THE OUTCOME OF PROSTAGLANDIN INDUCTION OF LABOUR IN WOMEN WITH PREVIOUS SCAR: A PROSPECTIVE CROSS SECTIONAL STUDY AT TERTIARY HOSPITAL

BY

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A dissertation submitted in fulfillment of the requirement for Masters of Obstetrics and Gynaecology

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ABSTRACT

The aim of the study was to compare the success rate of vaginal birth following induction of labour in women with previous caesarean birth in comparison to women without previous caesarean birth. This study also aimed to identify the factors associated with successful induction of labour. This is a one year prospective cross sectional study carried out in Hospital Tengku Ampuan Afzan (HTAA) in Kuantan, Pahang. A total of 100 women with a term singleton pregnancy who had one previous low transverse caesarean section presenting to HTAA for induction of labour with prostaglandin E2 (PGE_2) were compared with a control of 100 women with intact uterus. Primary outcome measured was the rate of successful vaginal delivery. Others include maternal and neonatal complications, and factors associated with high likelihood of vaginal delivery. Rate of vaginal delivery in women with scarred uterus was only 29% compared to control group (78%) which is statistically significant ($p<0.001$). There were no cases of uterine rupture or primary postpartum hemorrhage. All babies were born with good Apgar score (7 and more at 1 and 5 min). Only 29% of women with scarred uterus who were induced with PGE2 have successful vaginal delivery. Those with previous vaginal birth and high Bishop score (BS) have better chance for successful vaginal birth after caesarean (VBAC). PGE2 induction does not increase risk of maternal and fetal morbidity.

APPROVAL PAGE

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DECLARATION

I hereby declare that this thesis is the result of my own investigation, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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LIST OF ABBREVIATIONS

ARM- artificial rupture of membrane

AS- Apgar score

BMI- body mass index

BS-Bishop score

BW- birth weight

CS- Caesarean section

EFW-estimated fetal weight

IOL- induction of labour

IUGR- intrauterine growth restriction

MOD- mode of delivery

NICU- neonatal intensive care unit

PGE_2- Prostaglandin E_2

PROM- prelabour rupture of membrane

VBAC- Vaginal birth after caesarean

CHAPTER ONE

INTRODUCTION

Overall, the caesarean births have doubled in the past 10 years with the main indication for caesarean section (CS) being repeat CS (Locatelli et al, 2006). The monthly caesarean rate in HTAA is also high, ranging from 22 to 23% (Monthly census 2013). Many efforts were taken to reduce the caesarean rate which includes encouraging the women with previous caesarean birth to attempt vaginal birth after caesarean (VBAC). Therefore many studies have been conducted to assess the outcome of VBAC including induction of labour (IOL) outcomes (Grinstead & Grobman, 2004; Alsayegh et al, 2007; Cheuk et al, 2015).

In the general population the success rate for VBAC is about 50-70% and the rate is lower (44-61%) with no previous vaginal birth (Green Top Guideline, 2007). However, nearly one-fourth of women candidates for trial of labour require IOL (Locatelli et al, 2006). IOL has the potential to improve neonatal outcomes as perinatal mortality and fetal compromise increase progressively with gestation beyond 37 weeks (Stock et al, 2012). In general, elective induction of labour is associated with lower rate of caesarean delivery (Caughey, 2007).

With regards to method of induction, prostaglandins remain a preferred method for cervical ripening and labour induction (Taher et al, 2011; Alfirevic et al, 2015). PGE2 gel and Foley catheter had a comparable effect on the Bishop score after 12 hours and there was no case of scar dehiscence or uterine rupture (Ziyauddin et al, 2013; Cheuk et al, 2015; Souza et al, 2015).

The rate of repeat caesarean is different in women who had undergone VBAC in induced, augmented and spontaneous labour group which is 33%, 26% and 19% respectively (Green Top Guideline, 2007). So far, no local data is available for success rate of VBAC following IOL.

A few studies that were done show different outcomes. Alsayegh et al (2007) found no difference in outcome of women with previous caesarean birth between induction of labour group with prostaglandin E2 (75 women) and spontaneous labour group (78 women) in term of overall rate of caesarean section, which were 24% vs 20.5% respectively. There were also no cases of uterine rupture in both groups. (Alsayegh et al, 2007)

Studies found a few factors associated with the rate of VBAC following IOL. Prior vaginal delivery remained independently associated with an increased likelihood of vaginal delivery. Conversely, prior caesarean delivery for dystocia, induction on or past estimated date of delivery, the need for cervical ripening and maternal gestational or pre-existing diabetes were associated with a decreased likelihood of achieving successful trial of labour (Grinstead & Grobman, 2004).

Women should be informed of the two to threefold increased risk of uterine rupture and around 1.5 fold increased risk of caesarean section in induced and/or augmented labours compared with spontaneous labours. There was also a higher risk of uterine rupture with prostaglandin use (Green Top Guideline, 2007).

This study was therefore conducted to compare the success rate of vaginal birth following induction of labour in women with previous caesarean birth in comparison to women without previous caesarean birth. The rationale of doing this study in the local set up is in view of limited local data available. It was also to identify the factors contributing to successful induction of labour and also to compare

the associated maternal and neonatal complications in the two different groups of patients.

CHAPTER TWO

LITERATURE REVIEW

To date, many studies have been performed to assess the outcome of women with one previous caesarean who undergo VBAC. In a registration based retrospective study by Schoorel et al (2014) in Netherlands, a total of 371 out of 515 women had a successful VBAC (71%). In a retrospective study in Anatolia from 2010 to 2014, 55% (out of 70 trial of labour) had successful VBAC. Advanced cervical opening, effacement, gravidity, parity and prior vaginal deliveries were factors associated with successful VBAC (Senturk et al, 2015).

However, there are limited data available regarding the outcome of induction of labour in women with previous caesarean section as compared to women without caesarean section especially a local data.

In a retrospective study by Al Qahtani et al (2011), there was no difference in the rate of vaginal delivery following induction of labour with prostaglandin E2 between study (161 women with previous caesarean delivery) and control group (161 women without previous caesarean) which were 68.3% and 79.5% respectively. In addition, the rate of uterine rupture was 30 times higher in study group (2.5% vs 0.033%). Stock et al (2013) found a slightly different outcome which is 59.4% (4399/7401) had successful vaginal delivery following IOL for women with previous caesarean delivery. However 0.66% (49/7401) had uterine rupture and 5 of their babies died. A retrospective review by Kayani & Alfiveric (2005) found 5/205 cases of uterine rupture following IOL in women with previous caesarean birth (2.4%, 95 CI

0.8-5.6%). Two babies were profoundly acidotic at birth, but all five babies were healthy when discharged with no long term morbidity.

Many studies concluded a few factors influencing the outcomes of IOL in general. The study by Wolfe et al (2011) showed that obesity is associated with increased risk of failed labour induction. In addition, women with class III obesity without previous vaginal delivery and had had a macrosomic fetus had the highest rate of failed induction at 80% (Arrowsmith et al, 2011; Wolfe et al, 2011). Nulliparity, poor Bishop score and prolonged latent phase had the strongest association with failed IOL. Macrosomia, gestation age, bad obstetric history and prelabour rupture of membranes were other significant risk factors for emergency CS in IOL (Khan et al, 2012).

For IOL in women with previous caesarean delivery, a prior vaginal delivery remained independently associated with an increased likelihood of vaginal delivery. Conversely, prior caesarean delivery for dystocia, induction on or past estimated date of delivery, the need for cervical ripening, and maternal gestational or pre-existing diabetes were associated with a decreased likelihood of achieving successful trial of labour (Grinstead and Grobman, 2014). Furthermore, in women with no prior vaginal delivery/ies, IOL carries a relatively high risk of uterine rupture/dehiscence (Kayani & Alfiverix, 2005)

CHAPTER THREE

METHODOLOGY

3.1 DESIGN /SETTING OF THE STUDY

This is a prospective cross sectional study which was carried out in Hospital Tengku Ampuan Afzan (HTAA) in Kuantan, Pahang from January 2014 till December 2014.

3.1.1 Study population

The inclusion criteria included women of Para ≤ 5, singleton pregnancy with cephalic presentation at term, with or without one previous caesarean birth, with no contraindication for VBAC and had unfavourable cervix who were already planned for induction of labour for obstetric reasons by their clinical specialists.

Women with the signs of maternal/fetal compromise which required immediate delivery, intrauterine foetal death or polyhydramnios were excluded from the study.

All of them were categorised into two different groups, i.e: women with one previous caesarean birth (study group) and women without previous caesarean birth (control group).

3.1.2 Methods

They were recruited upon admission to the antenatal ward. Women with modified BS ≤6 were proceeded with IOL using prostaglandin E2 vaginal tablet (PGE2) based on the local protocol. Half tablet of prostaglandin was inserted for women with previous

caesarean birth while 1 whole tablet were used for women without previous caesarean birth.

The PGE2 was inserted at the posterior vaginal fornix by the attending doctor under aseptic technique at 7am. The next dose was repeated at 6h if BS $\leq$6 and no regular contraction present at that time. The maximum of 3 doses and 4 doses were inserted for women with previous caesarean birth and women without previous caesarean birth respectively.

Once BS was favourable (>6) following IOL, artificial rupture of membrane (ARM) were done followed by oxytocin infusion according to local protocol for patient with or without one previous scar respectively.

Follow-ups were done until delivery. Maternal outcomes which included mode of delivery (MOD) and maternal complications (eg: uterine scar dehiscence/rupture) were studied. Neonatal outcomes which included Apgar score (AS) of < 7 at 1 minute of life and at 5 minutes of life and admission to neonatal intensive care unit (NICU) were recorded.

3.1.3 Sample size

Sample size was calculated using PS software with level of significance $\leq$ 0.05, power of study = 0.8, ratio = 1, proportion of outcome in control group = 80%, and proportion of outcome in trial group = 60%, the estimated sample size (n) = 180 (90 in control group, 90 in trial group).

Taking into consideration the 10% drop out rate, the final sample size = 200 (100 in control group, 100 in trial group) was expected for this study.

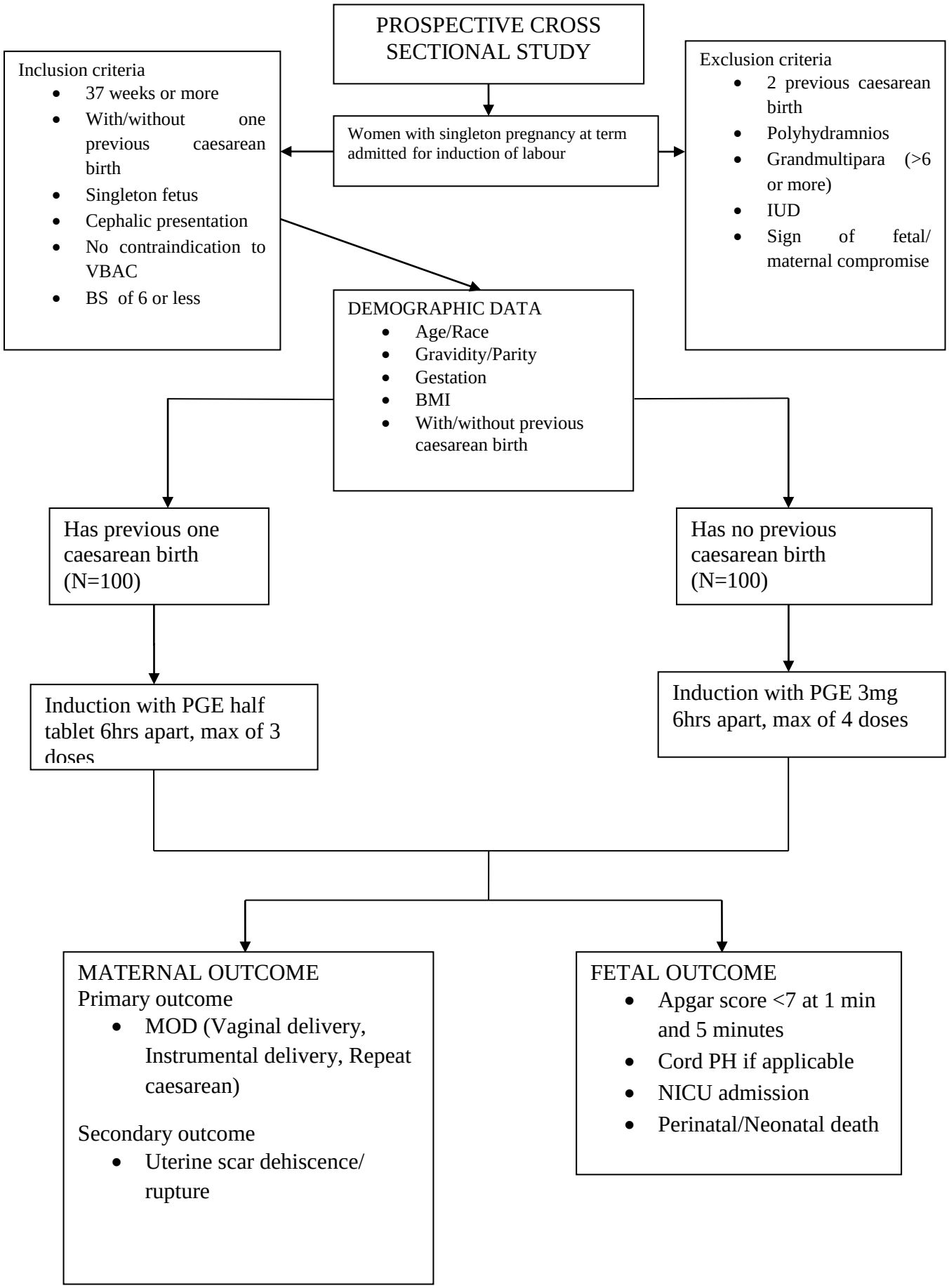
3.1.4 Statistical analysis

The collected data was analysed statistically using SPSS Software version 20. Results were expressed as means ± SD or percentage. Comparisons between groups were performed with analysis of variance (ANOVA) for numerical data and Chi square or Fisher's exact test for categorical data. The association between vaginal delivery and possible predictors was calculated by logistic regression and forward likelihood analysis, controlling for related variables. The odd ratio (OR) and 95% confidence interval (CI) were calculated. A P-value of <0.05 was considered significant.

3.2 DEFINITIONS

1. Unfavourable cervix: modified Bishop score of 6 or less
2. Term: gestation at 37 weeks and more
3. Failed induction: unfavourable cervix after 2 or 3 doses and after 4 doses of PGE2 administered for women with scarred uterus and women with intact uterus respectively
4. Poor progress of labour: 6-8 hours for women with scarred uterus and 10-12 hours for women with intact uterus following amniotomy/ruptured membrane with/without Syntocinon augmentation.

Figure 3.1 Study flow chart



CHAPTER FOUR

RESULTS AND FINDINGS

A total of 200 women were recruited during the study period in which 100 women with previous caesarean section belonged to the study group and another 100 women with intact uterus belonged to the control group.

The data was homogenous for both groups in term of age, race, gestation at delivery, body mass index (BMI) and estimated fetal weight (EFW). However, women with scarred uterus have higher gravidity and parity and also have babies with higher birth weight (BW). In addition, women in the study group were less likely to have had a previous vaginal delivery as compared to women with intact uterus ($p<0.001$). The majority of the previous CS for the study group was performed for a non-recurrent cause (88%). The main indications for IOL in both groups were mainly for diabetes mellitus and postdates. (Table 1)

The mean Bishop scores were almost the same, which was 3.7 in the study group and 3.9 in the control group. The study group required more PGE2 insertion and longer duration of induction (time from PGE2 insertion until cervix becomes favourable). The differences was however not statistically significant. In the study group, 26 women had failed induction after 2 or 3 PGE2 insertion while the remaining 74 women manage to enter active labour. In addition, women in the study group required less oxytocin augmentation and less blood loss following delivery compared to the control group. There was no difference in the duration of labour for both groups. (Table 2)

In women with scarred uterus, the majority of them had a repeat CS (71%) compared to the control group (22%) which was statistically significant ($p<0.001$). The indications for repeat CS were mainly due to failure to achieve cervical ripening (26%) and labour dystocia (24%). Three women with scarred uterus underwent CS for suspected scar dehiscence. Two of them had favourable BS after induction and entered the labour room for delivery. One of them was suspected to have scar dehiscence when blood stained liquor was noticed upon ARM which was performed at cervical dilatation of 3cm and the woman complained of pain at the scar site. Intra-operatively, there was no scar dehiscence. Instead a placenta previa Type 1 posterior was found. The second patient complained of pain at her scar during intrapartum while having regular 2:10 contraction. Intra-operatively, again no scar dehiscence was detected. The third woman had pain and tenderness at her scar during IOL, even before her cervix was favourable. Intraoperatively there was no scar dehiscence. All three women had no complications and all the babies were born with good AS of 8 at 1 minute and 9 at 5 minutes, not requiring admission to the NICU. (Table 3)

So, in actual fact, there was no case of uterine rupture following IOL in both groups. There was also no postpartum haemorrhage following either CS or vaginal delivery in both groups. All 200 babies were delivered with good AS (7 and more at 1 and 5 min). There were only 3 babies admitted to NICU which were from cases of caesarean section done for fetal distress and poor progress from the study group. All the 3 babies were admitted only for transient tachypnea of newborn.

In the study group, the likelihood of having successful vaginal deliveries was higher in women who had previous history of vaginal birth (OR 5.71, 95% CI 1.82-17.87), higher BS (OR 1.62, 95% CI 1.09- 2.65) and with lower requirement of PGE2

insertion (OR 0.2, 95% CI 0.02- 0.68). For the control group, BS and number of PGE2 are the significant determinant factors.

Table 1 Baseline characteristic of study group and control group

	Scarred uterus N=100	**Control** N=100	P value
Maternal age (years) Mean ± SD	30.1 ± 4.4	28.6 ± 5.3	0.45
Race (%)			
Malay	93	85	0.142
Chinese	2	5	
Indian	3	2	
Others	2	8	
Gestation at delivery (weeks) Mean ± SD	39 ± 1.4	39 ± 1.3	0.47
Gravidity Mean ± SD	2.6 ± 0.9	2.1 ± 1.3	0.004*
Parity Mean ± SD	1.4 ± 0.8	0.9 ± 1.1	0.001*
Prior vaginal delivery	26	54	<0.001 **
BMI(kg/m^2) Mean ± SD	25 ± 4.9	26 ± 6.1	0.53
EFW(kg) Mean ± SD	3.0 ± 0.3	2.9 ± 0.3	0.176
BW(kg) Mean ± SD	3.1 ± 0.5	3.0 ± 0.4	0.04*
Indications for IOL (%)			
Post datism	26	18	0.58
Diabetes	32	33	
Hypertension	13	13	
IUGR	4	7	
Oligohydramnios	9	11	
Prolonged latent phase	0	2	
PROM	9	6	
Reduced FM	7	10	

*One way annova **Chi square

Table 2 Labour characteristic among women undergoing IOL

	Scarred uterus N=100 Mean(SD)	**Control** N=100 Mean (SD)	P value
BS before IOL	3.7 ± 1.2	3.9 ± 1.2	0.3
No of PGE2	1.4 ± 0.5	1.3 ± 0.6	0.03*
Duration of induction (hours)#	21.3 ± 13.5	15.7 ± 12.6	0.06
Syntocinon augmentation (%)	43	50	<0.001**
Analgesic (%)			
Epidural	15	1	<0.001**
Pethidine	25	25	
Enthonox	23	32	
None	10	40	
Not applicable	27	2	
1st stage (hour) N= 115	3.8 ± 2.8	3.1 ± 2.3	0.19
2nd stage (min) N= 107	14.8 ± 14.2	12.1 ± 11.3	0.3
EBL(ml)			
Vaginal	229 ± 57	248 ± 64	0.17
CS	407 ± 138	513 ± 221	0.008

Mean ±SD or Number (%)
*One way Annova
**Chi square
#From 1st PGE2 inserted until cervix favourable