

Inter-delivery Interval and the Success of Vaginal Birth after Caesarean Delivery in Babylon Maternity and Pediatric Hospital

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ABSTRACT

Introduction: Birth is largely related to the human aspect and is considered to be of great importance in our societies today. The research aimed to determine whether a short inter-delivery interval is associated with a decreased rate of successful Vaginal Birth after Cesarean delivery (VBAC).

Material and methods: This was a prospective cohort study dealing with pregnant women who attended the Babylon maternity and pediatric teaching Hospital. The study was done at Babylon Maternity and Pediatric teaching hospital, the pregnant women had already experienced the Caesarean section for one time, and the study period was from the 1st January 2008 till the 31st August 2008.

Results: Outcome of Index Labour Vs Inter-delivery Interval shows statistical significance of association between the outcome of index labour and inter-delivery interval. Maternal Characteristics Vs Inter-delivery Interval showed statistical association. Also indications of previous CS Vs Inter-delivery Interval showed statistical association and mechanism of induction of Labour Vs Inter-delivery Interval shows statistical association.

Conclusion: Mother who had not complete the 19 months inter-delivery interval has more than 1.5 risk to end with caesarean section.

Keywords: Inter-delivery, Vaginal Birth and Caesarean Delivery.

or without a show or rupture of the membrane leading to progressive changes in the cervix.

The show is the release of a blood stained mucus plug from the cervix, which is expelled from the vagina. Rupture of membrane means the breakdown of the Chorio-amniotic membrane and release the amniotic fluid. The show and the rupture of the membrane can occur together without the labor being in progress and vice versa. However, when they occur with the presence of the pain it is highly suggestive that the process of labor has begun.³

Caesarean Section

Is the delivery of the baby by an abdominal and uterine incision, is increasingly used for safe delivery for fetal or maternal reasons either electively or as an emergency.⁴

Indication of Caesarean section based on the timing of Caesarean section at the time of decision making, the indications are grouped under one of four categories.

- Category 1 or emergency Caesarean section:
There is an immediate threat to the mother or the fetus. Ideally the Caesarean section should be done within the next 30 min. Like, abruption and cord prolapse.
- Category 2 or urgent Caesarean section:
There is maternal or fetal compromise, but was not immediately life threatening. The Caesarean section should be done within the next 60-75 min. Like, fetal heart rate abnormality.
- Category 3 or scheduled Caesarean section:
The mother needed early delivery, but there was no maternal or fetal compromise like, failure of progress
- Category 4 or elective Caesarean section:
The delivery is timed to suit the mother and staff. Like, placenta praevia.⁴

Study aimed to determine whether a short inter-delivery interval is associated with a decreased rate of successful Vaginal Birth after Cesarean delivery (VBAC).

MATERIAL AND METHODS

The study was a prospective cohort study dealing with

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INTRODUCTION

"Of all the experiences of the human condition, birth surely represents the most important. Human society places great important upon it; for social, not to mention legal, reasons knowledge of our birth date is lifelong requirement. Much more important than its timing is the need for our birth to release us towards independent existence with the fullest possible endowment for physical and intellectual development. Despite its enormous important it is doubtful if any of us can recollect any of this experience.¹

Background and definition

Labour:

Labour and delivery is the focus and climax of the reproductive process, it's both a physical and emotional challenge for the mother. It's also a hazardous journey for the fetus there is an interplay between the power of the uterus, the passages of the birth canal and the passenger, single or multiple. Our duty is to insure that this process achieved completion with all parities healthy and satisfied.²

Labour begins when uterine contraction becomes painful and progressive, more than one in every 5 minute, with

pregnant women who attended the Babylon Maternity and Pediatric Teaching Hospital. The study was done at Babylon Maternity and Pediatric Teaching Hospital, the pregnant women had already experienced the Caesarean Section for one time.

The study period was from the 1st January 2008 till the 31st August 2008.

Study Population

The total number of the pregnant women attending the Babylon Maternity and Pediatric Teaching Hospital for delivery was 10074 women for the period of study, out of them 3004 ended with caesarean section.

The inclusion criteria for eligibility in the study were:

- Mothers with previous one caesarean section.
- Singleton pregnancy.
- Term pregnancy and cephalic presentation.
- Have no absolute contraindication to normal vaginal delivery as (previous classical caesarean section, internal pelvic floor or anal sphincter repair and previous shoulder dystocia).
- Has no current pregnancy event like (significant fetal disease, placenta previa, obstructing pelvic mass, active primary herpes at onset of labor).

The number of the pregnant women with obstetrical history of previous one caesarean section who were eligible in this study was only 530 women.

Tools Of Data Collection (questionnaires)

The data collected through direct interview and direct examination for the eligible women.

The questionnaire consisted all women parameters as following:

Name, date of admission, maternal age, weight, height, gestational age in weeks, obstetric history (indication of previous caesarean section, interval of prior caesarean section and index pregnancy in months, history of complications of previous caesarean section, history of prior vaginal delivery), history of present pregnancy

On admission to the hospital, when labour started she was followed up and following were reported: Augmentation of labour, oxytocin use, artificial ruptures membrane and spontaneous rupture membrane.

Maternal outcome and complications were reported as following: Normal vaginal deliveries, caesarean section, post-partum haemorrhage, uterine rupture and dehiscence. *Fetal outcome were reported as following:* Birth weight \geq 2500 gm, apgar score at 5 min and perinatal death.

RESULTS

The number of the pregnant women with obstetrical history of previous one caesarean section who were eligible in this study was only 530 women. Out of them 235 ended with normal vaginal delivery while 295 ended with caesarean section; so the results were as following:

- The incidence of caesarean section among total number of the mother who had complete the 19 months or more inter-delivery interval was 493/1000 mothers, while the incidence rate of caesarean section among total number of the mother who had not complete the 19 months

Inter-delivery Interval	NVD			CS			Successful VBAC	
	N	%	P value	N	%	P value	N	% from each group
\geq 19 months	164	30.9	0.003	155	29.2	0.001	164	51.4
< 19 months	71	13.4		140	26.4		71	33.6
Total	235	44.3		295	55.7		235	44.3 of total

Table-1: Outcome of Index Labour Vs Inter-delivery Interval

Inter-delivery Interval	Age \geq 40 years			BMI \geq 30 Kg/M ²			Prior Vaginal Delivery		
	N	%	P value	N	%	P value	N	%	P value
\geq 19 months	73	13.8	0.001	155	21	0.001	155	21	0.001
< 19 months	90	17		98	18		39	7.4	

Table-2: Maternal Characteristics Vs Inter-delivery Interval

Inter-delivery Interval	Fetal Distress			Malposition			APH			CPD			2nd stage Arrest		
	N	%	P value	N	%	P value	N	%	P value	N	%	P value	N	%	P value
\geq 19 months	22	4.1	0.01	39	7.4	0.679	20	3.8	.576	31	5.8	0.07	22	4.2	0.09
< 19 months	7	1.3		29	5.5		30	5.7		21	4		34	6.4	

Table-3: Indications of Previous CS Vs Inter-delivery Interval

Inter-delivery Interval	Spontaneous Rupture of Membrane			Artificial Rupture of Membrane			Use of Oxytocin		
	N	%	P value	N	%	P value	N	%	P value
\geq 19 months	95	17.9	.042	214	40.4	.004	32	10	.047
< 19 months	45	8.5		166	31.3		11	5.2	

Table-4: Mechanism of Induction of Labour Vs Inter-delivery Interval

Inter-delivery Interval	Post-Partum Hemorrhage			Rupture Uterus			Uterine Dehiscence		
	N	%	P value	N	%	P value	N	%	P value
≥19 months	15	4.7	0.03	1	0.2	0.149	0	0	0.398
< 19 months	20	9.5		3	0.6		1	.2	

Table-5: Maternal Complications Vs Inter-delivery Interval

Inter-delivery Interval	Perinatal Death			Apgar Score at 5min<7			Birth Weight ≥ 2500 gm		
	N	%	P value	N	%	P value	N	%	P value
≥19 months	1	0.2	.341	10	1.9	0.002	235	44.3	0.001
< 19 months	2	0.4		20	3.8		119	22.5	

Table-6: Fetal outcome Vs Inter-delivery Interval

inter-delivery interval was 648/1000 mothers.

- The relative risk of getting caesarean section among the mother who had not complete the 19 months inter-delivery interval was 1.571 {C.I. 95% 1.250-1.974}, which was statistically significant.

Table-1: Outcome of Index Labour Vs Inter-delivery Interval shows statistical significance of association between the outcome of index labour (whether was normal vaginal delivery or through caesarean section) and the inter-delivery interval. So the results of this Table were:

- The total number of the mother who had ≥19 months inter-delivery interval was 319, and the total number of the mothers who had < 19 months inter-delivery interval was 211.
- 30.9% of the mothers have ≥19 months inter-delivery interval and ended with NVD, while 29.2% of the mothers have <19 months inter-delivery interval and ended with CS.
- 13.4% of the mothers have <19 months inter-delivery interval and ended with NVD, while 26.4% of the mothers have <19 months inter-delivery interval and ended with CS. The percentage of the mothers that ended with NVD was (44.3%), against the percentage of the mothers who ended with CS was (55.7%). Mothers who had an inter-delivery interval of more than 19 months had an (51.4%) chance of VBAC success, while mothers whose inter-delivery interval was less than 19 months had a VBAC success rate of (33.6%). There was highly significant association (P<0.01) between CS, NVD and inter-delivery interval.

Table-2: Maternal Characteristics Vs Inter-delivery Interval shows statistical association between the maternal characteristics (age ≥40 years, BMI ≥30 Kg/M² and history of prior vaginal delivery) and the inter-delivery interval. So the results of this Table were:

- 13.8% of the mothers aged ≥40 years old had ≥19 months inter-delivery interval, while 17% of the mothers aged ≥40 years old had <19 months inter-delivery interval; there was highly significant association (P<0.01) between maternal age ≥40 years and inter-delivery interval.
- 21% of the mothers had BMI ≥30 Kg/M² and inter-delivery interval ≥19 months, while 18% of the mothers had BMI ≥30 Kg/M² and inter-delivery interval <19 months; there was highly significant association

(P<0.01) between maternal BMI ≥30 Kg/M² and inter-delivery interval.

- 21% of the mothers had prior vaginal delivery and inter-delivery interval ≥19 months, while 7.4% of the mothers had prior vaginal delivery and inter-delivery interval <19 months; there was highly significant association (P<0.01) between mothers had prior vaginal birth and inter-delivery interval.

Table-3: Indications of Previous CS Vs Inter-delivery Interval shows statistical association between the indications of previous CS (fetal distress, malposition, APH (placenta preavia abruption), CPD and 2nd stage arrest) and the inter-delivery interval. So the results of this Table were:

- 4.1% of the mothers had history of fetal distress and inter-delivery interval ≥19 months, while 1.3% of the mothers had history of fetal distress and inter-delivery interval <19 months; there was significant association (P<0.05) between history of fetal distress and inter-delivery interval.
- 7.4% of the mothers had history of malposition and inter-delivery interval ≥19 months, while 5.5% of the mothers had history of malposition and inter-delivery interval <19 months; there was no significant association (P>0.05) between history of malposition and inter-delivery interval.
- 3.8% of the mothers had history of APH and inter-delivery interval ≥19 months, while 5.7% of the mothers had history of APH and inter-delivery interval <19 months; there was no significant association (P>0.05) between history of APH and inter-delivery interval.
- 5.8% of the mothers had history of CPD and inter-delivery interval ≥19 months, while 4% of the mothers had history of CPD and inter-delivery interval <19 months; there was no significant association (P>0.05) between history of CPD and inter-delivery interval.
- 4.2% of the mothers had history of 2nd stage arrest and inter-delivery interval ≥19 months, while 6.4% of the mothers had history of 2nd stage arrest and inter-delivery interval <19 months; there was no significant association (P>0.05) between history of 2nd stage arrest and inter-delivery interval.

Table-4: Mechanism of induction of Labour Vs Inter-delivery Interval shows statistical association between the mechanism of induction of labour (whether was through spontaneous rupture of membrane, artificial rupture of

membrane or through use of oxytocin) and the inter-delivery interval. So the results of this Table were:

- 17.9% of the mothers presented with spontaneous rupture of membrane (whether ended with NVD or CS) and had inter-delivery interval ≥ 19 months, while 8.5% of the mothers presented with spontaneous rupture of membrane (whether ended with NVD or CS) and had inter-delivery interval < 19 months; there was significant association ($P < 0.05$) between history of spontaneous rupture of membrane and inter-delivery interval.
- 40.4% of the mothers delivered through artificial rupture of membrane (whether ended with NVD or CS) and had inter-delivery interval ≥ 19 months, while 31.3% of the mothers delivered through artificial rupture of membrane (whether ended with NVD or CS) and had inter-delivery interval < 19 months; there was significant association ($P < 0.05$) between history of artificial rupture of membrane and inter-delivery interval.
- 10% of the mothers delivered by use of oxytocin (whether ended with NVD or CS) and had inter-delivery interval ≥ 19 months, while 5.2% of the mothers delivered by use of oxytocin (whether ended with NVD or CS) and had inter-delivery interval < 19 months; there was significant association ($P < 0.05$) between history of use of oxytocin and inter-delivery interval.

Table-5: Maternal Complications Vs Inter-delivery Interval shows statistical association between the maternal Complications whether was PPH, rupture uterus and uterine dehiscence and the inter-delivery interval. So the results of this Table were:

- 4.7% of the mothers severed from PPH and had inter-delivery interval ≥ 19 months, 12 of them was uterine inertia, while 9.5% of the mothers severed from PPH and had inter-delivery interval < 19 months, 17 of them was uterine inertia; there was significant association ($P < 0.05$) between PPH and inter-delivery interval.
- .2% of the mothers severed from rupture uterus and had inter-delivery interval ≥ 19 months, while .6% of the mothers severed from rupture uterus and had inter-delivery interval < 19 months; there was no significant association ($P > 0.05$) between rupture uterus and inter-delivery interval.
- There was no one severed from uterine dehiscence and had inter-delivery interval ≥ 19 months, while .2% of the mothers severed from uterine dehiscence and had inter-delivery interval < 19 months; there was no significant association ($P > 0.05$) between uterine dehiscence and inter-delivery interval.

Table-6: Fetal Outcome Vs Inter-delivery Interval shows statistical association between the fetal outcome (perinatal death, Apgar score at 5 min < 7 , and birth weight ≥ 2500 gm) and the inter-delivery interval. So the results of this Table were:

- .2% died at the third day of life in the intensive care unit, his mother had inter-delivery interval ≥ 19 months, while .4% one of them died intra partum and the second died during the first week of life severing from RDS, their

mothers inter-delivery interval < 19 months; there was no significant association ($P > 0.05$) between perinatal death and inter-delivery interval.

- 1.9% of the born babies had Apgar score at 5min < 7 and their mothers had inter-delivery interval ≥ 19 months (admitted to neonatal care unit), while 3.8% of the born babies had Apgar score at 5min < 7 and their mothers had inter-delivery interval < 19 months (admitted to neonatal care unit); there was highly significant association ($P < 0.01$) between Apgar score at 5min < 7 and inter-delivery interval.
- 44.3% of the babies with birth weight ≥ 2500 gm and their mothers had inter-delivery interval ≥ 19 months, while 22.5% of the babies with birth weight ≥ 2500 gm and their mothers had inter-delivery interval < 19 months; there was highly significant association ($P < 0.01$) between birth weight ≥ 2500 gm and inter-delivery interval.

DISCUSSION

Although the safety of vaginal birth after a previous low-transverse cesarean section has been established in many studies, there is increasing evidence that a failed attempt of VBAC is associated with various maternal and neonatal complications²⁶. These include postpartum hemorrhage, uterine rupture requiring hysterectomy, blood transfusion, perinatal and neonatal deaths and respiratory distress syndrome. Furthermore, these patients are at greater risk for complications compared with those with elective repeat cesarean section without labour.²³

In our study the risk of getting caesarean section among the mother who had not complete the 19 months inter-delivery interval was about 1.5 times than the mother who had complete the 19 months inter-delivery interval which is statistically significant, this agree with Wilson H. Huang, et al. So a short inter-delivery interval was associated with a decrease in the rate of successful VBAC.⁸

Mothers who had an inter-delivery interval of more than 19 months had an (51.4%) chance of VBAC success against (33.6%) to the mothers whose inter-delivery interval was less than 19 months this disagree with Caughey. He founded that timing between pregnancies has recently become an interesting predictor for a number of obstetric outcomes and VBAC success among them. In one analysis, women who had an inter-pregnancy interval of more than 18 months had an 86% chance of VBAC success, while women whose inter-pregnancy interval was less than 18 months had a VBAC success rate of 79%⁶ this low percentage of successful VBAC could be due to complication related to managing patients undergoing trial of labour after cesarean delivery which related to many factors like poor monitoring and follow-up. There was highly statistical significant association ($P < 0.01$) between maternal age ≥ 40 years and inter-delivery interval, this could be due to the reproductive age of the female which is 15-44 year²⁴, and this age group lied at the end of the reproductive age.

There was highly significant statistical association ($P < 0.01$)

between maternal weight BMI ≥ 30 Kg/M² and inter-delivery interval, this could be explained as the majority of Iraqi women have BMI over 30 kilo/squared meter, this agrees with N.G. Al-Tawil "Only 24% of the women were normal weight: 39%, 25% and 12% were overweight (BMI 25–29.9 kg/m²), obese (≥ 30 kg/m²) and morbidly obese (≥ 40 kg/m²) respectively."²⁴

There was highly significant statistical association ($P < 0.01$) between maternal history of prior vaginal delivery and inter-delivery interval, history of prior vaginal delivery in mothers with short inter-delivery interval could be explained due to week family planning.²⁶ Although, patients with a prior vaginal delivery have higher rates of successful VBAC compared with patients without a prior vaginal birth. Furthermore, women with a successful VBAC have a higher success rate in a subsequent trial of labour compared with women whose vaginal delivery was prior to cesarean delivery.¹⁶

The study founded that indications of previous CS in general was not statistical significant association as APH, CPD, malposition and arrest 2nd stage except fetal distress was statistical significant ($P < 0.05$). So indications of previous CS not related to out come of next pregnancy despite of the inter-delivery interval and this agree with Caughey "Predictors for increased success include a nonrecurring indication for prior cesarean delivery (eg, breech presentation (malposition, placenta previa) and prior vaginal delivery. A history of cephalopelvic disproportion (CPD), failure to progress, no prior vaginal deliveries, or a prior cesarean delivery performed in the second stage of labour are negative predictors of success in a subsequent trial of labour."⁶

So the mechanism of induction of labour whether was spontaneously or artificially rupture of membrane or through using of oxytocin was statistically significant association with inter-delivery interval ($P < 0.05$). Although Wilson H. stated short inter-delivery interval was associated with a decrease in the rate of successful VBAC in patients whose labours were induced.⁸ Also, several studies have demonstrated that women who are induced in a trial of labour after cesarean delivery have a 2 to 3 fold increased risk of cesarean delivery compared with those who present with spontaneous labour.¹⁶

The maternal complication was statistically not significantly associated with inter-delivery interval as rupture uterus and dehiscence except PPH was statistically significantly associated with inter-delivery interval, because of the small number of mothers' labour that complicated by rupture uterus and dehiscence, so the statistical association were not clear. Although the excessive use of oxytocin has been described as leading to an increased risk of uterine rupture.¹⁷ The oxytocin uterine rupture relationship deserves careful consideration; the relationship directly impacts management of patients. At this point, using oxytocin for induction and augmentation is probably advisable only when absolutely necessary.⁶ Also patients with a prior classical hysterotomy have a higher rate of uterine rupture in subsequent pregnancies.¹⁹

Fetal outcome (Apgar score at 5min < 7 and Birth Weight ≥ 2500 gm) was statistically significant associated with inter-

delivery interval except perinatal death was statistically not significant associated with inter-delivery interval, this may be because the small number of perinatal death the statistical association was not clear. Although a trial of labor after prior cesarean delivery is associated with a greater perinatal risk than is elective repeated cesarean delivery without labor, although absolute risks are low.²⁷ However, TOL is associated with increased rates of suspected and proven sepsis. This appears to be limited to infants delivered by cesarean section after a failed TOL.²⁸

CONCLUSION

The mother who had not complete the 19 months inter-delivery interval has more than 1.5 risk to end with caesarean section. Mothers who had an inter-delivery interval of more than 19 months had an (51.4%) chance of VBAC success against (33.6%) to the mothers whose inter-delivery interval was less than 19 months this disagree with Caughey. There was highly statistical significant association ($P < 0.01$) between maternal age ≥ 40 years and inter-delivery interval, this could be due to the reproductive age of the female which is 15-44 year²⁴, and this age group lied at the end of the reproductive age. There was a significant statistical correlation between the mother's date of the previous vaginal birth and the period between birth, and the date of vaginal birth can be explained to the short-term mothers between births due to family planning per week. Women with VBAC had a higher success rate in postnatal experience compared to women who had prenatal cesarean delivery.

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