An evaluation of the Bishop scoring system in relation to a method of induction of labour by intra-vaginal prostaglandin

D. J. HOUGHTON
F.R.C.S., M.R.C.O.G.

Department of Obstetrics and Gynaecology, St Bartholomew's Hospital, West Smithfield, London EC1A 7BE

Summary

This paper is a prospective study of the outcome of labour in 109 patients with favourable and unfavourable cervixes in whom labour was induced by intra-vaginal prostaglandin, with supplementary syntocinon infusion where necessary. There were 61 primigravidae and 48 multigravidae. The rate of operative intervention was virtually no higher than in those labours of spontaneous onset. The length of labour varied inversely with the Bishop score of the cervix before induction, with a coefficient of correlation of -0.995 for primigravidae and of -0.929 for multigravidae. Bishop score was shown to be a poor indicator of the number of doses of prostaglandin needed for successful induction.

Introduction

It was first shown by Garrett (1980) that success of induction by artificial rupture of the membrane depends upon the ripeness of the cervix, and this was later substantiated by Turnbull and Anderson (1968). Bishop (1964) described a scoring system to evaluate the ripeness of the cervix.

This early work refers to induction of labour by syntocinon and artificial rupture of the membranes. The use of local prostaglandins to ripen the cervix before induction was first proposed by Shepherd, Sims and Craft (1976) and Calder, Embrey and Tait (1977). Later McKenzie and Embrey (1977) showed that local prostaglandin affected the ripeness of the cervix, but it was not until Gordon-Wright and Elder (1979) described the use of prostaglandin tablets locally to induce labour that the substance was routinely used for induction rather than to ripen the cervix before induction by other agents.

In this unit we are using intra-vaginal prostaglandin pessaries to induce labour, with additional prostaglandin pessaries to make the unripe cervix favourable for induction. Some system is needed to decide whether or not a ripening dose of prostaglandin is required. This paper is a prospective study of

such a system using the Bishop score as an indicator of the number of doses of prostaglandin needed, and also studies the duration and outcome of labour in relation to the initial Bishop score.

Patients and methods

Induction of labour and its outcome was studied in all pregnant patients induced over a 6-month period. Only singleton pregnancies presenting by the vertex were studied. The indications for induction are shown in Table 1.

Most of the inductions were performed for post-maturity (59% of primigravidae and 50% of multigravidae), followed by hypertensive disease of pregnancy (27% of primigravidae and 14% of multigravidae) and trial of scar (16%) in multigravidae. In many instances there were several reasons for induction, but the prime indication in each case is listed in Table 1.

In all 109 cases, induction was carried out by intra-vaginal pessaries containing 3 mg of prostaglandin E₂ in a wax base of Witespol S55. A vaginal examination was made at 22.30 hours on the night before induction and the favourability for successful induction was assessed by the Bishop scoring system (shown in Table 2).

Each of the following parameters—cervical dilatation in centimetres, degree of cervical effacement, station of the fetal head in centimetres above or below the mother's ischial spines, consistency of the cervix and position of the cervix—were given points ranging from 0 to 3. If the sum total of these points was 6 or less, then 2 prostaglandin pessaries (6 mg) were inserted into the posterior vaginal fornix, at the time of this vaginal examination, in order to ripen the cervix for induction the next morning. The patients were instructed to remain in bed for 2 hr so that the pessaries would melt and the prostaglandin not be lost from the vagina. If the Bishop score was greater

TABLE 1. Indications for induction

Indication	Primigravidae		Multigravidae	
	No.	(%)	No.	(%)
Postmaturity	35	59	25	50
Hypertensive disease	16	27	7	14
Trial of scar			8	16
Intra-uterine growth retardation	3	5	1	2
Social	1	1.8	2	4
Poor obstetric history	0	0	2	4
Trial of labour	2	3.6		
Diminished fetal movements	1	1.8	1	2
Cardiac	1	1.8	0	0
Type 1 placenta praevia	0	0	1	2
Unstable lie	0	0	1	2
Rhesus disease	0	0	1	2
Diabetes mellitus	0	0	1	2
Total	59		50	

TABLE 2. Bishop scoring system

Score	0	1	2	3
Dilatation of cervix (cm)	0	1-2	3-4	5+
Percentage effacement of cervix	0-30	40-50	60-70	80+
Station of presenting part in cm above or below the ischial spines	-3	-2	-1 or 0	+1 or +2
Consistency of cervix	Firm	Medium	Soft	
Position of cervix	Posterior	Mid-	Anterior	

TABLE 3. Labours which began following the ripening dose of prostaglandin

Score	Primigravidae		Multigravidae	
	No. of labours	No. (%) of labours initiated by ripening dose	No. of labours	No. (%) of labours initiated by ripening dose
0	2	1 (50)	1	0 (0)
1	2	0 (0)	1	1 (100)
2	2	1 (50)	4	3 (75)
3	10	4 (40)	6	2 (33)
4	10	6 (60)	13	6 (46)
5	11	3 (27)	10	4 (40)
6	8	2 (25)	5	0 (0)
Total	45	17 (38)	40	16 (40)

than 6, then no pessaries were inserted the night before induction.

Labour was formally induced in all patients the following morning by inserting 2 prostaglandin pessaries into the posterior vaginal fornix at 06.00 hours. In 33 (39%) out of 85 patients, whose initial Bishop score was 6 or less, the evening ripening dose of prostaglandin initiated labour. In these cases, the morning dose of prostaglandin was omitted. A note was made of those labours in which the ripening dose of prostaglandin initiated labour during the night, and these cases are listed in Table 3.

As regards the dosage of prostaglandin used, no

distinction was made between primigravidae and multigravidae because it became clinically apparent early on in the study that induction by this regime was not greatly affected by parity. Many of the primigravid patients had shorter labours than the multigravidae, and of the 33 labours which resulted from the overnight ripening dose alone, 17 (52%) were in primigravidae.

If the early morning 'inducing' dose of prostaglandin failed to initiate uterine contractions by 10.00 hours, then the membranes were ruptured and an intravenous infusion of syntocinon was commenced, using the automatic infusion method described by

FIG. 1. Mean length of labour plotted against Bishop score—primigravidae.

Francis, Turnbull and Thomas (1970). Continuous fetal heart monitoring was used in all labours.

In appraising the value of the Bishop score, the length of labour from insertion of the first dose of prostaglandin to delivery was noted. A note was also made of the type of delivery, whether spontaneous vaginal, forceps or Caesarean section, in relation to the initial Bishop score.

Results

Length of labour

In calculating the mean length of labour, all patients delivered by Caesarean section were excluded, because the timing at which the operation was performed varied with the indication (e.g. fetal distress or lack of progress) and with the obstetrician involved. In this part of the survey, the number of labours studied was reduced to 51 primigravidae and 43 multigravidae and all calculations were based on vaginal deliveries. The Bishop scores ranged from 0 to 11 for the primigravidae and from 1 to 9 for the multigravidae. Figures 1 and 2 show the mean induction—delivery interval (in hr), with the standard error, plotted against the Bishop score, for (1) primigravidae and (2) multigravidae.

The general trend in both groups was for the induction—delivery interval to decrease as the Bishop score increased. With primigravidae the correlation coefficient was -0.995 and for multigravidae it was -0.929 . Using the exact-*t* test this gives *P* values of less than 0.001 in both groups.

Type of delivery

The type of delivery is tabulated against each Bishop score in Tables 4 and 5.

TABLE 4. Type of delivery according to Bishop score—primigravidae

Score	Total	No. of deliveries		
		Normal	Forceps	Caesarean section
0	2	2	0	0
1	2	0	1	1
2	2	1	1	0
3	10	4	3	3
4	10	4	5	1
5	11	6	4	1
6	8	4	2	2
7	6	1	3	2
8	4	3	1	0
9	4	2	2	0
10	1	1	0	0
11	1	1	0	0
Total	61	29 (48%)	22 (36%)	10 (16%)

FIG. 2. Mean length of labour plotted against Bishop score—multigravidae.

TABLE 5. Type of delivery according to Bishop score—multigravidae

Score	Total	No. of deliveries		
		Normal	Forceps	Caesarean section
0	1	0	0	1
1	1	0	1	0
2	4	3	0	1
3	6	3	2	1
4	13	13	0	0
5	10	8	0	2
6	5	3	1	1
7	1	1	0	0
8	5	5	0	0
9	2	2	0	0
Total	48	38 (80%)	4 (8%)	6 (12%)

There were too few subjects at the extreme ends of the range of Bishop scores to be able to comment on these results. However, in the other groups (with the exception of score 7 in primigravidae and score 6 in multigravidae) the rate of spontaneous vaginal delivery rose and the incidence of Caesarean section fell with increasing Bishop score. The incidence of forceps delivery was relatively constant for primigravidae (20–50%), but varied considerably for multigravid patients, where the rate was much lower (mean 8%). In this series the overall incidence of spontaneous vaginal delivery, forceps delivery and Caesarean section was 48, 36 and 16% respectively for primigravidae, and 80, 8 and 12% for multigravidae, with rates of 56, 32 and 12% respectively for the outcome of labours beginning spontaneously in primigravidae and 85, 6 and 9% for multigravidae in the same unit.

Discussion

The length of labour induced by intra-vaginal prostaglandin was found to vary in an approximately inverse manner with the Bishop score before induction, such that the correlation coefficients (r) were -0.995 and -0.929 for primigravidae and multigravidae respectively. Both these values are very highly statistically significant, with P values of less than 0.001. The regression curve shown by the graphs (Figures 1 & 2) is virtually linear. The fact that all the points do not pass exactly through a straight line can be explained by the unavoidable inaccuracies incurred in a biological study of this nature. Some of the parameters of the Bishop score are somewhat difficult to quantify, so that the decision as to whether a cervix is 50 or 60% effaced, or whether it is of soft or medium consistency would alter the score by a point either way. A further source of error may arise in timing the length of labour. This error becomes especially relevant in cases of forceps delivery, where the length of time permitted for the second stage may vary with the obstetrician involved. This variability could have been avoided by noting the time from insertion of the prostaglandin until the end of the first stage of labour. However, in many patients, especially those with epidural analgesia, the onset of full dilatation of the cervix may have passed unnoticed. Allowing for these sources of error, the Bishop score was a reliable indicator of expected success as far as the length of labour is concerned.

Of those patients with a Bishop score of 6 or less, 38% of primigravidae and 40% of multigravidae

began their labours overnight on their ripening dose of prostaglandin. In 70% of these primigravidae and 75% of the multigravidae the score was 4 or less, and one multigravid patient even had a score of zero, so the Bishop score would seem an unreliable guide to the use of a ripening dose of prostaglandin. Furthermore, of this group of supposedly unfavourable cervixes in which the ripening dose initiated labour, 53% were primigravidae. It therefore seems justifiable not to give a higher dose of prostaglandin to primigravidae than to multigravidae.

The study also showed that the intervention rate for operative deliveries fell with increasing Bishop score. This confirms the finding of Calder and Embrey (1975) that more complications arise when inducing labour in a patient with an unripe cervix.

Using the method of induction described, the intervention rate compared favourably with labours of spontaneous onset. The use of the Bishop score was found to be of little value in deciding whether to use a ripening dose of prostaglandin. Since pregnancies in which labour is induced are usually those most at risk, the ensuing labours are best conducted during the day-time when more supervision is available. Therefore, to avoid these labours commencing during the night, a more reliable guideline is needed to determine whether the cervix needs an overnight ripening dose of prostaglandin. Further research is needed to find a more accurate guide to the number of doses of local prostaglandin needed to induce labour.

Acknowledgments

I wish to express my thanks to the Consultant Obstetricians of St Bartholomew's Hospital for allowing me to study their patients and to all the nurses and resident medical staff who helped with the observations.

References

- BISHOP, E.H. (1964) A scoring system for cervical state. *Obstetrics and Gynecology*, **24**, 266.
- CALDER, A.A. & EMBREY, M.P. (1975) Management of labour; *Proceedings of the third RCOG study group* (Ed by Beard, R.W., Brudenell, M., Dunn, P., & Fairweather, D.), p. 64. Royal College of Obstetricians and Gynaecologists.
- CALDER, A.A., EMBREY, M.P. & TAIT, T. (1977) Ripening of the cervix with extra-amniotic prostaglandin E2 in viscous gel before induction of labour. *British Journal of Obstetrics and Gynaecology* **84**, 264.
- FRANCIS, J.G., TURNBULL, A.C. & THOMAS, F.F. (1970) Automatic oxytocin infusion equipment for induction of labour. *Journal of Obstetrics and Gynaecology of the British Commonwealth*, **77**, 594.
- GARRETT, W.J. (1960) Prognostic signs in surgical induction of labour. *Medical Journal of Australia*, **47**, 929.
- GORDON-WRIGHT, A.P. & ELDER, M.G. (1979) Prostaglandin tablets used intra-vaginally for induction of labour. *British Journal of Obstetrics and Gynaecology*, **86**, 32.
- MCKENZIE, I.Z. & EMBREY, M.P. (1977) Cervical ripening with intra-vaginal prostaglandin E2 gel. *British Medical Journal*, **2**, 1381.
- SHEPHERD, J.H., SIMS, C.D. & CRAFT, I. (1976) Extra-amniotic prostaglandin E2 and the unfavourable cervix. *Lancet*, **ii**, 709.
- TURNBULL, A.C. & ANDERSON, A.B.M. (1968) Induction of labour. *Journal of Obstetrics and Gynaecology of the British Commonwealth*, **75**, 23.