INDUCTION OF LABOR SANS PROSTAGLANDINS

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SUMMARY

A retrospective cohort study was done to determine the safety and efficacy of induction of labour using oxytocin alone or in combination with the Foley catheter. Two-hundred patients who were induced, were compared to women with labour of spontaneous onset in terms of duration of labour, mode of delivery, maternal pyrexia, fetal distress, Apgar score and perinatal mortality. Nulliparous patients who had labour induced were 1.7 (95% CI 1.0-3.1) times more likely to undergo caesarean section than those with spontaneous onset of labour. There was no significant difference between the two groups in duration of labour, maternal pyrexia or fetal distress. Selective induction of labour following cervical ripening with a Foley catheter is safe, effective and justified.

Termination of pregnancy is the ultimate obstetric intervention and depends on the physician's assessment of the obstetric balance; the risks and benefits, to mother and fetus, of continuing the pregnancy need to be weighed against those of interrupting it. With an unripe cervix, induction of labour by amniotomy and oxytocin infusion, is fraught with complications (Orhue et al, 1984). The Foley catheter has been shown to be inexpensive and effective in ripening the cervix (Embrey & Mollison, 1967). Although prostaglandin E2 is the generally accepted cervical ripening agent, many institutions including ours, still use an extra-amniotic Foley catheter. In the developing world prostaglandins are relatively expensive and not freely available. This study was designed to assess the safety and efficacy of induction of labour

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without prostaglandins.

THE PROTOCOL FOR INDUCTION

Decisions for induction were taken by consultant obstetricians. Patients were examined in the evening and scored by the modified Bishop score (Calder et al, 1977). If Bishop score was 5 or less, a Foley catheter was passed through the cervix into the extra-amniotic space by a no-touch technique. The bulb was inflated to 30 ml and the catheter pulled back so that the bulb hitched against the internal os. The distal portion of the catheter was left folded inside the vagina. About 12 hours later, the catheter was removed and amniotomy performed irrespective of the change in Bishop score. Oxytocin infusion was begun and titrated to obtain at least three contractions in 10 minutes. The duration of labour was calculated from onset of painful contractions to delivery. Failed induction was diagnosed if active labour was not established within 12 hours from onset of painful contractions. If patients needed a cesarean section after having ruptured their membranes for over 6 hours they were given 3 doses of cefazolin after cord clamping. Antibiotics were not routinely used when the Foley catheter was introduced.

PATIENTS AND METHODS

All 200 patients who had labour induced at the Christian Medical College Hospital, Vellore, between June 1st and September 30th, 1990, were included in the study. Women who had, had a spontaneous onset of labour and immediately followed these patients in the labour room register, were taken as controls. A retrospective cohort design was used with induction of labour as the exposure factor and the events of labour and delivery as the outcomes of interest. Details of the labour and delivery were taken from the medical records of these patients. The outcome of labour was analysed separately for nulliparas and multiparas. Analysis was by the chi-square and Student's t-test. Relative risks and their 95% confidence intervals were calculated where appropriate.

RESULTS

During the study period there were 2005 deliveries and 200 inductions giving an induction rate of 10%. The indications for induction are given in Table I. A third of the patients were induced for "past dates" of whom, only 28 patients were of greater than 290 days gestation.

Table I

Indications for Induction

	Number	Percentage
Past Date	72	36
PIH Hypertension	28	14
PROM	28	14
Growth Retardation	24	12
Bad Obstetric History	16	8
Poor Biophysical Score	10	5
Diabetes	8	4
Elective	6	3
Others	8	4
Total	200	100

The extra-amniotic Foley catheter was used in 149 patients whose Modified Bishop Score was 5 or less, to ripen the cervix prior to amniotomy and oxytocin infusion. The Foley catheter was not used if the cervix was favourable or, if membranes had already ruptured. The mean initial Bishop score in patients who had cervical ripening was 3.0 (SD 1.2) and the mean final Bishop score was 5.9 (SD 1.9). The mean change in Bishop score after the use of a Foley catheter was 2.9 (SD 1.6).

The induced group of patients was comparable to the control group for booking status, gestational age and baby weight as shown in Table II. There were significantly more nulliparous patients in the induction group. The duration of labour in nulliparous averaged about 8 hours in each group while in multiparas it was about 6 hours. There were no differences in mode of delivery, prolonged labour or Apgar scores at one minute, between the induced and control groups in either nulliparas or multiparas (Table III and IV). The caesarean section rate in the induced nulliparous patients was 1.7 times that in the nulliparas who went into spontaneous labour. The indications for caesarean section are given in Table V. There were no significant differences in complications between the induced and control group (Table IV). In the induced group, the fresh still birth occurred in and unbooked primigravida with pre-eclampsia and breech delivery at 29 weeks gestation. The three neonatal deaths were due to meconium aspiration, non-immune hydrops and, diaphragmatic hernia, respectively.

DISCUSSION

Induction of labour is undertaken when, in the opinion of the physician, the risks of delivery to the mother or the fetus or both are less than the risk of continuing the pregnancy (ACOG Tech

Table II

Comparability of Induced and Control Groups

Factor	Induction (n=200)	Control (n=200)	Significant
Booked	156 (78)	150 (75)	NS
Preterm	24 (12)	26 (13)	NS
Nulipara	109 (55)	85 (43)	P < 0.05
Mean Gestation (Days)	275 {17}	272 {15}	NS
Mean Parity	0.8 {1.2}	0.9 {1.0}	NS
Baby Weight (Kilograms)	2.8 {0.6}	2.9 {0.5}	NS

NS = Not significant; ( ) Percentage; { } Standard deviation.

Table III

Outcome of Labor in Nulliparas

Factor	Induction (n=109)	Control (n=85)	RR	95% CI	P Value
Duration of labour (Hours)	8.1 {4.4}	8.7 {3.9}			> 0.05
One minute Apgar Score	8.3 {1.5}	8.5 {1.3}			> 0.05
Labor > 16 hours	5 (4.6)	4 (4.7)	1.0	0.3-3.5	> 0.05
Spontaneous delivery	47 (43)	46 (54)	0.8	0.6-1.1	> 0.05
Instrumental delivery	33 (30)	25 (29)	1.0	0.7-1.6	> 0.05
Cesarean Section	29 (27)	13 (15)	1.7	1.0-3.1	0.058
Vaginal breech delivery	0	1 (10)			

RR = Relative risk; 95% CI = 95% Confidence interval; { } Standard deviation; ( ) Percentage

Table IV

Outcome of Labor in Multiparas

Factor	Induction (n=91)	Control (n=115)	RR	95% CI	P Value
Duration of labour (Hours)	5.5 {4.1}	6.2 {3.7}			NS
One minute Apgar Score	8.5 {1.7}	8.6 {1.4}			NS
Labor > 16 hours	5 (6)	2 (2)	3.2	0.6-15.9	NS
Spontaneous delivery	74 (81)	94 (82)	1.0	0.9-1.1	NS
Instrumental delivery	7 (8)	6 (5)	1.5	0.5-4.2	NS
Cesarean Section	9 (10)	14 (12)	0.8	0.4-1.8	NS
Vaginal breech delivery	1 (1)	1 (1)			

RR = Relative risk; CI = 95% Confidence interval; { } Standard deviation; ( ) Percentage

Bull, 1987). This procedure should be considered justifiable only if there is a medical indication and after it is shown that there is no increased risk to the mother or fetus and that the benefits of success outweight the disadvantage of

Table V

Indications for Cesarean Section

Indication	Induction (n=200)	Control (n=200)
Failed Induction	29 (76)	-
Cephalopelvic Disproportion	3 (8)	9 (33)
Fetal Distress	5 (13)	6 (22)
Doubtful Uterine Scar Integrity	1 (3)	6 (22)
Malpresentation	-	3 (11)
Placenta Praevia	-	2 (7)
Dysfunctional Labour	-	1 (4)
Total	38	27

(Percentage of Caesarean section in each group in parantheses)

Table VI

Complications in Induction and Control Groups

Factor	Induction (n=200)	Control (n=200)	RR	95% CI	Significance
One minute Apgar Score <5	4 (2)	7 (3.5)	0.6	0.2-1.9	NS
Maternal pyrexia	20 (10)	16 (8)	1.4	0.7-2.3	NS
Fetal distress	22 (11)	13 (6.5)	1.7	0.9-3.3	NS
Intra-partum stillbirth	1 (0.5)	0			
Neonatal death	3 (1.5)	0			

Percentages in parentheses

failure. Most of the patients induced in this study were for "past dates", pre-eclampsia and, growth retardation. Induction presumably avoids potential adverse outcomes such as birth asphyxia, meconium aspiration and perinatal mortality. The control group consisted of patients with risk factors that included malpresentation and antepartum hemorrhage.

Induction of labour when the cervix is unripe implies a willingness to perform cesarean section if the patient does not

go into active labour within 12 to 16 hours. Prolonged labour with ruptured membranes carries a high risk of infection. With an unfavourable cervix, induction of labour is associated with increased rates of epidural analgesia, electronic fetal monitoring, caesarean section, forceps delivery and episiotomy (Bishop 1964, Smith et al 1984). Once having initiated one form of interference, the physician more readily accepts further intervention in the form of operative delivery.

The foley catheter has been shown to be effective in ripening the cervix (Embrey & Mollison 1967; Sandhu and Tung 1984) and even comparable to prostaglandin E 2 in improving the cervical score (Ezimokhai & Nwabineli 1980). Criticism of mechanical methods of ripening the cervix centre on the potential for infection. However, when aseptic techniques are used sepsis does not pose a significant problem (Cross & Pitkin 1978; Peedicayil et al 1989). In our institution, the Foley catheter has been used not only for research but, also for routine pre-induction, cervical ripening. Unlike prostaglandins, the foley catheter does not stimulate labour during the ripening period. Vaginal PGE2 has been shown to produce 5 times more uterine hypertonicity and consequent fetal distress than the synthetic laminaria tent, Lamicel (Bagratee & Moodley 1990). Mechanical methods of cervical ripening may be preferable to PGE2 in developing countries where electronic monitoring may not be readily available.

In this study, nulliparas and multiparas have been analysed separately as parity is probably the single most important determinant of the outcome of induction. The induction and control groups have not been matched for confounding variables but seem to be comparable nevertheless. As in many previous studies, it is very difficult to select an appropriate control group that is similar in maternal age, parity, Bishop score, gestational age, pregnancy complication and, physician practice (Tylleskar et al 1979; Mercer et al 1992).

Although there were no significant differences in outcomes or complications of labour between the two groups, there was a very definite trend towards higher cesarean section rates in the induced group ($p = 0.058$). Most of the cesarean sections in the induced group were due to failed inductions, defined as failure to get into active labour in the least twelve hours. Perhaps, many of these operative deliveries could have been avoided if induction was not undertaken. Dysfunctional labour and failed induction would be even more likely if the initial Bishop score were to be very unfavourable. Indiscriminate induction would lead to a spiralling caesarean section rate especially in centres where the "vaginal birth after cesarean section" rate is well below the 50% mark.

The increased incidence of fetal distress and the perinatal mortality in the induced group is not very surprising as it is a high risk group of patients. More vigilant monitoring of labour, and tertiary neonatal care facilities might have avoided two perinatal deaths.

The duration of labour, incidence of caesarean section and instrumental delivery and maternal pyrexia are comparable

to other reports on induction (Kurup et al, 1991; Mercer et al, 1992). A maternal pyrexia rate of 10% is expected in induced patients especially since patients with premature rupture of membranes (PROM) have been included. A consistent trend in the literature is the increased use of epidural anaesthesia (Sande et al, 1983). In our institution epidural anaesthesia is seldom used.

In conclusion, selective induction of labor when indicated, is safe, effective and justified, even without the use of prostaglandins. The spectre of failed induction and hence increased resort to cesarean section needs always to be kept in mind.

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