



## Factors influencing the success of vaginal birth after caesarean section in Sarawak General Hospital 2010

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### ABSTRACT

The research was conducted to study influencing factors for successful vaginal delivery after caesarean section (VBAC) among women delivering at Sarawak General Hospital, Malaysia in 2010. It was a hospital based retrospective study in maternity unit, Sarawak General Hospital, Malaysia, among pregnant women with one previous lower segment caesarean section for trial of vaginal delivery during 2010. This study was carried out in through the antenatal, intrapartum and postnatal records. During the study period, a total of 525 pregnant women with one previous lower segment caesarean section scar were admitted for a trial of vaginal birth. Among 525 women, 390 did not have a prior history of successful VBAC and the remaining 135 women had at least one successful VBAC. Overall there was a successful VBAC rate of 60.4%. The success rate among women who had previous successful VBAC was 80.7%; while for those who had no prior history was only 53.3%. Influencing factors are studied among 390 women with one previous caesarean who did not have a prior history of successful VBAC. In the group of women whose body mass index (BMI) was  $\geq 25$  Kg/m<sup>2</sup>, the successful rate was lower at 44.5% when compared to 63.5% among women with a BMI <25 Kg/m<sup>2</sup> with a P value <0.000, [95% confidence interval (CI) 1.4-3.1]. The successful VBAC rates vary according to the gestational age of the pregnancy. The successful VBAC rate was 41.7% among women who were less than 37 weeks of gestation and 54.1% among those with gestational age 37 weeks and above. These were statistically significant with a P value -0.003, [95% confidence interval (CI) 0.3-0.8]. It is interesting to note that if the previous lower segment caesarean section was an emergency, the successful VBAC rate was 49.1% compared to 63.7% if it was an elective procedure. (P value= 0.009), [95% confidence interval (CI) 1.3-3.4]. Induction of labour reduced the successful rate of vaginal delivery in trial of labour. If labour was spontaneous, the successful VBAC rate was 55.1% compared to 16.7% in women who were induced into labour. (P value -0.001). The study concluded that previous successful VBAC, body mass index (BMI), gestational age, the type of previous lower segment caesarean section and induction of labour were significant factors in influencing the rate of successful VBAC.

#### Keywords:

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Vaginal birth after caesarean section (VBAC), Trial of labour after caesarean section (TOLAC), Lower segment caesarean section (LSCS) or Elective repeat lower segment caesarean delivery (ERCD), Royal College of Obstetricians and Gynaecologists (RCOG)

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## 1. Introduction

Caesarean section rates across the world have been gradually increasing for decades, seemingly unstoppable. In UK, the rate was 12% in 1990, 20% in 2001, 24% in 2008, 26.9% in 2013, 29.1% in 2014 and still rising despite efforts to reduce it [1]. In 2011, caesarean section rate in Australia was 32%, while in New Zealand it was 23.6% [2]. In the United States the caesarean section rate reached 32.2% in 2014[3]. China has one of the highest caesarean section rates in the world with 16 million babies or approximately 50% of babies born in 2010 were delivered by caesarean section [4]. The situation has become a global public and professional concern. Increasing rates of primary caesarean section have led to an increased proportion of the obstetric population who has a history of prior caesarean delivery. Last century, the increase in cesarean delivery rates was partly perpetuated by the dictum “once a cesarean always a cesarean” [5]. The statement “Once a caesarean, always a caesarean” by Dr. Edward Craigen in 1916, recognized elective repeat caesarean section as standard of care. The high frequency of classical caesarean section, deficiencies of blood banks & insufficient means of foetal monitoring made his proclamation an intelligent argument for that period. In the prevailing years, there were changes in the type of uterine incision in addition to various advances in technology. It permitted precise monitoring of foetus and mother, making vaginal birth after caesarean a relatively easy job for both patient as well as healthcare provider. In the 1970s, some began to reconsider this paradigm and accumulated data have since supported “trial of labour after caesarean section” as a reasonable approach in selected pregnancies [6-8].

Pregnant women with a previous section may be offered either planned trial of labour after caesarean section (TOLAC) or elective repeat caesarean delivery (ERCD). Each option has its benefits and risks and both are not risk free. RCOG Green-top guideline 2007 mentioned as “VBAC may not be as safe as originally thought” by referencing evidences [9-10]. So, patients and obstetricians conjointly need to consider the options with a view to planning mode and place of birth for each mother who had a previous caesarean delivery.

This study was carried out to study the success rate of trial of labour in women with previous caesarean section and its influencing factors. The results may serve as valuable information in assisting obstetricians as well as patients in making decisions on VBAC.

## 2. Methods

### 2.1. Setting

Hospital based retrospective study, reviewing patient’s inpatient case notes in Sarawak General Hospital

## 2.2. Sample size

A total of 525 women with a previous lower segment caesarean section were included in this study. Out of 525 women, 135 women had history of previous successful VBAC and the remaining 390 had no prior history of vaginal deliveries following a caesarean section.

## 2.3. Data collection

In the state of Sarawak, all pregnant women with one previous caesarean section would be appropriately counseled on the mode of delivery in the antenatal period. Unless there are clinical contraindications, all these women would be encouraged to go through a TOLAC. The patient would then make an informed choice of either ERCS or TOLAC.

The target population for the study was women who had one previous caesarean section and were admitted to the hospital for a trial of labour. Data were collected retrospectively by reviewing the case notes in hospital record system.

### 2.3.1. Inclusion criteria

1: Pregnant women with a history of one previous lower segment caesarean section who choose trial of labour. 2: Singleton pregnancy with no contraindications for vaginal delivery.

### 2.3.2. Exclusion criteria

1: Multiple gestation in early pregnancy. 2: Obstetric cases more than one caesarean section. 3: Women who choose elective repeat caesarean section

### 2.3.3. Data Entry and Analysis

This was a retrospective study on the outcome and influencing factors of success in trial of scars at Sarawak General Hospital within the period from 1st January 2010 to 31st December 2010.

Data entry was done using SPSS version 22 and data analysis was performed by  $X^2$  (Chi-square) test and t test. Multivariate analysis was conducted using logistic regression with enter method only for factors that were significant from the univariate analysis. *P* value of <0.05 was considered statistically significant.

### 2.3.4. Data Quality

Data were reviewed for completeness. The incomplete data were excluded in calculation and analysis.

### 2.3.5. Limitation

Neonatal outcome is not analyzed in this publication because of difficulties in follow up.

### 3. Financial disclosure

The authors declared that this study was not funded.

### 4. Results

During study period, 525 pregnant women with a previous one lower segment caesarean section had undergone trial of labour. Out of 525 pregnant women, 390 had no previous successful vaginal delivery but 135 had at least one previous successful VBAC. The total successful VBAC rate was 60.4%. Among the 390 pregnant women who had no prior successful VBAC, the success rate was lower at 53.3%. However, among 135 women who had previous successful VBAC, the success rate was significantly higher at 80.7%. This was statistically significant as  $p$  value 0.000 (Table 1).

The success rate of the trial of labour was influenced by the body mass index (BMI) and it was statistically significant. In group of women with BMI 25 Kg/m<sup>2</sup> and above, 44.5% had successful VBAC. Those with BMI below 25 Kg/m<sup>2</sup>, the success rate was higher at 63.5%. These data were significant in statistics.  $P$  value 0.000 (Table 1).

The study showed that among the group of women below 37 weeks of gestation, only 10 out of 24 women had successful vaginal delivery which was 41.7%. In the group of women with gestational age 37 weeks and above, 198 out of 366 or 54.1% had successful VBAC and the remaining 168 or 45.9% had failed in trial of labour. Data were also statistically significant.  $P$  value = 0.000 (Table 1).

The success rate of vaginal birth also depended if the previous caesarean section was an elective or emergency procedure. Among 390 women who had no prior VBAC, 277 women had previous emergency LSCS and 113 women had previous elective LSCS. In group of women with emergency LSCS, 136 or 49.1% had successful vaginal delivery. In group of women with previous elective LSCS, out of 113 pregnant women, 72 or 63.7% had successful vaginal delivery. The data were statistically significant as  $p$  value = 0.009 (Table 1).

The data showed among the 390 women, 18 women had undergone induction of labour. Out of which only 3 women (16.7%) went on to have a successful vaginal delivery. In group of 372 women with spontaneous labour, 205 women or 55.1% had successful vaginal delivery. These data were statistically significant.  $P$  value = 0.001 (Table 1).

Among the 390 women, 154 were in the group with an interval between current delivery and the previous caesarean section of more than 2 years. In that group 80 women (51.9%) had successful vaginal deliveries. The remaining 236 women were in group where the interval was less than 2 years. In this group, 128 women (54.2%) had successful vaginal delivery. The successful VBAC rate was between the two groups were statistically not significant.  $p$  value = 0.658 (Table 1).

Among 69 women who were 35 years old and above, 40 (58.0%) women had successful vaginal delivery. Out of the remaining 321 women who were under 35 years old, 168 (52.3%) had successful vaginal delivery. The difference was not statistically significant.  $p$  value = 0.395 (Table 1).

**Table 1**  
Success rate of VBAC and influencing factors

	SUCCESS RATE OF VBAC			P value	Chai square
	Total Women	Successful VBAC	LSCS		
Previous successful VBAC	135 (100%)	109 (80.7%)	26 (19.3%)	<0.001*	31.490
No previous successful VBAC	390 (100%)	208 (53.3%)	182 (46.7%)		
Total women of trial of labour	525 (100%)	317 (60.4%)	208 (39.6%)		
Maternal BMI	390				
<25 Kg/m <sup>2</sup>	181	115 (63.5%)	66 (36.5%)	<0.001*	14.126
≥ 25Kg/m <sup>2</sup>	209	93 (44.5%)	116 (55.5%)		
Gestational weeks of current pregnancy	390	208	182		
≥37	24 (100%)	10 (41.7%)	14 (58.3%)		
>37	366(100%)	198 (54.1%)	168 (45.9%)	<0.003*	11.682
Type of previous LSCS	390 (100%)	208	182		
Elective	113 (100%)	72 (63.7%)	41 (36.3%)	<0.009*	6.89
Emergency	277 (100%)	136 (49.1%)	141 (50.9%)		
Onset of labour	390 (100%)	208 (53.3%)	182 (46.7%)		
Spontaneous	372 (100%)	205 (55.1%)	167 (44.9%)		10.194
Induction of labour	18 (100%)	3 (16.7%)	15 (83.3%)	<0.001*	
Interval of current pregnancy and previous LSCS in years	390 (100%)	208 (53.3%)	182 (46.7%)		
>2	236 (100%)	128 (54.2%)	108 (45.8%)	<0.658	0.196
≤ 2	154 (100%)	80 (51.9%)	74 (48.1%)		
Maternal Age in years	390 (100.0%)	208 (53.3%)	182 (46.7%)		
< 35	321 (100.0%)	168 (52.3%)	153 (47.7%)		
≥ 35	69 (100.0%)	40 (58.0%)	29 (42.0%)	<0.395	0.724

Significant influencing factors are analyzed by logistic regression and it is also support as significant (Table 2).

**Table 2**  
Binary logistic regression for outcome variable (vaginal delivery) by using predictors (BMI, Gestational age, Previous LSCS type)

Predictors	B	Odd ratio (95% CI)	p value
BMI			< 0.001
< 25	0.776	<b>2.17 (1.44 – 3.26)</b>	
≥ 25		1.0 (Ref.)	
Gestational age			0.241
< 37		1.0 (Ref.)	
≥ 37	0.501	1.65 (0.71 – 3.81)	
Previous LSCS type			<b>0.009</b>
Elective	0.599	<b>1.82 (1.16 – 2.85)</b>	
Emergency		1.0 (Ref.)	
Onset of labour			<b>0.005</b>
Spontaneous	1.814	<b>6.13 (1.74 – 21.5)</b>	
Induced		1.0 (Ref.)	

The study showed 182 women had an unsuccessful trial of labour. The indications for the emergency caesarean sections included 75 (41.2%) cases for foetal distress, 55 cases or 30.2% for

poor progress, 16 cases or 8.8% for scar tenderness, 3 (1.7%) for failed induction and 30 cases or 16.5% grouped under others. There were 2 cases of scar dehiscence, giving an incidence of 0.5% among 390 women. Both these cases were identified during an emergency caesarean section for foetal distress (Table 3).

The indications of previous lower segment caesarean section among the 390 women were foetal distress (33.8%), breech presentation (22.6%), poor progress of labour (14.1%), placenta praevia (5.1%), failed induction (4.9%), preeclampsia (3.8%), malpresentations (3.3%), multiple pregnancies (1.5%) and others (10.8%) (Table 3).

**Table 3**  
Indications for lower segment caesarean sections in study

Indications	Previous lower segment caesarean section	Current lower segment caesarean section
Breech	88 (22.6%)	
Malpresentations	13 (3.3%)	
Placenta Praevia	20 (5.1%)	
Preeclampsia	15 (3.8%)	
Multiple pregnancy	6 (1.55%)	
Failed inductions	19 (4.9%)	3 (1.7%)
Foetal distress	132 (33.8%)	75 (41.2%)
Poor progress of	55 (14.1%)	55 (30.2%)
others	42 (10.8%)	30 (18.1%)
LSCS scar tenderness		16 (8.8%)
Total	390 (100%)	182 (100%)

## 5. Discussion

### 5.1. Successful VBAC rate

A total of 525 pregnant women were included in this study. Among them, 135 women had previous successful VBAC and the remaining 390 women had no prior history of VBAC. The overall successful VBAC rate in Sarawak General Hospital is comparable to other published results elsewhere, 60.78 %, 71.6%, 62%, and 56.52% [11-14]. Other published data also showed a success rate ranging from 43% in hospitals in New Zealand to 73% in Australia [2]. Published data in the United States gave figures between 60-80% [15]. A systematic review showed success rate varied from 82- 87% % [16-17].

The data showed that women with previous successful VBAC have higher success rate of 80.7%. This is comparable to other published studies where the success rate ranges between 87-91% [18-22]. Many published data concluded patients who had prior successful VBAC have a very good chance of subsequent successful VBAC.

### 5.2. BMI (Kg/m<sup>2</sup>)

Data indicated increased BMI is an unfavorable factor for success of VBAC. A small study also concluded that women with BMI >25 kg/m<sup>2</sup> was significantly high in the unsuccessful VBAC group [23]. BMI >25 kg/m<sup>2</sup> is one of the identified factors for failure of VBAC [24]. The 2012 New Zealand Ministry of Health clinical indicators concluded that women with BMI more than 30 should be counseled about the reduced VBAC success rates. A prospective observational study of 14,142 patients undergoing VBAC reported successful VBAC of 84.8% among women with normal weight compared to 60.7% in women with BMI ≥40 Kg/m [25]. The Royal Australian and New Zealand College

of Obstetricians and Gynaecologists mentioned that maternal BMI greater than 30 Kg/m<sup>2</sup> was a factor in reducing the success of VBAC [2].

### 5.3. Gestational Age

A total of 390 women in study were divided into two groups as gestational age less than 37 weeks and more than 37 weeks. Among them, 10 women out of 24 women in the group of less than 37 weeks gestation had successful VBAC rate 41.7%. The data high lightened the higher success was in group of gestation more than 37 weeks and extreme gestational age reduced the successful VBAC as statistics were significant. RCOG also reminded gestation above 41 weeks was associated with a decreased likelihood of planned VBAC success [26]. The results of successful VBAC in the group of less than 37 weeks gestation (41.7%) conflicted with a retrospective cohort study showing women who were preterm 24–36 weeks of had higher success rates 82% [27]. Another prospective NICHD study showed planned VBAC success rates for preterm and term pregnancies were similar 72.8% versus 73.3% [28].

### 5.4. Type of LSCS

It is interesting to note that there was a statistical difference in the VBAC success rate between those who had emergency or elective previous caesarean section. The success rate was lower among women who had emergency caesarean section, compared to women who had an elective procedure. Emergency caesarean section for foetal distress has been associated with lower VBAC success rate of 67-73%, compared to 77-89% for those who had previous elective caesarean section for other indications such as placenta praevia and breech [9].

### 5.5. Onset of labour (Spontaneous/IOL)

In this study, among the 390 women, 372 women had spontaneous labour and 18 had induction of labour. Out of 372 women, 205 (55.1%) had successful VBAC, while those who had induction of labour only 3 women or 16.7% were successful. In a NICHD study, the VBAC success rate among women had induction of labour was significantly higher at 67% compared to ours. Women should be informed during counselling for VBAC that there is a 1.5-fold increased risk of caesarean section in those who had induced labour [27].

### 5.6. Interval between current pregnancy and previous caesarean section

This study analyzed the association between VBAC success rate and the interval between the delivery date of the present pregnancy and the previous caesarean section. Study population was divided into two groups, a group of women who had pregnancy interval less than 2 years between current pregnancy and caesarean section and another group of women who had pregnancy interval 2 years or more. However, the difference in results was statistically insignificant. In a study, women who had an interval between current pregnancy and previous caesarean section of more than 18 months had a VBAC success rate of 86%, while women whose interval less than 18 months had a VBAC success rate of 79%. This difference was also not statistically significant, and it remains unclear whether the interval actually affects the success rate or whether it only reflects the risk of uterine rupture [29].

## 5.7. Maternal age

The analyzed data on the association between successful VBAC and maternal age showed a VBAC success rate of 58% among women who were 35 years or above and 52.3% among women less than 35 years of age. The difference was not statistically significant. A study in Ethiopia, failed to show any difference as well [30]. But the Green Top guideline stated that advanced maternal age is associated with a decreased likelihood of VBAC success [27].

## 5.8. Unsuccessful VBAC

The indications for caesarean section for failed VBAC among women in the study group were foetal distress (41.2%), poor progress (30.2%), scar tenderness (8.8%), failed induction of labour (3.3%) and others (16.5%). These data showed that the majority of caesarean sections for unsuccessful VBAC were due to foetal distress.

## 6. Conclusion

This study concluded that previous successful VBAC, previous elective lower segment caesarean section, lower maternal BMI, gestational age and spontaneous labour are associated with higher successful VBAC rate. These favourable factors should be included in counselling of trial of labour after caesarean section.

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