

## Study of spontaneous and induced vaginal birth after caesarian delivery

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### Abstract

**Introduction:** In the present study, we assessed the safety and efficacy of PGE<sub>2</sub> gel for labour induction and augmentation by Oxytocin injection in women attempting VBAC after caesarean section and thus reducing the rate of c-section in patients having previous c-section for non-recurring cause.

**Aims and Objectives:** We aimed at to evaluating the safety and efficacy of prostaglandin (PGE<sub>2</sub>) gel for induction of labour in previous c-section delivery and correlate Bishop's Score with pregnancy outcome in women attempting VBAC.

**Materials and Methods:** This is a prospective study of women admitted in Rajkiya Mahila Chikitsalya, Ajmer over a period of one year from July 2011 to June 2012 with singleton live pregnancy of >34 weeks of gestational age with previous one caesarean delivery and willing for VBAC.

**Result:** Success rate of VBAC was more in induced than spontaneous group (57.33% to 50.0%), and in patients with previous vaginal delivery after caesarean sectioned patients who were having Bishop's score >6. Rate of uterine rupture in induced group was more than spontaneous group but it was statistically insignificant. Admission in NICU was more in spontaneous group while APGAR score <5 was more in induced group. Cervical dilatation, effacement and head position are more significant for successful VBAC than cervical position and consistency.

**Conclusions:** In spontaneous and induced group there was no significant difference in distribution of group according to ANC visit, age, parity, gestational age, rate of uterine rupture, rate of uterine dehiscence, still birth, APGAR score <5 in 5 minutes. But success rate of VBAC was more in induced group and in women who have previous vaginal delivery after caesarean section. Admission in NNU was more in spontaneous group.

**Keywords:** VBAC, C- section, Apgar score, PGE<sub>2</sub>, Bishop's score.

### Introduction

There has been widespread rise in caesarean section during last three decades. Before 1970 the phrase "once a caesarean always a caesarean" was in prevalence but later on the escalating rate of caesarean sections, suggestion were made for trial of vaginal birth after caesarean section (VBAC) in an appropriate clinical setting and in properly selected group of women, the chance of successful planned VBAC after one previous caesarean is 72-76% whereas after previous two caesarean delivery is 62-75%.

C section left a scar on uterine wall. This scar is weaker than normal uterine wall so there is increased chance of rupture in subsequent pregnancy. But scar of lower segment c-section is stronger than classical upper segment scar. Advantage of VBAC include greater chance of an uncomplicated normal birth in further pregnancies, shorter recovery and shorter hospital stay, less abdominal pain after delivery, less complications of anaesthesia and surgery, early ambulation and resumption of work, economical, less chance of bleeding so less requirement of blood transfusion, scar related remote complications are avoided like keloid hypertrophy, incisional hernia, adhesions and scar endometriosis.

Disadvantages of VBAC are more chance of emergency caesarean deliveries, risk of weakening of scar and rupture, more chance of maternal & fetal morbidity and mortality.

Caesarean delivery rates decreased after trial of VBAC. Induction of labor in previous caesarean delivery also increased but initial report suggest that chance of emergency caesarean delivery and rate of rupture uterus was increased in induced labor as compared to it spontaneous counterpart.

Cervical ripeness is an important predictor of trial of labor success. PGE<sub>2</sub> gel used for cervical ripening. It contain 0.5 mg dinoprostone, a prostaglandin. It may be given at 6 hours interval, maximum of 1.5 mg. Most common complication associated with PGE<sub>2</sub> are tachysystole and hyperstimulation of uterus. PGE<sub>2</sub> gel is more convenient, more comfortable and less invasive than amniotomy and oxytocin which require intravenous access and reduce women morbidity during induction of labor.

Cervical status is most commonly evaluated by Bishop's score. It is the method of assessment of condition of cervix or favorability for success of induction of labor.

In the present study we assessed the safety and efficacy of PGE<sub>2</sub> gel of labor induction in women attempting VBAC after caesarean delivery & thus reducing the rate of caesarean section in patients having previous caesarean section for non-recurring cause.

### Materials and Methods

This was a prospective study conducted at Department of obstetrics and gynecology, JLN Medical College, Ajmer

over a period of one year from July 2011 to June 2012. A total of 333 women with singleton live pregnancy of >34 weeks of gestational age with previous one caesarean delivery and willing for VBAC were enrolled in the study.

**Inclusion Criteria:** Singleton live pregnancy, gestational age more than or equal to 34 weeks, previous one caesarean delivery and, willing for VBAC.

Bishop's scoring (Table 1) was done at the time of admission. If it was >6 they were observed for spontaneous progress of labor. If score was <6, two groups A & B were formed on the basis of type of labor as follows

**Group-A:** women having medical indication for termination of pregnancy was induced with PGE<sub>2</sub>

(dinoprostone) followed by augmentation of labor by injection oxytocin depending upon Bishop's score.

**Group-B:** Women not having medical indication for termination of pregnancy had spontaneous progress of labor.

**Exclusion Criteria:** Scar of other uterine surgery like myomectomy, h/o previous still birth, congenital fetal anomalies (hydrocephalus), recurrent indication of c-section, previous 2 or more c sections, previous classical c section, previous inverted T or J uterine incision, multifetal gestation, women not willing for VBAC, hypersensitivity to prostaglandin, having asthma or glaucoma.

**Table 1: Bishop's scoring**

Cervix	Score			
	0	1	2	3
Position	Posterior	Midposition	Anterior	-
Consistency	Firm	Medium	Soft	-
Effacement	0-30%	40-50%	60-70%	>80%
Dilatation	closed	1-2 Cm	3-4 Cm	>5 Cm
Head Station	-3	-2	-1	+1, +2

Total score=13, favorable score=6-13, unfavorable score=0-5

After instillation of single dose of PGE<sub>2</sub> gel or augmentation of labor by oxytocin, if Bishop score 6 is achieved, women were further observed for spontaneous progress of labour. If score remains <6 after PGE<sub>2</sub> gel administration, caesarean delivery was conducted for failed induction. During this whole study if at any time it was observed, that there is unsatisfactory progress of labour, any sign of scar dehiscence, or non-reassuring fetal heart, vaginal delivery was abandoned and c section was conducted. Data was collected for following variables maternal age, parity, previous vaginal birth, previous VBAC, interval b/w previous caesarean delivery and present pregnancy, indication of previous c section, Bishop's score,

induction to delivery. Maternal and neonatal outcome were analysed under following points;

1. Primary outcome (successful and unsuccessful VBAC)
2. Secondary outcome; Complications (uterine rupture, scar dehiscence), Live birth, intrapartum stillbirth, Apgar score, admission in NNU and early neonatal death.

## Results

During the study period 333 women with previous single low transverse caesarean delivery, singleton pregnancy and >34 weeks of gestation age were enrolled. These women had a trial of VBAC.

**Table 2: Maternal outcomes in the two groups (N-183)**

S. No.	Characteristic	Group A (n=75)		Group B (n=108)		Significance of difference	
		No.	%	No.	%	x <sup>2</sup> (df)	P value
1	Successful VBAC	43	57.3	54	50	0.170(1)	0.68
2	Unsuccessful VBAC	32*	42.7	54*	50	0.292(1)	0.589

\* Included 4 patients of rupture uterus in two in each group

Table 2 shows the success rate of VBAC was more in those women who were induced and augmented by injection

oxytocin. However the difference was statistically insignificant.

**Table 3: Delivery outcome according to Bishop's score at admission (N=333)**

	Bishop's score <6 (183) N(%)	Bishop score >6 (150) N(%)	x <sup>2</sup>	P value
Successful VBAC	97 (53%)	96 (64%)	4.089	0.043
Unsuccessful VBAC	82 (44.80%)	54 (36.0%)	2.647	0.104
Uterine rupture	4 (2.19%)	0(0%)	3.319	.069

Table 3 shows that rate on successful VBAC is higher in women with Bishop Core >6 and with no uterine rupture.

**Table 4: Showing maternal morbidity in two groups (N=183)**

Characteristics	Group A (n=75)		Group B (n=108)		Significance of difference	
	No.	%	No.	%	x <sup>2</sup>	P
Rupture uterus	2	2.7	2	1.9	0.137	0.711
Uterine dehiscence	4	5.38	7	6.66	0	0.996
Blood transfusion	14	18.7	10	9.2	3.438	0.064
Fever	2	2.7	5	4.6	0.464	0.496
PPH	0	0	1	0.9	0.698	0.403
Manual removal of placenta	2	2.67	3	2.78	0.173	0.678
Inversion of uterus	0	0	0	0	-	-

Most serious maternal morbidity was rupture uterus. 4 cases of uterine rupture occurred in the study. Two were in group A induced and f/b augmentation with oxytocin and two were in spontaneous group B. however the rate of uterine rupture occurred in 2.7% in group A and 1.9% in group B and it was statistically insignificant. Uterine

dehiscence was more in spontaneous B group (6.66%) as compared to group A (5.38%) but difference was statistically insignificant. None of the other maternal morbidity parameters in both the groups were statistically significant.

**Table 5: Birth weight distribution in the two groups (n=183)**

Birth weight(Kg)	Group A(n=75)		Group(n=108)		Significance of difference	
	No.	%	No	%	X <sup>2</sup>	P
<2.5	4	5.3	27	25	12.167	<0.001
2.5-3.5	65	86.7	73	67.6	8.684	0.003
>3.5	6	8	8	7.4	0.022	0.882

Birth weight of <2.5 Kg was statistically more in women who had spontaneous labor. Birth weight 2.5-3.5 was statistically more in induced group.

**Table 6: Perinatal outcome in the two groups (n=183)**

Characteristic	Group A (n=75)		Group B (n=108)		Significance of difference	
	no	%	no	%	x <sup>2</sup>	P
Live birth	72	96	106	98.1	0.769	0.381
Still birth	3	4	2	1.9	0.769	0.381
Admission to NNU	2	2.7	12	11.11	4.467	0.035
Early neonatal death	0	0	2	1.9	1.404	0.236
Apgar score <5 mint.	4	5.33	2	1.9	1.692	0.193

This table shows five still births occurred in study group. Three still birth occurred in women who were induced and two occurred in those who had spontaneous labor. NNU admission were more in those who were had spontaneous group (Group B), and it was statistically more

than group A. There were two early neonatal deaths in the study which occurred in women who had spontaneous labor. Apgar score < 5 at 5 minute was more in group A, however the difference was statistically insignificant.

**Table 7: Relationship of success of VBAC with history of prior vaginal delivery (VD) (N=183)**

Group	VBAC Status	No of prior VD	Prior VD before c-section	Prior VD after c-section	X <sup>2</sup>	P value
A (N=75)	Successful (VBAC) (n=43)	34	3	6	5.815	0.055
	Unsuccessful (VBAC) (n=54)	27	5	0		
B (N=108)	Successful (n=54)	44	7	3	0.547	0.761
	Unsuccessful (n=54)	42	7	5		

This table shows that women having prior vaginal delivery (VD) after caesarean delivery i.e. history of VBAC has statistically significant difference in the success rate of VBAC in Group A while this was not in Group B.

## Discussion

Induction of labor f/b augmentation for women attempting a VBAC is quite controversial. These controversies are due to conflicting results from studies that have examined the health outcomes of induction of labor in women with a prior caesarean delivery. Many study groups have included women with different numbers of prior cesarean deliveries, different types of caesarean incisions and different histories with regard to vaginal delivery. The present study was planned to study the safety in induction and augmentation of labor and to study the Bishop's score as a predictor of success of induction.

In the present study we used PGE<sub>2</sub> gel intracervically single dose followed by augmentation by injection oxytocin according to Bishop's score. Blanco et al had done an observational study with previous caesarean delivery. They induced 25 women with PGE<sub>2</sub> gel and 56 women were observed for spontaneous labour. They used 1 mg of PGE<sub>2</sub> gel intracervically and repeated at 4 hours, if active labour did not start. They have not specified about the cervical status in the study. Flamm et al had also done an observational study on 5022 women with previous cesarean delivery, they induced 453 women with PGE<sub>2</sub> gel and 4569 women were observed for spontaneous labor. They used 2-4 mg of PGE<sub>2</sub> intracervically at 4 hours. Rayburn et al had done a randomized controlled trial on 294 women with previous cesarean delivery. 143 women were induced with PGE<sub>2</sub> gel and 151 women had expectant management. They used 0.5 mg of PGE<sub>2</sub> gel intracervically and repeated at weekly visit. Cervical status was not stated.

Distribution of women in both the groups were similar in respect to antenatal visit, maternal age, parity, gestational age, interval between previous caesarean delivery and present pregnancy, and a women who had prior vaginal delivery, 53% of women had one or more antenatal visits in the study. This was stated only in the study of Delaney et al in which antenatal visits were 17.3%. Mean maternal age in the present study was 26.89±3.76 years and with maternal age ranged from 20 to 40 years. Mean maternal age in successful VBAC was more in induced group (27.12 vs 26.50; p 0.510). Maternal age was stated only in two studies. One studied by Delaney et al in which mean maternal age was 30.1±5.0 years. Other was Grobman et al in which mean age was 28.7±5.7 years. Mean parity in present study was 1.27±0.56. By Delaney et al mean parity was 1.4±0.8 more than the present study. Mean gestational age in present study was 38.21±1.76 weeks, similar in both groups A and B. the mean gestational age was by Grobman et al was 39.7 weeks more than the present study. Women who had prior vaginal delivery in present study were 19.6%. Among 19.6% of women, 61.1% had vaginal delivery before previous caesarean delivery and 38.9% had vaginal delivery after previous caesarean delivery. Distribution of

women with prior vaginal delivery was similar in both the groups in the present study. While in the study of Kayani and Alfirovic 45.36% women had prior vaginal delivery out of which 43.18% had vaginal delivery before previous caesarean delivery and 56.82% had vaginal after previous caesarean delivery. In the study by Grobman et al 47.9% women had prior vaginal delivery, Delaney et al had 25.7% women with prior vaginal delivery.

Success rate of VBAC was insignificantly more in induced than spontaneous group (57.33% vs 50.50%, p=0.680) in present study. Success rate of VBAC was 55.74%, 37.5% and 100% in induced women who had no prior vaginal delivery, had prior vaginal delivery before previous caesarean delivery and had prior vaginal delivery after previous caesarean 51.16%, 50%, 37.5% in spontaneous group in women who had no prior vaginal delivery, had prior vaginal delivery before previous caesarean delivery and had prior vaginal delivery after previous cesarean delivery respectively (0.761). In present study 69.33% of women had successful induction f/b augmentation of labor in induced group and among these the incidence of successful VBAC was 82.69%. Blanco et al had not found significant difference in the success rate in those induced with PGE<sub>2</sub> gel and those who had spontaneous labor. Flamm et al had observed significant difference in VBAC success rate in PGE<sub>2</sub> gel induced group with spontaneous labour group (51% vs 67%). Rayburn et al had found success rate of 49% success rate in both the groups. These three study have not specified the cervical status and prior obstetric history. In the study of Kayani and Alfirovic, success rate of VBAC in those induced with PGE<sub>2</sub> gel with unfavorable cervix was 47%. Success rate in women who had no prior vaginal delivery, had prior vaginal delivery before previous caesarean delivery and had prior vaginal delivery after previous caesarean delivery was 26.41%, 47.36% and 88% respectively. In the study of Grobman et al. success rate of VBAC was significantly more in spontaneous group than induced group of women who had no prior vaginal delivery (64.7% vs 51.0%, p<0.001) and in women who had prior vaginal delivery (88.3% vs 88.3% p<0.001). They included all women induced with other method of induction in induced group.

The rate of uterine rupture in literature is 1.02%, .87% and 0.36% in induced, augmented and spontaneous labour. Rate of uterine rupture in induced and spontaneous group was 2.7% and 1.9%, p=0.711 in present study respectively. Two uterine rupture occurred in induced group were in those women who had prior vaginal delivery before caesarean delivery. Two uterine rupture occurred in spontaneous group. Out of these, one uterine rupture occurred in women in no prior vaginal delivery and other in women who had vaginal delivery after previous caesarean delivery. Nothing can be said conclusively about this as number of subject in both group was very small and uterine rupture is a rare event. Flamm et al observed 1.3% and 0.72% uterine rupture in induced and spontaneous group respectively. There was no uterine rupture in study of Blanco et al and

Delaney et al found uterine rupture rate 1.1% and 0.3% in induced and spontaneous group respectively. These above studies have not specified about the cervical status which might be the reason for less rate of uterine rupture. Kayani and Alfrevic had reported 1% of uterine rupture in those induced and had unfavorable cervix. Grobman et al had reported overall 1.2% uterine rupture in those induced with PGE2 gel without prior vaginal delivery and 1.7% when had unfavorable cervix. No uterine rupture occurred in women who had prior vaginal delivery in both the studies. Rate of uterine rupture in present study was comparable with above study as cervical status was taken into account. Rate of uterine dehiscence in present study was 5.38% and 6.66% in induced and spontaneous group,  $p=0.996$ , respectively. There was no case of uterine dehiscence in women induced with PGE2 gel in the study of Kayani and Alfrevic.

The incidence of maternal morbidities (as per table 4), like blood transfusion (18.7% vs 9.2%,  $p=0.064$ ), fever (2.7% vs 4.6%,  $p=0.496$ ), post-partum haemorrhage (0% vs 0.9%,  $p=0.403$ ), manual removal of placenta (2.67% vs 2.78%,  $p=0.678$ ) was almost similar,  $p$  value being statistically insignificant in induced and spontaneous group in present study. Delaney et al had reported blood transfusion (0.6% vs 0.5%,  $p=0.58$ ), fever (2.2% vs 3.3%,  $p=0.03$ ) and post-partum haemorrhage (7.3% vs 5.0%,  $p=0.01$ ) in induced and spontaneous groups. Similarly Grobman et al had reported composite maternal morbidity as 1.87% and 1.26% in induced and spontaneous group and it was statistically insignificant.

Mean birth weight (Table 5) of neonates in present study was  $2.7513 \pm 0.5421$  Kg spontaneous group women had statistically significantly more number of neonates of  $<2.5$  Kg than induced group (25% vs 5.3%,  $p<0.001$ ). While neonates of 2.5-3.5 Kg were significantly more in induced group (86.7% vs 67.6%,  $p=0.003$ ). Delaney et al had mean birth weight  $3.452 \pm 483$  Kg.

In the present study 4% and 1.9% still births occurred in induced and spontaneous group respectively. Admission to NNU was 2.7% and 11.1% in the two groups respectively,  $p=0.035$ . This was statistically significant. The incidence of newborn with Apgar score  $<5$  at 5 minutes was more in induced group (5.33% vs 1.9%,  $p=0.193$ ) as compared to spontaneous group, but the difference was not statistically significant. There were 1.9% early neonatal deaths in spontaneous group and none in induced group but the difference was statistically insignificant. By Delaney et al, the overall neonatal deaths were similar in induced and spontaneous group and it was 0.2%, NICU admission was 13.3% and 9.4% in induced and spontaneous group respectively. Apgar score  $<3$  at 5 minutes was 0.12% and 0.23% in induced and spontaneous group. Neonatal morbidity was more in spontaneous group which might be due to less birth weight in neonates. Kayani and Alfrevic

had found no neonatal morbidity in terms of neonatal death, admission to NICU and Apgar score  $<5$  at 5 minute. Successful VBAC was statistically more in women who had Bishop's score  $>6$  than women who had the score  $<6$  (64% and 53%,  $p=0.043$ ), and the difference was statistically significant. In the present study cervical dilatation, cervical effacement, and head station was more in women who had successful VBAC and the difference was statistically significant as compared to those who had unsuccessful VBAC.

## Conclusion

The present study was done primarily to assess the safety of induction by PGE2 gel followed by augmentation of labor by oxytocin in women attempting VBAC and secondarily it correlate Bishop's score with pregnancy outcome in women attempting VBAC. Success rate of VBAC was more in induced than spontaneous group (57.33% vs 50.0%,  $p=0.680$ ), but difference was statistically insignificant. In the induced group the success rate of VBAC among those having successful induction was 82.69%. Hence we conclude that women can be induced with prostaglandin gel f/b induction by oxytocin with previous one vaginal delivery as it reduces the duration of labor without affecting the fetal and maternal outcome in comparison to spontaneous labor.

**Conflict of Interest:** None.

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