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Use of PG-E 2 Gel for Cervical Ripening in Labour Induction

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ABSTRACT

Continuing a woman's pregnancy allows her cervix to remain closed and strong, and her uterus to remain calm and not contracting. There is a need to reverse both of these conditions to initiate labour. Cervix includes a small smooth muscle and mainly connective tissue with collagen as its key component and it must ripen as it becomes soft and pliable.

Prostaglandins play a significant role in the process of cervical maturation and labour initiation. Prostaglandin E2 intracervical gel contains 0.5 mg of dinoprostone and induces collagen breakdown, dispersion, fluid absorption by stromal tissues and successful cervical maturation for labor induction when applied locally.

Materials and Methods: 70 antenatal patients who fulfilled the inclusion criteria were studied. Group 1 had patients who required a single dose of PGE2 gel and group 2 had patients who required a second dose of PGE2 gel.

Results and Observation: Group 1 had 56 patients requiring a single dose of dinoprostone gel and group 2 had 14 patients requiring a second dose of dinoprostone gel for induction. The common indication for induction of labour was postdatism (45.71 %), The mean bishop score at the time of induction was 1.9. The improvement in mean bishops score at 6 and 12 hours in group 2 is just 2 as compared to 7.02 in group 1, The overall mean induction delivery time was 21.45 hours. The incidence of normal delivery was 74.28% and caesarean section rate in our study was 21.45 %. The common complications that occurred were vomiting (7.14%), diarrhea (5.71 %).

Conclusion: PGE2 GEL is a safe and effective method for the induction of labour. The success of induction depends upon the cervical status. It increases the chances of a vaginal delivery without increasing maternal and neonatal morbidity.

Key Words: PG-E2, Cervical ripening, Labour, Induction

INTRODUCTION

Modern obstetrics aim to improve maternal and fetal safety during antenatal period as well as parturition. The purpose of labor induction is to achieve safe vaginal delivery.

Labor induction is a procedure done after 28 weeks of gestation, intended to gradually induce uterine contractions resulting in the gradual effacement and dilatation of the cervix and culminating in vaginal delivery. The clinical necessity for labour induction emerges from conditions in which the result of the pregnancy in question is assumed to be safer if it is medically interrupted, rather than left to follow its normal path. The performance of induction largely depends on the conformity and structure of the cervix¹. Therefore, the unripe cervix remains a well-recognized impediment to effective labor induction.

At the end of pregnancy a sequence of complex metabolic, physiological and physical processes cascade, culminating in delivery. The neuroendocrine pathways, humoral transmission, steroids, and local hormones modulate many events. The cervix becomes smooth, short with decreased cervical resistance during the transition to the start of labour. This cycle is called "cervical ripening". The final successful outcome of induction depends on the degree of the pre-labor changes²

- A. Calder (1980)³ showed that prostaglandins essentially mature the cervix in two ways.
1. They induce collagen breakdown
 2. They alter the hydration of tissue and the binding of collagen by altering the composition of glycosaminoglycan / proteoglycan. Glycosaminogly-

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cans are strongly hydrophilic and improve hydration in the tissue. Water content in non-pregnant cervix is 80% and it rises to 86% in pregnant cervix⁴. Thus they destabilize the fibrils of collagen and foster maturation. Chondratin sulphate and its epimer dermatin sulphate are the most common glycosaminoglycans in the cervix^{5,6}

Prostaglandin E2 intracervical gel contains 0.5 mg of dinoprostone and induces collagen breakdown, dispersion, fluid absorption by stromal tissues and successful cervical maturation for labor induction.

MATERIAL AND METHODS

The present retrospective study was carried out in the Dept. of OBGY at Datta Meghe Medical College, Shalinitai Meghe Hospital and Research Centre, (DMIMSU), Nagpur in collaboration with Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Sawangi Meghe, Wardha, from October 2019 till March 2020 at tertiary care hospital and medical college. 70 antenatal patients were studied. Inclusion and exclusion criteria were laid for the patients.

Inclusion criteria

1. Singleton live foetus.
2. Cephalic presentation
3. Gestational age >37wks.
4. Bishop score ≤5
5. Reactive NST

Exclusion criteria

1. Gestational age <37 wks.
2. Previous uterine surgery.
3. Abnormal presentation
4. Premature rupture of membranes.
5. Hypersensitivity to prostaglandin.

Patients fulfilling the inclusion criteria were included in the study. Data were collected from the hospital records. Dinoprostone gel containing 0.5 mg prostaglandin E2 was used. After history taking and initial systemic examination per abdomen examination was done, per vaginum examination was done and bishop score was assessed. Prostaglandin E2 gel was introduced intracervically after taking written informed consent.

Procedure for PGE2 gel insertion -- after emptying the bladder patient is allowed to lie down supine in the lithotomy position. The tip of the prefilled syringe is placed intracervically and the gel is deposited just below the internal cervical os. After application, the woman remains reclined for at least 30 minutes.

Patients were monitored for vital parameters, fetal heart rate, uterine activity, and progress of labour. Vitals were recorded hourly. Fetal heart sounds were monitored half-hourly. Per vaginal examination was done every 6 hours and bishop score assessed. If bishop score is favourable *i.e.* 6 or above, repeat dose was avoided. The patient was observed for spontaneous progress of labour and if required augmentation with oxytocin was done according to titration method till 3 contractions in 10 minutes were reached. Partograph was charted for active labour. If after 24 hours cervix was unfavorable *i.e.* 5 or less then repeat dose of cerviprime was used. Maximum 2 doses of PGE2 gel were used. Those requiring a single dose of PGE2 gel were grouped as group 1 and those requiring reinstallation were grouped as group 2.

Observations and results

Out of 70 patients, group 1 had 56 patients requiring single dose of dinoprostone gel and group 2 had 14 patients requiring second dose of induction.

For induction the mean gestational age was 39.02 weeks. At the time of induction the mean age was 24.8 years.

The common indications for induction of labour were post-datism (45.71 %), pregnancy induced hypertension (21.42%) and intrauterine growth retardation (12.85%)

Table 1: Shows indications of LSCS

LSCS INDICATIONS	GROUP 1	GROUP 2	OVERALL
POST DATISM	44.64 %	50%	45.71%
PIH	17.14%	21.42%	21.42%
IUGR	14.28%	7.14%	12.85%
OTHERS	19.64%	21.42%	20%

As seen from the table in both the groups the most common indication was post datism, followed by pregnancy-induced hypertension. While in group 1 the percentage was 44.64%, in group 2 it was almost 50%.

The mean bishop score at the time of induction was 1.9. The mean bishop score at 6 hours and 12 hours was compared in both groups.

Table 2: Shows Bishop score mean

HOURS AFTER IOL	GROUP 1	GROUP 2	OVERALL MEAN
0 HOURS	2.2	1	1.9
6 HOURS	6.21	2.5	5.4
12 HOURS	9.26	3	8.01

The improvement in mean bishops score at 6 and 12 hours in group 2 is just 2 as compared to 7.02 in group 1,

The mean duration of the latent phase in group 1 and group 2 was 12.34 hours and 28.25 hours respectively. Mean induction delivery time was 17.52 hours and 37.17 hours respectively in group 1 and group 2.

Table 3: shows induction delivery time in hours

	Group 1		Group 2		Overall Mean
	Mean	Range	Mean	Range	
Duration of Latent Phase	12.34 hours		28.25 hours		18.56 hours
Induction Delivery Time	17.52 hours	8-28 hours	37.17 hours	32-40.5 hours	21.45 hours

51.78% patients required augmentation and 48.21% went in spontaneous labour in group 1 and 78.57% patients required augmentation and 21.42% went in spontaneous labour in group 2. Patients requiring augmentation were more in group 2.

The total incidence of vaginal delivery was 74.28 %, with 78.57 % in group 1 and 74.28 % in group 2. The incidence of lower segment caesarean section was 25.71% with 21.42 % in group 1 and 42.85 % in group 2.

Table 4: Shows mode of delivery

	Group 1	Group 2	Overall
VAGINAL BIRTH	44 (78.57%)	8 (57.14%)	52 (74.28%)
LSCS	12 (21.42%)	6 (42.85%)	18 (25.71%)

The common indications of lower segment caesarean section were fetal distress, arrest in the progress of labour. The incidence of lower segment caesarean section was more in group 2.

The mean birth weight was 2.68 kg. Mean apgar at 1 minute was 7 and at 5 minutes were 9. 2 babies were admitted in NICU. There was no neonatal death.

The common complications that occurred were vomiting (7.14%), diarrhea (5.71 %).

3 patients had atonic postpartum haemorrhage, and 2 patients had traumatic postpartum haemorrhage. No serious complications happened.

DISCUSSION

Continuing a woman's pregnancy allows her cervix to remain closed, and her uterus to remain relaxed. There is a need to reverse both of these conditions to initiate labour. Cervix includes a small smooth muscle and mainly connective tissue with collagen as its key component and it must become soft

and pliable. Prostaglandins play an significant role in the process of cervical maturation and labour initiation.

Throughout pregnancy and delivery, the fetal membranes and the decidua contain PGE2. PGE2 changes cervical biochemistry and also stimulates PGF2 α . PGF2 α in effect sensitizes oxytocin to the myometrium. Exogenous PGE2 (Dinoprostone) administration is considered to imitate this natural cycle and contributes to cervical maturation or labor.⁶

In this study, the mean bishop score improvement was 3.5 at 6 hours and 6.2 at 12 hours Multiple studies showed an increase in bishop score varying from 3-7^{7,8}. The mean score for the Bishop was 5.4 at 6 hours which is equivalent to the Noah et al. 1987 sample.⁸

The mean average production time for the induction was 21.45 hours. Various studies have shown significant variability in the induction delivery period ranging from 9 hours Noah et al. 8 to 20.2 hours in a study performed by Jackson Gm 1994 9. In our study, the mean induction delivery time was greater in group 2 than in group 1.

In our sample, the frequency of caesarean rate was 21.45 percent while in Warke et al. ¹⁰ sample it was 16.67 percent. The prevalence of caesarean section cited in foreign literature ranged from 6 to 26.66 percent to 10 percent. In our sample the prevalence of caesarean section was greater in group 2.

In this study, the number of babies admitted in NICU was 2 with no neonatal death while in a study done by Kavita et al. significant number of babies required NICU admission with PGE2 gel, though there was no particular mention regarding the number of doses.¹¹

CONCLUSION

PGE2 GEL is a safe and efficient labor-induction process. The effectiveness of induction depends on the state of the cervix. This raises vaginal delivery chances without increasing maternal and neonatal morbidity.

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