Factors affecting VBAC success at a Tertiary Level Hospital in Pretoria, South Africa

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Abstract
There is growing concern about rising global caesarean delivery (CD) rates. One of the strategies to overcome this problem is to reduce primary caesarean section. A trial of labour following a previous CD is another option that may be explored.
Aim
The aim of the study was to determine the success rate and risk factors for women attempting vaginal birth after a prior caesarean delivery (VBAC).
Methods
This was a retrospective analysis from 2013-2018 of women attempting a vaginal birth after caesarean section at a tertiary level hospital in Pretoria, South Africa.
Results
The VBAC success rate was 36%. Factors that were associated with a successful VBAC were a third pregnancy, previous successful VBAC (61%), presentation in the active phase of labour and a neonatal birthweight of less than 3kg.
Conclusion
Pregnant women with a CD in a prior pregnancy should be appropriately counselled regarding delivery options. Risks and benefits of elective repeat caesarean delivery versus trial of labour should be clearly explained to expectant mothers.

Introduction
There is a global concern regarding the increasing rate of caesarean deliveries (CDs). While a CD may be a lifesaving procedure, it may be performed unnecessarily with no additional benefit. The World Health Organisation (WHO) states that there is no improvement in maternal and neonatal mortality if CD rates are in excess of 10-15% per region.[1] The CD rate in South Africa is presently 25% and this rate varies in different regions and institutions in the country.[2] In some regions the CD rate can be as low as 8% but in other institutions like Steve Biko Academic Hospital (SBAH) the rate is 53%. Caesarean delivery rates in tertiary institutions are generally higher than that of district level hospitals. While the reasons for the rise in CD are many and complex one of the reasons that has contributed to the increasing rate is the dictum "once a caesarean, always a caesarean".[3] This may lead to many repeat CDs being performed. With the increase in CD rates there is also an increase in the complications associated with repeat CD. These include, abnormal placentation disorders such as the placenta accreta spectrum disorders and placenta praevia. Women who have had a CD have an increased risk of unexplained stillbirth. [3] In low resource settings, CD is associated with high morbidity and mortality. Women who undergo a CD in South Africa are three times more likely to die than those who deliver vaginally.[2]

A study performed at Chris Hani Baragwanath Academic Hospital in Johannesburg, South Africa found that a previous CD was the third most frequent reason for CD, contributing 23% of all CDs.[4] A case series published in 2018 evaluating global trends for CD reported that countries such as Brazil and China had CD rates of 55.6% and 45.7% respectively.[5] Caesarean section rates for women classified as group 5 under the Robson classification system (group 5 = women with a previous uterine scar, who begin labour at or after 37 weeks gestation with a singleton cephalic presentation) contribute 32.7% in Brazil and 33.9% in China. This category, along with other strategies to reduce the CD rate, should be studied further.[5]

In the 1970's researchers began to collect data on trial of labour after prior CD. Some studies have reported success rates of up to 67% but rates vary in different parts of the world. The Royal College of Obstetricians and Gynaecologist (RCOG) quote figures as high as 85-90% success for VBAC.[6] A study conducted at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) evaluated the mode of delivery and outcomes of women with a single previous CD. The authors found that 63% of women with a single previous caesarean scar chose to attempt VBAC. The VBAC success rate in this study was 35%.[7]

The aim of the study was to determine the success rate and risk factors for women attempting vaginal delivery after a prior caesarean delivery.

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Methods

This was a retrospective analysis of women with one previous caesarean delivery attempting vaginal birth in the current pregnancy. Delivery information was obtained for women who delivered at SBAH from 2013-2018. SBAH is a tertiary referral hospital and is the only hospital performing VBAC in the central and eastern parts of the Tshwane District. Women with a CD in a prior pregnancy are counselled at their local ante-natal clinic or district level hospital about the risks and benefits of vaginal delivery versus elective CD. Women with the following clinical characteristics are advised not to attempt vaginal delivery: more than one previous CD, known previous classical uterine incision, prior uterine rupture, multiple gestations, previous uterine surgery in the upper segment of the uterus and those in whom vaginal delivery is contraindicated, eg placenta praevia. The level of healthcare worker providing the counselling ranges from a midwife to specialist. Women choosing to attempt vaginal delivery are requested to present to SBAH when in labour. Progress of labour is monitored using a partogram and surgeons, anaesthetists and theatre staff are available on site should an emergency CD be required.

Data were collected from the daily delivery record sheets that are completed for all women delivering at SBAH. Additional information was obtained from patient case notes and the maternity register.

Descriptive statistics in the form of means and standard deviations in the case of continuous data and frequencies and percentages in the case of categorical data were calculated. The sample size was calculated using the nQuery version 8.2.1.0, based on the suspect that 75% of women who attempt VBAC fail, and deliver by emergency caesarean section, with an accuracy within 0.05 (5%) with a 95% confidence. Ethical approval was obtained from the University of Pretoria Research Ethics Committee (ref: 270/2019)

Results

Two hundred and eighty nine maternal case notes were analysed for the study period from 1 January 2013 to 31 December 2018. The baseline characteristics of the study population are shown in Table 1.

One hundred and three women (36%) attempting a trial of labour had a successful vaginal birth. One hundred and one women who delivered vaginally had one prior CD while there were 2 women with 2 prior CDs. Both women with 2 prior CDs presented in advanced stages of labour and delivered vaginally before surgery could be arranged. Reasons for failed VBAC included: poor progress of labour (n=138, 74.2%), fetal distress (n=24, 12.9%), cephalo-pelvic disproportion (n=15, 8.1%) and 5 women (2.7%) later declined continuation of a trial of labour. Ninety-five percent (n=275) of women in the study population had no complications. There were 9 (3.1%) cases of postpartum hemorrhage, 5 in those who had a successful VBAC (4.8%) and 4 (2.1%) in the failed VBAC group. Two (0.7%) women required blood transfusions: one in the failed VBAC group and 1 in the successful VBAC group. There were no maternal deaths.

The mean neonatal birth weight was 2964g in the successful VBAC group, compared to an average of 3248g in the failed VBAC group. Four neonates (3.9%) in the successful VBAC group were born with a 5-minute Apgar score of < 7 compared to 7 neonates (3.8%) in the failed VBAC group (p = 0.91). Fifteen (5.2%) neonates required admission to the neonatal intensive care unit, 4 (3.9%) in the VBAC group and 11 (5.9%) in the failed VBAC group.

Table 1. Clinical characteristics of women admitted for trial of labour after caesarean section

Age (years)	
Mean(SD)	29.3 (4.7)
Obstetric History	
Parity, median (IQR)	1 (1-2)
Gravidity, median (IQR)	2 (2-3)
Race, n (%)	
Black	257 (88,9)
White	15 (5,2)
Indian	9 (3,1)
Colored	4 (1,4)
Not classified	4 (1,4)
Antenatal booking, n (%)	**279 (96.5)**
Number of previous caesarean deliveries	**n** (%)
1	285 (98.6)
2	4 (1.4)
Cervical dilatation on admission (cm)	**n,** (%)
1-3	178 (61.6)
4-7	71 (24.6)
8-10	40 (13.84)
Previous VBAC, n (%)	**33 (11.4)**
Previous vaginal delivery (unscarred uterus), n (%)	**69 (23.9)**
Indication for the primary caesarean delivery	**n** (%)
Fetal distress	148 (51.1)
Labor dystocia	78 (27)
Malpresentation	16 (5.5)
Failed induction of labor	15 (5.1)
Other /not recorded	32 (11.0)
Maternal weight, mean (SD)	**74.1 (11.4)**
HIV status	**n,** (%)
Positive	49 (17.0)
Negative	234 (81.0)
Unknown	6 (2.1)
Maternal co-morbidities	**n,** (%)
None	264 (91.4)
Hypertension	21 (7.3)
Diabetes	2 (0.7)
Asthma	2 (0.7)

Abbreviations: IQR; interquatile range, SD; standard deviation, VBAC; vaginal birth after caesarean section

Discussion

The VBAC success rate of 36% at our institution was significantly lower than rates reported in developed countries. The RCOG Green Top Guideline advises that women be counseled that the chance of the successful VBAC is approximately 70% but lower success rates have been reported for women of African ancestry.[6,8] Wu et al. reported a success rate of 54% for women from African regions.[9] Van Bogaert and van der Walt reported success rates of 42% and 54% respectively.[8,10]Both studies were carried out in South African hospitals with a similar population to our study participants. Factors that were associated with a successful VBAC in our study were a third pregnancy, previous successful VBAC (61% success rate), presentation in the active phase of labor, neonatal birthweight of less than 3kg. These findings were similar to findings by Wu et al, who reported that previous VBAC, previous vaginal delivery and Bishop score were associated with a significant likelihood of successful VBAC.[9] The average gravidity of the patients who had a successful VBAC was 3 and those who failed to achieve VBAC was 2, supporting the evidence that higher parity improves chances for a successful VBAC. Our study population in general had a low parity

Table 2 Factors associated with a successful vaginal birth after caesarean section.

Characteristics	Successful VBAC (n=103)	Failed VBAC (n=186)	p-value
Age, mean (SD)	29.0 (4.5)	29.5 (4.7)	0.43
Gravidity, mean (IQR)	3 (2-3)	2 (2-3)	**0.04**
Parity, mean (IQR)	1 (1-2)	1 (1-2)	0.08
Ante-natal care attendance, n (%)	102 (95.3)	179 (98.8)	0.07
Race, n(% of population)			
Black	92 (35.8)	165 (64.2)	
White	5(33.3)	10 (66.7)	
Indian	5 (55.6)	4 (44.4)	
Coloured/mixed race	4 (50.0)	4 (50.0)	
Previous successful VBAC, n (%)	19/31 (61,3)	12/31 (38,7)	**0.002**
Previous vaginal delivery n (%)	21 /62(33,9)	41/62 (66,1)	0.16
Maternal weight, mean (SD)	74.1 (11.7)	74.1 (10.9)	0.98
Cervical dilatation (cm) on admission			
1-3, n (%)	42 (39.3)	136 (73.1)	
4-7, n (%)	38 (37.4)	29 (15.6)	< **0.01**
8-10, n (%)	23 (23.3)	21 (11.2)	< **0.01**
Outcomes			
Reasons for failed VBAC			
Foetal distress		24 (12.9)	
Poor progress		138 (74.2)	
CPD		15 (8.2)	
Decline VBAC		5 (2.4)	
Not indicated		4 (2.2)	
Post partum hemorrhage, n (%)	5 (4.8)	4 (2.1)	0.37
Birth weight (g), mean (SD)	2964 (474.2)	3248 (409.9)	<**0.01**
10 minute Apgar score < 7, n (%)	4 (3.9)	7 (3.8)	0.91
NICU admission, n (%)	4 (3.9)	11 (5.9)	0.78

with mean of 1 in both groups. A previous vaginal delivery did not improve the chance of VBAC success in our study.

Seventy six percent of patients admitted in the latent phase of labour had a failed VBAC, compared to 43% those who were admitted active phase and 47% of those admitted in advanced labour. Presentation to the labour ward in advanced labour was associated with a 52% success rate. This rate is modest compared to the 60-80% success rate quoted by first world countries.[7] The admission Bishop score should be one of the factors considered during admission to predict the likelihood of a successful VBAC.

Several studies have found an association between the primary indication for the previous CD and the success rate of VBAC. The American College of Obstetrics and Gynecology Practice Bulletin 205 states that women with a prior CD for arrested labour are less likely to achieve a VBAC than those who have a CD for a non-recurring indication such as breech presentation.[3] Previous vaginal delivery and/or previous successful VBAC are also associated with higher VBAC success rates. Ten percent of study participants in our study had a previous successful VBAC while 21% had delivered vaginally previously. Of those with a previous VBAC, 61% (p=0.002) had a successful VBAC and 34% (p=0.16) of the patients with a previous vaginal delivery had a successful VBAC.

Complications of VBAC

The complication rate in our study was low. No woman attempting VBAC was admitted to the intensive care unit and there were no cases of uterine rupture. There was no significant difference in the rates of postpartum hemorrhage and only 2 women received a blood transfusion post- delivery (0.1%). Neonatal outcomes were also comparable between the 2 groups. Adverse outcomes were measured in terms of 10-minute Apgar score and Neonatal Intensive Care Unit (NICU) admission. Ten-minute APGAR scores of less than 7 were present in 3.74% of the successful VBAC group and 3.84% in the failed VBAC group. There was no significant difference in NICU admission between the 2 groups. The low complication rate observed in our study is most likely due with the strict VBAC protocol that was followed. All women admitted for trial of labour were admitted to delivery room where a drip and catheter were inserted. Labour progress was plotted on a partogram. If labour did not progress adequately, women were offered a CD and this was performed within an hour after the decision was made.

The time interval between the prior CD is important. Henler and Bujod found a significantly higher risk of uterine rupture for women who had had a CD in the preceding 24 months.[11] The risk of uterine rupture was 4.8% for those with a CD less than 12 months prior, 2.7% between 12-24 months and 0.9 % for those who attempted VBAC after 25 months.[11]This is important in counseling and policy making with regards to patient selection as suitable candidates for VBAC.

Counseling for VBAC

Counseling a woman about the benefits and risks associated with ERCD and VBAC is important and should be undertaken as early as

possible in the pregnancy. This will give the patient time to make an informed choice. It also allows the woman to have the opportunity to discuss, throughout the pregnancy, concerns and questions regarding the delivery. The health care provider should be able to give non-directive counseling and should have the necessary skills and knowledge about the different delivery options.

Nilsson et al conducted a study on views of women in countries with low VBAC rates.[12] The findings were that different caregivers have different views on VBAC. The differing views made decision-making difficult for women and counseling was framed by the attitudes and beliefs of the attending practitioner.[12] Counselling regarding mode of delivery in our study was performed by the attending registrar on call (91%), referring medical officer (3.5%) or midwife (4.8%).

Cost effectiveness of VBAC.

Failed VBAC is associated with both monetary and non-monetary costs including emotional and physical complications for the patient. Factors such as lengthier hospital stay and physical complications such as uterine rupture, post-partum hemorrhage, maternal sepsis and poorer neonatal outcomes have been reported.[3] Although the overall complication rate in our study was low, the average hospital stay for women who had a failed VBAC was increased by 1-2 days compared to women admitted for elective CD. The cost effectiveness of VBAC depends on the likelihood of successful trial of labour and the risk of complications. Gilbert et al found that TOLAC was only cost effective when the VBAC success rate was more than 46%.[13] Paré et al found that for a woman with a single prior CD planning one future pregnancy, an ERCD was preferred since it resulted in fewer hysterectomies.[15] In contrast, if several future pregnancies were desired TOLAC was preferred due to the overall reduction in cases of hysterectomy and placenta accreta.[14] This should be taken into consideration in our setting where resources are limited and staff and bed shortages are a constant problem. In addition, TOLAC was still more cost effective than ERCD in low risk women with a high likelihood of successful VBAC. Long-term effects of multiple repeat CD and the impact on future pregnancy complications must be considered. The review lists the conditions under which ERCD is more cost effective than TOLAC, "these include a low likelihood of high likelihood of TOLAC success, high likelihood uterine rupture and a high cost of TOLAC relative to ERCD and high likelihood of disutility resultant from stress urinary incontinence after VBAC."[15]

Other non-monetary considerations which are difficult to predict are the risks of increasing complications with higher numbers of CD. Often women find this difficult to understand as it is related to potential risk in a future pregnancy that they may have not considered yet. There may also be emotional distress to women who feel their reproductive choice of family size is limited if they deliver by CD. Women who achieve a successful VBAC are often very satisfied with the outcome as there is a sense of accomplishment that comes with the ability to deliver vaginally. Often both the women and physicians do not like the unpredictability of awaiting labor, while ERCD is timed for both the convenience of the doctor and patient.[3]

Strength and Limitations

The strength of this study is that all the deliveries were managed according to a strict protocol in the labor ward and this is an accurate indication of the success rate under optimal conditions in a tertiary center. A limitation of the study was that this was a single center retrospective study and some cases could have been missed. Study numbers of White, Indian and Coloured populations were low and do not necessarily reflect the true status in these groups.

Conclusion

The success rate of VBAC in our institution was 37%, which is comparable to other South African public health institutions. Although the short-term maternal and neonatal complication rates were low, the low likelihood of successful VBAC makes one consider the feasibility of encouraging women in our setting for TOLAC. The results of this study may assist with the development a VBAC success prediction model in our institution.

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