Outcome of induced labour in pregnancies at 41 weeks gestation and over in Saudi Arabia

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نتائج المخاض المُحَرَّض في الأسبوع الواحد والأربعين وما يليه من فترة الحمل في المملكة العربية السعودية

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الخلاصة: أجريت دراسةٌ أترابيَّة وصفية استعادية في مستشفى الملك فيصل العسكري في المملكة العربية السعودية، لمقارنة نتائج الحمل لمن أجري لهن مخاض محرض بالبروستاغلاندين E_2 في الأسبوع الحادي والأربعين وما يليه من فترة الحمل. ودُرست 450 امرأة ممن تلقَّين الرعاية السابقة للولادة في المستشفى في الفترة بين عامَيْ 1995 و1999. وكانت الحصائل الرئيسية التي تم قياسُها هي معدل إجراء العملية القيصرية ومعدل المراضة في الفترة المحيطة بالولادة ومعدل الوفيات في الفترة المحيطة بالولادة. وفيما عدا الأحمال السوية، فإن معدل العمليات القيصرية لم يزدد كثيراً عندما تم تحريض المخاض في الأسبوع الحادي والأربعين من الحمل مقارنةً بإجرائه في فترة تتجاوز الأسبوع الثاني والأربعين منه. ورغم حدوث مضاعفات أكثر في الفترة المحيطة بالولادة عندما تم التحريض في الأسبوع الثاني والأربعين فإن النتائج لم تكن مشجعة، ولابد من إجراء دراسة سريرية استباقية واسعة.

ABSTRACT A retrospective, descriptive cohort study was conducted at King Faisal Military Hospital, Saudi Arabia, to compare pregnancy outcomes in patients induced with prostaglandin E_2 from 41 weeks gestation. A total of 450 women whose antenatal care and delivery were conducted at the hospital during 1995–99 were studied. The main outcome measures used were caesarean section rate and perinatal morbidity and mortality. In otherwise normal pregnancies, the caesarean section rate was not significantly increased when induction of labour was carried out at 41 weeks gestation compared with ≥ 42 weeks. Although more perinatal complications occurred when induction was carried out at 42 weeks, the results were not statistically significant. A large prospective clinical trial is indicated.

Issue de l'induction du travail dans les grossesses à 41 semaines de gestation en Arabie saoudite

RESUME Une étude de cohorte descriptive et rétrospective a été réalisée à l'Hôpital militaire King Faisal en Arabie saoudite pour comparer l'issue de la grossesse chez des patientes ayant eu un travail déclenché par prostaglandine E_2 à partir de 41 semaines de gestation. Au total, 450 femmes dont la surveillance prénatale et l'accouchement avaient été effectués à cet hôpital de 1995 à 1999 ont été incluses dans l'étude. Les principales mesures utilisées pour évaluer l'issue étaient le taux de césariennes et la morbidité et la mortalité périnatales. Dans les autres grossesses normales, le taux de césariennes n'augmentait pas significativement lorsque l'induction du travail avait lieu à 41 semaines de gestation par rapport à 42 semaines ou après. Même si les complications périnatales étaient plus nombreuses lorsque l'induction avait lieu à 42 semaines, les résultats n'étaient pas statistiquement significatifs. La réalisation d'un essai clinique prospectif de grande envergure est indiquée.

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Introduction

Induction of labour is the artificial initiation of uterine contractions prior to spontaneous onset, leading to progressive dilatation and effacement of the cervix and delivery of the baby. The most common indication for induction of labour is prolonged pregnancy. The aim is to improve the health outcomes of the mother and/or baby. Induction of labour beyond 41 weeks gestation has been shown to reduce rates of caesarean section, operative vaginal delivery, meconium staining and macrosomia (birth weight > 4000 g) and risk of fetal and neonatal death [*1,2*].

A meta analysis of randomized controlled trials by Sue-A-Quan et al. [*3*] suggests that elective induction of labour at 41 weeks gestation, compared with expectant management with selective labour induction, is associated with fewer perinatal deaths and no increase in the caesarean section rate. In a recent study by Alexander et al. [*4*], it was shown that the high rate of caesarean section in women with prolonged pregnancies is due to risk factors intrinsic to the patient rather than to the induction of labour itself. Another study [*5*] concluded that post-term pregnancy was associated with maternal and neonatal morbidity, but not perinatal mortality. However, the American College of Obstetricians and Gynecologists (ACOG) [*6*] has recommended a reconsideration of the management of post-term pregnancy, including reinterpretation of the statistical risk of stillbirth in post-term pregnancies, using ongoing (undelivered) rather than delivered pregnancies as the denominator. This shows a far higher risk to post-term fetuses than previously believed to be the case.

Saudi Arabian society still takes pride in large family size and multiparity is common. The morbidity associated with repeat caesarean sections in our community has been well documented [*7*]. Given the desirability of minimizing the rate of caesarean deliveries, we conducted this study to determine the outcome of induction of labour in uncomplicated pregnancies at 41 weeks of gestation and beyond.

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 450 women whose laboour was induced due to gestation ≥ 41 weeks. Although hospital policy was to induce labour at 42 weeks gestation in uncomplicated singleton pregnancies, some patients were induced at 41 weeks for social reasons. Others were induced at ≥ 43 weeks because they had not presented at 42 weeks. The patients were categorized into one of the above three groups: Group 1 (patients induced at 41 weeks for social reasons), Group 2 (patients induced at 42 weeks in uncomplicated singleton pregnancies), and Group 3 (patients induced at ≥ 43 weeks because they had not presented at 42 weeks). Patients were excluded from the study if they had any antenatal complications, such as hypertension, diabetes, fetal anomaly, intrauterine growth retardation, antepartum haemorrhage, or history of ruptured membranes or previous caesarean section.

Only those patients with certain dates and or early scan at ≤ 20 weeks of gestation, and with no other complications were included in the study. Fetal maturity was assessed by measuring the bi-parietal diameter (BPD) or crown-to-rump length (CRL). Where there was a discrepancy

between dates and early scan, the scan date was taken.

Information obtained included demographic data, use of oxytocin for augmentation, mode of delivery, birth weight, Apgar score, sex, admission to neonatal intensive care unit and other neonatal complications.

Labour induction

The protocol for induction of labour at the King Faisal Military Hospital Maternity Unit was as follows. Before induction, the cervical score using the modified Bishop score was noted, and a 1.5 mg prostaglandin E_2 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 30 minutes after the insertion of the tablet. The patient was reassessed by the same obstetrician 6 hours after the initial tablet insertion, and depending on the response as indicated by the Bishop score, the initial prostaglandin E_2 dose was either increased by 1.5 mg or the same dose repeated. If there was no change in the Bishop score, the dose was increased. Where there was an increase by one or two points, the same dose was inserted. This procedure was repeated every 6 hours until regular contractions ensued. The maximum dose of prostaglandin E_2 allowed over a 24-hour period was 15 mg. On the second day of induction, patients were started with the 1.5 mg dose, increasing by 1.5 mg each 6 hours, as on the first day of induction. The total dose of prostaglandin used was recorded, as were any complications during induction.

Labour was actively managed using the partogram. Augmentation of labour was carried out for inefficient uterine contractions with 5 units of oxytocin (Syntocinon, Novartis-Pharma) in 500 mL dextrose/saline by an accurate infusion pump, commencing at a rate of 1 mU/min, and increasing at intervals of not less than 30 min until 3 strong contractions/10 min were induced. The third stage of labour was managed actively. Fetal well-being was monitored by continuous cardiotocogram.

Analysis

Statistical analysis was performed using the *Statistical Package for Social Sciences* for Windows, version 7.5. The one-way analysis of variance test for equality of means was used for quantitative variables, while the chi-squared and Fisher exact tests were used for qualitative data. The level of significance was set at $P = 0.05$.

Results

There were 22 936 deliveries in the hospital during the study period, of which 450 (1.96%) were induced due to prolonged pregnancy ≥ 41 weeks. There were 296 patients in Group 1 (patients induced at 41 weeks for social reasons), 99 patients in Group 2 (patients induced at 42 weeks in uncomplicated singleton pregnancies), and 55 patients in Group 3 (patients induced at ≥ 43 weeks because they had not presented at 42 weeks). There were no statistically significant differences between the groups comparing the mean maternal age, parity or dose of prostaglandin used (Table 1). There was, however, a statistically significant difference in birth weight between the groups, with the highest weight in Group 1 ($P < 0.05$).

Table 2 shows other characteristics of the labour and the neonate. Labour was augmented with oxytocin in 21.6% of Group 1, 18.2% of patients in Group 2, and

Table 1 Characteristics of mother, neonate and labour in 450 pregnant women with induced labour: comparison between different gestation groups

Variable	Group 1*	Group 2	Group 3	*P*-value
All women	(*n* = 296)	(*n* = 99)	(*n* = 55)	
Parity	3.94 ± 3.71	3.75 ± 3.32	4.71 ± 2.60	0.243
Maternal age (years)	28.88 ± 6.43	28.39 ± 6.74	28.78 ± 5.02	0.550
Birth weight (g)	3358 ± 400	3238 ± 504	3319 ± 431	0.032
Prostaglandin E_2 dose (mg)	4.95 ± 4.38	4.30 ± 2.96	5.52 ± 5.36	0.208
Nulliparous women	(*n* = 43)	(*n* = 16)	(*n* = 3)	
Maternal age (years)	22.28 ± 3.78	21.81 ± 3.89	24.00 ± 2.65	0.860
Birth weight (g)	3225 ± 337	3126 ± 451	3607 ± 218	0.073
Prostaglandin E_2 dose (mg)	5.60 ± 4.40	4.21 ± 2.10	17.10 ± 14.10	< 0.001

All values are mean ± standard deviation.
n = *total number of women.*
**Group 1: gestation 41 weeks, social reasons; Group 2: gestation 42 weeks, uncomplicated singleton pregnancy; Group 3: gestation ≥ 43 weeks, not presented at 42 weeks.*

12.7% of Group 3. This difference was not statistically significant. In Group 1, 8.1% of patients were delivered by caesarean section, 10.1% in Group 2 and 7.3% in Group 3, with no statistically significant difference. There were no perinatal deaths in the study group. There were 3 neonates in Group 1 with thick meconium aspiration. There were 10 (3.3%), 4 (4.0%) and 1 (1.8%) admissions to the newborn intensive care unit (NICU) for Groups 1, 2, and 3, respectively. These differences were not statistically significant.

Maternal and fetal characteristics among nulliparous mothers are also shown in Table 1. A significantly much higher dose of prostaglandin E_2 was used in Group 3 ($P < 0.001$). Table 2 shows the characteristics of the labour and the newborn among nulliparas. There was a statistically significant difference in the mode of delivery.

Discussion

Our study focused on induction of labour at 41 weeks of gestation and beyond. The literature is replete with studies on induction of labour in prolonged pregnancy, that is, pregnancy of > 42 weeks or 294 days duration taken from the first day of the last menstrual period [*8,9*]. We conducted the present study to ascertain the benefits or risks of induction of labour at over 42 weeks gestation compared with induction performed earlier or later.

For the mother, the risk of prolonged pregnancy is operative delivery, with its attendant morbidity in both spontaneous and induced labour. However, there are conflicting reports regarding operative delivery rates in patients with prolonged pregnancy managed by induction of labour and those managed conservatively [*10,11*].

Table 2 **Characteristics of labour and neonatal outcomes in 450 pregnant women with induced labour: comparison between different gestation groups**

Variable	Group 1[a]		Group 2		Group 3		χ^2	*P*-value
	No.	%	No.	%	No.	%		
All women	(*n* = 296)		(*n* = 99)		(*n* = 55)			
Oxytocin augmentation	64	21.6	18	18.2	7	12.7	2.37	0.29
Mode of delivery							0.50	0.77
Caesarean section	24	8.1	10	10.1	4	7.3		
Vacuum/forceps	7	2.4	2	2.0	2	3.6		
Normal delivery	265	89.5	87	87.9	49	89.1		
Apgar score < 7 at 5 min	6	2.0	2	2.0	2	3.6	0.36	0.83
NICU admission	10	3.4	4	4.0	1	1.8	0.55	0.76
Meconium aspiration	3	1.0	0	0.0	0	0.0	1.57	0.45
Nulliparous women	(*n* = 43)		(*n* = 16)		(*n* = 3)			
Oxytocin augmentation	14	32.6	4	25.0	1	33.3	0.32	0.85
Mode of delivery							12.0	0.017
Caesarean section	6	14.0	2	12.5	1	33.3		
Vacuum/forceps	0	0.0	1	6.3	1	33.3		
Normal delivery	37	86.1	13	81.3	1	33.3		
Apgar score < 7 at 5 min	1	2.3	0	0.0	0	0.0	0.45	0.79
NICU admission	3	7.0	0	0.0	0	0.0	1.39	0.49

n = *total number of women.*
[a]*Group 1: gestation 41 weeks, social reasons; Group 2: gestation 42 weeks, uncomplicated singleton pregnancy; Group 3: gestation ≥ 43 weeks, not presented at 42 weeks.*
NICU = *neonatal intensive care unit.*

In our study, the groups were similar with respect to maternal age, parity, dose of prostaglandin used and absence of antenatal complications. The caesarean section rate was lowest in the group of patients induced after 42 weeks although the difference was not statistically significant.

Alexander et al. [*12*], studying pregnancy outcomes by week of gestation, concluded that routine labour induction at 41 weeks was likely to increase labour complications and operative delivery without significantly improving neonatal outcome. This result may have far reaching implications for the Saudi Arabian community, where grand multiparity (parity ≥ 5) is common and it is desirable to reduce the caesarean delivery rate to within the limits of maternal and fetal safety.

In another published work, the same authors [*4*] showed that risk factors intrinsic to the patient, such as nulliparity and unfavourable cervical dilatation, were the cause of excess caesarean sections in women with prolonged pregnancies, rather than induction of labour itself. However, more recent studies [*13,14*] have concluded that elective induction of labour at 41

weeks gestation is associated with only a minimally increased risk of caesarean delivery, regardless of the state of the cervix or method of induction. A large multicentre prospective trial [*11*] that randomly assigned women with low risk uncomplicated singleton pregnancies at ≥ 41 weeks to either induction of labour within 4 days of randomization or to expectant management up to 44 weeks showed a lower rate of caesarean section and intrapartum fetal distress in the induced group.

A major problem, especially in the developing world, is the inability to accurately determine gestational age. Many women do not keep an accurate record of their menstrual cycle and they book late for antenatal care or not at all. Ultrasonography, a more objective estimate of gestational age, is usually unavailable in remote areas. In our military community, however, the percentage of unbooked patients is relatively low, at about 5%.

Although there were no perinatal deaths recorded in the present study, three other epidemiological studies [*15, 18*] report risks of stillbirth in continuing singleton pregnancies near term, and suggest that the risk to the fetus of continuing a pregnancy beyond 41 weeks of gestation is greater than was previously believed. When the risk of stillbirth is expressed as a function of ongoing pregnancies rather than of total births, the risk is highest at 41 weeks because most pregnancies have already delivered by 41 weeks. Our study also demonstrated that a greater number of babies born to mothers induced at 42 weeks of gestation had complications such as meconium aspiration and admission to the newborn intensive care unit, although the difference was not statistically significant. However, there was a statistically significant difference in the birth weight, indicating that the placenta continues to function normally in uncomplicated pregnancies and suggesting that the theory of placental ageing needs to be examined more critically. With regard to nulliparous patients, our study revealed statistically significant differences in the prostaglandin dose used for induction of labour and also the mode of delivery. It is difficult, however, to draw conclusions from these results because of the small sample size.

Conclusions

This was a retrospective study and, as such, it is difficult to reliably extrapolate from the results. Rand et al. [*19*], in a review of induction of labour in prolonged pregnancies, proposed that routine induction of labour be recommended at 41 weeks gestation. Nevertheless, we conclude from the results of the present study that there is no difference in pregnancy outcome when induction of labour is carried out in otherwise normal pregnancies at 41, 42 and ≥ 43 weeks. We look forward to a large prospective, randomized trial in our community, the results of which may require a change to the present policy in this hospital of induction of labour at 42 weeks in uncomplicated pregnancies.

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Pregnancy, childbirth, postpartum and newborn care — a guide for essential practice

While in modern times the health of mother and children has greatly improved, latterly there has been limited progress in reducing maternal mortality and a slow-down in the decline of childhood mortality. Recognizing the large burden of maternal and neonatal ill-health on the development of individuals, communities and societies, world leaders included specific goals and targets to reduce maternal, infant and childhood mortality as part of the Millennium Declaration.

As part of the WHO/UNICEF Integrated Management of Pregnancy and Childbirth strategy, the publication *Pregnancy, childbirth, postpartum and newborn care — a guide for essential practice* provides a full range of updated, evidence-based norms and standards that will enable health care providers to give high quality care during pregnancy, delivery and in the postpartum period, considering the needs of the mother and her newborn baby. It is aimed at skilled attendants working at the primary health care level in settings with limited resources. The guide will also be helpful for decision-makers, programme managers and health care providers in developing their strategies to meet the health needs of all mothers and children.

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