

Induced labour with prostaglandin E₂ in different parity groups after premature rupture of membranes

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تحريض المخاض بالبروستاغلاندين E₂ في مجموعات مختلفة من الحوامل بعد تمزق الأغشية المبسر
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الخلاصة: تقارن هذه الدراسة نتائج تحريض المخاض باستخدام البروستاغلاندين E₂ على شكل أقراص مهبلية لدى المصابات بتمزق الأغشية المبسر في تمام الحمل في مجموعات مختلفة من الحوامل. وقد أجريت مراجعة استيعادية لسجلات المستشفى شملت 169 امرأة راجعن قسم الولادة في مستشفى الملك فيصل العسكري في المملكة العربية السعودية. ولم يكن هناك فروق يُعتدُّ بها إحصائياً بين مختلف المجموعات من الحوامل (للحمل للمرة الأولى، للحمل الأول وحتى الحمل الرابع، للحمل ما بعد الخامس) وذلك من حيث معدلات تسارع المخاض والعملية القيصرية وإدخال الوليد في قسم الرعاية المركزة أو انخفاض أحراز أبغار. ولم تحدث مضاعفات خطيرة لتحريض المخاض مثل العدوى أو فرط استتارة الرحم أو تمزقه. يمكن استخدام البروستاغلاندين E₂ بحذر لتحريض المخاض لدى الحوامل في تمام الحمل ممن تمزقت لديهن الأغشية في وقت مبسر، حتى من كان حملهن للمرة الخامسة وما بعد، ما لم تكن هناك في سوابقهن ولادة بعملية قيصرية.

ABSTRACT The study compared the outcome of induction of labour with prostaglandin E₂ vaginal tablets in patients with premature rupture of membranes (PROM) at term in different parity groups. A retrospective review was made of the hospital records of 169 women attending the maternity unit of King Faisal Military Hospital, Saudi Arabia. There were no statistically significant differences between the 3 groups (parity 0, parity 1-4 and parity 5+) in rates of labour augmentation, caesarean sections, neonatal intensive care admissions or low Apgar scores. There were no serious complications of induction of labour such as infection or uterine hyperstimulation or rupture. Prostaglandin E₂ may be used with care for labour induction in women with PROM at term, even grand multiparas, unless there is history of previous caesarean delivery.

Induction du travail par prostaglandine E₂ dans différents groupes de parité après rupture prématurée des membranes

RESUME Cette étude a comparé l'issue de l'induction du travail par comprimés de prostaglandine E₂ administrés par voie vaginale chez des patientes ayant eu une rupture prématurée des membranes à terme dans différents groupes de parité. On a procédé à un examen rétrospectif des dossiers hospitaliers de 169 femmes consultant à la maternité de l'Hôpital militaire King Faisal en Arabie saoudite. Il n'y avait aucune différence statistiquement significative entre les trois groupes de parité (parité 0, parité 1-4 et parité 5+) pour les taux d'augmentation du travail, de césariennes, d'admissions en soins intensifs néonataux ou les faibles scores d'Apgar. Il n'y avait aucune complication grave liée à l'induction du travail telles qu'infection, hyperstimulation ou rupture utérine. La prostaglandine E₂ peut être utilisée avec précaution pour l'induction du travail chez les femmes ayant eu une rupture prématurée des membranes à terme, même chez les grandes multipares, sauf s'il y a des antécédents de césarienne.

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Introduction

Premature rupture of membranes (PROM), defined as rupture of the fetal membranes before the onset of spontaneous uterine activity, occurs in about 10% of all pregnancies [1], with the majority of cases occurring after 37 weeks of gestation [2-4]. The consequences of PROM for the mother include endomyometritis and a risk of intrapartum complications following induction of labour. Neonatal morbidity is largely a result of infection and its sequelae. Furthermore, the increased incidence of retained placenta in PROM may be due to increased frequency of marginal cord insertion [5] and this in turn may explain the known increase in the incidence of primary and secondary postpartum haemorrhage in PROM.

Induction of labour for women with PROM at term has been shown to be more beneficial than expectant management in nulliparous women [6]. Prostaglandin E₂ vaginal tablet is the most frequently used agent for induction of labour in our local region where about 40% of obstetric patients at term are grand multiparas. Prostaglandin E₂ is contraindicated in grand multiparas by the manufacturers, and thus induction of labour with prostaglandin E₂ in grand multiparas after PROM at term may be regarded as risky. However, there is some research evidence that the drug is safe in grand multiparas [7,8]. Furthermore, oral misoprostol, which is another agent that has been shown to be effective and cheap way to induce labour in patients with PROM [9], is not readily available in Saudi Arabia. At the same time, it has been demonstrated that complications such as tachysystoles, non-reassuring fetal heart rate and uterine rupture occurred more frequently when induction of labour was

conducted with misoprostol [10-13] and it may therefore be unsuitable for labour induction in cases of PROM at term in our community.

This study aimed to investigate the outcome of induction of labour with prostaglandin E₂ vaginal tablets in patients with PROM at term, comparing nulliparous, multiparous and grand multiparous women.

Methods

Data collection

The study was carried out at the Maternity Unit of King Faisal Military Hospital, Saudi Arabia. A retrospective review was made of the hospital records of 169 women whose labour was induced with prostaglandin E₂ vaginal tablets because of PROM at term (> 37 weeks) over a 5-year period (January 1995 to December 1999). Patients were excluded from the study if there was a multiple pregnancy, a congenital fetal anomaly or a history of antepartum haemorrhage. However, patients with a history of only 1 previous lower segment caesarean section were included in the study.

The patients were classified into three groups as follows: parity 0, parity 1-4 and parity 5+. Details about the women's demographic data and the induction of labour together with delivery were obtained from the hospital record file. Infection was diagnosed by clinical and laboratory tests which included high vaginal swab culture, leucocytosis and C-reactive protein in the serum.

Labour induction

The protocol for induction of labour after PROM at the King Faisal Military Hospital Maternity Unit was as follows. After con-

firming the diagnosis of PROM and the gestational age, the cervical score using the modified Bishop score at induction was noted and a 1.5 mg prostaglandin E₂ vaginal tablet (Prostin, Upjohn) was inserted into the posterior vaginal fornix. The patient was instructed to stay in bed for 30 minutes while a non-stress test was performed for 1 hour commencing about 30 minutes after the insertion of the prostaglandin tablet. The patient was reassessed about 6 hours after the initial prostaglandin insertion and depending on the response of the cervix to the initial prostaglandin as indicated by the Bishop score, the dose was either increased by 1.5 mg or the same dose was repeated. The procedure was repeated every 6 hours until regular contractions ensued. The maximum dose of prostaglandin allowed over a 24-hour period was 15 mg. The total dose of prostaglandin used as well as complications during induction were recorded. If tetanic contractions were noted during induction, the prostaglandin tablet was retrieved and the patient was given 5 mg of ritodrine by slow intravenous infusion.

Labour was managed routinely. The length of second stage of labour was taken

as the time from full dilatation of the cervix to the delivery of the baby.

Analysis

Statistical analysis was carried out using the SPSS version 7.5. One-way analysis of variance test was used for quantitative variables while chi-squared and Fisher exact test were used for qualitative data.

Results

There were a total of 22 963 deliveries during the study period, 169 (0.74%) of which were induction of labour after PROM. Of the 169 study women, 38 were nulliparas, 75 were multiparas (parity 1–4) and 56 were grand multiparas (parity 5+).

The demographic data of the mothers as well as some characteristics of the labour are shown in Table 1. Not surprisingly, women with higher parity had significantly higher mean gravidity and mean age than women of lower parity ($P < 0.05$). There was a statistically significant difference in the length of the second stage of labour ($P < 0.05$) between groups, from a mean of 27.8 minutes in nulliparas

Table 1 Characteristics of mother, neonate and labour in 169 women with premature rupture of membranes at term: comparison between different parity groups

Variable	Parity 0 (n = 38)	Parity 1–4 (n = 75)	Parity 5+ (n = 56)	P-value
Gravidity	1.21 ± 0.47	3.74 ± 01.25	9.04 ± 2.43	$P < 0.001$
Maternal age (years)	23.00 ± 4.89	25.29 ± 3.93	33.13 ± 5.24	$P < 0.001$
Length of 2nd stage of labour (min)	27.80 ± 27.10	7.78 ± 10.66	5.02 ± 9.45	$P < 0.001$
Prostaglandin E2 dose (mg)	5.05 ± 4.19	5.00 ± 3.99	4.42 ± 3.38	$P = 0.644$
Birth weight (g)	2944 ± 341	3040 ± 458	3075 ± 414	$P = 0.32$
Gestational age at delivery (weeks)	38.92 ± 1.36	39.26 ± 1.34	39.02 ± 1.21	$P = 0.349$

All values are mean ± standard deviation.
n = total number of women.

to 5.02 minutes in grand multiparas. There were no statistically significant differences between the parity groups in the neonate's birth weight or the total dose of prostaglandin E₂ used for induction.

Table 2 shows other characteristics of the labour and fetal outcomes. Although oxytocin was used for augmentation of labour in a higher percentage of nulliparas and a lower percentage of grand multiparas, the results were not statistically significant. There were also no statistically significant differences between the groups in the rate of caesarean sections, rate of admission to the neonatal intensive care unit or Apgar scores of less than 7 at 5 minutes.

Four (7.1%) of the grand multiparas and 4 (5.3%) multiparas had had a previous caesarean section. There were no cases of rupture of the uterus in the whole study group even though oxytocin was used for augmentation in 1 of the patients with previous caesarean section among the multipara (1-4 parity) group. There were no other complications, such as uterine hyperstimulation, nor any cases of endometritis or neonatal infection in the study population.

Discussion

Although the study was retrospective and small in terms of sample size, it showed that the outcome of labour induction in patients with PROM at term did not differ significantly between high and low parity groups. In our study population, the groups were similar with respect to the neonate's birth weight and gestational age at delivery and the dose of prostaglandin used, but dissimilar in terms of the mother's age and, obviously, gravidity, and in the length of the second stage of labour.

There were no complications of labour, such as uterine hyperstimulation or rupture of the uterus, nor were there any cases of endometritis or neonatal infection in the study population. Why there were no cases of infection is difficult to explain especially when there is substantial direct and indirect evidence that reproductive tract infections and associated changes are responsible for many instances of preterm PROM [14]. Nevertheless, it is known that the florid pelvic infection that is seen in some parts of the industrialized world is still relatively uncommon in Saudi Arabia. Hallak et al.

Table 2 Characteristics of labour and neonatal outcomes in 169 women with premature rupture of membranes at term: comparison between different parity groups

Variable	Parity 0 (n = 38)		Parity 1-4 (n = 75)		Parity 5+ (n = 56)		Significance
	No.	%	No.	%	No.	%	
Oxytocin augmentation	12	31.6	17	22.7	9	16.1	$\chi^2 = 3.14, P = 0.208$
Caesarean section	3	7.9	2	2.7	4	7.1	$\chi^2 = 1.97, P = 0.37$
NICU admission	4	10.5	3	4.0	3	5.4	$\chi^2 = 2.02, P = 0.36$
Apgar score < 7 at 5 min	1	2.6	1	1.3	1	1.8	$\chi^2 = 0.25, P = 0.88$

NICU = neonatal intensive care unit.

n = total number of women.

[15] in their study demonstrated that delayed induction of labour after hospital admission was linked to worsened perinatal outcome in terms of NICU admission and infection rates and suggested immediate induction for PROM at term especially if digital examination has been performed. In a multicentre international study of PROM at term, clinical chorioamnionitis and maternal colonization with group B streptococcus were identified as the most important predictors of neonatal infection [16]. Other authors have quoted rates of clinical amnionitis and endometritis to be around 5.3%–8.0% and 1.7%–3.2% respectively [17,18].

The relatively short second stage of labour in our study group may be explained by the cultural practice that encourages the squatting position, thereby strengthening the levatores ani muscles. However, this may not explain why we did not encounter any cases of infection in the study. The caesarean section rate in the study group overall was 5.3% and there was no statistically significant difference in the caesarean section rate among the three groups studied. It is also noteworthy that while oxytocin augmentation was carried out in 22.3% of the study group overall there was no significant difference statistically in the three groups. While caesarean section rates of about 12% have been quoted following induction of labour with prostaglandin E₂ for PROM at term [18], Peleg et al. [19] in their review concluded that strong predictors of caesarean delivery after PROM at term included nulliparity, long labour, previous caesarean delivery and epidural anaesthesia.

Prostaglandin E₂ vaginal tablets have been used safely in grand multiparas in our community and in similar populations to ours for induction of labour in normal and complicated pregnancies [7,8,20]. There are also reports that demonstrated its use in grand multiparas with a history of previous caesarean section [21]. However, what has probably not been reported in the literature is the use of prostaglandin E₂ vaginal tablets in grand multiparas with previous caesarean scar who had PROM at term. There were no cases of rupture of the uterus in the whole study group even though some of the women had had a previous caesarean section and even though oxytocin was used for augmentation in one of the multiparas who had had a previous caesarean section. However, we cannot draw conclusions from this result because of the small sample size.

Although we have defined grand multiparity as parity > 5 or the 6th baby, a recent study however has suggested that grand multiparity should start from parity 4 or 5th baby and that nulliparous and grand multiparous mothers are at higher risk than low multiparous mothers [22]. From the results of this study, it may be reasonable to conclude that prostaglandin E₂ vaginal tablets may be used for induction of labour in patients with PROM at term, irrespective of parity and history of previous caesarean delivery. However extreme caution must be taken before augmenting labour with oxytocin in the grand multiparas with PROM at term in the presence of a previous lower caesarean section scar. A large prospective trial involving grand multiparous women may produce more conclusive results.

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Making pregnancy safer

Reducing the number of women dying in childbirth by three-quarters by 2015 is one of the key goals of the Millennium Declaration. This goal was agreed by world leaders from 189 countries at the UN Millennium Summit in September 2000.

Every minute, a woman dies from complications related to pregnancy and childbirth — that means 1600 deaths every day, more than half a million deaths every year worldwide. In addition, for every woman who dies in childbirth, around 20 more suffer injury, infection or disease, approximately 10 million women each year.

WHO is committed to achieving the Millennium Development Goal and has called for intensified action addressing threats to maternal health. WHO assists countries with especially high rates of maternal deaths to strengthen their health systems to build a "continuum" of care so that all women and their babies can go through pregnancy, childbirth and the postnatal period safely, irrespective of their ability to pay for these services.

Source: WHO Fact sheet No. 276