

Factors Associated with Success of VBAC in three teaching hospitals in Addis Ababa, Ethiopia: A case control study

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Table of Content

Acknowledgment-----	1
Table of contents-----	2
List of tables	
Acronyms	
List of tables	
<u>Executive Summary:</u>	5
<u>Statement Of The Problem</u>	6
<u>Significance Of The Study</u>	9
<u>Litrature Review</u>	12
<u>Objectives</u>	20
<u>General Objective</u>	20
<u>Study Area</u>	21
<u>Study Period</u>	21
<u>Study Design</u>	22
<u>Population</u>	22
<u>Source Population</u>	22
<u>Inclusion And Exclusion Criteria</u>	23
<u>Sample Size And Sampling Technique</u>	24
<u>Data Collection Methods</u>	25
<u>VARIABLES</u>	26
<u>Dependent</u>	26
<u>Independent</u>	26
<u>OPERATIONAL DEFINITION</u>	27
<u>Analysis</u>	28
<u>Budget</u>	29
<u>Work Plan</u>	30
ANNEX I Dummy Tables-----	32
ANNEX II Questionnaire-----	36

List of tables

Acronyms

AAU-----	Addis Ababa University
ACOG-----	American college obstetricians and gynecologists
C/S-----	Cesarean section
CI-----	Confidence Interval
CX.DIL----	cervical dilatation
GA-----	gestational age
GMH-----	Ghandi Memorial Hospital
HIV-----	Human Immuno deficiency Virus
IUFD-----	Intra Uterine fetal death
NRFHRP-	Non reassuring fetal heart rate pattern
OB-GYN-	obstetrics and gynecology
OR-----	Odds Ratio
RH- -----	Rhesus
ROM-----	rupture of membrane
SPH-----	Saint Pauls Hospital
SVD-----	Spontaneous Vaginal delivery
TAH-----	Tikur Anbessa Hospital
TOL-----	Trial of labour
VBAC-	Vaginal birth after cesarean section

Executive summary:

Brief Background Vaginal delivery after previous one cesarean section for a non recurring indication has been described with many evidences as a safe practice and success rate of 60-80 %.Hence many centers are offering VBAC for candidates leaving the century old dictum of once cesarean always cesarean. But predicting success of VBAC after TOL is still a difficult problem with lack of a validated tool of prediction world wide. Studies on predictors of success are few and most of them conducted in developed countries and difficult to generalize. Therefore assessing factors associated with successful VBAC is very important to counsel mothers on VBAC.

Objective To assess demographic, past and present obstetric factors associated with successful VBAC In three teaching Hospitals in A.A

Methods A case control study was conducted to compare the factors associated with successful VBAC in teaching hospitals in Addis Ababa in one year period. The cases were those successfully delivered vaginally and the controls were those with failed VBAC and delivered by C/S. The sample size was 101 vaginal deliveries and the controls were 103 failed VBAC patients which made the case to control ratio of 1:1. In this study the factors associated with success of VBAC were prim parity, history of still birth, history of successful VBAC in the past, rupture of membrane at admission, cervical dilatation at admission, presence of meconium and presence of malposition. Also 66 % of the failed VBAC patients had indications for the second C/S which could have been corrected by augmentation if there was no scar..

CONCLUSIONS and RECOMMENDATIONS It is possible to prepare a decision tool on the success of VBAC by taking important past and present obstetric and reproductive performance history as predictor..

CHAPTER -I

1.1 Statement of the problem

Caesarean delivery is most frequently performed surgical procedure world wide which is an operation done to deliver a baby through an incision in the uterus (1). Even though, variation exists in rates for caesarean delivery among countries; currently the rates range from 10% to 40% of all deliveries . The current Caesarean section rate of in some countries is too high and unsustainable, and according to the World Health Organization. In developing countries in particular the prevalence of women with multiple previous caesarean sections is becoming high due to high fertility.

For long time mothers with previous cesarean section deliver by cesarean section for their next pregnancy for fear of complications. So, previous cesarean section has been found to be the commonest cause of increased caesarean section rate in many parts of the world. (1) Repeat cesarean section is associated an increased risk of maternal complications and is unsustainable economically for most countries. Therefore trial of labor for selected group of patients with previous scar is a preferred strategy. In 1988, ACOG, recommended that, in the absence of a contraindication, a woman with one previous low-transverse cesarean delivery be counseled to attempt labor in a subsequent pregnancy. (1, 3)

Vaginal birth after cesarean section (VBAC) is associated with shorter maternal hospitalizations, less blood loss and fewer transfusions, fewer infections, and fewer thrombo-embolic events than cesarean delivery (2). Several reports have indicated that the absolute risk of uterine rupture attributable to a trial of labor is about 1 per 1000. In African studies too the incidence of rupture is only 2.1%.

There are substantial evidences that pregnancies with one previous cesarean section can have has a success rate of 60 to 80 percent of vaginal delivery if the indication for the primary cesarean section is a non recurring one. In many hospitals in sub-Saharan Africa a comparable success rate has been reported. In a meta analysis in sub Saharan African countries, the rate of TOL was ranged from 37% to 97% across reports With success of 63-75%.However, fear of rare complications, VBAC rate has decreased in the past ten years.

It was reported at several studies that, VBAC Success rates are high if the primary cesarean section indication was a nonrecurring indication (4).Some of the non recurring indications for cesarean section are, Failure to progress ,Fetal distress ,Placenta previa ,Transverse lie ,Breech presentation, Oblique lie ,Pregnancy induced hypertension, and Twins (17).Factors that have been associated with a lower success rate are gestational age greater than 40 weeks, birth weight greater than 4000 g, inter delivery interval less than 19 to 24 months, and maternal obesity.

The major causes of failed VBAC in some studies are slow progress of labor, dystocia, and fetal distress. This is because of the reservations put on augmenting labor on mothers with previous scar. Even though evidences are there which show no increased risk of rupture by augmenting labor in a scarred uterus, this continues to be the fact at many centers increasing the rate of failed VBAC.

The place of cesarean section to prevent HIV transmission to the baby among HIV positive mothers has been pronounced. It is said that C/S reduces the transmission by 50% if done electively or within 4 hours of rupture of membrane. But most of the studies favoring c/S came before the combined ARV regimens were being used. The American College of Obstetricians and Gynecologist (ACOG) recommends elective C/S at 38 weeks for women with VL above 1000 copies/ml to prevent MTCT of HIV .(14,15)

The recent WHO guideline is not in favor of doing cesarean section for an HIV positive mother who is on HAART or ARV prophylaxis for developing countries due to the associated surgical morbidities. But the practice of TOL and its success (VBAC) is not known for these groups of people. So it is very important the effect of HIV infection on the rate and success of VBAC in the study areas.(16)

TOL in developing countries like Ethiopia after one LSCS should be encouraged provided no absolute contra-indications for vaginal delivery. In major teaching hospitals in Ethiopia, VBAC has been practiced for some time. The number of mothers with previous scar is significant considering an estimated cesarean rate of 20-30 % in major hospitals and the increasing number of private hospitals. But, there are no studies done which address the issue of successful VBAC and its determinants in Ethiopia

Success rate which vary from 50-90% indicate that, factors associated with success are difficult to generalize and vary from center to center and there is no completely a reliable way to predict whether a trial of labor will be successful in an individual patient. More over, mother's choice on mode of delivery is the most important single factor in VBAC. Women's expectations for birth and mode of birth preferences are influenced not only by knowledge of the potential benefits and risks but also demographic, obstetrical and social factors. So, knowing factors associated with successful vaginal delivery would help counsel mothers for VBAC.

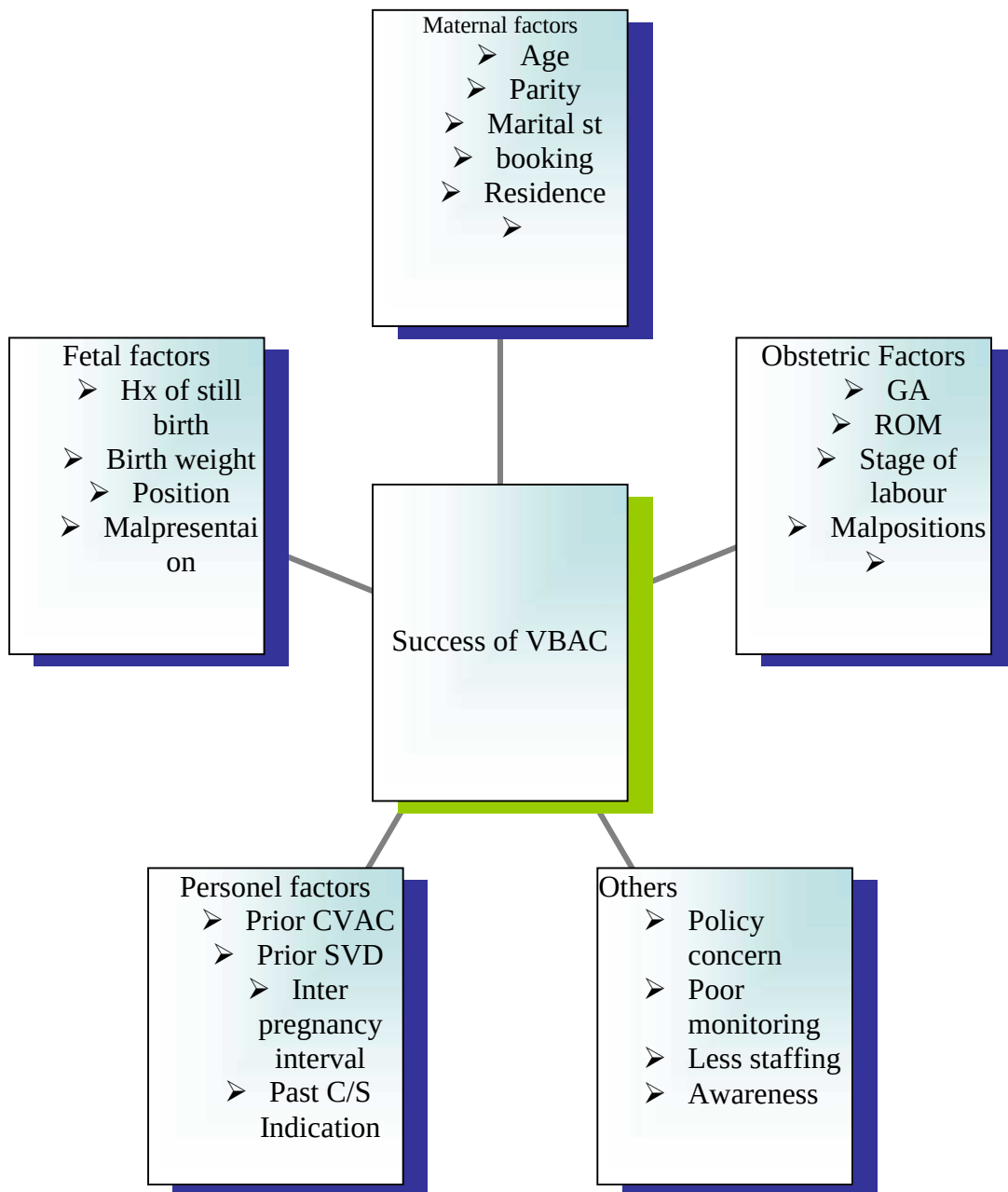
The crucial questions are how to reliably predict successful attempt at vaginal birth after Caesarean section, and how to determine and quantify the magnitude of the risk of failure that is acceptable to women. Many studies have addressed methods for identifying women at low and high risk of failure of an attempted vaginal birth after a prior cesarean but none of them have resulted in a validated result. Currently, therefore, there is no validated tool to predict the factors

determining successful vaginal birth among women with a prior cesarean delivery.

1.2Significance of the study

- 1 The purpose of the present study is to identify maternal demographic, past and present obstetric factors which are related with high success of VBAC in teaching hospitals in Ethiopia.
- 2 This study is supposed to explore some factors like GA, Birth weight and dystocia as cause of failed VBAC.
- 3 The identification of these factors could help in sorting out some factors which have a higher likelihood of successful VBAC and help develop a shared patient-physician decision tool.
- 4 This study will explore the rate and success of of trial of labour given to HIV positive women with one previous scar
- 5 It will explore the practice of cesarean section and its role as a PMTCT package for HIV positive mothers in the teaching hospitals
- 6 It can also be an input in the development of protocol on VBAC by the hospitals.
- 7 It can also be one reference for studies which will be conducted in the area of TOL.

Pathways conceptual framework for Successful VBAC



CHAPTER-II LITRATURE REVIEW

Caesarean delivery is a surgical operation to deliver a baby through an incision in the uterus, Cesarean section (C-section) is the most frequent surgical intervention worldwide. With the onset and evolution of anesthetic techniques during the previous century, and the development of antibiotic therapy in the 1960s, obstetricians were to find more and more reasons for carrying out this operation.(3)Its rate varies internationally from 10-25%.(4)The rate of caesarean section in most developed countries around the world has continued to increase over recent years, and currently accounts for 21.3% of all births in the United Kingdom, 23% in Northern Ireland , 23.3% in Australia , and 26% in the United States .(6,7,8,9). Caesarean section rates in South America are reported to be even higher, reaching in excess of 50% in some private hospitals in Chile, Argentina, Brazil and Paraguay.(10,11)

Many reasons have been suggested to account for the increase in caesarean section observed over recent years, including the increasing use of electronic fetal heart rate monitoring during labor, a reduction in the training available to obstetricians in both operative vaginal births and vaginal breech births, in addition to fears of litigation.(2) However, there are still complications associated with this procedure. Maternal morbidity associated with C-section is five to ten times greater than that associated with vaginal delivery. Maternal deaths considered to be caused by the procedure have been estimated at 5.8 to 59 per million C-sections. In one USA review, the only category in which maternal mortality did not decline during the 1970s was repeated cesarean deliveries, where the mortality rate was four times as great as for uncomplicated vaginal deliveries.(5)

In 1916, Craig made his famous, dictum, "Once a cesarean, always and a cesarean." Since then, Subsequent deliveries after a cesarean section used to be delivered by a repeat c-section. This policy was the result from the fear of catastrophic uterine scar. For almost a century, previous

caesarean section was the most common indication for a woman undergoing a repeat caesarean, accounting for 28% of births in the United Kingdom and over 40% of births in the United States. In South Australia, the main reason (56.6%) of elective caesarean and 13.9% of emergency caesareans were a previous caesarean.(5) In 1978,it was reported that subsequent vaginal delivery was safely attempted in 83 percent of their patients with prior cesarean deliveries with risk of rupture being rare in properly selected women.(3).Following this the American College of Obstetricians and Gynecologists issued a consensus statement supporting vaginal birth after caesarean section as a "safe and acceptable" care option, in an attempt to address the increasing caesarean section rate. Now, VBAC is becoming more and more common. (1)

ACOG put the following selection criteria useful in identifying candidates for VBAC: One previous low-transverse cesarean delivery, Clinically adequate pelvis, No other uterine scars or previous rupture, Physician immediately available throughout active labor capable of monitoring labor and performing an emergency cesarean delivery, and Availability of anesthesia and personnel for emergency cesarean delivery.

Circumstances under which a trial of labor should not be attempted are as follows: Previous classical or T-shaped incision or extensive transfundal uterine surgery, Previous uterine rupture, Medical or obstetric complication that precludes vaginal delivery, Inability to perform emergency cesarean delivery because of unavailable surgeon, anesthesia, sufficient staff, or facility, and Two prior uterine scars and no vaginal deliveries (1,2,3,4)

VBAC decreases the harms related with routine ERCS. Repeat elective caesarean birth is associated with an increase in need for blood transfusion, infection, damage to the bladder and bowel, and deep venous thrombosis. As the number of caesarean births for each individual woman increases, so does the difficulty in performing surgery due to adhesions, and the risk of

damage to the bladder or bowel at the time of surgery. There may also be difficulties in conceiving a further child or the development of placenta praevia or placenta accreta/percreta(1,2,3,4)

But VBAC is also associated with uncommon, but potentially serious complication, that of uterine rupture. If it fails, emergency cesarean section may be done which has increased chance of infection, bleeding, and deep venous thrombosis, when compared with both vaginal birth and elective caesarean birth.(4) A recent large-scale prospective study has shown that among women with a prior cesarean delivery, the rates of maternal complications are highest among women who attempt vaginal birth and fail (14.1%), intermediate among women who have a planned cesarean delivery (3.6%), and lowest among women who attempt vaginal birth and succeed (2.4%).Therefore, the balance of risks and benefits of trial of labor versus planned repeat cesarean section itself depends on the risk of emergency cesarean section should labor be attempted.

There is no recommended rate for VBACs, and it is not clear if higher or lower rates are preferable. The VBAC rate can be used for tracking trends in the performance of VBAC's over time, and for general information. The VBAC rate is calculated as the percent of deliveries among women with a previous Cesarean section that were performed vaginally (14)

While there is considerable variation in the proportion of women who are offered and attempt VBAC, successful rates of between 56% and 80% are reported in the literature. British figures indicate that among women with a prior caesarean section, 33% will successfully achieve vaginal birth in a subsequent pregnancy, although again there was considerable variation across institutions, ranging from 6% to 64% (6).

Rates of planned VBAC across sub-Saharan Africa are reported between 54 and 97%, with

successful vaginal birth being achieved in 63 to 84% of women].Ina meta analysis of 17 reports across Africa, The proportion of women who were allowed a trial of labor ranged from 37% to 97% across reports. The probability of a vaginal delivery among these women was 69% (95% CI 63-75% ..(12)

In a study done in Lahore, Success vaginal delivery was achieved in 70% of the patients and repeat emergency caesarean section was carried out in 30% of the patients. Leading indication for repeat caesarean section was failure to progress, fetal distress and scar tenderness. No maternal and fetal complication occurred .Criteria used to select women for a trial of labor appeared to have a limited impact on the probability of vaginal delivery. .Generally for developing countries, it is better to give trial of labor in patients who do not have absolute contra-indications for vaginal delivery.(13)

Despite widespread attempts to increase the proportion of women with a previous caesarean who attempt VBAC, the number of women attempting VBAC in recent years has declined markedly. This is highlighted by data from the United States, indicating a fall in the number of women attempting VBAC from 28.3% in 1996 to 12.7% in 2002 partly fear of litigations and increase of reports of complications.. As a result, many physicians and hospitals have discontinued the practice altogether.

This abrupt change in practice has contributed to the cesarean delivery rate in the United States increasing again, reaching an all-time high of 26.1% in 2002, while the VBAC rate has decreased by 55% to 12.6%(3) Hence, Public interest and debate over the relative safety of vaginal birth after caesarean continues, with calls from key international agencies for better quality evidence.

The Place of cesarean section among HIV Positive women

up to a third of infant HIV infection occur through transmission from mother during labour and

delivery, this period for prevention of MTCT is critical. Vaginal delivery is associated with increased MTCT of HIV as compared to C/S performed prior to onset of labour and rupture of membrane (1).

The American College of Obstetricians and Gynecologists (ACOG) recommends elective C/S at 38 weeks for women with VL above 1000 copies/ml to prevent MTCT of HIV (1). A meta-analysis of 15 Prospective Cohort studies, which included 8533 mother-child pairs found a 50% reduction in transmission rates on women who underwent a scheduled C/S before an onset of labour or rupture of membrane in women with VL above 1000 copies and no additional benefit in women with VL below 1000 copies (1).

However, prospective analysis of 1983 mother-infant pair in Europe between 1997 and 2004, suggested possible continuing benefit of C/S in women with lower VL, compartmentalization of HIV in genital tract acting as a reservoir independent of plasma VL was suggested as explanation for continuing protectiveness of C/S. Based on these findings in the United Kingdom, C/S is done at 38-39 weeks to all HIV infected women with informed decision for women whose VL is below 50 copies (). In some African countries like Tanzania, C/S for PMTCT purpose is prohibited because of potential morbidity and mortality associated with C/S (15). In contrast, according to the new Ethiopian Guideline, when resource is available and the patient fulfills the current recommendation allows C/S for the purpose of PMTCT (17).

What is the success rate for trials of labor?

Most published series of women attempting a trial of labor after a previous cesarean delivery indicate that 60–80% have successful vaginal births. The earliest studies usually included only those subjects who met strict inclusion criteria, excluding those who were not felt to be appropriate VBAC candidates. However, in a population-based study of nearly 40,000 women

from hospitals throughout California, 61.4% of women who attempted VBAC were successful. But the success rate is variable from center to center and country to country. It is also difficult to make comparisons between main factors affecting success of VBAC. But knowing factors affecting success of VBAC are quite important in the decision making process and patient counseling. (4)

There is no completely reliable way to predict whether a trial of labor will be successful in an individual patient. Even if many researchers have tried to develop prediction tools so far no universal criteria is available which accurately predicts successful VBAC.(5)

Generally, success rates for women whose first cesarean delivery was performed for a nonrecurring indication are similar to those of patients who have not undergone a previous cesarean delivery. in some reports it has been reported that success is related to sociocultural, economic, medical and institutional aspects and explain the preference of some women and their physicians for an abdominal delivery. (10)

The vaginal delivery rate probably exceeds 80 percent in the following subgroups: Previous successful TOLAC, Previous vaginal delivery, Previous cesarean delivery for non vertex presentation, Women with spontaneous onset of labor .Other factors that have been associated with successful TOLAC are young maternal age and favorable cervix.(3)

Most women who have undergone a cesarean delivery because of dystocia may have successful VBAC of (50–80%). If the prior cesarean delivery for dystocia was performed before complete cervical dilation (5–9 cm), success is 67–73% and full dilatation, 13%. Women who have given birth vaginally at least once are 9–28 times more likely to have a successful trial of labor than women who have not undergone vaginal delivery. If the most recent delivery was a successful VBAC, the likelihood of failure is reduced by 30–90%. (3).Factors that negatively influence the

likelihood of successful VBAC include labor augmentation and induction , maternal obesity , gestational age beyond 40 weeks , birth weight greater than 4,000 g , and inter delivery interval of less than 19 months .(2)

The following characteristics decrease the probability of successful TOLAC to below 75 percent: Increasing number of cesarean deliveries. Women delivered abdominally because of failure to progress have the lowest rate of successful TOLAC, although approximately two-thirds are delivered vaginally. The likelihood of successful TOLAC is higher if the cesarean was performed in the latent phase of labor, and it is lower if it was performed after full dilatation or if the neonate's birth weight has increased compared with the prior pregnancy. In one study, as an example, the rate of successful TOLAC was significantly higher after a prior cesarean delivery where maximum cervical dilatation was 6 to 9 cm than when full dilatation was achieved: 73 versus 13 percent. (4)

In a study conducted in Brazil from 1985-1995 the rate of TOL was found to be 11 %. The factors significantly associated with vaginal delivery were monthly family income below 5-fold the Brazilian minimum monthly wage, reliance on the Brazilian national health system for healthcare, low maternal age, and first cesarean section indicated because of fetal breech or transverse presentation, or twin pregnancy.(10)

In developing countries like Ethiopia, policy of once a caesarean always a caesarean section must be abandoned and replaced by once a caesarean always a hospital delivery.. Departmental policy regarding the criteria for selection of case, for trial of labor should be analyzed in depth and reviewed in order to increase the percentage of cases, which could be enrolled for trial of labor.

CHAPTER-III

OBJECTIVES

General Objective

To identify factors associated with successful VBAC among mothers with one previous cesarean section given TOL in three teaching hospitals in Addis Ababa

Specific objectives

- 1 To determine socio demographic factors associated with success of VBAC
- 2 To see the effect of factors related to past delivery differences on VBAC Hospitals
- 3 To identify factors related to the current labor and delivery on VBAC
- 4 To identify reasons for failed VBAC
- 5 To assess the rate and success of TOL/VBAC among HIV positive women and those having medical illness

CHAPTER-IV- Methods and Materials

4-1 Study Area

The study was conducted in three hospitals in Addis Ababa, Ethiopia; namely, Tikur Anbesa (TAH) Hospital, St. Pauls (SPH) Hospital and Ghandi Memorial Hospital (GMH).. In the three teaching hospitals an estimated 10,000 total of Deliveries are expected within one year which are registered on the log book.

4-2 Study Period

The study period was from May 2009 to May 2010 in the three teaching hospitals in Addis Ababa. This period was taken because the available registry and reporting formats were available in the period only.

4-3 Study Design

A case control study was conducted to compare factors associated with successful VBAC among mothers with one previous cesarean section and offered trial of labor with controls. It was a retrospective analysis from data obtained through Chart review review.

1 The **cases** were Patients with **successful VBAC**

2 The **controls** were patients with **failed VBAC**.

Matching was not done because there were no known confounding variables to match with and all the variables in the logbook were included for comparative analysis.

4-4 Population

Source Population

All deliveries conducted in teaching hospitals hospital in the specified time period and registered on the labor wards registry books. Most mothers are from Addis Ababa.

Study population

All mothers with one previous cesarean scar offered TOL in the study period.

4-5 Inclusion and exclusion criteria

Inclusion Criteria

All deliveries with only one previous scar and allowed VBAC according to the hospitals

Protocol and started labour spontaneously

Exclusion Criteria

- 1 Poorly registered cases
- 2 Those terminated by elective cesarean section
- 3 vertical, inverted T or unknown uterine incision,
- 4 Previous uterine rupture, previous uterine surgery (including hysterectomy or previous myomectomy involving entry of the uterine cavity or excessive myometrial dissection),
- 5 previous uterine perforation, multiple pregnancy,
- 6 any contraindication to vaginal birth (including placenta praevia, transverse lie, active genital herpes infection, breech presentations),
- 7 cephalo-pelvic disproportion as judged by the clinician,
- 8 Lethal congenital anomaly, fetal anomaly associated with mechanical difficulties at birth (such as hydrops, hydrocephalus, omphalocele).

4-6 Sample Size and Sampling technique

A double proportion sampling technique was used using EPI6 stat-calc taking Success rate as 70 % .The sample size was calculated to get a minimum OR of 2 among cases over controls with 95% confidence interval; and power of 80%.

CI	Power	OR	Estimated level of exposure among cases	Ratio(case: control)	Sample size
95	80	2	70	1:1	100:100 (200)

There fore the sample size for cases was 100 for cases and 100 for controls making a total sample size of 200..Because the sources of the data were nurses delivery log book, discharge summaries and OPD admission log books and these sources were not similarly available in the three hospitals it was not possible to get the full list of study units or sampling frame from which to select the cases and controls randomly. So we took every case and control in the study period until the minimum sample size was fulfilled. There were several missing charts and we took the available charts. Generally we obtained 101 vaginal deliveries and which constitute the group of cases and 103 controls which constitute the group of controls.

4-7 Data Collection Methods

The data was collected from patients charts which were traced by their card number and names and retrieving from the archives office of respective hospitals. Data collectors were residents who were oriented on the study objective and data collection tool with close supervision from principal investigator. The information which was extracted from the patient's charts was filled on the structured questionnaire which comprised of questions on maternal socio demographic, past and present obstetric experience, mode of delivery and birth outcomes. The information filled were only those available on the chart and with less missing variables.

4-9- VARIABLES

Dependent

1. mode of second delivery,

Independent

1. Maternal age at this delivery,
2. marital status
3. Parity
4. Gestational age
5. Booking status
6. Address
7. HIV status and presence of co morbid medical illness
8. Indication for c/S of the first and inter delivery interval
9. Hx of successful VBAC and history of prior SVD
10. History of still birth
11. Status of membrane at admission and duration rupture
12. Presence of meconium
13. Cervical dilatation at admission and position of the presenting part
14. Duration of labour
15. Mode of delivery
16. Indication of the second C/S
17. Birth weight and outcome of the baby
18. Any complications

4-8 OPERATIONAL DEFINITION

1. **Successful VBAC** –Successful vaginal rout delivery after TOL according to the hospital protocol
2. **TOL-** Mothers actually offered ,accepted and tried a chance of VBAC as decided by the attending physician
3. **Failed VBAC-** Mothers delivered by C/S after they were offered TOL
4. **Birth weight-** Birth weight of the baby immediately after delivery
5. **Indication Of past C/S-** An indication of the first C/S which was documented by the attending physician as told by the mother or reviewed from past chart
6. **Booked-** At least one visit in any health facility
7. **GA-** Gestational age determined from either LMP or early U/S
8. **Indication of the second C/S-** Indication of the second C/S obtained from chart
9. **Dystocia-** any sort of labor progress abnormality which needed augmentation
- 10.**Duration labor-** Duration of labor at admission as registered on the patient chart
11. **Inter delivery interval-**Interval between the previous and the current delivery
12. **Rupture of membrane-**rupture before admission to hospital
13. **Cervical dilatation** –cervical dilatation at the time of admission
14. **History of dead child-** any history of fetal or neonatal death in the past
15. **Complications-** any kind of complication happened before discharge related to the current delivery or surgery

4-10 Analysis

Data was entered after checking completeness, cleaning and coding into computer SPSS version 15 software .A bivariate analysis was done using chi square test for difference of proportions between cases and controls for categorical variables and results showed in OR and respective confidence intervals. .Analysis of variance to test difference of means for selected continuous variables was done between cases and controls, using independent t-test . A trend analysis using chi square test was done for continuous variables.Re categorization was made for some variables accordingly. Information is be generated in the form of tables, frequencies, percentages, OR, confidence intervals .A multivariate analysis was run using binary logistic regression backward conditional model to control the confounding effect independent determinants.

Ethical clearance

Ethical clearance was obtained from Addis Ababa university department of OB-GYN DRP committee and submitted to the hospital medical director before the start of the study. Confidentiality was highly secured.

The study participants will be informed about the purpose of the study and the importance of their participation in the study by contributing information that determine the rate of successful vaginal delivery after previous cesarean section. Also the study subjects will be informed as they can decline from the study. Then after assuring the confidential nature of responses and obtaining informed consent from the study subject information will be filled from the patient's charts was conducted with strict privacy.

Result

In this study a total of 204 number of mothers with one previous cesarean scar who were allowed trial of labor based on the hospitals protocol and who fulfilled the inclusion criteria of this study were included for this study. Of these 101 are the group of cases who have successfully delivered vaginally and an equal proportion of mothers, i.e 103 who delivered by cesarean section were taken as controls. The study participants were taken from the three teaching hospitals namely Tikur Anbessa hospital, Ghandi memorial hospital and Saint Pauls Hospital. All the patients were managed by the same protocol and same group of physicians. But the number of study units taken from Tikur anbessa Hospital was proportionally high.

94 (93.1%) of cases and 95 (92%) of controls were from Addis Ababa while few are from surrounding towns. All the study participants were married and booked. The place of ANC follow up was in the three hospitals but the majority was at health centers.

Regarding the indications of past cesarean section, 79(79.2%) of cases and 93(90%) controls had known indications. The known indications were fetal distress, malpresentations, big baby, failed induction and CPD. Of these 50(54.6%) of cases and 49(47.6%) of controls had transverse skin incisions for the last c/s.

There is no statistical difference between the two study groups on the means of maternal age, parity, gestational age, and birth weight of the current delivery. The inter delivery interval of the past cesarean section and the current delivery is ranging from one year to 15 years. The mean age of interval is 4.9 ± 2.8 years. But there is no difference of means between the two study groups. There was statistically significant difference of the mean values of cases and controls on cervical dilatation at admission, duration of rupture of membrane and duration of labor after admission.(table --)

Table-1 Maternal Demographic and Obstetric factors of study participants Compared

	Successful VBAC(cases)		Failed VBAC (Controls)	
	#	%	#	%
Maternal age				
<25	32	32	20	19.4
26-30	42	42	59	57.3
>30	26	26	24	23.3
Address				
A.A	94	93.1	95	92.2
Outside A.A	7	6.9	88	7.8
Parity				
I	65		78	
II	26		15	
>III	10		10	
Place of Booking				
This hospital	33	32.7	37	36.3
Other Hospital	21	20.8	16	15.7
H/C	47	46.5	49	48
GA				
Known	70	69.3	73	70.9
Unknown	31	30.7	30	29.1
Gestational age in weeks(among Known)				
<40	31	30.7	32	31.1
37-40	18	17.8	20	19.4
>40	52	51.5	51	49.5
HIV status				
Negative	79	78.2	85	82.5
Positive	9	8.9	8	9.7
Unknown	13	12.9	10	9.7
COMORBID ILLNESS				
YES	11	50.5	11	49.5
NO	90	49.5	92	50.5

Table-2 Comparison of cases and controls by factors related with past previous c-section

	cases		Controls	
	#	%	#	%
Type OF SKIN INCISION				
Transvers	50	54.9	49	47.6
Midline	41	45.1	54	52.4
Not documented	10		0	
Indication				
Known	79	79.2	93	90.3
Unknown	22	21.8	10	9.7

We have found that there is a decreasing tendency of successful VBAC above age 25 and above one parity which was found statistically significant. There was no also association found on the mode of delivery and, gestational age, history of abortion, place of ANC follow up, HIV status and presence of medical illness.(table).

Table 3.Independent t- tet for difference of means between cases and controls of selected variables

Variable	Successful VBAC(mean)	Failed Vbac(Mean)	p-value
Maternal Age	28.39 ±4.45	28.6± 4.1	0.79
# ANC Visits	2.43±3.04	2.24±2.23	0.632
parity	1.5 ± 0.88	1.39 ± 0.88	0.384
GA in weeks	39.75 ± 2.7	39.6 ± 2.6	0.61
Interdelivery interval	4.9 ± 2.8	4.64 ± 2.3	0.48
Duration of ROM	4.76 ± 4.8	8.63 ± 7.8	0.009
Cervical dilatation at admission	5.46 ± 2.45	3.3 ± 1.49	0.000
Duration of labor	4.9± 4.05	6.4 ± 4.7	0.018
Cervical dilation at time of C/S	----N/A	4.07 ± 1.85	N/A
Birth weight	3086 ± 487	3169± 411	0.193

Among the past obstetric performance of the mother, history of still birth was found to be associated with low chance of successful VBAC, while history of successful VBAC in the past was associated with high successes which were found statistically significant. Mothers who have unknown indications of the past cesarean section have a higher chance of success than those with known indications. Fetal distress and failed induction as past indications are associated low success. But there was no association found between success and vaginal delivery prior to the past cesarean section.

Regarding the current delivery, those mothers who were admitted after rupture of membrane, at active first stage of labor and having occipito-anterior position were having a higher chance of vaginal delivery which was found to be strongly statistically significant. Where as those with meconium and who didn't deliver within four hours of admission had a higher failure rate of VBAC which is also statistically significant. There was no association between the birth weight of the baby and the mode of delivery. There were four still births among the cases but they were all intra uterine deaths.

Table 4 Mode of delivery of cases with success full VBAC

<i>Mode of delivery</i>	<i>#</i>	<i>%</i>
<i>SVD</i>	<i>65</i>	<i>64.4</i>
<i>Vaccum</i>	<i>19</i>	<i>18.8</i>
<i>Forceps</i>	<i>17</i>	<i>16.8</i>

Table5 Indications of C/S for controls with failed VBAC

<i>Indication for C/S</i>	<i>#</i>	<i>%</i>
<i>Arrest d/o</i>	<i>23</i>	<i>22.3</i>
<i>Slow Progress</i>	<i>45</i>	<i>43.7</i>
<i>NRFHRP</i>	<i>19</i>	<i>18.4</i>
<i>CPD</i>	<i>8</i>	<i>7.8</i>
<i>others</i>	<i>8</i>	<i>7.8</i>

Regarding the mode of delivery, 65(64.5%) of the cases had spontaneous vaginal deliveries while the rest were instrumental deliveries. Among the controls the common indications for the cesarean section up on failed VBAC were slow progress (43.7) and arrest disorders (23.3).The others were NRFHRP and CPD. There were -- complications among the cases like tear and episiotomy infection, while among the controls there were -----complications like wound infection, extensions and PPH. There was one cesarean hysterectomy.

Generally the independent factors found to be associated with successful VBAC by the multivariate analysis with logistic regression were history of stillbirth, history of successful VBAC, admission at active first stage of labor, and occipito anterior positions.

Table 6 Multivariate analysis of independent variables associated with successful VBAC

Variable	Successful VBAC	Failed VBAC	Adjusted OR	95 % confidence interval
History of still birth	10/101	21/103	0.31	0.16, 0.96
Prior successful VBAC	20/101	7/103	3.40	1.12, 9.48
Cervical dilatation at admission < 4cm	28/101	70/103	0.15	0.08, 0.30
OP/OT positions	10/101	18/103	0.36	0.14, 0.96

Table 7 Bivariate analysis of cases and controls by selected present and past obstetric factors

	<i>cases</i>	<i>controls</i>	<i>CRUDE OR</i>	<i>95 % CI</i>
<i>Maternal age</i>				
<25	32	20	2.25	1.07, 4.73
26-30	42	59	1	1
<i>Parity</i>				
I	65	78	0.83	0.3, 2.31
II	26	15	1.73	0.51, 5.89
>III	10	10	1	
<i>Gestational age in weeks</i>				
<40	31	32	1.03	0.56, 1.97
40	18	20	1.13	0.53, 2.39
>40	52	51	1	
<i>Inter delivery interval</i>				
<2yrs	17	9	1	
2.1-4	14	22	0.34	0.1,1.08
4-6	24	30	0.42	0.14,1.23
>6	46	42	0.58	0.21,1.58
<i>Hx of stillbirth</i>				
yes	10	21	1	
No	91	82	2.46	1.03,5.98
<i>PAST C/S INDICATION</i>				
Known	79	93	0.39	0.16, 0.92
Unknown	22	10	1	
<i>Indication of the past cesarean section</i>				
Fetal distress	16	25	0.29	0.1,0.86
Malpresentation	17	19	0.41	0.13,1.22
Big baby	10	11	0.41	0.11,1.40
Failed Induction	10	14	0.32	0.09,1.12
CPD	12	14	0.39	0.11, 1.38
Others	14	10	0.64	0.18, 2.2
Unknown	22	10	1	1
<i>Health of baby of past C/S</i>				
Live	95	87	2.91	1.01, 8.77
Dead	6	16	1	
<i>Prior success ful VBAC in the past</i>				
Yes	20	7	3.39	1.27, 9.34
No	81	96	1	

SVD before c/s				
Yes	22	18	1.32	0.62, 2.79
No	79	85	1	
.ROM at admission				
Yes	52	40	1.67	0.92, 3.03
No	49	63	1	
Duration of ROM				
<12hrs	40	25	6.4	1.46, 32.1
>12 hrs	3	12	1	
Presence of Meconium				
Yes	11	27	1	
No	90	76	2.19	1.28, 6.72
Cervical Dilation at admission in cm				
≤ 3	28	70	1	
>3	73	33	5.53	2.91,10.56
Position of presenting part				
OA	38	21	1	
OP/PT	10	18	0.31	0.11, 0.86
UK	53	64	0.46	0.23, 0.92
Duration of labour after admission in Hours				
<4 hrs	56	42	1.81	0.16, 0.92
>4 hrs	45	61	1	
Birth weight in grams				
<2500	7	3	5.83	0.48, 93.2
2500-4000	92	95	2.42	0.4, 18.5
>4000	2	5	1	
No				

Discussion

This study was conducted with the main objective of identifying factors associated with successful vaginal delivery among mothers with one previous lower segment cesarean section scar who were allowed to undergo trial of labor .The main determinants found in this study were history of still birth, history of successful VBAC ,past indication of past C/S, presence of meconium, cervical dilatation at admission, rupture of membrane at admission and its duration and position of the presenting part. In this study parity, maternal age, gestational age, medical illness, HIV status ,inter delivery interval, history of SVD ,and birth weight were not found significant determinants.

The strength of this study is the inclusion of all patients with one previous cesarean scar and allowed VBAC according to the hospitals protocol. Strict inclusion and exclusion criteria were used. To increase precision 1:1 ratio between cases and controls was taken. Chart review along with residents working in the hospital also added to the quality of the information. Case ascertainment was done in such a way that after taking the mothers name and card number tracing was done to find the charts. Analysis was done for only variables with less missing value. There were some limitations to this study that should be mentioned here. First of all there could be a possibility of selection bias in the selection of cases and controls. Because there was no a proper sampling frame from which to select randomly, selection was conducted by tracing those mothers from discharge summaries, nurses reporting note and OPD admission registry. Even then there was inconsistency in these sources and there were several missing charts once selection was made. The second possible bias is information bias .There was differences on the information documented on the chart regarding certain variables like position of the presenting part, history and cervical diameter. For these kinds of cases the information extracted was those

documented by senior residents at the time of evaluation. There could also be a possibility of recall bias by the mothers at the time of clerking especially on the inter delivery interval and indications of past cesarean section .Ascertainment of maternal age and gestational age was also difficult..In addition there was poor documentation on important variables, like occupational status, educational status, Apgar score, blood loss, post delivery hematocrit and medical illness which has made these variables to be excluded from analysis.

In this study the univariate analysis showed that low maternal age and primiparity were associated with high success rate with vaginal delivery even though the bivariate analysis didn't show that. This is consistent with other authors due to low socioeconomic status and need for more children that are linked with these groups of mothers. Gestational age was not found a significant predictor of success in this study. There are reports which found that gestational age above 40 weeks is associated with poor success. But still others didn't find this result. In our case the finding could also be confounded by high number of unknown dates and ascertainment of correct date was not possible.

History of still birth was one parameter which was associated with poor success in this study. this could be arising from the assumption that the cesarean route of delivery would give the mother a higher chance of alive baby. But this was not supported by other studies and in this study too, there was no difference in the neonatal outcome between the two groups.

The other important finding is that HIV status and presence of co morbid obstetric or medical illness was not a significant factor which determined the route of delivery. This was arising from the assumption that cesarean delivery would decrease chance of vertical HIV transmission. But currently this trend should be outweighed with risk of post operative complications and infections.

Regarding the past cesarean section the inter delivery interval was not associated with success of delivery. On other reports it was found that interval of less than 2 years was associated with poor success but not in our case. This could be partly due to difficulty of case ascertainment and recall bias. Those mothers with unknown indications for past cesarean section have been found amazingly associated with high success. But this could be due to absence of documentation of past indications on the chart in which case it was considered as unknown. From known indications fetal distress, malpresentations and failed induction were associated with poor success. This is against other reports that breech as indication for past cesarean section is associated with good success.

History of successful VBAC in the past was found to be associated with success which is similar to other reports. But history of prior spontaneous vaginal delivery was not statistically associated with success unlike other reports. But on the univariate analysis more mothers with past SVD had successful VBAC.

Regarding the current delivery those who were admitted with rupture of membrane had a higher proportion of success. This is due to the labor accelerating nature of rupture of membrane. But those who had clinically detectable meconium were associated with poor success due to the fear of fetal distress.

The strongest factor determining success in this study was cervical dilatation at admission. Those who were admitted with cervical diameter greater or equal to 4 cm (Active first stage of labour) had a strong association than those admitted at cervical diameter of less than 4 cm (latent first stage of labour). This is due to high frequency of false labour and slow progress in these group of patients. In addition the lack of policy of augmentation of patients with scar in these hospital they will end up with cesarean section. This is also supported by the finding that the mean

cervical diameter at the time of cesarean section for failed VBAC group is -5.46 ± 2.45 . The other important factor determining success was knowing the position of the presenting part. Those having occipito anterior position were associated with higher success than those with OP, OT or unknown positions. Even though there is no report as to whether position of the presenting part is associated with success, physicians should be tolerant to let the labour progress unless they see clear signs of CPD.

There was no difference in the birth weight of both groups even though there are reports that macrocosmic babies have poor success. This could be because those mothers who were suspected to have macrosomia clinically would be allowed VBAC in these hospitals. In this study there was no difference in the health of the neonates in both groups, all are alive. This could be an evidence for the commonest assumption among mothers and physicians that vaginal route delivery increases perinatal death.

The indications of cesarean section for 2/3rd (66 %) of those with failed VBAC are slow progress and arrest of cervical dilatations. Both conditions could have been augmented if a policy of augmentation was there in these hospitals. The proportion of complications was also higher among the failed VBAC group which is consistent with several reports.

Generally the independent variables found to determine success of VBAC found with multivariate analysis were history absence still birth, history of successful VBAC, cervical diameter at admission more than 3cm, and occipito anterior position of the presenting part. The study failed to see the effect of socioeconomic status of the mother, past C/S indications and place of past cesarean section as determinants.

Conclusion

In this study it was found that factors related to successful vaginal delivery after trial of labour among mothers who had one previous cesarean scar are those related to past obstetrics performance and mainly to the current labor. The main determinants include history of stillbirth, history of successful VBAC in the past, rupture of membrane, absence of meconium, cervical stage of labor at admission, position of the presenting part, duration of labor, and knowledge of the previous indication for the past cesarean section.

Probability of successful vaginal delivery was found to be low in those who were admitted to labour ward at latent first stage of labour than those admitted later. It is found that admitting woman at latent first stage of labor reduce chance of success by 85 %. The presence of still birth, meconium and not knowing the position of the presenting part was also associated with cesarean section. Those mothers with history of successful VBAC had 3-4 fold incremental risk of vaginal delivery. Other factors were unknown indications for past cesarean section , rupture of membrane at admission and those who stayed less than 4 hours in the labor. From known indications fetal distress and failed induction were associated with failed VBAC.

Unlike other studies presence of comorbid obstetric or medical illness and HIV status were not found related with success. Successful VBAC was noticed among primipara ladies and those below 25 years of age, it was not found statistically significant. The majority of mothers who underwent cesarean section for failed VBAC were for indications that sought augmentation. The surgical complications following C/S were significantly high. There was no difference in the neonatal health between the two modes of deliveries.

We didn't find association with booking status, marital status, maternal age, place of ANC follow up ,parity, HIV status, medical illness, inter delivery interval ,past SVD, ,birth weight of

the current delivery. For lack of data socio economic factors were not analyzed.

Recommendations

Although success rate of 70 % has been reported for VBAC, a decision tool to predict those who have a higher chance of success still lacks. The general recommendation to have a higher success is to let the woman have trial of labor and strict labour follow up. The Hospitals may use the findings of this study to develop a decision tool and increase the success of vaginal delivery.

Based on our findings we recommend the following:

- ✓ Mothers who agreed on VBAC and fulfill the criteria need to be admitted to labour ward after They are in active phase of labour or after they have rupture of membrane
- ✓ Physicians need to counsel mothers with history of still birth to try VBAC because there is no significant difference on the outcome of the baby between the two modes of delivery
- ✓ Because there are ample evidences on the success of augmentation of patients with scar, a policy on augmenting those who have slow progress needs to be considered by the department
- ✓ Proper evaluation of the position of the presenting part and ascertainment of the past indication should be stressed
- ✓ Allowing TOL for mothers with co morbid medical and obstetric illness is to be encouraged
- ✓ HIV positive mothers on HAART should also be allowed TOL
- ✓ Proper documentations of the important patient data should be improved. Tracing of mothers who were offered TOL is extremely difficult to find from the archives room.
- ✓ This paper can be done with addition of important variables prospectively.

- ✓ The increasing rate of C/S is not justifiable while the vaginal delivery is safe. So taking the presence of factors which increase the success of vaginal delivery in the decision taking process and counseling needs to be encouraged.

ANNEX I

DATA COLLECTION FORMAT ON determinants of Successful VBAC.

I. Identification

1. Card #-----
2. Hospital-----
3. Delivery
 - 1.Succesful VBAC 2.Failed VBAC
5. Address
 - 1.AA 2.outside Addis
6. Marital status
 1. Married 2.Unmarried

II. Maternal Obstetric Information at this pregnancy

7. Maternal age----
8. ANC booking status, and # of visits-----
9. Place of ANC follow up
 - 1.At this Hospital 2.H/C 3.Private
- 10.Parity of the mother
 - 1.Para--- 2. Abortion----- 3.SVD(# and alive or dead)
11. Gestational age from LMP OR early U/S-----
- 12.Previous History of still birth
 1. yes 2.no
- 13.HIV status
 - 1.Negative 2.Positive 3.Unknown

14. Timing of HIV test 1) Before labour 2) At labour
15. If HIV positive, CD4 Count-----, Viral load-----
16. Treatment status 1) On HAART 2) on prophylaxis 3) No ARV
17. Obstetric illnesses
1. Preclampsia 2. Diabetes 3. Others

III. Previous c/s

15. Interval from the current pregnancy in years-----
16. Type of Skin Incision-----
17. Indication -----
18. timing of previous c/s-(elective/emergency)-----
19. Any post op complications-----
20. outcome of the baby-
1. Alive 2. Dead
21. Presence, # and outcome of Successful VBAC then, -----

IV. current delivery

22. ROM at admission and Duration of ROM-----
23. meconium
1. yes 2. No
24. Cervical dilatation at admission-----
25. Position of the presenting part-----
26. Duration of stay at labour ward before delivery---
27. Mode of delivery

1.SVD 2.Vaccum 3.forceps 4.C/S

28.Reason for failed VBAC

1.Slow progress

2.NRFHRP

3.Suspicion of Dehiscence 4.Dystocia 5.others

29.CX dilatation at decision of failed VBAC----

30.Birth outcome

1. Alive

2.dead

31.Birth weight-----

32.Any complication post partum-----

.References

1. American College of Obstetricians and Gynecologists (ACOG):
ACOG Practice Bulletin: vaginal birth after previous cesarean
delivery. Clinical management guidelines. *Int J GynecolObstet*
2004, 54:197-204
2. Gabbe's. Obstetrics: Normal and Problem Pregnancies, 5th
ed.2007. 3(19). 500-507
3. Williams Obstetrics 22nd edi. Prior Cesarean
Delivery.2007.4(26)
4. Up-to-date version 16.3.vaginal birth after cesarean
delivery.2008
5. Ugwumadu A. Does the maxim "Once a Caesarean, always a

Caesarean” still hold true? PLoS Med .2005.2(9): e305

6. .RCOG: The Sentinel National Caesarean Section Audit Report- RCOG Clinical Effectiveness Support Unit. RCOG Press; 2001
7. AIHW: Australia's mothers and babies 2000. In *Perinatal Statistics Series Number 12* Sydney, ; 2003.3.
8. Chan A, Scott J, Nguyen A, Keane R: Pregnancy outcome in South Australia, 2000. Adelaide, Pregnancy Outcome Unit, Epidemiology Branch, Department of Human Services; 2001
9. Menacker F: Trends in cesarean rates for first births and repeat cesarean rates for low-risk women: United States, 1990-2003. *Natl Vital Stat Rep* 2005, 54:1-8
- 10.Cecatti JG, Pires HMB, Faúndes A, Duarte Osis MJ. Factors associated with vaginal birth after previous cesarean section in Brazilian women. *Rev Panam Salud Publica*. 2005;18(2):107–13
- 11.Jodie M Dodd*1, Caroline A Crowther1, Janet E Hiller2, Ross R Haslam3 and Jeffrey S Robinson1 . Birth after caesarean study – planned vaginal birth or planned elective repeat caesarean for women at term with a single previous caesarean birth: protocol for a patient preference study and randomized trial *BMC Pregnancy and Childbirth* 2007, 7:17
- 12.Boulvain M, Fraser WD, Brisson-Carroll G, Faron G, Wollast

- E: Trial of labor after caesarean section in sub-Saharan Africa: a meta-analysis. *BJOG* 1997, 104:1385-1390
- 13.TAJ G., SOHAIL N., CHEEMA S.Z., ZAHID N., RIZWAN S.
Review of Study of Vaginal Birth After Caesarean Section (VBAC) *Lahore General Hospital, Lahore*, ANNALS VOL 14. NO. 1 JAN.- MAR. 2008: 13-16
- 14.HIV/AIDS Prevention and Control Office. Guideline for PMTCT of HIV in Ethiopia, July 2007
- 15.WHO. Antiretroviral Drugs for Treating Pregnant Women and Preventing HIV Infection in Infants in Resource Limited Settings towards Universal Access 2006. Geneva, Switzerland
- 16.Tanzanian Ministry of Health. Guideline for PMTCT of HIV in Tanzania, 2007
- 17.[What is Vaginal Birth after Cesarean Section? Healthwise®](#)
Knowledgebase, © 1995-2005 Health wise, Incorporated, P.O. Box 1989, Boise, Idaho 8370
- 18.Russillo B, Sewitch JM, Cardinal L, Brassard N: Comparing Rates of Trial of Labour Attempts, VBAC Success, and Fetal and Maternal Complications Among Family Physicians and Obstetricians, *J Obstet Gynaecol Can* .2008;30(2):123-128
- 19.Ezechi OC , Kalu BKE, Njokanma FO, Ndububa V, Nwokoro CA, Okeke GCE. TRIAL OF LABOUR AFTER A PREVIOUS CAESAREAN SECTION DELIVERY: A PRIVATE

HOSPITAL EXPERIENCE in Nigeria. *Annals of African Medicine* Vol. 4, No. 3; 2005: 113 – 117

20.AAFP's TOLAC Guideline,2005,page 1-5

21.Leeman LM, PlanteLA.Patient Choice Vaginal Delivery? *Ann Fam Med* 2006; 4:265-268.

22.Placek PJ,Taffel SM. Vaginal Birth after Cesarean (VBAC) in the 1980s.*Am J Public Health* ,1988;78:512-515.

23.Smith GCS, White IR, PellJP, Dobbie R (2005) Predicting cesarean section and uterine rupture among women attempting vaginal birth after prior cesarean section .*PLoS Med* 2(9): e252.