COMPARISON OF INTRACERVICAL PROSTAGLANDIN E2 AND INTRAVENOUS OXYTOCIN IN INDUCTION OF LABOUR

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ABSTRACT

154 patients requiring induction with unfavourable cervix at varying period of gestation were studied. Patients were distributed into two groups. 76 patients were induced with 0.5 mgm single dose intracervical application of Prostaglandin E2 gel and remaining 78 patients with Oxytocin and efficacy of the two methods of induction was compared. Labour was established within 24 hours in 71.4% of primigravidas and 91.7% of multigravidas in the prostaglandin treated group compared to 65.6% of primigravidas and 89.1% of multigravidas in the oxytocin group. The study found substantial improvement in cervical score 12 hours after application of intracervical prostaglandin E2 gel and decrease in Caesarean section rate with no major adverse effect to mother or neonate.

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KEY WORDS: Induction; Intracervical Prostaglandin E2 gel; Oxytocin.

Introduction

Whenever further continuation of pregnancy is considered hazardous, termination of pregnancy is sought for. The aim of induction being to achieve a safe vaginal delivery for the fetus without causing harm to mother. Failed induction may be associated with, besides a poor neonatal outcome, great physical and mental trauma to the mother. Failed induction is the failure to enter into active phase of labour after 12 hours of regular uterine contractions in a patient who has been induced [1].

The success of induction of labour depends largely on the parity and the pre-induction state of cervix. It is the prelabour softening, effacement and eventual dilatation that culminates in spontaneous labour. Important structural and biochemical changes take place during ripening of cervix. There is a gradual dissociation and scattering of previously densely packed collagen along with qualitative and quantitative changes in proteoglycan content within ground substance [2].

Local use of prostaglandin E2 (PGE2) by extra-amniotic, intravaginal and intracervical route has been found to be effective in priming the cervix and inducing labour in patients at term with poor Bishop score [3,4,5]. Extra-amniotic use, besides being invasive is associated with increase risk of introducing infection. The intravaginal application though less invasive and easy to use requires larger dose of the drug and hence associated with gastrointestinal side effects and uterine irritability. Besides its action is unpredictable and result often unsatisfactory [6]. The intracervical use

has fewer side effects.

Intravenous oxytocin infusion with low amniotomy has been and is still widely practised to induce labour. However, prostaglandins used locally have been found to be successful in inducing particularly those patients who have an unfavourable cervix. It permits longer ambulation, decreased analgesia requirement and lower incidence of neonatal jaundice.

The aim of the present study was to compare the methods of induction with escalating oxytocin infusion and intracervical PGE2 gel application amongst primigravidas and multigravidas in women with unfavourable cervix.

Material and Methods

The present prospective study was carried out at the Obstetrics and Gynaecology departments of Military Hospital Dehradun and Command Hospital (Western Command) Chandimandir between Jan 94 to April 96. The annual delivery rate in these two hospitals averaged about 1100 and the induction rate was 16.8%.

154 women with modified Bishop score of 3 or less and requiring induction were randomly assigned into two groups viz A (n=76) and B (n=78). Primigravidas and multigravidas were included at different periods of gestation. Patients excluded were those below 28 weeks, those with severe oligohydramnios (less than one pocket of 1.0 cm vertical length), prelabour rupture of membranes, multiple gestations, intrauterine deaths and those with past history of uterine surgery.

Patients of group A were administered at 2000 hrs intracervical PGE2 containing 0.5 mgm per 3.0 gm in gel form (Dinoprostone gel-Cerviprime) available in pre filled sterile syringe with catheter just below level of internal os taking aseptic precautions. Ambulation was permitted 20 minutes after instillation. Cervical score before and after 12 hours of administration were noted.

Group B patients were assessed in the morning of induction

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and intravenous oxytocin infusion begun at 2 mu/mt at 0800 hours by gravity fed system with manual compression switch. The oxytocin infusion was escalated by doubling technique till a maximum of 64 mu/mt or till good uterine contractions were achieved. All patients in this group were re-evaluated after 12 hours if they had not delivered and delivered by caesarean section if labour was not established by then.

Group A patients too were re-evaluated next morning at 0800 hrs if not delivered by then and their cervical scores noted. Those who were yet to go into labour were induced with oxytocin as in Gp B.

Amniotomy was done in all cases in labour at 3.0 cm cervical dilatation. Informed written consent was obtained prior to induction in all cases. Induction was considered having failed if in spite of oxytocin at 64 mu/mt patient failed to go into active labour. Good uterine contractions were considered achieved when there were 3/4 contractions in 10 mts lasting 45-60 secs each. The definition of excessive uterine activity was considered as advocated by Sanchez Ramos et al. Tachysystole was defined as at least six contractions in 10 mts for two consecutive periods of time and hypersystole as a single contraction lasting for two minutes. Hyperstimulation syndrome was defined as either tachysystole or hypersystole associated with fetal tachycardia, bradycardia or irregularity. Mode of delivery, birth weight, Apgar score at 5 mts after birth and evidence of neonatal jaundice (more than 8 mg %) within first seven days of birth were also noted.

Results

Amongst 154 patients studied, 60 patients were primigravida and 94 were multigravida. Of the 60 primigravidas 28 in group A were administered intracervical PGE2 gel and remaining 32 in group B were subjected to oxytocin infusion. Amongst 94 multigravidas, 48 in group A underwent intracervical PGE2 instillation and the remaining 46 underwent oxytocin drip for initiation of labour.

Patient characteristics are summarised in Table 1. Both the group were comparable as regards their age, weight gestational age and initial cervical score calculated as per modified Bishop's score. 70.1% of induction were for postdatism (Table 2). Other reasons were intrauterine growth retardation, hypertensive disorders of pregnancy, unexplained still birth in previous pregnancy and diabetes.

TABLE 1
Patient characteristics

Groups	Group A (PGE2 gel)		Group B (Oxytocin)	
	Primi (n=28)	Multi (n=48)	Primi (n=32)	Multi (n=46)
Mean of Age (years)	23.5	31.5	23.7	32.0
Wt (kgs)	62.5	68.7	63.0	69.1
Gestation age (weeks)	38.7	39.1	38.8	39.5
Initial cervical score	2.2	2.3	2.8	2.7

Labour was established in 71.4% of primigravidas and 91.7% of multigravidas in group A in contrast to 65.6% of primigravidas and 89.1% of multigravidas in group B. 21.4% primigravidas and 60.4% multigravidas induced with PGE2 gel delivered vaginally in the first twelve hours compared to 12.5% of primigravidas and

TABLE 2

Indications for induction in 154 patients with PGE2 gel and oxytocin

	Group A (PGE2 gel)		Group B (Oxytocin)		Total (%)
	Primi	Multi	Primi	Multi	
Postdatism	16	35	20	37	108 (70.1)
IUGR	2	8	4	6	20 (13.0)
Hypertensive disorders	10	2	8	2	22 (14.3)
H/o unexplained still births	—	2	—	1	3 (1.9)
Diabetes	—	1	—	—	1 (0.7)
Total	28	48	32	46	154

52.2% of multigravidas in the oxytocin group. By 24 hours, however, 71.4% of primigravidas and 91.7% of multigravidas had delivered vaginally in the prostaglandin group A in contrast to 65.6% of primigravida and 89.1% of multigravidas in oxytocin group B. 7 primigravidas and 3 multigravidas in the PGE2 gel applied group required acceleration of labour. 35% of primigravidas (7 out of 20) and 9.1% of multigravidas (4 out of 44) did not go into labour after 12 hours of PGE2 intracervical application and required oxytocin infusion. The mean induction delivery interval in PGE2 group was longer in both primigravidas and multigravidas compared to the oxytocin group. The mean amniotomy delivery interval was more in primigravidas in the PGE2 group but almost similar amongst PGE2 and oxytocin group in multigravidas (Table 3).

TABLE 3
Results of induction

	Group A (PGE2 gel)		Group B (Oxytocin)	
	Primi (n=28)	Multi (n=48)	Primi (n=32)	Multi (n=46)
Labour established	20 (71.4)	44 (91.7)	21 (65.6)	41 (89.1)
(a) in 12 h	6 (21.4)	29 (60.4)	4 (12.5)	24 (52.2)
(b) in 24 h	20 (71.4)	44 (91.7)	21 (65.6)	41 (89.1)
Oxytocin used in group A*	14	7	—	—
Induction delivery mean in hrs	15.3	11.27	14.35	10.9
Rupture of membranes delivery mean in hours	8.23	5.21	6.74	5.32
Failed induction	8 (28.6)	4 (8.3)	11 (34.4)	5 (10.9)

*Includes 7 acceleration amongst primigravidas and 3 amongst multigravidas. Remaining required oxytocin for induction because of failure of PGE2 gel (single application). Parenthesis - Percentages

The improvements in cervical score at 12 hours after PGE2 application in both primigravidas and multigravidas against the oxytocin group is evident from Table 4.

Table 5 depicts the average birth weights and Apgar Score 5 minutes after birth. Only one male child was born with severe birth asphyxia due to meconium aspiration in a post-term primigravida in the oxytocin induced group. There were no perinatal deaths. Three cases of neonatal jaundice were observed between second and third day. The jaundice disappeared following conservative management within seven days. The single case of neonatal

TABLE 4
Cervical score after 12 h

	Group A (PGE2 gel)		Group B (Oxytocin)	
	Primi	Multi	Primi	Multi
Initial score (mean)	2.1	2.5	2.2	2.4
After 12 h (mean)	6.8	7.3	4.2	4.9

TABLE 5
Birth weights, neonatal jaundice and apgar score

	Group A (PGE2 gel)		Group B (Oxytocin)	
	Primi	Multi	Primi	Multi
Mean birth weight in kg	2.7	2.7	2.8	1.6
Neonatal jaundice	1	—	2	—
Apgar score at 5 mts				
7 - 10	17	38	14	40
4 - 6	3	5	2	1
0 - 3	—	—	1	—

TABLE 6
Mode of delivery and indications of LSCS

	Group A (PGE2 gel)		Group B (Oxytocin)	
	Primi (n=28)	Multi (n=48)	Primi (n=32)	Multi (n=46)
Normal vaginal delivery	17	42	15	39
Ventouse delivery	1	1	1	2
Forceps delivery (low/outlet)	2	—	1	—
Total vaginal deliveries	20	43	17	41
LSCS deliveries	8	5	15	5
Indication for LSCS				
a) failed induction	8	4	11	5
b) fetal distress	—	1	2	—
c) failure to progress	—	—	2	—

jaundice in the prostaglandin group was not born of mother given oxytocin infusion either for acceleration or induction.

In the present study 78.6% delivered vaginally and remaining underwent abdominal delivery. 46.9% oxytocin induced primigravidas underwent LSCS delivery as compared to 28.6% in prostaglandin induced group (Table 6). The LSCS rates amongst multigravidas in both the groups were similar. 28 of the 33 (84.8%) caesarean deliveries were for failed induction while the remaining were for either intrapartum fetal distress or failure to progress. The incidence of failed induction in the oxytocin group were 34.4% among primigravidas and 10.9% among multigravidas. The prostaglandin group had a rate of 28.6% and 8.3% of failed induction amongst primigravidas and multigravidas respectively.

Severe untoward effects either in the form of gastrointestinal symptoms or pyrexia were not noticed in the present study. One PGE2 induced multigravida who underwent oxytocin augmentation in labour, however, developed hyperstimulation syndrome.

She was managed with discontinuation of drip and sedation following which she progressed normally. Tocolytic drugs were not required in the case.

Discussion

We compared the efficacy of PGE2 gel applied intracervically with escalating oxytocin dosage and observed that only 28.6% of patients in the former failed to progress to labour as compared to 34.4% of patients in the latter amongst primigravidas. Amongst multigravidas, however, we noted that only 8.3% in the prostaglandin group and 10.9% in the oxytocin group failed to progress to labour. Our results are at variance to findings of Arulkumaran et al (1985) who noted that 45.8% of primigravidas and 7.7% of multigravidas of cervical score 3 or less when induced with oxytocin failed to go in labour and required caesarean delivery [2]. They concluded that cervical priming methods may improve chances of successful induction. We noted lesser failure of induction and lesser operative deliveries amongst the prostaglandin group.

Our study corroborates the findings of Ulmstein et al [7] and Shepherd et al [8] that intracervical PGE2 gel results in improvement of cervical score facilitating oxytocin initiation of labour and often initiates labour per se. The improvement of cervical score from a mean of 2.1 to 6.8 in primigravidas and from mean of 2.5 to 7.3 in multigravidas 12 hours after PGE2 gel application intracervically is similar to that observed by Trofatter et al [9]. The authors in their study of 30 patients with poor cervical score of 3 noted an improvement of cervical score from 1.2 to 6.7, 12 hours after intracervical PGE 2 application [9]. Our improvements of cervical score resulted in successful initiation of labour by escalating oxytocin dose amongst 35% of primigravidas and 9.1% of multigravidas. 28.6% of primigravidas and 8.3% of multigravidas in the present study failed to go in active labour even after oxytocin infusion following single application of PGE2 gel. As it was not wise to delay delivery due to fetal considerations in the present study, a repeat dose of PGE 2 gel was not tried. The effect of second repeat dose of intracervical PGE2 gel requires further evaluation and may bring down the failure rates further.

71.4% of primigravidas and 89.6% of multigravidas in the prostaglandin group delivered vaginally within 24 hours with a mean induction delivery interval of 15.30 hours and 11.27 hours respectively. Trofatter et al had also observed a mean induction delivery interval of 13.3 hours. Our findings are at variance with that of Ulmsten and coworkers [7] who reported only 53% of delivery in first 24 h but similar to Mishra et al

reporting delivery rate of 73.8% among primigravidas in the PGE2 intracervically treated group within first 24 h [10]. Our policy of selectively augmenting labour as of Mishra et al accounted for our high success rates [10].

The failure to observe any adverse reaction after PGE2 application makes it safer for use. The single case of hyperstimulation syndrome was consequent to excessive oxytocin stimulation in prostaglandin treated multigravida. There was no adverse perinatal outcome. Neonatal jaundice observed was comparable in both groups [11].

Prostaglandin E2 gel intracervically applied improved the inducibility score of cervix and initiates labour in significant number of cases with predictable outcome. It is safe for both mother and fetus and allows ambulation unlike oxytocin induction. The reasonably good success rate with resultant decrease in caesarean sections without adverse maternal effects and neonatal outcome make PGE2 gel applied intracervically a preferred method of induction of labour than oxytocin alone. We advocate close monitoring and judicious use of oxytocin for labour augmentation in those treated with PGE2 gel especially in multigravidas. Further trials are required to compare the advantages if any for repeat PGE2 gel in patients who do not respond to single dose therapy for labour induction.

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