Delivery outcomes at term after one previous cesarean section

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ABSTRACT

Objective: To determine the maternal and perinatal outcomes at term in women with one previous cesarean delivery and with no history of vaginal birth.

Methods: This is a case-control study conducted at King Abdul-Aziz University Hospital, Jeddah, Kingdom of Saudi Arabia, between January 1, 1999 and December 31, 2002. One hundred sixty-two women with one previous cesarean delivery and with no previous vaginal birth were compared with 324 control women.

Results: The cesarean section rate was higher in the study group 40 (24.7%) versus 23 (7.1%) in the control group and was statistically significant ($p<0.001$). Seventeen (10.5%) were induced with prostaglandin E2, and 33 (20.4%) required labor augmentation with oxytocin in the study, versus 22 (6.8%) and 21 (6.5%) in the control group. The duration of labor was longer in the study women compared to the control group (7.6 ± 3.0 hours versus 6.0 ± 2.3 hours), and this was statistically significant ($p<0.001$). There was one uterine dehiscence, and 2 uterine ruptures in the study women, and none in the control group. Eight (1.65%) women had postpartum hemorrhage, 3 (0.62%) needed blood transfusion, and 7 (1.44%) developed postpartum pyrexia.

Conclusion: Women with no a prior history of vaginal delivery are considered less favorable, the vaginal birth after cesarean section success rate may be even lower if the indication for previous primary cesarean delivery was failure to progress, and may be associated with increased risk of uterine rupture. Further study is required to confirm our findings.

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Evidence-based medicine has prove that vaginal birth after cesarean section (VBAC) is relatively safe, and efficacious in appropriately selected patients, and has been considered a key method of reducing cesarean section rate. Several studies in the literature exist on vaginal birth after cesarean delivery. However, little distinction in obstetric outcomes is made between women with or without previous vaginal birth.[1] Those women who have not experienced previous vaginal delivery are functionally considered as nulliparous patients. Also, they have longer labor, and are more likely to required induction, augmentation, and analgesia.[2] Furthermore, the risk of less successful trial of labor, maternal and fetal morbidity is also increased.[3] In our society high parity is favorable, repeat cesarean is an unacceptable option by the couple and is considered a limiting factor. Our study aimed to determine the cesarean section rate, maternal and perinatal outcomes at term in women with one cesarean delivery and no previous vaginal birth.

Methods. This is a retrospective case-control study conducted at King Abdul-Aziz University Hospital, Jeddah, Kingdom of Saudi Arabia, between January 1, 1999 and December 31, 2002. The study group, which included all women with one previous low-transverse cesarean section and with no previous vaginal delivery, was reviewed (the medical records, labor, and delivery charts). Data were collected for the following variables; indications of previous cesarean delivery, maternal age, height, and weight, gestational age, gravidity, parity, abortions, medical disorders such diabetes mellitus (DM), pregnancy induced hypertension (PIH), induction of labor with prostaglandin E2 (PG E2), augmentation with oxytocin, and duration of labor. The outcomes measures; VBAC successful trial of labor and cesarean section rates, fetal birth weights, macrosomia ≥4000 g, maternal and fetal morbidity and mortality. The research and ethical committee at King Abdulaziz University hospital approved the study. The diagnosis of uterine scar dehiscence was an incidental finding made at the time of cesarean section, and was defined

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as a defect that involved the entire thickness of uterine wall but not the visceral peritoneum. Uterine rupture included a defect in the overlying peritoneum (entire thickness of uterine wall and the visceral peritoneum) with the extrusion of intrauterine contents into the peritoneal cavity. The inclusion criteria for the study were: 1. Patient completed 37-week gestation or more, 2. Patient agreed to undergo VBAC after counseling regarding the potential risks, 3. Cephalic presentation, 4. Fetal estimated weight <4000 g, 5. Absence of contraindications for VBAC. Exclusion criteria were: 1. More than one previous cesarean section, 2. Previous classical or low vertical uterine incision, 3. Multiple gestation, and 4. Breech presentation. Each case in the study group was compared with 2 multiparous women with ≥1 previous vaginal delivery (before and or after primary cesarean delivery) and were chosen as the control group women during the same period. Our labor protocol is the same as mentioned in previous publication.[4] The fetal heart monitoring was carried out for all women during labor. Augmentation with oxytocin (if needed) was administered at an initial infusion rate of 1-mU/minute to be increased every 30 minutes by 1-mU/minute until the patient has adequate uterine contractions (3 uterine contractions every 10 minutes, each lasting for at least 45 seconds) with maximum dose of 16-mU/minute. Analgesia in labor was provided by intramuscular pethidine with Phenergan and or inhalation analgesia (Entonox). In both groups, labor, maternal, and perinatal outcomes were compared. Successful VBAC was defined as woman attempting a trial of labor and succeeding in vaginal delivery, whether spontaneously, or assisted with vacuum or forceps.

Multiple logistic regression was performed to adjust for confounding variables, including maternal age, weight, gestational age, DM, labor induction, oxytocin use, labor duration, and fetal birth weight ≥4000 g. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS for windows, version 11). The percentage or means ± SD, Student t-test for continuous variables, and chi-square test or Fisher exact test for categorical data. Odd ratio (OR) and the 95% confidence intervals (CI) were computed. A *p*-value <0.05 was considered statistically significant.

Results. During the study period 16,071 women delivered, with 268 (1.7%) women with one primary cesarean section and no previous vaginal birth. One hundred and six women had elective repeat cesarean delivery, for the following reasons; 75 women for cephalopelvic-disproportion (CPD), 18 breech presentation, 5 twins, 6 request cesarean delivery, one triplet, and one placenta previa. One hundred sixty-two (1.01%) women met the inclusion criteria for the study group and attempted VBAC. The rate of VBAC in women with no prior vaginal delivery was 61%. Indications for primary cesarean delivery in both groups are presented in **Table 1**. Failure to progress was higher in the study than the control women, and statistically different (p=0.01). The control group included all women with previous vaginal birth before cesarean. Only 212 (65.4%) women have had ≥1 previous successful VBAC before the current pregnancy. **Table 2** shows maternal clinical characteristics of the study and control women. The control women were older in age,

Table 1 - Previous indications of cesarean delivery in the study group.

Variable	Study group No previous vaginal delivery (n = 162) n (%)	Control group Previous vaginal delivery (n = 324) n (%)	*P*-value
Failure to progress	60 (37)	86 (26.5)	0.01
Fetal distress	44 (27.2)	104 (32.1)	NS
Malpresentation	49 (30.2)	91 (28.1)	NS
Placenta previa	4 (2.5)	20 (6.2)	NS
Others	5 (3)	23 (7.1)	NS

Table 2 - Maternal clinical characteristics.

Variable	Study group No previous vaginal delivery (n = 162)	Control group Previous vaginal delivery (n = 324)	*P*-value
Pregnancy induce hypertension	6 (3.7)	5 (1.5)	NS
Diabetes mellitus	1 (0.1)	16 (5)	0.01
Age (mean±sd)	26.6 ± 4.2	28.8 ± 4.5	0.001
Gravidity (mean±sd)	2.2 ± 0.7	4 ± 1	0.001
Parity (mean±sd)	1 ± 0.0	2.6 ± 0.7	0.001
Abortions (mean±sd)	0.2 ± 0.7	0.4 ± 0.7	0.01
Gestational age (mean±sd)	39.3 ± 1.5	39 ± 1.3	NS
Maternal height (mean±sd)	153.4 ± 6.3	154.1 ± 6	NS
Maternal weight (mean±sd)	71.1 ± 16.1	72.1 ± 14.1	NS
Prostaglandin E2 induction	17 (10.5)	6 (3.7)	NS
Augmentation with oxytocin	33 (20.4)	6 (3.7)	<0.001
Labor duration (mean±sd)	7.6 ± 3.0	6.0 ± 2.3	<0.001

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higher in gravidity, parity, previous abortions, and DM, and were statistically different. Labor augmentation and duration are higher in the study compared with the control group ($p<0.001$). The comparison of the obstetric (maternal and perinatal) outcomes is shown in **Table 3**. The rate of successful VBAC was significantly lower in the study women than in the control group. Also, the cesarean section rate was higher, ($p<0.001$). Two uterine ruptures, one dehiscence, occurred in the study and with none in the control multiparous women. A review of the medical records for primary indication of cesarean delivery showed failure to progress, uterine ruptured at the second stage, fetal birth weights <4000 g, all had no inductions, their labor started spontaneously, and with no labor augmentation. Two infants were found outside the uterine cavity through the previous uterine scar with low Apgar scores at 5 and 10 minutes. One infant delivered in poor condition and developed neurological complications; the other one died at the age of 26 hours. The 2 uterine ruptures were repaired and received blood transfusion. The fetal birth weights and macrosomia between the 2 groups were not statistically different. Ten (2.1%) infants delivered with low Apgar scores <7 at 5 minutes, 4 out of 10 need intubations and were admitted to neonatal intensive care unit (NICU). The post delivery complications are reported in **Table 4**. Eight (1.65%) women developed postpartum hemorrhage due to uterine atony, 3 (0.62%) of 8 needed blood transfusions, 7 (1.4%) developed postpartum pyrexia and needed treatment with antibiotic. Also, the length of hospital stay was greater in the study women compared to the control group, and was statistically significant ($p=0.01$). Multiple logistic regression analysis was performed to adjust for confounding variables associated with the VBAC success trial of labor, uterine rupture, and dehiscence. Previous vaginal birth before and after cesarean delivery remained independently significant factors for VBAC success (OR 5.82, 95% CI: 2.91-11.64; $p=0.01$). When compared with women with no previous vaginal delivery, associated with lower success trial of labor and increased cesarean section (OR 3.5, 95% CI: 2.2-5.6; $p<0.001$). Also, more used oxytocin and longer labor duration in women with no previous vaginal delivery; this may increase the risk of uterine rupture (OR 2.9, 95% CI: 1.03-8; $p=0.03$ and OR 1.3, 95% CI: 1.1-1.6; $p=0.05$).

Table 3 - Maternal and perinatal outcomes.

Variable	Study group No previous vaginal delivery (n = 162) n (%)	Control group Previous vaginal delivery (n = 324) n (%)	*P*-value
Successful VBAC	122 (75.3)	301 (93)	<0.001
Cesarean rate	40 (24.7)	23 (7.1)	<0.001*
Reason for C/S			
FTP	29 (18)	13 (4)	<0.001
Fetal distress	11 (7)	10 (3.1)	<0.001
Fetal weight (mean±sd)	3178 ± 490	3170 ± 441	NS
Fetal macrosmia (> 4000 g)	8 (5)	15 (4.6)	NS
Apgar Ascore <7 (at 5-minutes)	3 (2)	7 (2.2)	NS
NICU admission	3 (2)	1 (0.3)	NS
Still birth		1 (0.3)	
Neonatal death	1 (0.6)		

* failed VBAC, VBAC - vaginal birth after cesarean section, C/S - cesarean section, FTP - failure to progress, NICU - neonatal intensive care unit,

Table 4 - Maternal morbidity.

Variable	Study group No previous vaginal delivery (n = 162) n (%)	Control group Previous vaginal delivery (n = 324) n (%)	*P*-value
Postpartum hemorrhage	4 (2.5)	4 (1.2)	NS
Blood transfusion	2 (1.2)	1 (0.3)	
Pyrexia	3 (2)	4 (1.2)	
Uterine-ruptured	2 (1.2)		
Uterine dehiscence	1 (0.6)		
Hospital stay (mean ± sd)	1.82 ± 1.4	1.3 ± 1.0	0.01

Discussion. The VBAC trial in women with no previous vaginal delivery before and or after cesarean delivery is challenging. The risk of uterine rupture has been estimated at 1:1000 deliveries, with higher rates found among women who attempted VBAC.[5]

Recently, Zelop et al,[2] reported the rate of uterine rupture among women with no previous vaginal delivery as 1.1% (30/2762), in comparison with 0.2% (2/1021) among women with previous vaginal delivery (adjusted OR 0.2, 95% CI: 0.04, $p=0.8$). However, the investigator did not give an explanation for the observed decreased risk of uterine rupture among women with previous vaginal delivery. Our finding results were similar, uterine rupture among women with no previous vaginal delivery was 1.9% (OR 1.7, 95% CI: 1.5-1.9; $p=0.01$). Whereas, no uterine rupture in multiparous women with previous vaginal delivery, a factor that is protective against uterine rupture and increases the success of a trial of labor. Furthermore,

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short labor duration and less used augmentation with oxytocin when compared to the study group ($p<0.001$). On review of the literature, several authors have the same finding results. In addition, they demonstrated that all their uterine ruptures were found in women with no previous vaginal delivery.[6,7] However, previous VBAC was considered a favorable factor and is associated with a higher rate of successful trial of labor. Hendler and Bujold[1] in their observational cohort study found an increased rate of uterine scar dehiscence. The higher rate of dehiscence does not reflect a higher rate of uterine rupture. However, the thickness of the lower uterine segment between women with and without a prior VBAC may need to be studied to confirm the finding.
McMahon et al[3] identified a 2-fold increase in major morbidity in the VBAC group compared with the elective repeat cesarean section group. Also, mentioned 2 uterine ruptures-related to perinatal death. We found, the major maternal morbidity among women who failed VBAC, and with no previous vaginal delivery. Three (1.9%) women had uterine disruptions. Serious fetal morbidity and mortality outcome associated with uterine rupture; one neonatal death, and one alive with adverse neurological sequelae.

Complications, such as puerperal fever, blood transfusion, and postpartum hemorrhage were comparable. When comparing women who have successful VBAC with those who have failed VBAC, the risk was greater in women attempted a trial of labor and failed. However, several authors reported, the morbidity is not increased among women with vaginal delivery before and or after the previous cesarean section.[6-10]

Recently published data on VBAC in grand multiparous women, previous vaginal deliveries were highly associated with the successful VBAC rate.[4] Gyamfi et al[11] reported, previous VBAC is 7 times more suitable to have a subsequent VBAC success (OR 7.4, 95% CI: 4.5-12.6) versus 2 with previous vaginal birth before cesarean (OR 1.8, 95% CI: 1.3-2.6). When control women were subgrouped, the effect of a prior vaginal birth before and after cesarean delivery on the VBAC success rate is demonstrated; 112 (34.6%) with no previous attempted of VBAC, the VBAC success rate was 98 (88%) (OR 2, 95% CI: 1.1-3.5; $p=0.01$), and 212 (65.4%) have previous vaginal delivery before and after (previous 1≥ successful attempted of VBAC), the success rate was 203 (96%). The combined effects of previous vaginal birth before and after cesarean delivery remained independently significant factors for VBAC success (OR 5.82, 95% CI: 2.91-11.64; $p=0.01$). Comparing this study group, the VBAC success rate was 122 (75.3%). Furthermore, 20 (50%) out of 40 women who failed VBAC and have repeat cesarean delivery; have had history of a recurrent indication. The VBAC success rate even lower 66.2% (OR 1.7, 95% CI: 1.1-2.82; $p=0.04$), when primary cesarean delivery was failure to progress.

Multiparous women tend to be older than nulliparous women and associated with medical complications such diabetes mellitus and commonly associated with large fetuses. The study results; the fetal birth weights and macrosomia were not statistically different between both groups. Although, the American College of Obstetrics and Gynecology guidelines for vaginal delivery after a previous cesarean delivery advised caution in the trial of labor of an estimated fetal weight of ≥4000 g.[12] Several authors found no impact of fetal macrosomia on predicting successful VBAC and the rate of vaginal delivery.[13-14] However, women with suspected birth weights of >4000 g, the rate of uterine rupture is 1.6% versus 1% with birth weight ≤4000g (adjusted OR 1.6, 95% CI: 0.7-4.1), and was not different.[15] Women with macrosomic fetuses ≥4000 g and with previous vaginal delivery, trial of VBAC may be a reasonable clinical option and dose not appeared to be substantially increased uterine rupture.[14,15] However, the ideal study design to assess the safety of trial labor in nulliparous women with one previous cesarean section is randomized clinical trial. Neither elective repeat cesarean nor trial of labor after cesarean delivery is risk free.

In conclusion, those women with no prior of vaginal delivery are considered less favorable, the VBAC success rate may be even lower if the indication for previous primary cesarean delivery were failure to progress, and may be associated with increased risk of uterine rupture. Further study need to confirm our findings.

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