Induction of labour with prostaglandin gel in patients with unfavourable cervices

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Summary: 151 primigravid patients with Bishop scores of 4 or less were induced with prostaglandin E2 gel using an initial dose of 2 mg followed by 1 mg or 2 mg at 6 hours. Eighty one patients (53.6 per cent) were in established labour or had delivered by 12 hours, and a further 31 (20.5 per cent) had achieved successful ripening of the cervix. Ninety per cent and 64.5 per cent respectively achieved vaginal delivery and although 39 patients failed to respond to this regime, 72 per cent delivered vaginally after augmentation. No case of hypertonus was recorded and only one patient had abdominal delivery for "failed induction". This regime provides an effective means of induction of labour for a difficult group of patients with little worry of overstimulation and low "failed induction" rates.

Key words: Labour induction; Prostaglandin.

INTRODUCTION

Prostaglandin E2 (PG E2) administered into the posterior vaginal fornix is a well established and highly effective means of induction of labour and in patients with Bishop scores of 5 or more, a single dose of 1 mg will achieve success in 68% of multigravidae and 48% of primigravidae, the remainder requiring a further dose at 6 hours (Cameron 1985). For patients with cervical scores of less than 4 however, this regime achieves less than satisfactory induction rates (Walton, 1985) whereas in a small pilot study an initial dose of 2 mg followed by a further prostaglandin at 6 hours if necessary, was found to give better results (Chin *et al.*, 1989). We report the results of the larger multicentre study using this regime.

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MATERIALS AND METHODS

This was an open label study involving 151 patients enrolled from 5 centres. All patients were primigravidae with Bishop scores of 4 or less and with a gestation of 37 weeks or more who required induction of labour.

Mean age was 24.0 years (range 18-35) and a medical or obstetrical indication for induction was present in each case (hypertension/pre-eclampsia 50%; post term 30% and intra-uterine growth retardation 13%). Inclusion and exclusion criteria were the same as those in the earlier pilot study (Chin *et al.*, 1989).

All patients were given an initial dose of 2 mg PG E2 vaginal gel into the post vaginal fornix. Six hours later, the Bishop scores were assessed and depending on this, further PG was

given. If cervical dilatation had increased by 3 cm or more and/or the patient was in established labour, no further gel was given. More PG was administered if there was neither cervical dilatation nor uterine contractions (2 mg) or if cervical dilatation was less than 3 cm and uterine contractions were less than two per 10 min period (1 mg). The Bishop score was reassessed at 12 hours and the need for augmentation with oxytocin was evaluated at 15 hours for those patients still not delivered. Artificial rupture of membranes was performed when considered appropriate.

RESULTS (Table 1).

Successful induction, i.e. establishment of labour or delivery within 12 hours occurred in 81 (53.6%) of the 151 patients evaluated. A further 31 patients (20.5%) had successful ripening within the study time. Prostaglandin was unsuccessful in ripening the cervix or establishing labour in the remaining 39 (25.8%) patients. No uterine hypertonus was recorded and in only two patients was labour thought to be rapid.

Successful induction

Of the 81 patients who had established labour or delivered in the 12 hour period, 54 (67%) did so with the study drug alone, the remaining 27 requiring oxytocin augmentation after 12 hours. The initial 2 mg dose alone was required in 40 (50%) of these patients, the rest requiring a further dose at 6 hours of 1 mg (19) or 2 mg (21). A further patient received further doses of PG instead of oxytocin.

Table 1. – *Outcome of prostaglandin induction.*

	Successful induction (n=81)	Successful ripening (n=31)	Failures (n=39)
Vaginal delivery	73	20	28
Caesarean section	8	11	11
Total prostaglandin used			
2 mg	40	8	5
3 mg	19	9	11
4 mg	21	13	23
More than 4 mg	1	1	0

The mean induction to amniotomy interval for this group was 8 hours 48 mins (SD 3 h 6 mins) induction to start of labour interval 6 h 37 mins (SD 3 h 6 mins) and induction-delivery interval 15 h 05 min (SD 4 h 34 mins).

The first stage of labour ranged from 2 hours to 20 hours (mean 7 h 27 min; SD 3 h 58 min) with mean second and third stages of 1 h 2 min and 7 min respectively. Ninety-eight per cent of patients given PG alone and 89% of those requiring oxytocin were delivered within 24 hours of induction. Vaginal delivery was achieved in 73 (90%) of these patients. Caesarean section will be discussed later.

Successful ripening

This was defined as a change in the Bishop score of 3 or more at 12 hours in the absence of uterine activity and of the 31 (38%) patients in this group, 8 received only one dose of prostaglandin, the remainder requiring a second dose of 1 mg (9 patients) 2 mg (13 patients) and 3 mg (1 patient). Six patients had a caesarean section without further induction; 5 for abnormal cardiotocography and 1 for a failed induction. Further efforts to induce labour were made in 25 patients by either prostaglandin or oxytocin, depending on the individual centre's policy. Of these, 20 patients (80%) successfully achieved vaginal delivery. Thus in total, 64.5% who had successful ripening delivered vaginally.

Failures

Thirty nine patients (25.8%) neither achieved a significant change in the Bishop score (<3) nor went into labour during the 12 hour period. All but 5 patients received a second dose of prostaglandin at 6 hours of 1 mg (11 patients)

or 2 mg (23 patients). Caesarean section was performed in 5 of these patients, the remainder requiring a further attempt at induction. Of this latter group, 28 (72% of the failures) went on to vaginal delivery.

Caesarean sections

The reasons for caesarean section in each of the three outcome groups are listed in Table 2. In only one patient was abdominal delivery required for "failure of induction", and in no case was fetal distress deemed to be due to abnormal uterine activity. In the "successful induction group" significant dilatation of the cervix (mean 8.9; SD 1.46) had occurred before operation was necessary.

Neonates

The mean birth weight of the infants was 3229.8 g (SD 570 g). There were no perinatal deaths although one infant died at two weeks due to a diaphragmatic hernia. Seven neonates had an Apgar score of less than four at one minute but only two babies had scores less than 6 at 5 minutes. Neonatal problems in addition to the diaphragmatic hernia included congenital cytomegalo virus infection (1), heroin addiction (1) and Klippel-Feil Syndrome (1).

Table 2. – *Indications for caesarean section.*

	Successful induction (n=81)	Successful ripening (n=31)	Failures (n=39)
Fetal heart abnormalities	2	5	8
Failure to progress	2	3	1
Cephalo-pelvic disproportion	3	1	1
Failed forceps	1	0	0
Cord prolapse	0	1	0
Failed induction	0	1	0
Not specified	0	0	1
	8 (10%)	11 (35.5%)	11 (28.2%)

DISCUSSION

There seems little doubt that cervical scoring can provide a useful guide to determining the success or failure of an induction method (Houghton, 1982), the unripe cervix with low Bishop score (less than 4) having the highest "failure of induction" and complication rates (Calder *et al.,* 1977) particularly in primigravidae. Vaginal prostaglandin has been used for ripening cervix in preparation for more formal methods of induction in these cases for many years (Gordon & Calder, 1983; Stewart *et al.,* 1983) but with the more recent availability of effective gel preparations these prostaglandins have been found in themselves to have successful induction rates (Chin, *et al.,* 1989). The present study confirms that in primigravidae with very low Bishop scores, a revised regimen of 2 mg followed by 6 hours later by 1 or 2 mg will result in a clinically satisfactory outcome in 74.2% of patients, i.e. establishment of labour or delivery within 12 hours (53.6%) or successful ripening (20.5%). The time taken to start labour and the duration of first stage are well within the limits normally encountered with patients with higher Bishop scores.

Although the overall caesarean section rate (19.9%) would appear to be high when compared to other studies (MacKenzie & Embrey, 1977; Varma *et al.,* 1983) the percentage of caesarean section in the successful induction group (10%) approaches that for all primigravidae. This result however, does not agree with our original pilot study rate of 7%. Only one caesarean section was performed for "failure of induction" and none were per-

formed for the effects of hyperstimulation, suggesting that the value of this regime is that the unripe cervix in a primigravida should no longer be regarded as "uninducible" nor should it deter the obstetrician from pursuing a vaginal delivery.

As a result of this study, we would recommend that an initial dose of 2 mg, further prostaglandin (1-2 mg) in 6 hours if needed and reassessment at 12 hours is an optimal regime for managing these difficult patients. This would result in satisfactory induction-delivery times, acceptable vaginal delivery rates and a reduction in the need for caesarean section for induction failure.

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