Induction of Labor with Prostaglandin E2 in Women with Previous Cesarean Section and Unfavorable Cervix

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Abstract:

Background: Induction of labor is common in obstetric practice. According to the most current studies, the rate varies from 9.5 to 33.7 percent of all pregnancies annually. In the absence of a ripe or favorable cervix, a successful vaginal birth is less likely. Therefore, cervical ripening or preparedness for induction should be assessed before a regimen is selected. To objective is to study the pregnancy outcome of induction of labor with prostaglandin E2 (PGE2) in women with one previous lower segment cesarean section.

Methods : A prospective study was conducted at Maternity & Children Hospital, Buraidah (Qassim), Saudi Arabia. The sample included 153 consecutive women with one previous cesarean section, of whom 75 underwent induction of labor (study group) and 78 were admitted with spontaneous onset of labor (control group). Vaginal tablets of PGE2 were used for cervical ripening in the study group. Mode of delivery, neonatal outcome, indications for cesarean section, and rate of uterine rupture were compared between the groups.
Results : There were no significant differences between the study and control groups in mean (_S.D.) maternal age (30:9 _ 4:7 years versus 31:2 _ 4:8 years, P ¼ 0:6), gestational age at delivery (39:2 _ 1:8 weeks versus 39:3 _ 1:6 weeks, P ¼ 0:36), overall rate of cesarean section (24% versus 20.5%, P ¼ 0:8), rates of low 5-min Apgar score (3.1% versus 3.7%, P ¼ 0:67) or cesarean section performed for non-reassuring fetal heart rate (9.3% versus 7.69%, P ¼ 0:1). There were no cases of uterine rupture, in both groups.

Conclusion : The findings suggest that induction of labor in women with one previous cesarean section does not increase the risk of cesarean section rate and does not adversely affect immediate neonatal outcome. We cautiously suggest that when there is no absolute indication for repeated cesarean section, induction of labor may be considered.

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Before 1970s the phrase “once a cesarean, always a cesarean” dictated obstetric practice. Later because of escalating rates of cesarean section (CS) suggestions were made that vaginal birth after CS (VBAC) might help in reducing the rates of CS. So trial of labor in cases of previous CS (PCS) has been accepted as a way to reduce the overall CS rates.

There is evidence of safety of trial of labor, with or without induction of labor, with reduction in iatrogenic prematurity, and maternal morbidity and mortality. The safety of vaginal birth after cesarean section (CS) remains controversial. Some investigators showed that the rates of per natal death and uterine rupture are reduced with elective repeated cesarean section in pregnant women with prior cesarean section [1,2].

Induction of labor is common in obstetric practice. According to the most current studies, the rate varies from 9.5 to 33.7 percent of all pregnancies annually. In the absence of a ripe or favorable cervix, a successful vaginal birth is less likely.

Therefore, cervical ripening or preparedness for induction should be assessed before a regimen is selected. Assessment is accomplished by calculating a Bishop Score. When the Bishop Score is less than 6, it is recommended that a cervical ripening agent be used before labor induction. Pharmacologic agents available for cervical ripening and labor induction include prostaglandins, misoprostol, mifepristone, and relaxin. When the Bishop Score is favorable, the preferred pharmacologic agent is oxytocin.

Moreover, labor induction with prostaglandins had been associated with an increased risk of adverse maternal and neonatal outcome, especially those caused by uterine rupture (3–6).

However, in all these studies, the prostaglandin type and the protocol of administration were not uniform. Moreover, the diagnosis of uterine rupture was retrospectively confirmed by examining individual medical records. Therefore, the actual reported incidence of uterine rupture may have been overestimated. At the same time, other studies have shown no increase in maternal or neonatal adverse outcome when labor was induced in women with one previous cesarean section (7,8).

In Europe, most women today have only one or two children; however, this issue is of major importance in developing countries and in countries like Saudi Arabia where family size is relatively large (9) and the risks of several repeated cesarean sections need to be considered.

Several repeated cesarean sections can increase the rate of placenta previa and placenta accreta in subsequent pregnancies, leading to severe complications and even maternal death (10–12).

Therefore, vaginal delivery after CS is currently preferred in Saudi Arabia for pregnant women who have undergone one previous low transverse cesarean section.

The aim of the current study was to determine pregnancy outcome in women with one previous cesarean delivery in whom labor was induced in comparison with those who entered labor spontaneously.

Methods

Subjects

In the 12 months period from January 2006–December 2006, we recruited 75pregnant women in Maternity & Children Hospital, Buridah, Obstetrics & Gynecology Department with a history of one low transverse cesarean delivery where we induced labor using prostaglandin E2 (study group). Eligibility criteria for the study were patients with singleton pregnancy, vertex presentation, gravidity less than five and sonographically estimated fetal weight of less than 4000 g. Women with spontaneous uterine contractions, a Bishop Score _4 were excluded, as were women who refused labor induction.

The various indications for labor induction are specified in Table (1).

Table (1). indications for induction of labour.

Indication of induction	(N=75)	Percentage
Postdates	56	74.7
Hypertensive disorders	10	13.3
IUGR	5	6.7
Gestational DM	2	2.7
PROM	2	2.7

Findings were compared with a control group of 78 pregnant women with a history of low-transverse CS with spontaneous onset of labor during the same period. Inclusion criteria for the control group were singleton pregnancy, vertex presentation, clinical estimated fetal weight of less than 4000 g, no prior trial of induction of labor in the studied pregnancy, no maternal demand for CS and no definitive contraindications for vaginal delivery, such as placenta previa.

Management protocol

Prior to PGE2 application, all patients in the study group received a detailed explanation of the procedure and provided written informed consent. All underwent physical and vaginal examination, nonstress test, and detailed ultrasound assessment for estimated fetal weight, amniotic fluid index. The usual induction protocol included intravaginal application of a 1.5mg tablet of Dinoprostone (Pharmacia Upjohn, Puurf, Belgium) to the posterior vaginal fornix. If after one dose,

cervical change was inadequate with minimal uterine activity; additional same doses were given at intervals of 6 h. with a maximum of four doses. Patients in whom the Bishop score rose to 7 or more were transferred to labor room, where labor was further augmented with oxytocin or artificial rupture of the membranes, as necessary. Ripening was considered a failure if there was no significant change in the Bishop score (Bishop's score 7 or more) after six hours of fourth application of PGE2. In both the study and control groups, if oxytocin was used for labor augmentation, fetal membrane rupture (artificially or spontaneously) was followed by continuous electronic fetal monitoring. Oxytocin administration was ceased if more than 200 Montevideo units were recorded.

Pregnancy outcome

Pregnancy outcome was compared between the study and control groups. Maternal outcome was

characterized by gestational age at delivery, indications for and rate of CS and rate of symptomatic uterine rupture (defined as complete disruption of the prior uterine scar in association with at least one of the following symptoms or signs: laparotomy for hemorrhage or hemoperitoneum, excessive injury to the bladder or extrusion into the peritoneal cavity of any portion of the fetal-placental unit), cesarean delivery for non-reassuring fetal heart rate tracing. Only cases of confirmed uterine rupture were included in the final analysis. Duration of labour calculated from the onset of active phase of labour till delivery of the head.

Neonatal outcome was defined by birth weight, low Apgar score (-7) at 5 min, and need for admission to the neonatal intensive care unit (NICU).

Statistical analysis

Data were analyzed with the SPSS for Windows (version10.0) statistical package. Results are expressed as means _ S:D: or rate. Comparisons between groups were performed with analysis of variance (ANOVA) or Student's t-test for continuous data, and with chi-square or Fisher's exact test for categorical data. The association between CS and possible predictors was calculated by logistic regression and forward likelihood analysis, controlling for related variables. The odds ratio (OR) and 95% confidence interval (CI) were calculated where appropriate. A P-value of <0.05 was considered significant.

Results

The antenatal and postnatal data for the groups are show in Table (2).

Table (2). Antenatal and postnatal data for the study and control groups.

Parameter	Group 1 (N=75)	Group 2 (N=78)	P value	Significance
Maternal age (years)	30.9 _ 4.7	31.2 _ 4.8	P> 0.05	NS
Gravidity	3.3 _ 1.4	3.4 _ 2.0	P> 0.05	NS
Parity	1.7 _ 1.0	2.0 _ 1.5	P> 0.05	NS
Gestational age (weeks)	39.2 _ 1.8	39.3 _ 1.6	P> 0.05	NS
Birth weight (g)	3163 _ 539	3324 _ 492	P> 0.05	NS

There were no between-group differences in maternal age, gravidity, or gestational age at delivery. Mean birth weight was higher in the control group. The need for labor augmentation, the overall rate of CS and the rate of neonates with Apgar Score _7 or those who were admitted to NICU was comparable between the studied groups.

Findings on multivariate analysis for the mode of delivery, reason for CS, duration of labor, use of oxytocin, complication and low Apgar scor at 5 min. are shown in Table (3).

No difference was found in rate of uterine rupture or in immediate neonatal outcome between the groups.

Discussion

Several studies suggested that for appropriately selected women with PCS, a trial of labor is safe, even safer than elective repeat CS. Published literature shows that there has been a 60-80% success in attempts at vaginal birth after cesarean section [(2).] However, the identification of prospective risk factors associated with all uterine scar failures (uterine rupture and uterine dehiscence) may guide the selection of VBAC candidate's better [(19).] The risk of uterine rupture in cases of PCS is believed to be significantly higher with an induced labor than with a spontaneous labor with trial. In a study when authors had excluded prostaglandin E**2** (PGE**2**) exposure, however, the risk was only 0.74% which was not significantly higher than that associated with spontaneous labor. Non-significant trends towards higher rupture rates with the use of PGE**2** have been reported by others [(20).]

The need for labor induction in women with previous CS poses a dilemma for physicians. Cumulative evidence suggests that labor induction in this patient population increases the risk of uterine rupture leading to adverse maternal and neonatal outcome [(3) 4).] At the same time, vaginal birth after cesarean may prevent the short [(13)] and long-term [(10–12)] complications associated with repeated cesarean section. The objectively evaluation of the risks and benefits of labor induction in women with previous CS is potentially confounded by a number of variables.

Table (3). Comparison of management outcome.

Parameter	Group 1 (N=75)	Group 2 (N=78)
Mode of delivery Vaginal delivery LSCS	57(76%) 18 (24%)	62 (79.5%) 16 (20.5%)
Indication of LSCS Non reassuring CTG . Non-progress Failed induction	7 (9.33) 6 (8) 5(6.66)	6 (7.69) 9 (11.5) 0 (0)
Duration of labour . • 12 hours 12 hours Use of oxytosin	3 (4.0) 61 (81.3) 19(25.33%)	3 (3.8) 64 (82.1) 23(29.48%)
Complications No complication PPH Low Apgar at 5 min.	73 (97.3) 1 (1.3) (3.1)	77 (88.7) 1 (1.2) (3.7)

Among these is the status of the cervix at the time of initiation of induction, the course of labor, and the need for oxytocin for augmentation. Since the present study was based on the experience of a single center, over a 12- month- period, with the same team of special lists, using the same strict protocol these potentially confounding factors, characteristic of studies with different management protocols applied in different medical centers, were minimized. Our study showed that the rate of CS was similar in women who underwent labor induction with PGE2 and in women with spontaneous onset of labor although all women in the induction group had an unfavorable cervix (Bishop Score less than 4). Moreover, there were no between-groups differences in the indications for CS, especially those related to non-reassuring fetal heart rate (except for failure of induction).

Induction of labor by itself was not found to be a predictive factor. Therefore, we speculate that the relatively low rate of CS in both groups in our study may be related to the tendency of physicians to follow the protocol in patients with a previous cesarean delivery out of concern of the risk of uterine rupture.

No difference was found in rate of uterine rupture or in immediate neonatal outcome between the groups. These findings are in agreement with some studies [8,16] but disagree with others (3,5,17,18) that demonstrated a higher rate of uterine rupture and adverse neonatal outcome after PGE2 induction.

The reason for this discrepancy is unclear, although the lower uterine rupture rates were reported in earlier studies and the higher ones in more recent reports. It is possible that PGE2 induction is recently being used more liberally in women attempting vaginal birth after CS (VBAC) than in recent years when the concept of VBAC was first introduced. Another reason for the relatively low rate of PGE2 related complications found in the present sample may be related to our implantation of a strict protocol of induction, avoidance of additional applications if spontaneous uterine contractions are recorded, management of labor with intrauterine pressure monitoring with cautious use of oxytocin. On the other hand, one may suggest that the absence of uterine ruptures in the PGE2 induction group is due to a relative small number of patients in our sample.

As most of our patients desire future pregnancies, we believe that obtaining individualized informed consent regarding risks and benefits of induction of labor should be provided. We cautiously suggest that when no absolute indications for repeated cesarean section are present, induction of labor with PGE2 may be considered under a strict management protocol and close monitoring.

Conclusion

The findings suggest that induction of labor in women with one previous cesarean section does not increase the risk of cesarean section rate and does not adversely affect immediate neonatal outcome. We cautiously suggest that when there is no absolute indication for repeated cesarean section, induction of labor may be considered.

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