Clinical Topics

Induction of labour using prostaglandin E_2 pessaries

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Summary and conclusions

The routine method of induction at Queen Charlotte's Maternity Hospital is now by the use of prostaglandin E_2 pessaries. The first 502 consecutive patients thus induced are presented: the caesarean section rate for a failed induction with an unfavourable cervix has fallen to 2%.

The prostaglandin E_2 pessary is highly efficient and acceptable for all cases in which a simple amniotomy will not suffice.

Introduction

The unripe cervix is a poor prognostic sign for induction and prolonged labour with all its sequelae may result. In patients with unfavourable induction features there is up to a 42% incidence of caesarean section for failed induction,[1] which has resulted in a need for methods by which the cervix may be ripened.

Several studies have shown that prostaglandin paste applied both extra-amniotically[3] and intravaginally[4] may not only improve the condition of the cervix[2] but also induce labour. Prostaglandin pessaries placed in the posterior vaginal fornix are efficient while at the same time are very simply administered.[5] Prostaglandin E_2 (PGE_2) pessaries were introduced as a method of induction at this hospital in June 1978. We present the results of their use in 502 unselected consecutive patients until the series was completed in January 1979.

Method

The patients were admitted the night before a planned induction for varying obstetric and medical reasons (table I), and in the course of a routine examination the state of the cervix was assessed according to Bishop's pelvic score.[6] The patients were then classified as having either unfavourable (Bishop's score 0-4) or favourable (5-13) induction features. The former received a "ripening" pessary during the evening (between 2000 and 2300). Several of these patients laboured with this alone, and the change in Bishop's score at amniotomy or reassessment for monitoring was noted. Those with unfavourable cervices received a second "inducing" pessary the next morning (between 0700 and 0800) once the Bishop's score had again been assessed. Those patients judged on admission to have favourable features received a single PGE_2 inducing pessary at a similar time.

The pessaries contained 3 mg of PGE_2 (Upjohn, England) in a Witepsol S55 base (Dynamit Nobel AG). This base is a glycerol ester of lauric acid and is a standard pharmaceutical medium for both pessary and suppository medications. These were made by the hospital pharmacist and then stored in a ward refrigerator at 4°C until use.

TABLE I—*Indications for induction of labour*

Indication	Number	%
Post-term	164	31
Hypertensive disorders	170	34
Other medical reasons	8	2
History of infertility	9	2
Poor obstetric history	40	8
Maternal age	19	4
Stabilising induction	5	1
Fetal growth retardation	39	8
Breech presentation	26	5
Trial of uterine scar	9	2
Multiple pregnancies	3	1
Sociogeographic reasons	10	2
Total	502	100

They could very easily be inserted into the posterior fornix as part of a routine vaginal examination. Once this had been done the patients remained in bed for 20 minutes and were then encouraged to ambulate under regular nursing observation until labour established. Any at-risk fetuses were monitored with external cardiotocography from the time of pessary introduction until full internal monitoring could start at amniotomy. Otherwise amniotomy and internal monitoring were instituted when established labour was diagnosed by either regular painful contractions requiring analgesia or cervical dilatation beyond 2 cm. The Bishop's score at this time was noted. If the patient had not established in labour four to six hours after induction she was then reassessed and either amniotomy was performed or syntocinon started, or both. Alternatively a further PGE_2 pessary was inserted, depending on the obstetrician's judgment.

Regional epidural analgesia was available for both medical and obstetric indications as well as on request by the patient. Continuous active management was observed during labour, and was recorded on the standard labour ward partograph. A record was kept if syntocinon was needed to augment labour, a decision taken by the obstetrician attending the patient. The ripening pessary (P_1)-delivery interval, the inducing pessary (P_2)-delivery interval, and the length of labour were noted.

The type of delivery and Apgar score of the baby were recorded, as was the maternal temperature during labour.

Results

Altogether 502 cases are presented (tables II and III). These were consecutive and unselected patients with an expected distribution between primigravidae and multigravidae with both unfavourable and favourable cervical features.

Of the unfavourable group 43% of the primigravidae and 52% of the multigravidae laboured after the first ripening pessary (P_1) alone.

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TABLE II—*Details of the 502 patients studied*

	Favourable features		Unfavourable features	
	Primigravidae n = 156	Multigravidae n = 196	Primigravidae n = 110	Multigravidae n = 40
Age (years ± SD)	25·7 (±7·5)	28·1 (±9·6)	27·7 (±5·3)	27·3 (10·3)
Gestation (weeks ± SD)	39·6 (±1·2)	40·1 (±1·25)	39·0 (±0·6)	39·7 (±1·6)
Epidural	125 (80%)	114 (58%)	98 (89%)	28 (69%)
Syntocinon	58 (37%)	20 (10%)	44 (40%)	16 (41%)
Cervical dilatation at acceleration ± SD	4·6 (±2·5)	4·3 (±2·4)	2·3 (±1·2)	3·3 (±2·9)
Labour after P_1			47 (43%)	21 (52%)
Length of labour (hours ± SD)	9·2 (±4·4) n = 145	5·4 (±3·0) n = 190	10·6 (±5·1) n = 89	6·8 (±4·0) n = 33
P_1—Delivery interval (hr ± SD)	12·5 (±5·4) n = 145	7·2 (±41) n = 190	19·8 (±8·4) n = 89	14·7 (±7·7) n = 33
P_2—Delivery interval (hr ± SD)			16·0 (±5·2) n = 42	10·0 (±6·7) n = 12

The remainder of this group required a second inducing pessary (P_2). As can be seen syntocinon augmentation was required in 40% of these patients with unfavourable features. Of those with favourable features 37% of the primigravidae and only 10% of the multigravidae required syntocinon.

The length of labour and induction delivery intervals are as would be expected with an active management of labour policy and compare favourably with other methods. The modes of delivery are shown in table III.

Twenty-six breech inductions are included and three multiple pregnancies. All the breeches laboured with no need for syntocinon acceleration, and reached the second stage when delivery was effected either vaginally (21 cases) or by caesarean section (five) for lack of descent and progress.

Nine patients were induced having had a previous caesarean section. All delivered vaginally and one required syntocinon augmentation. The scars were all judged to be intact on pelvic examination after delivery.

Out of a total of 502 cases, there were eight failed inductions (1·6%) (table IV). Of these, six were primigravidae and two multigravidae with unfavourable cervices. Thus of 150 unfavourable cases, 5·3% failed to be induced: six of the 110 unfavourable primigravidae (5·5%) failed to be induced. Five of the eight, however, subsequently laboured six to 16 hours later, a decision having been taken four hours after P_2 to leave them overnight. Four of these five patients delivered normally and the other with the aid of forceps. The average length of labour in these cases was 8·4 hours.

The caesarean section incidence therefore for failed induction was three cases out of 150 who initially had an unfavourable cervix (2%). Of the total 502 cases, 0·6% required a caesarean section for failed induction, and 48 patients (9·6%) for various obstetric indications (table V).

TABLE III—*Mode of delivery of 502 patients*

	Favourable features		Unfavourable features	
	Primigravidae n = 156	Multigravidae n = 196	Primigravidae n = 110	Multigravidae n = 40
Normal delivery	50 (32%)	147 (75%)	36 (33%)	21 (52·5%)
Forceps delivery	89 (57%)	31 (16%)	47 (43%)	10 (25%)
Breech	6 (3·8%)	10 (5%)	4 (3%)	1 (2·5%)
Multiple delivery		3* (1%)		
Caesarean section	11 (7%)	6 (3%)	23 (21%)	8 (20%)
Apgar scores ± SD				
1 min	8·0 (±2·0)	8·9 (±2·5)	7·3 (±2·7)	7·6 (±2·3)
5 min	9·0 (±2·6)	9·7 (±0·5)	9·5 (±1·6)	9·5 (±1·0)

*Two sets of twins and one set of triplets: all delivered spontaneously.

TABLE IV—*Outcome of "failed induction" after two pessaries*

	Unfavourable cervices		
	Primigravidae	Multigravidae	Total
Number	110	40	150
Failed induction	6	2	8
Vaginal delivery later	3	2	5
Caesarean section	3	0	3
Caesarean rate	2·8%	0	2%

TABLE V—*Delivery by caesarean section*

Indications	Number
Failed induction	3
Failed trial of forceps	3
Breech: 2nd stage	5
Fetal distress	18
Abruptio placentae	1
Secondary arrest of labour (beyond 6 cm cervical dilation)	18
Total	48

Complications

There was only one episode of sustained hypertonus: a grand-multigravida with seven previous vaginal deliveries. The cervix was already 4 cm dilated and after insertion of a PGE_2 pessary she laboured vigorously, contracting every minute. The pessary was removed and external cardiotocography begun. Intravenous salbutamol, 250 μg, abolished the hypertonus, and she delivered spontaneously 90 minutes later a healthy infant with an Apgar score of 9 at one minute. Forewater amniotomy has since been performed on such patients.

There were no episodes of fetal distress and no intrapartum or neonatal deaths associated with this method of induction. The condition of the fetus at birth as judged by the Apgar scores was satisfactory (table II).

Discussion

The purpose of this paper is to highlight a new and simple method of induction that may be suitable for most obstetric units. We do not intend to discuss the management of individual obstetric problems; the overall induction rate of 22% at Queen Charlotte's during this trial is probably a reasonable reflection of the present incidence throughout Britain as a whole rather than in selected individual units.

There can be little doubt that local prostaglandins play an important part in softening and ripening the cervix to render it more favourable for induction, presumably by a beneficial effect on the collagen and ground substance making up its structure. Further to this they may also efficiently induce labour itself, suggesting a physiological role in this process. Recently circulating oestradiol has been implicated as a mediator for this action of prostaglandins.[7] Nowadays we as obstetricians have to temper the happy medium between intensive monitoring and active management on the one hand and non-intervention, perhaps associated with a desire for natural ehildbirth, on the other. Induction by the non-invasive technique described appears to be highly acceptable to the patients, allowing them to progress into a more natural form of labour without all the stigma of a more formal amniotomy and intravenous drip, which is feared by many mothers. It is simple and efficient for the obstetrician and midwife, entailing merely the introduction of a pessary into the posterior fornix on routine examination.

The value of this method of induction is that it may be applied to all cases, except perhaps those in which simple amniotomy would result in a short labour, such as grand multigravidae or cases in which the cervix is already well dilated. This series of 502 cases encompasses all cases for induction—high risk cases as well as low risk cases and includes trials of scar, trials of breech delivery, and multiple pregnancies. Although it must not be forgotten that this is a method of induction, we have found it unnecessary to monitor continuously all patients with cardiotocography after insertion of a ripening or even inducing pessary. Most patients being induced have had an antenatal cardiotocograph performed shortly before induction, and high risk cases may have intensive intrapartum monitoring instituted at any stage at the discretion of the obstetrician. We now insert the PGE_2 pessaries in high risk cases on the labour ward, where full monitoring may be performed; the other lower risk patients have their pessaries inserted on the antenatal wards. Routine nursing observations are carried out while the patient sleeps if a ripening pessary has been used or in between periods of being ambulant if an inducing pessary has been inserted. This must benefit both the mother and the fetus. As soon as labour ensues, or the need for closer observation or analgesia arises, the patient may transfer to the labour ward.

The question of convulsions occurring in patients given prostaglandins has been raised in the past,[8] but such complications have not been confirmed by further studies.[9 10] We also have not experienced this problem, and we do not exclude epileptics from this method.

The point of great interest is that the incidence of caesarean section in those primigravidae with unfavourable features has been about 42%[1] up to now. This has fallen to 21%, but these figures include all indications for caesarean section. Although this "failure to achieve a vaginal delivery" rate has halved, the true "failed induction" rate resulting in a caesarean section is only 2%, and this must be attributed to the local effect of the prostaglandins.

The other indications for caesarean section are as would be expected from any group selected for induction, and the fact that only 3·6% of the total 502 patients induced required such delivery for fetal distress, shows how safe a procedure this is. Of the 18 cases requiring caesarean section for fetal distress, all had been successfully induced and were actively labouring but with no evidence of uterine hypertonus: that 12 of these cases reached a cervical dilatation and were actively labouring indicates that the induction itself must have been successful. Except for the three failed inductions, failure to achieve a vaginal delivery is irrelevant from the induction point of view or its method: their obstetric problem was independent of this and required appropriate management as indicated.

Induction with a pessary does not commit one to delivery within a set time as do the more traditional methods. With very unfavourable features and a poor response to the PGE_2, providing there is no contraindication obstetrically, the patient may be left after the second pessary if, for example, there is no change after a further four hours. This was done with the eight cases who failed to labour after the second pessary, and five of them subsequently laboured overnight.

This review confirms that induction by local PGE_2 reduces the need for intravenous oxytocin.[4] Only 40% of unfavourable cases and 22% of the favourable cases required syntocinon augmentation.

This method of induction would appear to give a rapid and sustained release of prostaglandin resulting in an acceptable duration of labour. This is without the need for further increments of local prostaglandin, which is the case when PGE_2 tablets in varying doses are given.[11] We concluded that a wax-based pessary containing PGE_2 in a stable form would be the best vehicle for the even release of PGE_2, and the necessity for this to be produced has been emphasised.[12]

We concluded that the pessary described provides just such a medium for PGE_2 resulting in an extremely useful addition to the available methods of induction of labour. This particular method is highly efficient and acceptable for all cases in which simple amniotomy will not suffice.

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What are the possible long-term sequelae of mumps encephalitis in a middle-aged woman? The patient in question suffers from headaches, insomnia, and intermittent attacks of inco-ordination, dysarthria, and dysphasia.

Nearly half of all patients who experience mumps have an increased number of cells, usually lymphocytes, in the cerebrospinal fluid, though symptoms of meningitis, stiff neck, headache, and drowsiness are less common. The very fact that this happens in the cerebrospinal fluid shows that the virus often gets to the brain. The difference between meningitis and encephalitis just represents a difference in describing a severity of central nervous system infection. The virus is present in the cells in both cases and is almost certainly present in normal cases of mumps in which there are no central nervous system signs. Any viral encephalitis can have both psychological and neurological sequelae. Clearly this patient's symptoms need a full neurological investigation. She may be getting intermittent raised intracranial pressure which could be accounting for some of this symptomatology or indeed they may have an epileptic or migrainous background. It is odd, however, that they tend to come on at weekends and are associated with mild infection. This would suggest the possibility of a psychogenic factor as well. Furthermore, she may be menopausal and after any severe encephalitic illness depression is a major factor and the menopause may worsen this. As she is not sleeping well it might be worth trying tricyclic antidepressants at night, particularly amitriptyline, in a dose that gives her a good night's sleep, remembering it may take 10 to 14 days before any benefit is felt. Nevertheless, I would emphasise again this sort of case at this age needs a full neurological investigation with EEG, *x*-ray films of the skull, possibly a CT scan, and even a lumbar puncture.

A woman developed carpal tunnel syndrome during one pregnancy. Will the trouble recur in a future pregnancy?

Carpel tunnel syndrome in pregnancy may be related to water retention, with swelling in relation to the flexor retinaculum or the transverse carpel ligaments and should respond to local infiltration with either steroids or diuretics. If it does not, then release by open surgery is indicated as for the usual type of carpel tunnel syndrome.