Clinical Evaluation of Prostaglandin E_2 Gel for Preinduction Cervical Ripening in Term Pregnancy with a Low Bishop Score

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Abstract :

Objective : *A prospective clinical trial study investigating the therapeutic effect of prostaglandin E_2 gel in priming the cervix of patients with a low Bishop score.*

Study Design : *Pregnant women with low Bishop scores necessitating labour induction were enrolled in this study. Following the administration of intracervical prostaglandin E_2 gel Bishop scores were assessed at 6,12 and 24 hours thereafter. Repeated dose was given if no satisfactory change of Bishop score was achieved 24 hours later. Oxytocin was given if the Bishop score was > 4 and labour was not established or in some instances to augment inadequate uterine contraction. Mode of delivery, time interval to delivery, delivery outcome and complication were recorded.*

Results : *Of the 28 patients studied, the overall success rate of cervical ripening was 89.28%. Seven patients (25%) had spontaneous deliveries without oxytocin administration. Five patients (17.8%) necessitated repeated dose of prostaglangin E_2 gel and 3 patients (10.72%) failed to achieve satisfactory Bishop scores after second application. Caesarean section rate was 20%. Uterine hyperstimulation, diarrhea, transient fetal tachycardia and bradycardia were the adverse effects encountered.*

Couclusion : *Intracervical prostaglandin E_2 gel can be used successfully for cervical ripening in term and postterm pregnancies with low Bishop scores.*
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Key words : prostaglandin E_2 gel, cervical ripening

During recent years, there has been much interest in cervical ripening properties of prostaglandin E_2 in patients with unfavourable cervix. Ripeness of the cervix influences the success of the induction[1]. A patient with unfavourable cervix is of great challange when induction is necessary. If the cervical status is not good enough, prolonged induction may result with an increase in both fetal and maternal morbidities.

The present study was carried out to evaluate the efficacy of pros-

taglandin E_2 gel applied intracervically in term pregnancies or beyond. Prostaglandin E_2 gel given by this route yielded satisfactory results for this purpose in many recent reports[2-5]. There is a difference of opinion as to whether prostaglandin E_2 in vivo ripens the cervix by initiating biochemical and structural changes in its connective tissue or by inducing uterine contractions that shorten, soften and dilate the cervix. This dosage of prostaglandin may trigger endogenous prostaglandin synthesis and many patients entered active labour after a latency period of several hours[2,5-8].

Patients and Methods

The study was conducted at Siriraj Hospital, during the year 1992. The characteristics of patients recruited for study included those of primigravidae, singleton pregnancy with the Bishop score of 4 or less. The fetus must be in cephalic presentation and in good condition as evidenced by reactive nonstress test. The uterine contraction must not be in a regular manner. The patients with obvious cephalo-pelvic disproportion or who had previous uterine scar were excluded likewise those with ruptured membranes, antepartum hemorrhage, active asthma, medical complications including a history of hypersensitivity to prostaglandins. Informed consent was obtained from each patient prior to entry into this study.

A sterile speculum was inserted during which cervix and vagina were gently sponged free of mucous and discharge. Prostaglandin E_2 gel (0.5 mg of prostaglandin E_2 with 2.5 ml of gel) stored at 4°C warmed to skin temperature was then installed into the cervical canal under direct visualization. Bishop scores were determined again by the same physician at 6,12,24 hours after application. Oxytocin infusion was given for induction of labour at any time if satisfactory Bishop score (>4) was achieved and no labour was established or given to augment inadequate labour. Artificial ruptrue of membranes was performed when cervix dilated 3 cm and effacement 100%. Repeated dose of prostaglandin E_2 gel was again given if no satisfactory Bishop score was achieved after 24 hours. Surgical difficulty, technical failure and adverse effects were recorded. Continuous uterine activity and fetal heart rate monitoring with electrotocodynamometer were recorded at least for the first two hours after application. Vital signs and venous access were obtained. Failure of treatment was certified if no satisfactory progress of Bishop score was achieved 24 hours after second application.

Mode of delivery, time interval from application to delivery and fetal outcome were recorded, fetal outcome was assessed by Apgar's score. Baseline laboratory studies for complete blood count and differential, renal and liver function tests, urinalysis were obtained and then repeated 24 hours after gel application.

Results

There were 28 patients enrolled in the study. All of the patients had at least 38 complete weeks of pregnancy. Indications for labour induction are shown in Table 1.The average maternal age was 28.25 ± 4.48 yr (17-33 yr) , the average height was 154.86 ± 5.46 cm (145-167 cm) and the average body weight at the time of delivery was 59.72 ± 8.13 kg (50.2-78.3 kg). All patients were primiparous except 2 patients with 1 and 2 previous early spontaneous complete abortions. Bishop scores before treatment are shown in Table 2. Surgical difficulties on application of the gel were found in 2 cases due to posterior-pointed cervix but no technical failure was found.

Table 3 shows the accumulated total number of cases who had Bishop scores of more than 4 after 6,12,24 hours and after second dose application. The overall success rate of cervical ripening was 89.28%. Seven patients (25%) established spontaneous regular contractions and delivered without oxytocin being given. One of these 7 patients had uterine hyperstimulation but with acceptable fetal heart rate pattern during the course of labour. Uterine hyperstimulation also noticed in another patient which lasted for only 1 hour after initial application of gel and eventually returned to normal regular contraction pattern and this patient necessitated oxytocin augmentation 12 hours later. In both cases, fetal outcomes were good without signs of fetal distress.

Three patients (10.71%) showed unsatisfactory changes of cervix (Bishop score ≤ 4) and were judged as failures. Two of the 3 patients had surgical difficulties at the time of both first and second gel applications.

Adverse effects were encountered in 7 patients, 2 uterine hyperstimulation, 1 diarrhea, 2 transient bradycardia and 1 transient tachycar-

Table 1 Indications for induction

Indications	No.(%)
Elective and/or postterm	24 (85.71)
Diabetes mellitus	2 (7.14)
Hydrocephalus	1 (3.57)
Pre-eclampsia	1 (3.57)
Total	28 (100)

Table 2 Bishop scores before treatment

Bishop score	No.(%)
1	9 (32.14)
2	8 (28.57)
3	6 (21.42)
4	5 (17.85)
Total	28 (100)

Table 3 Cumulative successful cases

Cumulative cases with Bishop score>4	No.(%)
After 6 hours	13 (46.43)
After 12 hours	21 (75.00)
After 24 hours	23 (82.14)
After application of 2nd dose	25 (89.14)

Table 4 Outcomes of induction

Mode of delivery	**No (%)**
Spontaneous	19 (76)
Vacuum extraction	1 (4)
Caesarean secton	5 (20)
Average birth weight (g)	3037.60±421.76
Mean Apgar'r scores :	
At 1 min.	8.60±1.91
At 2 min.	9.28±1.10
At 5 min.	9.80±0.50
Time interval from treatment to delivery (hr)	
One dose (n = 23)	26.75 ± 17.88 (6.83-70.66)
Two doses (n = 25)	30.49 ± 21.43 (6.83-74.06)

dia. None of the cases had severe complications during or after deliveries and no postpartum hemorrhage or infection was observed in this study.

Table 4 shows mode of delivery, fetal outcome and time interval from treatment to delivery. Caesarean section was performed in 5 instances. The indications for caesarean section were cephalo-pelvic disproportion in 2 cases, 2 fetal distress and 1 diabetic case with suspicion of chorioamnionitis 24 hours after the first dose. No obvious fetal distress at 5 minutes after birth was observed in all cases.

There were no differences in pre- and post-treatment laboratory tests for complete blood count, urinalysis, renal and liver function tests. These tests were performed before the start of treatment and repeated at 24 hours after the first and second doses of gel application.

Discussion

The state of cervix assessed by Bishop score is obviously related to success of a labour induction as Bishop reported in 1964[1]. Prostaglandin E_2 has attracted great attention in terms of preinduction cervical softening. There have been lots of investigation for this purpose. Various routes of administration of prostaglandin E_2 have been investigated for this clinical application and to avoid unwanted adverse effects of larger doses of systemically administered prostaglandin E_2 required to produce cervical ripening. Data obtained from this study showed the effectiveness of prostaglandin E_2 gel intracervical administration for cervical ripening.

In this study only 1 dose of gel was required and all achieved spontaneous vaginal delivery without oxytocin augmentation. Failure of treatment was partly from surgical difficulty at the time of gel application due to cervical position. Multiple gel applications in a situation in which a satisfactory result was not achieved with a single dose were accepted in recent studies[2,3]. A report of a double-blinded study confirmed that prostaglandin E_2, not the gel vehicle, induces cervical changes and labour [4].

Caesarean section rate in this study was not higher than other recent reports[5,6]. Two cases of fetal distress were unrelated to hyperstimulation, both occurred in postmaturity with marked decrease amniotic fluid volume observed at the time of artificial rupture of membranes.

Despite uterine hyperstimula-

tion encountered in 2 patients in this study progress of labour through spontaneous deliveries was achieved with good fetal outcome. Although many previous studies reported no hyperstimulation with the intracervical route,[2,5-7] some had very low or about the same percentages of uterine hyperstimulation as this study[8,9]. Nevertheless, rupture of uterus associated with the use of intracervical prostaglandin gel for induction of labour was recently reported[10].

There is always the possibility that furthur investigations may lead to a better cervical softening agent. The abundance of worldwide information now available makes prostaglandin E_2 as being clinically acceptable in terms of safety and efficacy. Prostaglandin E_2 therapy has low maternal side effects, low percentages of failure, does not increase instrumental deliveries or caesarean section and gives favourable fetal outcome. From the present experience, it is recommended to give a repeated dose after the first 24 hours evaluation of cervical condition. This will give more chance for the cervix to achieve better Bishop scores. Prostaglandin E_2 gel should be used cautiously under the control of electronic fetal monitoring.

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Peferences

1. Bishop EH. Pelvic scoring for elective induction. Obstet Gynecol 1964;24:266-8.
2. Mainprize T, Nimrod C, Dodd G, Persand D. Clinical utility of multiple-dose administration of prostaglandin E_2 gel. Am J Obstet Gynecol 1984; 156: 341-3.
3. Brindley BA, Sokol RJ. Induction and augmentation of labour:Basis and methods for current practice. Obstet Gynecol Surv 1988;43:730-43.
4. Rayburn WF. Prostaglandin E2 gel for cervical ripening and induction of labour : A critical analysis. Am J Obstet Gynecol 1989;160:529-34.
5. Trofatter KF, Bowers D, Gall SA, Killam AP. Preinduction cervical ripening with prostaglandin E2 (Prepidil) gel. Am J Obstet Gynecol 1985; 153: 268-71.
6. Burnstein P, Leyland N, Gurland P, Gare D. Cervical ripening and labour induction with prostaglandin E_2 gel : A Placebo-controlled study. Am J Obstet Gynecol 1987; 156: 336-40.
7. Ferguson II JE, Ueland FR, Stevenson DK, Ueland K. Oxytocin-induced labour characteristics and uterine activity after preinduction cervical priming with prostaglandin E_2 intracervical gel. Obstet Gynecol 1988;72:739-45.
8. Noah ML, DeCoster JM, Orr JD, et al. Preinduction cervical softening with endocervical PGE_2 gel. Acta Obstet Gynecol Scand 1984;66:3-7.
9. Kieback DG, Zahradnik HP, Quaas L. Clinical evaluation of endocervical prostaglandin E_2-triacetin-gel for preinduction cervical softening in pregnant women at term. Prostaglandins 1986; 32: 81-5.
10. Mayrmon R, Shulman A, Pomeranz M, et al. Uterine rupture at term pregnancy with the use of intracervical prostaglandin E_2 gel for induction of labour. Am J Obstet Gynecol 1991;165:368-70.