

## Successful Vaginal Birth Subsequent to Cesarean Section

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### 1. ABSTRACT

Successful vaginal birth after cesarean section is more comfortable than repeat elective cesarean section. Trial of labor should take into consideration the patient's preference, together with the proper setting. **Aim:** identify factors affecting the successful vaginal birth subsequent to cesarean section in order to develop a predictive score for successful trial. **Subject & Methods:** a prospective study design at the delivery unit in delivery unit in Mansoura University, Egypt, Egypt. 200 parturient women who were selected purposively with previous one lower segment cesarean section. A structured interviewing schedule, maternal and neonatal assessment sheet, partograph, labor record; were used for data collection. **Results:** revealed that vaginal birth after cesarean section was successful in 76.5% of women and the rest 23.5% had failure in vaginal birth after cesarean section and underwent emergency repeated cesarean section. Positive factors which increase the likelihood of successful vaginal birth after cesarean were; younger women age, gestational age, parity, duration between the previous cesarean section and the present pregnancy, history of prior vaginal birth before the previous CS, and bishop score as well as neonatal weight. **Conclusion:** maternal age > 25 years, gestational age >40 weeks, parity more than three, duration between the previous cesarean section and the present pregnancy < 18 months, recurrent indication of CS and abnormal fetal condition, delay in labor progress as well as fetal weight >4,000kg. Furthermore, more problems during the fourth stage of labor were mostly exposed to ERCS. **Recommendations:** Vaginal birth subsequent to cesarean section trial of labor should be conducted in hospitals, with adequate facilities for immediate delivery and resuscitation of the newborn as well as high quality care and proper counseling from the nurse midwife. Furthermore, factors associated with failure in the successful VBAC as well as women with prior cesarean deliveries require special management, both antenatal, in labor and delivery.

**Keywords:** *Successful, Vaginal birth, Cesarean section*

### 2. Introduction

A Cesarean section is a surgical operation in which the mother makes incisions in her uterus (hysterotomy) and abdomen (laparotomy) to deliver one or more babies. After 28 weeks to deliver one or more babies. Cesarean section may be elective or emergency (1).

The term elective refers to a cesarean section performed when unfavorable circumstances arise during labor, whereas "elective" refers to a decision taken throughout pregnancy and before to the start of labor. The practice of elective repeat cesarean sections has been progressively evolving following the release of multiple research supporting the safety and effectiveness of a trial of vaginal birth after a previous C-section (2).

Over the past 20 years, the rate of cesarean sections has climbed from 5% to 25% in the United States and certain other western countries. Recurring cesarean procedures account for as much

as 50% of abdominal deliveries. One of the most important ways to lower the number of cesarean deliveries in the US is to encourage vaginal birth after cesarean delivery, or VBAC. After reaching a peak of 25% in 1988, the rate progressively decreased to 20.7% in 1996 (3). The increased use of trial of labor (TOL) following prior cesarean sections to promote vaginal birth after cesarean sections (VBAC) and lower the cesarean rate in the US is mostly to blame for this reduction.

According to the World Health Organization, no nation on earth can legitimately have a cesarean rate higher than 15%. The rate is, 36% in Brazil, 40% in Chile, 34.0% in Taiwan. And also is about 17%-40% in 19 countries in Latin America 22.4% in Italy, 21.4% in the United Kingdom, 26.1% in Turkey (4)

Although hospital cesarean deliveries rose to 22% in 2000, the rate of cesarean deliveries in Egypt is

still high. While the rate of cesarean sections climbed steadily in public hospitals, it was somewhat higher in private ones. The indication of a previous cesarean delivery accounted for about 25% of all cesarean deliveries. (5).

According to **Tahir et al. (2018)**, During Caesarean sections, the uterine incisions are made in different places. A lower segment incision is a horizontal incision that passes through the abdomen and the lowest part of the uterus. ('bikini line' incision), wounds are less noticeable, heal more quickly, and are less likely to become problematic in subsequent pregnancies. A vertical cut on the uterus is referred to as a classical incision. The abdominal incision can be made vertically or horizontally; it should only be made in severe cases or under certain circumstances, such as when the placenta is laying extremely low, the baby is sideways, or the infant is very little, as these factors may raise the risk of complications in subsequent pregnancies and deliveries (6).

Maternal indications for cesarean delivery include antepartum hemorrhage; Pregnancy induced hypertension, diabetes mellitus, cardiac diseases, dystocia, previous cesarean section, obesity, grand multiparas, genital herpes infections and human-immuno-deficiency virus Infections. While fetal indications for cesarean delivery include fetal distress such as a worsening abnormal heart rate during delivery, mal presentation, malposition, fetal macrosomia, cord prolapse, congenital anomalies and fetal thrombocytopenia (7).

Cesarean section having several maternal intra-operative complications such as anaesthetic complications, uterine lacerations, ureteral injury, bowel injury, uterine atony; In addition, post-operative consequences for mothers include wound infection, fascial dehiscence, urinary tract infection, delayed return of bowel function, and thromboembolic events. complications, Pelvic thrombophlebitis, maternal mortality, thromboembolism, bleeding, infection, unintentional surgical injuries, prolonged hospital stay, emergency hysterectomy, hospital readmission, adhesion formation, infertility, and risks associated with subsequent pregnancies such as uterine rupture, hysterectomy, and abnormal placentation (8). A cesarean section also comes with a number of risks for the baby, including asthma, iatrogenic prematurity, respiratory issues, fetal injuries, neonatal mortality, trauma, and inability to breastfeed. (9).

Vaginal birth after cesarean section, or VBAC, is the safe delivery of a child by many

women who have had a previous C-section. A VBAC has several advantages, including avoiding the risks of surgery (diminished blood loss, deep vein thrombosis, infections, etc.), preventing another scar on the uterus—which is crucial if the parturient woman intends to become pregnant again—faster recovery, and reduced risk for the unborn child (reduced risk of being admitted to a special care nursery for respiratory issues, for example). (10).

Trial of labor (TOL) not in: History of uterine rupture; Previous classical or T-shaped incision; Unavailable surgeon or anesthesia; Inability to perform emergency cesarean delivery; Obstetric or medical complications that prevent vaginal delivery (11).

Rupture of the **uterine** scar is one of the complications connected to VBAC. Approximately one out of every 200 attempts at a VBAC ends in uterine scar rupture. The risk of stillbirth and hysterectomy is higher in women with uterine ruptures. An unsuccessful labor trial that results in a cesarean delivery is a frequent consequence. In Brazil, up to 40% of women who try a vaginal birth by caesarean section experience complications. Fetal discomfort and labor dystocia are frequent instances of issues that call for a cesarean; Following a TOL, a cesarean section raises the mother's and the fetus's risk of infection. (12).

While they do not decide on the mode of delivery, nurse midwives play a crucial role in advising women about vaginal birth after cesarean section or labor trial by taking into account the various significant parameters pertaining to current pregnancy and previous cesarean section. Using a sufficient number of purposeful samples and a sufficiently homogenous population, the nurse midwife might help build a scoring system. By predicting a patient's odds of success and weighing the advantages and hazards, a labor after cesarean section trial's outcome may be improved by the use of such a scoring system.

## 2.1 AIM OF THE STUDY

to identify factors affecting the successful vaginal birth subsequent to cesarean section in order to develop a predictive score for successful trial.

### 2.2 Objectives:

1. *To determine the percentage of women with successful vaginal birth after cesarean-after trial of labor.*
2. *To determine the percentage of women with emergency repeated cesarean section- after trial of labor.*

3. *To determine the relative importance of the various factors that could affect the likelihood of a vaginal birth following a single cesarean delivery in order to create a predictive score for a successful trial.*

### 3. SUBJECTS AND METHODS

**3.1 Design:** A prospective study design

**3.2 Research Setting:**

This study was conducted on 200 women at the delivery room in delivery unit in Mansoura University, Egypt. This ward affiliated to the department of obstetrics and gynecology, during the period from 1<sup>st</sup> September 2022 till the end of February 2023.

**3.3 Sample:**

During a six-month study period, women were purposively recruited based on the following inclusion criteria: Women who had previously had one lower segment cesarean section, women who were parturients and wanted to try a vaginal birth after delivery, women who had a single viable fetus with vertex presentation at the beginning of labor, women who had a spontaneous onset of labor with an adequate pelvis, and women whose gestational age was greater than or equal to 37 weeks were all chosen. Women having a history of upper segment or uterine rupture, two or more CS episodes in the past, extreme cephalo-pelvic disproportion, Women with a history of CS who showed signs of CS during their current pregnancy and parturient women who refuse the trial of VBAC were excluded from the sample.

**3.4 Tools of data collection**

1. **An Interviewing questionnaire** that include personal, menstrual, obstetrical, and medical history such as; age, parity and gestational age and Present history of labor.
2. **Maternal assessment record** which include the finding of; **General examination** on admission to labor room (height, weight, and maternal vital signs), **Abdominal examination** to determine fetal heart rate and to assess the frequency, duration and intensity of uterine contractions, **Local examinations:** P.V examination to determine the cervical dilation, effacement, and station, and **Ultrasonography** to assess the gestational age, fetal viability, and fetal weight
3. **Partograph:** This was used to evaluate fetal and maternal condition as well as the labor progress during the active phase of the first stage of labor.

4. **Record used for labor;** it entails data about the mode of delivery whether spontaneous or assisted vaginal delivery or emergency repeated cesarean section and whether labor was augmented by oxytocin or not. As well as included data about the maternal postnatal problems such as: postpartum hemorrhage, hysterectomy, and evaluation neonatal condition

**3.5 Field study**

The delivery unit's policy during the study period was to permit all women who met the previously stated inclusion criteria and had undergone a lower segment cesarean section at least once to undergo the VBAC-TOL. The Faculty of Nursing submitted an official letter to the relevant authorities in the study setting in order to gain formal approval for data collection.

Relevant literature was reviewed in relation to the preliminary phase. This was beneficial for writing the literature evaluation as well as for choosing and preparing the data collection instruments. To evaluate the tool's content validity, a panel of three specialists in the field of obstetrics and gynecological nursing examined it. Adaptations were made in accordance with their assessment. Cronbach's alpha coefficient was determined in order to evaluate the tool.

**3.6 Ethical Considerations**

The Mansoura University Faculty of Nursing's Research Ethics Committee approved the research protocol (permission provided on May 14th, 2023 under Ref. No. o473). With the participants' informed consent, the interviews were conducted at a time and location of their choosing. The patients gave their informed consent before all interviews were recorded, anonymized, and subsequently analyzed and published. Parturient women who declined the VBAC trial were not included in the sample, and all procedures were carried out in compliance with the applicable rules and regulations. These women had an indication for CS during their current pregnancy.

**3.7 Pilot Study:**

In order to evaluate the applicability and clarify the practicality of the research tools, as well as to estimate the time required to complete the tools, a pilot study including 10% of the study setting sample that was excluded from the study sample was conducted. Additionally, it assisted in identifying any barriers and issues that might arise throughout the data gathering process. Based on the results of the pilot study, specific tool

modifications were made. After this pilot study, the procedure for gathering data was carried out.

### 3.8 Statistical analysis

Version 20 of the statistical package for the social sciences (SPSS) was used to handle and evaluate the data that was gathered. While qualitative data was expressed as numbers and percent, quantitative data was expressed as means $\pm$ SD. The significance of quantitative variables was tested using the Student t-test; the significance between qualitative factors was tested using the Chi square and Fisher's exact test.

For every important predictive feature in the study, odds ratios and 95% confidence intervals (CI) were computed in order to establish the prediction score for successful vaginal delivery following cesarean section. table including the predictive score variables, and each variable was assigned a score based on the 95% confidence interval and odds ratio values. Odds ratio: Represent the influence of each significant variable on the successful VBAC chances e.g., Bishop score  $\geq 4$  having odds ratio 14.8, means that women with Bishop score  $\geq 4$  are 14.8 more times to deliver by vaginal delivery compared with women with Bishop score  $< 4$ .

#### Scoring system

The goal of the current study is to create a scoring system that can reasonably forecast the likelihood of a successful vaginal birth after a cesarean section. The odds ratios for the factors that substantially impact the success rate of vaginal delivery following a prior cesarean section were used to compute this. The following factors carried considerable weight in predicting vaginal birth following cesarean section:

1. Bishop score  $\geq 4$ .
2. Previous vaginal delivery before the previous CS.
3. Indications of the 1<sup>st</sup> cesarean section were breech presentation, fetal distress and pregnancy induced hypertension.

So, if the woman had Bishop score  $> 4$  on admission to Labor and Delivery Unit, the woman will get 6 points, if the woman had previous vaginal delivery before the previous CS, 4 points will be given. While if the woman's previous CS was due to breach presentation, Pregnancy Induced hypertension (PIH) or fetal distress 2 points will be given.

When choose one primary indication only for the previous CS the calculated probabilities for successful VBAC was given a maximum score of

12 Given a score of at least 4, the likelihood of a vaginal delivery following a cesarean surgery is 68%; if a score of at least 6, the likelihood is 88%; and if a score of at least 10, the likelihood is 90%.

### 4. Results

**Table 1** shows that more than half (57.5%) of women were below 25 years old, and the mean age was  $26.1 \pm 4.9$  years. As for parity; more than two-thirds of the studied women (68.5%) had  $\leq 3$  previous deliveries. Meanwhile, the gestational age almost three quarters of (71.5%) of women was between 37<sup>th</sup> to less than 40 weeks. As for the spacing between the cesarean section and the present pregnancy, the highest percentage of women (56.5%) was  $\geq 18$  months.

**figure 1** shows about 76.5 percent of parturients who had cesarean sections successfully gave birth vaginally (VBAC). Out of these, only 3.5 percent underwent aided vaginal delivery, while the remaining 23.5% underwent emergency repeated cesarean section (ERCS) because of either fetal distress or failure to achieve vaginal birth following cesarean section.

**Table 2**, Compared to the elder group, women between the ages of 20 and under 25 were far more likely to experience a VBAC failure (88.4% vs. 11.6%, respectively). According to the table, 57.5% of women who successfully underwent a VBAC were employed, whereas just 38.3% of women who underwent an ERCS were. In addition, compared to women who underwent ERCS, the majority of women who had successful VBACs had low parity ( $\leq 3$ ). Furthermore, the likelihood of a successful VBAC was higher for gestational ages between 37 and less than 40 weeks, compared to 7.4% for the ERCS group. (81.8 %, 92.6 % vs. 18.2%, 7.4%, respectively, for parity & gestational age, respectively). Difference observed is statistically significant ( $p = 0.00^*$ ).

**Table 3** indicates that the likelihood of a successful VBAC was higher for women who had a longer interval ( $\geq 18$  months) between their previous cesarean section and their current pregnancy (88.1 % vs. 11.6%, respectively) than for the ERCS group. Fetal distress accounted for 41.7% of cases of ERCS, with failure of labor progress (33.3%) and twin pregnancies (25.0%) following as the most common indications. However, malpresentation, antepartum hemorrhage (APH), or pregnancy-induced hypertension (PIH) accounted for the majority of women who had successful VBACs; their prior CSs were (86.8%, 82.0%, and 81.0%,) respectively.

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It is clear in **table 4** that the incidence of successful VBAC was significantly higher in women who had a history of previous vaginal birth before their previous CS, compared to those who had not (85.9% & 58.3%, respectively). Moreover, women who had ERCS were less likely (14.1%) to have vaginal birth before their previous CS compared to those who had successful VBAC (85.9%). The difference observed is statistically significant ( $P=0.00^*$ ). Moreover, Bishop is significantly associated with successful VBAC. Thus, the proportion of women who had a score of  $\geq 4$  were significantly more likely to have successful VBAC than those with Bishop score  $<4$  (80.5 % & 33.3%, respectively).

**Table 5** indicates that there is a trend toward an increase in the occurrence of an Apgar Score of less than 7 (100.0%) at 5 minutes in the ERCS group, as opposed to none at all in the successful VBAC group. This is statistically significant. Meanwhile, exposed to NICU admission was, also, 100.0% in the ERCS group. Moreover, babies had normal a neonatal weight were more likely to be delivered by successful VBAC (92.7%). And the rest had abnormal a neonatal weight were significantly more likely to be delivered by ERCS (60.0%). Differences observed are statistically significant ( $p=0.00^*$ ).

**Table 6** demonstrates the connection between the current delivery method and the issues faced by mothers. The outcomes showed that

uterine dehiscence (100.0%) was more common in women with ERCS. receive blood transfusion (83.3%) and have postpartum hemorrhage (55.2%) than those who had successful VBAC (0.0%, 16.7%, and 44.8%, respectively). As for the hospitalization period, the same table points to a statistically significant relation, with a trend toward decreasing mean ( $1.2 \pm 0.7$  days) of hospitalization period among those who had successful VBAC. Difference observed is a statistically significant ( $p=0.00^*$ ).

**Table 7** represents the influence of each significant variable on the successful VBAC chances. It is clear that the Bishop score  $\geq 4$  having odds ratio 14.8, means that women with Bishop score  $\geq 4$  are 14.8 more times to deliver by vaginal delivery compared with women with Bishop score  $< 4$ .

**Table 8** demonstrates the scoring method for predicting a successful VBAC using the odds ratios and 95% confidence interval values., and the significance of the odds ratio for each variable in the table. Calculated probabilities for successful VBAC was given a maximum score of 12: If score  $\geq 4$ , chances for vaginal birth after cesarean section are  $\geq 68\%$ , if score  $\geq 6$ , chances for vaginal birth after cesarean section are  $\geq 88\%$  and if score  $\geq 10$ , chances for vaginal birth after cesarean section are  $\geq 90\%$ .

**Table 1: Distribution of the Studied Women According to their general characteristics (n=200)**

Characteristics		No.	%
Maternal age (years)	20 -	115	57.5
	25 -	52	26.0
	30 - 35	33	16.5
<b>Mean <math>\pm</math> SD = 29.9 <math>\pm</math> 5.3</b>			
Occupation	House wife	82	41.0
	Working	118	59.0
Parity	$\leq 3$	137	68.5
	$>3$	63	31.5
Gestational age (weeks)	37-	143	71.5
	40 - 42	57	28.5
	<b>Mean <math>\pm</math> SD= 37.5 <math>\pm</math> 2.3</b>		
Spacing between women's previous CS and present pregnancy (months)	$< 18$	88	44.0
	$\geq 18$	112	56.5
	<b>Mean <math>\pm</math> SD= 22.9 <math>\pm</math> 9.0</b>		

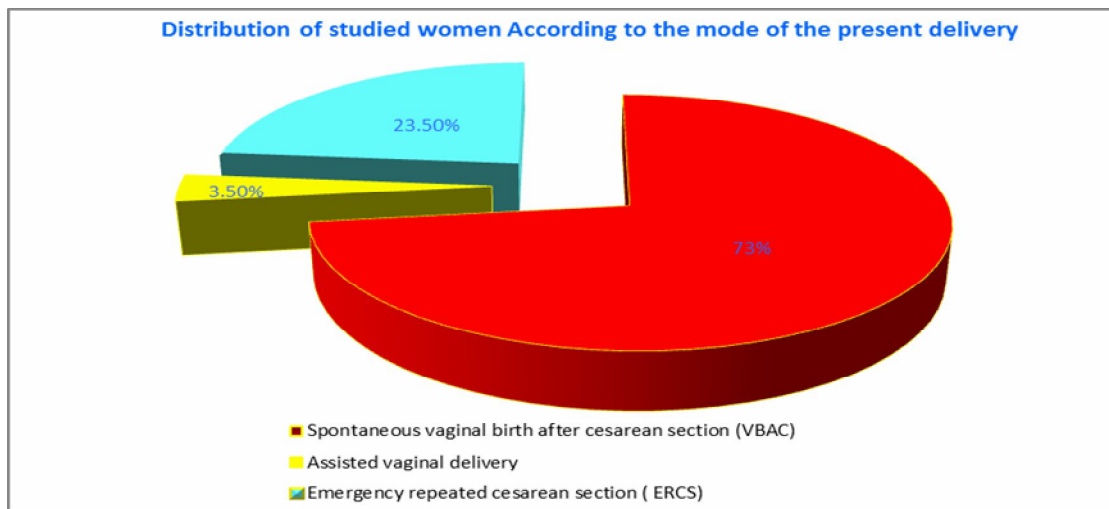


Figure (1): Distribution of studied women According to the mode of the present delivery.

Table 2: Relationship between the mode of present delivery, age, Occupation, parity and gestational (n=200).

Maternal Age (years)	Mode of Present Delivery (n=200)					Test	P-value	
	Successful VBAC (n=153)		ERCS (n = 47)		Total			
	No.	%	No.	%				
20 -	114	88.4	15	11.6	129	$\chi^2 = 8.1$	0.03 *	
25 -	39	84.8	7	12.2	46			
30 -35	14	56.0	11	44.0	25			
<b>Mean ± SD</b>	26.7 ± 4.5		30.2 ± 4.7			t=4.3		
Occupation	House wife	65	42.5	29	61.7	94	$\chi^2=9.1$	0.002*
	Working	88	57.5	18	38.3	106		
Parity	≤ 3	112	81.8	25	18.2	137	$\chi^2 = 12.41$	0.00 *
	> 3	39	61.9	24	38.1	63		
Gestational age (weeks)	37-	151	92.6	12	7.4	163	f	0.00 *
	40 - 42	23	62.2	14	37.8	37		

\* P < 0.05 (significant),  $\chi^2$ = chi square test, f = Fisher exact test

Table 3: Relationship between the mode of present delivery, spacing between the previous CS and the present pregnancy and indications for the previous CS.

Spacing between the Previous CS and the Present Pregnancy (months)	Mode of Present Delivery (n = 200)					Test	P-value
	Successful VBAC (n = 153)		ERCS (n = 47)		Total		
	No.	%	No.	%			
< 18 months	42	77.8	12	22.2	54	f	0.07
≥ 18 months	129	88.4	17	11.6	146		
<b>Mean ± SD</b>	25.4 ± 8.7		16.9 ± 6.2			t=1.87	0.06
<b>Indications for the Previous CS</b>							
Fetal distress	7	58.3	5	41.7	12	t. test = 0.8	0.06
APH	50	82.0	11	18.0	61	t. test = 125.6	0.00 *
PIH	17	81.0	4	19.0	21	t. test = 78.6	0.00 *
Malpresentation	59	86.8	9	13.2	68	t. test = 152.6	0.00 *
Failure of labor progress	4	66.7	2	33.3	6	t. test = 21.9	0.00 *
Twins	24	75.0	8	25.0	32	t. test = 53.6	0.00 *

\* P < 0.05 (significant), f = Fisher exact test, t = Paired t-test

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**Table 4: Relationship between mode of the present delivery, history of vaginal birth before the previous CS, and Bishop score on admission.**

Vaginal Birth before CS	Mode of Present Delivery (n=200)						Test	P-value
	Successful VBAC (n = 153)		ERCS (n = 47)		Total			
	No.	%	No.	%				
Yes	110	85.9	18	14.1	128	$\chi^2 = 221.8$	0.00 *	
No	42	58.3	30	41.7	72	$\chi^2 = 23.6$	0.00 *	
<b>Bishop Score on admission</b>								
$\geq 4$	132	80.5	14	9.6	146	f	0.00 *	
$< 4$	18	33.3	36	66.7	54			

\* P < 0.05 (significant),  $\chi^2$  = chi square test, f= Fisher exact test

**Table 5: Relationship between the mode of present delivery and the neonatal outcomes**

Neonatal Outcomes		Mode of Present Delivery (n=200)						Test	P-value
		Successful VBAC (n=153)		ERCS (n = 47)		Total			
		No.	%	No.	%				
Apgar score < 7	At 1 <sup>st</sup> min	5	41.7	7	58.3	12	f	0.75	
	At 5 <sup>th</sup> min	0	0.0	5	100.0	5		0.03 *	
Admission to NICU		0	0.0	5	100.0	5	$\chi^2 = 4.5$	0.03 *	
Current neonatal weight (kg)	2.500 -	102	92.7	8	7.3	110	$\chi^2 = 33.4$	0.00 *	
	3.000 -	62	77.5	18	22.5	80			
	3.500 -4.000	4	40.0	6	60.0	10			

\* P < 0.05 (significant), f = Fisher exact test,  $\chi^2$  = chi square test

**Table 6: Relationship between the mode of present delivery and the encountered maternal problems**

Maternal Problems		Mode of Present Delivery (n=200)						Test	P-value
		Successful VBAC (n = 153)		ERCS (n = 47)		Total			
		No.	%	No.	%				
Post-partum hemorrhage		13	44.8	16	55.2	29	$\chi^2=0.3$	0.54	
Administration of IV blood		1	16.7	5	83.3	6	$\chi^2=2.4$	0.06	
Uterine dehiscence		0	0.0	2	100.0	2	$\chi^2=3.5$	0.03 *	
Hospital stay(days)	Range	1-2		1-4			t- test =30.6	0.00 *	
	Mean $\pm$ SD	1.2 $\pm$ 0.7		2.5 $\pm$ 0.36					

\* P < 0.05 (significant).  $\chi^2$  = chi square test, t = Paired t-test

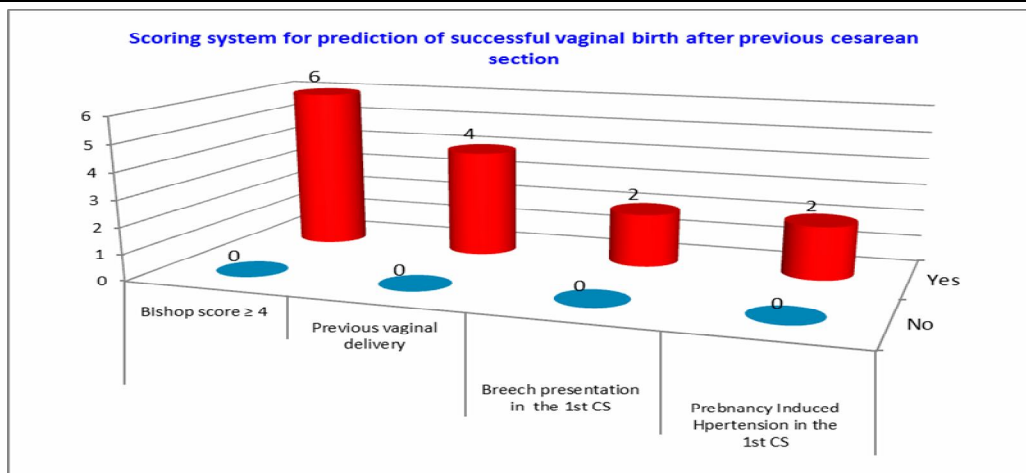
**Table 7: Variables studied and their adjusted odds ratios in predicting successful VBAC**

Variables	Odds Ratios	95% CI	Significance
Bishop score $\geq 4$	14.8	6.7 - 27.8	0.00 *
Previous vaginal delivery	3.6	2.3 - 6.8	0.00 *
Indications of the 1 <sup>st</sup> CS			
▪ Breech presentation	1.6	1.3 - 2.6	0.00 *
▪ Fetal distress	0.3	0.2 - 0.9	0.00 *
▪ Pregnancy Induced hypertension	0.3	0.2 - 0.8	0.02 *

\* P < 0.05 (significant), Odds= odds ratio, 95% CI= 95% confidence interval.

**Table 8: Scoring system for prediction of successful vaginal birth after previous cesarean section**

Factor	No	Yes
Bishop score $\geq 4$	0	6
Previous vaginal delivery	0	4
Indications of the 1 <sup>st</sup> CS		
<b>Grade A</b>		
<i>Breech presentation</i>	0	2
<b>Grade B</b>		
<i>Fetal distress</i>		
<i>Pregnancy Induced hypertension</i>	0	2



**Figure 2: Scoring system for prediction of successful vaginal birth after previous C.S**

**5. Discussion**

With the publication of several studies demonstrating the safety and efficacy of a trial of vaginal delivery after cesarean section, the practice of elective repeat C-sections has been gradually changing. Following a cesarean section, women who gave birth vaginally experienced a lower risk of thromboembolic illness, peripartum infection, postpartum pain, postpartum hemorrhage, and anesthetic problems. (13).

Conversely, a woman's obstetric future is restricted to obstetric hysterectomy, a higher rate of secondary infertility, ectopic pregnancy, placenta previa, and placenta accrete, as well as a decreased total number of possible deliveries following delivery by C.S. (14). The aim of this study was to identify factors affecting the successful vaginal birth subsequent to cesarean section in order to develop a predictive score for successful trial.

The current study's findings show that the percentage of vaginal births following cesarean sections that are successful (VBAC) during the study period was 76.5%. Of these, only (3.5%) were assisted by vacuum extraction. Almost quarter of the sample (23.5%) underwent emergency repeated cesarean section (ERCS) due to either failure of fetal progress or fetal distress.

The study finding is in agreement with *Coassolo (2005)* who found that the prevalence of successful VBAC was 70% (15). Also, in line with these present study findings, *Quinones (2005)*, found that successful vaginal birth was achieved in 74.0% of women with one previous cesarean section (16). The current study's findings on the relatively high prevalence of successful vaginal births may be due to the several approaches that have been suggested for managing vaginal birth trials following cesarean sections and the supporting data for these approaches' application in clinical settings. The results of this study showed that younger women had a considerably higher chance of having a successful VBAC than older women did. Along the same vein *Bujold et al., (2004a)* discovered that women over 40 who had a previous cesarean delivery were nearly three times as likely than women under 40 to experience a failed labor attempt.. (17). Such finding may be related to the powerful pushing down efforts practiced by the woman during labor, together with the good contractions of her uterine muscles, which are usually associated with the young maternal age (18). In disagreement with *Chamberlain and Steer (2001)*; who reported no relation between age and the frequency of use of cesarean section (19).



also found a statistically significant relation between job status and the mode of delivery. The highest percentage of women who were working more liable successful VBAC (57.5%) compared to 38.3% of women with ERCS. This figure is close to that reported by *Balachandran, et al., (2004)*, who found a significant relationship (20) between maternal job status, and the mode of delivery, to impact the success of TOL. Working women had highest success rate. In disagreement with *Lee et al., (2005)*, who have pointed to some inverse associations between mode of delivery and the level of education, job status, income level, and area of residence (21).

The present analysis reveals a comparatively high proportion of successful vaginal births, which could be attributed to the several approaches suggested for managing vaginal birth trials following cesarean sections and the supporting evidence for their use in clinical practice. Younger women were far more likely than older women to have a successful VBAC, according to the results of the current study. In keeping with that *Dinsmoor (2004)*, who found a significant relation between the parity and the successful outcome of the VBAC-TOL. The study finding may be due to the fact that multiparas required more labor augmentation (22). Regarding gestational age, the results of this study showed that a higher success rate for vaginal birth after circumcision is linked to gestational ages between 37 and less than 40 weeks. This corresponds with *Yamani (2004)*, who reported that gestational age is a significant factor in predicting the success of VBAC (23).

According to the results of this study, women who had waited more than 18 months to have a CS after their prior pregnancy were more likely than the ERCS group to have a successful VBAC. According to Shipp et al. (2001), women with a shorter inter-delivery interval had a three-fold lower incidence of uterine rupture than those whose previous birth occurred within 18 months (24). Additionally, Huang et al. (2002) discovered that women who had waited 18 months or longer between their previous cesarean section and their current pregnancy had an 86% chance of successfully completing a VBAC, compared to 79% for those who had less time (25).

In the current study the common indications for ERCS were fetal distress followed by failure of labor progress and twin pregnancies. Meanwhile, the majority of women who had successful VBAC had their previous CS was due to malpresentation, ante partum hemorrhage or pregnancy induced hypertension. This is in congruence with *Hager et*

*al.*, who reported that that the most frequent indications were foetal distress (26).

Numerous research works have looked at the signs of a previous C-section as a predictor of what will happen in a later labor trial. Cephalo Pelvic Disproportion (CPD) had the lowest VBAC success rate across all studies. The second lowest success rate for VBAC was fetal distress. The nonrecurring indications with the highest success rates were placenta previa and breech birth. A higher percentage of patients who choose not to undergo a trial of labor following cesarean delivery is similarly linked to failure to progress or dystocia as grounds for prior cesarean delivery (27).

The current study's findings indicate that women with successful VBACs had normal body mass indices (BMIs). Conversely, compared to women who had a successful VBAC, those who underwent ERCS had a higher likelihood of becoming obese (28). This is in good agreement with the discovery of *Arrowsmith et al., (2011)* On labor problems after IOL in extended pregnancies and maternal obesity, and they discovered that IOL for obese women is linked to higher incidence of CS. The link between obesity and the increased risk of macrosomia, shoulder dystocia, gestational hypertension, diabetes, and poor myometrial contractility during pregnancy could provide one explanation(29). The present study revealed that the history of prior vaginal delivery before the previous cesarean section had a significant value in predicting successful vaginal birth after cesarean section. The chance for successful VBAC in women was significantly higher in women who had a history of previous vaginal birth before their previous CS, compared to those who had not. The study results are corresponding well with the finding of *Hashima, et al., (2004)* They came to the conclusion that patients without a history of vaginal birth had lower rates of successful VBACs than those who had (30). In addition, women who successfully complete a vaginal birth before a cesarean delivery have a better success percentage in a subsequent labor trial. (31,32).

According to the results of the current study, a successful vaginal birth following a cesarean section was significantly predicted by the Bishop Score upon admission. Women who had a Bishop Score of >4 were much more likely than those who had a Score of <4 to have had a successful VBAC. This result is consistent with this Bishop Score > 4 was found by *Bujold et al. (2007)* to be a robust and substantial predictor of a successful vaginal delivery following a cesarean section (33). In a

similar vein, this result concurs with **Gonen's (2004)** who has concluded that all the parameters of Bishop Score appear to be effective predictors of success in a trial of labor after cesarean section. However, cervical dilatation was found to be the most effective parameter (34). These findings may be attributed to the fact that, A more favorable cervix is indicated by a higher Bishop score. The most reliable indicator of a successful VBAC is a more favorable cervix. The present study has investigated the relation between the mode of delivery and fetal Apgar scores. It was pointed that Apgar scores <7 at the first minute and fifth minute were statistically higher among babies born by ERCS, with the result that 5 babies were exposed to NICU admission. These findings are in agreement with **Kennare, et al., (227)** who have reported that, the neonates born by repeated cesarean section have low Apgar scores compared with those born by vaginal birth (35). This low Apgar scores may be due to the effect of the anesthesia and cesarean birth.

Furthermore, the present study findings illustrated that women with normal a neonatal weight were more likely to be delivered by successful VBAC. Women with large neonatal weight were significantly more likely to be delivered by ERCS. This is explained by the morbid conditions that are associated with larger baby, such as obstructed labor. This corresponds well with the finding of **Blanchette et al., (2001)** who has indicated that a higher failure of a trial of labor with increasing birth weight (36). This study finding is in-agreement with another study who reported that no significant difference among neonates delivered either by VBAC or by repeated cesarean section regarding the birth weight (37).

The present study finding revealed that, the most common early post-operative complications following cesarean section were postpartum hemorrhage, the need for blood transfusion. Overall, such complications were higher in the failed VBAC group compared with the successful VBAC group. The above mention findings are in congruence with **Landon et al., (2004)** who reported that the rate of post-partum hemorrhage and blood transfusion were higher in the failed VBAC group compared with the successful VBAC group (38).

In the current study the, only 2 uterine dehiscence occurred in the ERCS group compared with no recorded cases among the successful VBAC group. Furthermore, no recorded cases of true uterine rupture, hysterectomy, or maternal deaths among all the study subjects. The current

figure is very close to that reported by **Hibbard, et al., (2001)** who have demonstrated that the rate of uterine dehiscence was higher in the failed VBAC group compared with the successful VBAC group, with no hysterectomy or maternal deaths among the successful VBAC group or the ERCS group (39). Contrary to this, a different study discovered that uterine rupture is one of the biggest dangers women face when contemplating a labor trial. There could be serious consequences for mothers and newborns from this potentially deadly incident (40).

As for the hospitalization period, the current study has also shown that a statistically significant relation, with a trend toward decreasing mean of hospitalization period among those who had successful VBAC. This is consistent with **Hibbard et al., (2008)**, We found that, when compared to women in the successful VBAC group, those who underwent cesarean sections had longer mean hospital stays—1.5 to 2 days (41). The goal of the current study is to create a scoring system that can reasonably forecast the likelihood of a successful vaginal birth after a cesarean section. The odds ratio values, 95% confidence interval, and significance of each odds ratio for every variable in the table comprise the grading system for successful VBAC prediction. The maximum score for the calculated probability of a successful VBAC was 12: A vaginal delivery after cesarean surgery is 68% likely with a score of at least 4; 88% likely with a score of at least 6; and 90% likely with a score of at least 10.

Similar to this, Gonen (2004) made an effort to create a grading system based on five variables that were strongly linked to a successful VBAC: cervical dilatation, aberrant presentation as a first CS indication, prior VBAC, gestational age <41 weeks, and lower gestational age at the time of the first CS. Every aspect was rated from 0 to 3. The proposed score help obstetricians when counseling women with past cesarean birth (34).

## 6. Conclusion

Almost three quarters of women (76.5%) had successful VBAC, whether spontaneous 73.0% or Assisted vaginal delivery 3.5%. The rest only 23.5 % had ERCS. Positive factors which increase the likelihood of successful VBAC were; ; younger women ( age < 25 years), working women , gestational age < 40 weeks, parity ≤ three, longer inter delivery duration between the previous cesarean section and the present pregnancy (≥ 18 months), history of prior vaginal birth , within normal BMI, Bishop score ≥ 4 on admission , as well as women with normal a neonatal weight ( 2.500 g - 3.500 g ) . Furthermore, negative factors

which decrease the likelihood of successful VBAC were more problems during the fourth stage of labor among women who had ERCS. The nurse midwife should always take into consideration the predictive score for successful VBAC trial together with, the proper counseling of the woman in this regard.

### 7. Recommendations

It was recommended that women with prior cesarean deliveries require special management, both antenatal and in labor and delivery and should be closely monitored by the nurse midwife. The nurse midwife should recognize what management strategies that influences the outcome i.e. how should labor be planned and managed in TOL after cesarean women? Negative factors which decrease the likelihood of successful VBAC should be identified and receive the best possible management. Furthermore, vaginal birth after cesarean section trial of labor should be conducted in hospitals, with adequate facilities for immediate delivery and resuscitation of the newborn as well as high quality care and proper counseling from the nurse midwife. Quality care should be emphasized in nursing curriculum and in training programs and should be applied for women at high risk labor. Further researches are recommended

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