with complications such as hysterectomy and even maternal death. These risks may be more important in low income countries, where the total fertility rate (TFR) per woman is higher than in Western countries (68). For example, the TFR for a woman in Zimbabwe is 5 compared to 1.7 for a woman in the Netherlands (Table 3.1).

A policy of elective repeat caesarean section should be discouraged. The risk of uterine rupture and the risks after a failed trial of labour do not counterbalance the increased risks of elective repeat caesarean section. A liberal approach to a trial of labour should be supported, but its safety depends on the quality of supervision. In order to prevent the catastrophe of uterine rupture, intermittent fetal auscultation and the use of a partograph should be used to monitor labour. Women who wish to have a vaginal birth after caesarean section should be advised against home delivery or delivery at a health centre without facilities to perform an emergency caesarean section. The use of maternity waiting homes should be promoted. Nevertheless, it is obvious that, when a pregnant woman in Africa has previously had severe cephalopelvic disproportion with bladder damage, ruptured uterus or a classical scar, or when she has a malpresentation in the present pregnancy, caesarean section in early labour should be performed.

**What are the risk factors at caesarean section which predict failure of a trial of labour in subsequent pregnancy?**

In countries where morbidity and mortality due to caesarean section are low, the risk of trial of labour should be balanced against the risk of elective repeat caesarean section (section 1.6.3-4). Apart from the risk of uterine rupture, which occurs in the range of 0.4% to 2%, the patient is at increased risk of infection and other major complications, especially when a trial of labour fails (44;69). McMahon et al. found that, compared to an elective caesarean delivery, a trial of labour was associated with an almost two-fold increased risk of rupture of the uterus, hysterectomy and operative injury. These complications almost exclusively occurred in those women in whom the trial of labour was not successful (64). Also, in a study by Hook et al., sepsis of the neonate was increased after failed trial of labour (18). This emphasises the
importance of being able to predict the success rate of a trial of labour for a particular patient. An attempt has been made to develop scoring systems in order to predict a successful trial of labour. Rosen et al., as described in section 1.6.2, found a success rate of TOL greater than 50%, irrespective of the previous indication for caesarean section (70). In a scoring model by Troyer et al. only a non-reassuring fetal heart tracing on admission, a variable which cannot be discussed with a woman before labour starts, reduced the chance of success of a trial of labour below 50%. Otherwise success rates were high, and even after previous dystocia 63% delivered vaginally (71). Pickhardt et al. tried to formulate a prognostic model using stepwise logistic regression in order to predict the success rate of a trial of labour in 336 women. Their model used estimated fetal weight, number of previous caesarean sections, cervical dilatation and estimated gestational age as factors to predict the success rate of trial of labour. The positive predictive value was 63% to 72%, equal to the a priori expected success rate of trial of labour of 50% to 80% (72). Weinstein et al. performed stepwise logistic regression in a study on 471 women with one previous caesarean section. Bishop score of 4 or higher at trial of labour (OR 6.0; CI 95% 3.5-10.4), previous vaginal delivery (OR 1.8; CI 95% 1.1-3.1), previous breech (OR 1.9; CI 95% 1.0-3.7), and previous hypertension (OR 2.3; CI 95% 1.0-5.8) were related to higher success. Previous cephalopelvic disproportion showed no significant value in predicting the success rate of a trial of labour. In their proposed scoring model, all women had an expected success rate of trial of labour of more than 50% (73). Flamm et al. developed a predicting scoring model using data of 2,502 women with one previous caesarean section. The model was tested on a control group of 2,501 women. Previous vaginal birth was a major contributor to success in this scoring model. Other factors in the model were: age under 40, previous caesarean section not because of failure to progress, cervical effacement and dilatation. Even with the lowest score (no previous vaginal delivery and previous failure to progress), the success rate of trial of labour was 49% (74). For that reason, scoring models are of limited value in discriminating between women who will have a successful trial of labour and women who will need an emergency caesarean section.

In our study on risk factors at caesarean section and failure of subsequent trial of labour (section 3.2), we included only women who gave birth twice, to eliminate the influence of previous vaginal delivery (75). The VBAC rate was 49%, with a success rate of 71% after TOL. We showed that women who had had a previous caesarean section at more than 7 cm of cervical dilatation were more often offered an ERCS during a next pregnancy (OR 2.2; CI 95% 1.1-4.5). The labour pattern at the time of the first caesarean section (< 1.0 cm/h) is important for the prediction of VBAC. Women with risk factors at index labour like the use of oxytocin,
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a history of failure to progress/suspected CPD, cervical dilatation < 1 cm/h or contractions lasting more than 12 hours had significantly more chance of a failed trial of labour in subsequent pregnancy (Table 3.6). In our study, we outlined the importance of the partograph for future pregnancies, providing a proper diagnosis of failure to progress/CPD during a woman's first labour. We also identified birth weight of the new-born in subsequent pregnancy of more than 4,000 g to be strongly associated with failure of TOL (OR 6.6; CI95%, 2.4-18.4) (75).

Active management during the active phase of a woman's first labour, documented by an obtained partograph, will help to standardise and compare labour patterns (76-78). Labour pattern and previous dilatation have been studied before as predictor of VBAC. Hoskins et al. reported a success rate of only 13% in 245 women who had a caesarean section at full dilatation in their previous pregnancy (79). Other studies reported success rates of TOL ranging from 65% to 80% in women with previous dystocia in the second stage of labour (80-83). In a study by Jongen et al., even 55 women with a failed previous instrumental delivery had a TOL with a success rate of 75% (84). The above mentioned studies on trial of labour after previous caesarean section for dystocia in the second stage of labour had all TOL rates between 50 to 75%. Also in our study, caesarean section at the second stage of labour did not increase the risk of a failed TOL in subsequent pregnancy (Table 3.6). There are two reports which describe outcome of TOL in relation to birth weight and uterine rupture among women with one previous caesarean section and no other deliveries. In a study by Zelop et al. (n=2,749), the success rate of TOL associated with birth weights of 4,000 g or less was 71% versus 60% for those with birth weights > 4,000 g (p=0.001, RR 1.7; CI95%, 1.3 - 2.2). The rate of uterine rupture did not significantly differ between the two groups, 1% versus 1.6% respectively (85). Elkousy et al. studied a larger group of women (n=6,348) and identified a significant trend (p<0.001) in decreasing success rates of TOL with increasing birth weights (68% with < 4,000 g, 52% with 4,000 - 4,249 g, 45% with 4,250 - 4,500 g and 38% with > 4,500 g). The success rates of TOL were further decreased when the indication of the previous caesarean delivery was cephalopelvic disproportion or failure to progress (39% with 4,250 - 4,500 g and 29% with > 4,500 g). The uterine rupture rate in this subgroup was 3.6% for women with a neonatal weight of 4,000 g or more and 1.2% with a neonatal weight of < 4,000 g (RR 2.3; p<0.001) (86). Elkousy's study emphasises the need of information on the labour pattern at the time of the first caesarean section. Failure to progress/CPD, diagnosed at the first caesarean section in combination with an expected birth weight > 4,500 g in subsequent pregnancy, can help to identify women who have lower success rates of TOL and higher risks
of uterine rupture. The increased risk of uterine rupture and the lower success rates of TOL should be discussed with these women. Also a pre-pregnancy weight of the expectant mother of more than 135 kg (BMI 57 +/- 9kg/m²) reduced the success rate for TOL (n=30) to 13% (4/30; CI95% 3.7% - 30.7%) in studies by Carroll et al. and Chauhan et al. (87;88). Infectious complications after TOL were higher among these morbidly obese patients (53%), and lower after elective repeat caesarean section (28%). These results are incongruent with those of Edwards et al., who reported a 63% (5/8; CI95% 24% - 91%) success rate in a small group of 8 women who had a BMI of 50 or greater (89).

In addition, our study confirmed the speed of cervical dilatation as a tool in monitoring subsequent labour in women with previous caesarean section. Dilatation < 0.5 cm/h during subsequent labour was a risk factor for failed TOL (p=0.01, Table 3.7). Hamilton et al. studied dystocia and the course of labour in relation to uterine rupture (n=19) in a case-control study. When cervical dilatation was lower than the 10th percentile and was arrested for two or more hours, caesarean delivery would have prevented 42% (n=8) of uterine ruptures (90). This study of Hamilton confirms the use of a partograph as a tool for assessing those at risk of uterine rupture. These results confirm an earlier case control study by Leung et al. (n_cases=70); dysfunctional labour, mainly based on arrested dilatation for 2 hours or more, had a 7 times increased risk of uterine rupture (OR 7.2; CI95% 2.7-20.0) (91). Khan et al., in a retrospective cohort study (n=236), found an 8 times increased risk of uterine rupture (n=7) after an arrested dilatation for 2 hours or more (OR 8.0; CI95% 1.6-40) (76). A case-control study by Phelan et al. did not find a relation between a protracted active phase and uterine rupture (n=18) (92). The studies of Hamilton, Leung, Khan and our own study support the use of a partograph at a woman’s first labour, and at a subsequent TOL after previous caesarean section.

Is a trial of labour after two or three previous caesarean sections safe for mother and child?

Despite the fact that the absolute numbers of women with more than one previous caesarean section are small, in a general obstetric practice, the issue of how to manage their labour will arise several times a year. The major concern is the strength of the uterine scar and the chance of uterine rupture. The danger of uterine rupture to mother and child was described in sections 1.4.3.3 and 1.6.4.1 The risk of uterine rupture increases with the number of previous caesarean sections. Leung et al., Miller et al. and Caughey et al. reported a scar rupture rate
between 1.7 and 3.7% (Table 1.1 and 1.2) (91;93). Studies on more than one previous caesarean section show success rates of a TOL between 60 - 90% (Table 1.2).

In our study, after two or three previous caesarean sections the VBAC rate was low (20%). The TOL rate was 24%, with a high success rate (83%) (94). The uterine rupture rate was 1.7% after TOL and 1.1% at elective repeat caesarean section. There should be awareness of the fact that uterine rupture can also occur before the onset of labour, as happened with one woman in our study. Previous failure to progress did decrease the chance of a successful trial of labour (OR 0.4; CI95% 0.3-0.8). On the other hand, previous vaginal delivery is not a "conditio sine qua non" for a safe trial of labour after more than one previous caesarean section. In our study, 31 women had a VBAC without a previous vaginal delivery. One uterine rupture followed by hysterectomy could have been avoided if labour had not been induced with prostaglandins.

Induction and augmentation should not be started lightly. Even after only one previous caesarean section, induction of labour with oxytocin and prostaglandins significantly increases the risk of uterine rupture, compared to spontaneous onset of labour (section 1.6.4.2) (46). Without any intervention, women with more than one previous caesarean section already have a risk of uterine rupture during labour, which is higher compared to women with one previous caesarean section. Therefore it should be questioned if induction of labour is the safest strategy for such women. If there is an indication for terminating pregnancy and the spontaneous onset of labour can no longer be awaited, an elective repeat caesarean section is a slightly safer option than induction. Arrest of the progress of labour should not be followed by augmentation with oxytocin, but interpreted as dysfunctional labour with increased risk of uterine rupture (91). "After twice a caesarean section, prevent complications of trial of labour" should replace the dictum "twice a caesarean section, always a caesarean section".

There is little support for the concept of trial of labour in women with two or more previous caesarean sections. A study investigating the practices of consultants in the United Kingdom found that only 5% would support a trial of labour in women with more than one previous caesarean section, despite 97% of respondents supporting a trial of labour after one previous caesarean section (95). The recent "National Sentinel Caesarean Section Audit Report" confirmed the practices of supporting trial of labour after one caesarean section. However, no questions were asked about more than one previous caesarean section; it does not seem to be "an issue", unfortunately (8). Clinicians should support a woman's request for a trial of labour, regardless of the number of previous caesarean sections, provided she has been counselled with accurate information on outcome and risk.
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