A Comparative Study Of Prostaglandin E2 Gel With Oxytocin Infusion for Induction Of Labor

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Abstract : **Objectives -** To compare the safety and efficacy of prostaglandin E2 gel with I.V. oxytocin for induction of labour. **Methods -** Over 200 pregnant women admitted for induction of labour were randomly allocated into two groups; Group A (100 women) who had pre induction cervical ripening with prostaglandin E2 gel; Group B(100 women) who received IV oxytocin without cervical ripening. **Statistical analysis used:** Student t test, Z test, correlation of coefficient. **Results:** The demographic characteristics of the women and indications of labor in both groups were comparable. The mean Bishop score at 12 hours in group A and group B were 9.33 ±1.63 and 5.76 ±3.07 respectively and were statistically significant ($p<0.05$). The mean duration of labor in group A was 8.99±4.7 hours and in group B was 16.22±5.11 hours. The difference was highly significant ($p< 0.0005$). The complications and side effects were minimal with good neonatal outcome in group A compared to group B. Conclusion: Prostaglandin E2 gel when used intracervically is a safe and effective method for induction of labour. [Sharma A et al NJIRM 2013; 4(6) : 111-115]

Key Words: Bishop's score, Cerviprime, Duration of labor

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Introduction: Induction of labor near term is frequently required for a wide range of obstetric and medical conditions. Recently elective induction of labor at term has increased dramatically. In practice pharmacological uterine stimulation with IV oxytocin is combined with artificial rupture of membranes but it can cause water retention in women with heart disease, adrenal disease, and sometimes neonatal hyperbilirubinemia, electrolyte imbalance and anoxia to the fetus. Recently excellent results in terms of increased efficacy and decreased side effects have been described with use of low dose prostaglandin E2 gel. [1,2] Significant increase in Bishop score was seen in all studies which was associated with shortening of induction to delivery interval, lower maximum dose and less duration of IV oxytocin infusion. This study has been undertaken to explore the utility of prostaglandin E2 gel in the management of pregnant women for induction of labor and at the same time to study the safety and efficacy of prostaglandin E2 gel in the existing obstetric set up. The study was approved by local institutional ethics committee.

Material and Methods: This study was undertaken in dept of obstetrics and gyneacology, RIMS, Ranchi from July 07 to Aug 08 which included all pregnant women (200) attending labor ward above 35 weeks and less than 42 weeks, with parity ≤4, with single live fetus in cephalic presentation ,with intact membranes and Bishop score ≤ 4. All cases of previous LSCS, previous scarred uterus, non cephalic presentation, cephalopelvic disproportion, placenta previa with or without jaundice, glaucoma, convulsive disorder, asthma were excluded from the study. Study comprised of a study and control group each of sample 100. After thorough history taking and general examination, obstetrical examination was done and Bishop score assigned to each patient. After this subjects were randomized into study and control group. Informed consent was taken. Women in study group were applied PGE2 gel 0.5 mg (in 3gm base) (cerviprime dinoprone gel, ASTRA IDL limited). After 6 hours vaginal examination was repeated and post PGE2 Bishop score was calculated. Dinoprostone was repeated for a maximum of 2 doses unless the patient developed adequate uterine contractions. A note was made whenever the woman went into active labor, and amniotomy was done as and when indicated. IV oxytocin induction was done for

women not in labor after 12 hours of PGE2 gel application and labor was augmented if the woman was not in labor.

Control group comprised of women who underwent oxytocin induction of labor without cervical priming with PGE2 gel. Progress of labor was monitored as in study group and amniotomy was done as and when indicated. IV oxytocin infusion , both in study and control group cases was started at the dose of 1 mu/min and escalating doses of IV oxytocin (doubles every half and hour) were given. (1,2,4,8 mu/min). The IV oxytocin was titrated against the response and was increased till the woman got good contractions lasting for 40 sec and coming at the frequency of three every ten minutes. IV oxytocin infusion was not increased above a maximum of 64 mu/min. The outcome of study was compared between the two groups on the basis of Bishop score after 6 and 12hours of PGE2 gel application, no of women entering labour without oxytocin infusion, duration of oxytocin infusion, maximum dose of oxytocin , duration of labor, route of delivery and APGAR score of baby at 1 and 5 minutes of life. Other complications and side effects specific to prostaglandins such as hyperpyrexia, vomiting and diarrhoea, incidence of PPH, cervical tears, vaginal tears were recorded.

Statistical Methods: The values for the Bishop score ,duration and maximum dose of IV oxytocin infusion, duration of labour, duration of rupture of membranes and apgar score has been expressed as mean and standard deviation. To compare the means of two samples students t test was used. Correlation of coefficient was calculated to know the correlation between change in Bishop score and duration of labor. Z test was applied to test the equality of proportions in the data for age, parity, indications for induction of labor, period of gestation, complications and route of delivery.

Results: The demographic characteristics of the women and indications of labor in both groups were comparable. Maximum number of women belonged to age group of 24-26 years. The distribution of women according to parity was comparable in both groups. The mean Bishop scores at 0 hours in group A (2.42 ±0.88) and group B (2.8±1.00) were not statistically significant. The mean Bishop score at 12 hours in group A and group B were 9.33 ±1.63. and 5.76 ±3.07 and are statistically significant (p<0.05). (Table 1)

Tables 1- Mean Bishop scores at 0 hour, 6 hours and 12 hours and change in Bishop scores

Variable Group	Mean Bishop score at 0 hr	Mean bishop score at 6 hours	Mean bishop scores at 12 hours	Change in bishop score
Group A(96)	2.42 ± 0.88	4.88 ± 0.42	9.33 ± 1.63	6.92 ± 1.93
Group B 100)	2.80 ± 1.00	3.41 ± 1.10	5.76 ± 3.07	2.92± 2.25
p value	> 0.05	> 0.05	< 0.005	< 0.005

In group A a significant number of women(48%) did not receive IV oxytocin infusion and went into labor with priming dose of cerviprime alone. 52% required IV oxytocin out of which only 4 were for augmentation and 48 were for induction of labor. In group B 100% women required oxytocin infusion.

The mean duration of IV oxytocin infusion in 52 women was 9.06±5.59 hours in group A. The mean duration of IV oxytocin infusion was 23.62 ±7.63 hours in group B. The difference in duration of IV oxytocin in group A and group B was statistically significant. (p < 0.0005)(Table 2).

Table 2- Duration of IV oxytocin infusion

Group	Duration of IV oxytocin infusion (hrs)	p value
A (n =52)	9.06 ± 5.59	P<0.0005
B (n=100)	23.62±7.63	

The mean duration of labor in group A was 8.99±4.7 hours and in group B was 16.22±5.11 hours. The difference was highly significant statistically (p< 0.0005).(Table 3)

Table 3- Duration of labour (DOL) in two groups, and subgroups of primiparous and multiprous women

Group	DOL in total no. of women (hrs)	DOL in primiparous women (hrs)	DOL in multiparous women (hrs)
A	(n=96) 8.99 ±4.7	(n=64) 9.05±4.25 p>0.4	(n=32) 8.88±4.25

B	P<0.0005 (n=100) 16.22±5.1	(n=68) (n=32) 16.74±5.27 15.03±4.97 p>0.2

The duration of rupture of membranes in group B (12.34 ±5.72 hours) was more than in group A (5.38 ± 4.31) and was statistically significant.(p< 0.0005)(Table 4).

Table 4- Duration of rupture of membrane (DORM) in two groups, and subgroup of primiparous and multiparous in each group

Group	DORM in total no. of women (hrs)	DORM in primiparous women (hrs)	DORM in multiparous women (hrs)
A	(n=96) 5.38 ±4.31	(n=64) (n=32) 5.33±3.91 5.41±5.39 p>0.4	
B	P<0.0005 (n=100) 12.34±5.72	(n=68) (n=32) 12.53±5.75 11.81±5.86 p>0.4	

Fetal distress as evident by foetal bradycardia and meconium staining of liquor was recorded in 20(20%) women in group A and 24(24%) in group B. Only 12 women required emergency caesarean section for foetal distress in group A and all others delivered vaginally. In group B no woman had emergency caesarean section for foetal distress. There were 77 (77%) spontaneous vaginal deliveries in group A and 72(72%) in group B. There were 12 emergency caesarean sections (12%) in group A, 8 for fetal bradycardia and 4 for meconium stained liqour; while 8(8%) in group B were for non progress of labor. The incidence of spontaneous vaginal delivery, instrumental deliveries and caesarean section has not been found statistically significant. (Table 5).

Table 5- Distribution of women according to mode of delivery

Mode of delivery	No of women (%) in Group A	No of women (%) in Group B	p value
Spontaneous vaginal delivery (SVD)	77 (77)	72(72)	>0.05
Outlet forceps delivery (OFD)	7(7)	12(12)	>0.05
Ventouse delivery (VD)	4(7)	8(8)	>0.05
Caesarean section (CS)	12(12)	8(8)	>0.05
Total	100	100	

The mean apgar score of babies at 1 minute and 5 minutes of life is similar and not statistically significant. There were four newborns with apgar score of <7 at one minutes of life in group A, and none in group B.

Discussion: Varieties of methods have been advocated in past for initiation of labour prior to spontaneous onset for innumerable reasons[3].In the initial steps of onset of labour, cervix becomes soft, short and stretchable in other words ripened. So now it is a standard practice [4] to use cervical ripening agents prior to induction of labor. In the last one decade prostaglandins especially PGE2 have attracted the greatest attention for ripening of cervix and have become the preferred pharmacological agent for induction of labor [5].

The most suitable preparation or vehicle for intravaginal or intracervical application has been compared and gel base has most widely been recommended for intravaginal or intracervical application [6,7]. The use of PGE2 gel by any route has been reported to improve vaginal delivery and decrease caesarean rates and instrumental delivery[8]. Initially PGE2 gel was considered to be unsafe and dangerous in females of high parity but now various studies have reported it to be safe and effective method in grand multiparous women [9, 10, 11] .Rather low dose dinoprostone is reported to be more effective in multi gravida than primigravida.

Bishop score at 0 hour i.e. before any treatment was instituted, was comparable in two groups and also within each group in primiparous and multiparous women. The mean change in Bishop score in group A, after 12 hours of strict intracervial application of PGE2 gel was 6.92 as compared to 2.8 in group B (p<0.005)(table 1). The change is comparable to results of Raza F et al[12] who reported the Bishop score to increase to 5.5 after 6 hours and to 9.5 after 12 hours from an initial value of 2.8 in PGE2 receivig group.Results are also consistent with results of previous studies of Akram A et al[13] an Carta et al[14] . The change is higher than what has been observed by Noah et al[15].

Out of 100 women, 48 (48%) went into labor and did not require IV oxytocin in gel group A, which is comparable to 44% as shown by Ulmsten et al[16]. Trofatter et al[17] reported that 37% women experienced labour with PGE2 gel alone. Noah et al[15] reported 58% incidence of women going into labour with gel treatment alone. This is also in agreement with results of Bernstein P et al[18] where 46% of women did not require intravenous oxytocin. The women who did receive IV oxytocin in group A needed it for much shorter duration (9.05 hours) than the women in group B (23.62 hours).

The mean duration of labor of 8.99 hours and mean duration of rupture of membranes of 5.38 hours in group A is less than mean duration of labour of 16.22 hours and mean duration of rupture of membranes of 12.34 hours in group B. Trofatter et al[17] reported mean duration of rupture of membranes of 7.4 hours and 4.7 hours in PGE2 gel and non gel groups respectively. The comparatively longer duration of rupture of membranes in present study can be explained by the policy of early artificial rupture of membranes in whom foetal distress is anticipated to be more, like post dated pregnancy, intrauterine growth retardation and hypertensive disorders of pregnancy.

In group A, 12 women required emergency caesarean section for foetal distress and none in group B for fetal distress. Wiqvist et al[19] reported 3 cases in 50 women (6%) who received PGE2 gel and had emergency caeserean section for fetal distress. Ulmsten et al[16] in 25 women reported only 1 foetal distress due to uterine hypertonicity which was ameliorated by bolus IV terbulatine and caseerean section was not required. Success rate in terms of vaginal delivery in our study is comparable to Raza F et al,[12] Warke et al[20] and Islam RU et al[21] . Incidence of emergency LSCS was more (about 18.9%) in study of Krupa S et al[22] but the sample size (50) was small. No significant impact on route of delivery was assessed in this study.

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