Oral Prostaglandin E_2 and Amniotomy for Induction of Labour

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Summary
THIS IS a preliminary communication of an ongoing study of the efficacy, safety and acceptability of oral prostaglandin E2 in association with amniotomy for the induction of labour. Out of the initial series of 43 cases, vaginal delivery was achieved in 38 on prostaglandin E2 alone, 2 with the addition of oxytocin infusion. Three Caesarean sections were performed, one for borderline disporportion and two for foetal distress. The mean induction delivery interval was 11 hours for primigravidae and 6 hours 9 minutes for multigravidae. There were no untoward maternal or foetal side effects.

Introduction

The name prostaglandin was coined by von Euler in 1935 for the active principle in seminal and prostate extracts. Consequent on successful laboratory biosynthesis (Bergstrom 1964), elucidation of precise chemical structure (Bergstrom 1967), and commercially applicable chemical synthesis (Corey 1971) it has achieved the "wonder drug" status of the early 1970's comparable to penicillin in the 1940's and steroids in the 1960's.

An ideal agent for the ending of the pregnant state – universally effective, safe, acceptable, possessing no side effects and requiring minimal monitoring – is yet to be found. It is therefore not surprising that when the biological significance of prostaglandins in human reproductive physiology was recognised, the substance was tried extensively in all trimesters and by very varied routes of administration. (Karim et al 1969, 1970, 1971) Embrey (1970) Beazley et al (1970) Ratnam (1973). The possibility that oral prostaglandins may be such an agent for induction of labour has been the objective of this investigation.

Patients and Method

The patients, randomly selected, were normal healthy females with no maternal or obstetric complications. All of them had regular menstrual pattern and were sure of their last menstrual period. Their inclusion in this study was based either on their post-dated pregnancy or treated mild pre eclampsia near term. On admission after the usual labour-room preparation they were subjected to a vaginal examination where cephalopelvic disproportion was excluded. A pelvic scoring was noted (Appendix A) as an index of inductivity rating following which the forewaters were ruptured artificially. One miligram prostaglandin E2 (PGE2) in the form of 0.5 mg. capsules was given orally immediately.

Appendix A
Method of Pelvic Scoring

Qualities/Score:	*0*	*1*	*2*
Cervical effacement	Tubular 2 cm long	1-2 cm	Less than 1 cm
Dilatation of the cervical os	Closed	1 cm	2 cm
Consistency of the cervix	Firm	Soft, not stretchable	Soft and stretchable
Direction of the cervical os	Sacral	Axial	Anterior
Station of presenting part in relation to the ischial spines.	Above – 2 cm	– 2 cm to – 1 cm	– 1 cm to zero

One hour later, depending on the frequency and strength of the uterine contractions, this dose was either repeated or doubled to 2 mg, which

was the maximum single dose. Thereafter at hourly intervals 1 mg PGE2 was repeated until labour was established. Once labour was established (contractions of about 40 seconds duration recurring once in 2 to 3 minutes) PGE2 administration was discontinued and labour was expected to progress normally. If the contractions subsided or diminished in intensity or frequency, an additional maximum single dose was given at hourly intervals. The foetal heart rate and rhythm and uterine contractions were monitored clinically by the nursing staff and recorded intermittently at half-hourly intervals until delivery. Maternal blood pressure, pulse and respiration were recorded as in a normal labour but the nursing staff were briefed to watch out for usual signs of toxicity such as nausea, vomiting, diarrhoea, tachycardia, headache and blurring of vision. Labour was reviewed frequently by one of us or the patient's consultant not less than every 6 hours by vaginal examination. If at the end of 12 hours, labour has not been established, i.e. good effective uterine contractions with progressive effacement and dilatation of cervix to 6 cm. or more, treatment was discontinued and case considered a failure. If foetal distress or uterine hypertonus occurred, treatment was stopped and effective measures taken to deliver the foetus.

The biological monitoring of every patient after PGE2 administration was carried out by performing the following investigations: (a) full blood picture including haemoglobin, erythrocytes sedimentation rate, total and differential leucocyte count, blood indices & platelet count; (b) enzyme studies serum glutamic oxalo-acetic and glutamic pyruvic transaminases, (c) full liver function tests; (d) full urinalysis and blood urea; (e) random blood sugar.

Results

Vaginal delivery was achieved in 38 out of the 43 patients included in this report. Of the 5 failures two had spontaneous vaginal delivery within two hours of commencement of an oxytocin infusion – two units in 500 ml. dextrose at 20 drops per minute. The remaining three were delivered abdominally, one for borderline disproportion and two for foetal distress. (Table I).

Induction – Established labour interval

The average induction – established labour interval was 4 hours. Two-thirds of patients were in labour by the third hour and more than ninety per cent by the sixth hour of commencement of induction (Table II).

Induction – Delivery Interval

In this series the average induction – delivery interval was 11 hours for primigravidae and 6 hours 9 minutes for multigravidae. As expected a corelation exists between the pelvic score and the induction delivery interval i.e. the higher the score the shorter

Table I
Details of *5* Induction Failures

Reg. No.	Age	Gravida	Body Weight (lbs.)	Pelvic Score	Induction Labour Interval (hrs.)	Total PGE2 given (mg.)	Remarks
8172575	32	3	230	4	6	11	SVD after 2 Units oxytocin infusion within 2 hours. Baby weighed 8 lbs. 3 ozs.
0889474	24	1	141	3	5½	11	SVD after 2 Units oxytocin infusion for 5 hrs. 10 mins. Baby weighed 8 lbs. 6 ozs.
1813685	24	1	125	3	4½	8	LSCS for foetal distress. Baby weighed 6 lbs. 3 ozs. Failed oxytocin induction 4 days before PGE2.
7537118	21	1	116	6	4½	6	LSCS for borderline disproportion. Baby weighed 6 lbs. 4 oxs. Height of patient – 4ft. 8 ins.
156236	32	2	151	4	4½	7	LSCS for foetal distress. Baby weighed 7 lbs. 2 ozs. Involuntary secondary infertility for 7 yrs.

Table II. Induction – Established Labour Interval

Duration in hours	No. of patients	Percentage
1 – 3	28	65.1
4 – 6	11	25.5
7 – 9	1	2.4
10 – 12	3	7.0
12 or more	–	–
	43	100

the interval and vice versa (Table III). On the other hand the pelvic score did not reflect the dosage of prostaglandin needed (Table IV). The body weight of the patient presumably was a more important parameter as illustrated by one of the 5 failures. (Case Registered No. 8172575) A gravida 3 para 2 with a pelvic score of 4 had an induction – established labour interval of 6 hours. She did not deliver after 11 mg. of PGE2 following which the uterine contractions subsided. Twenty four hours after commencement of PGE2 a two-unit oxytocin infusion was instituted and she delivered normally within two hours. She, however, weighed 230 pounds (104.5 kg.).

Table III
Corelation between Pelvic Score & Induction – Delivery Interval

Pelvic Score	No. of patients	Average induction – delivery interval
4	13	10 hrs. 31 mins.
5	17	6 hrs. 46 mins.
6	10	7 hrs. 30 mins.
7	2	4 hrs. 15 mins.
8	1	3 hrs.
	43	

Table IV
Relation of pelvic Score to dosage of PGE2 required

Pelvic Score	No. of patients	Average dosage of PGE2 reqd.
4	13	5.3 mg.
5	17	4.9 mg.
6	10	3.4 mg.
7	2	5.0 mg.
8	1	5.0 mg.
	43	

Obstetric Complications

One patient had post-partum haemorrhage requiring transfusion of one unit of blood. She however gave a history of post-partum haemorrhage requiring 3 units of blood in the previous pregnancy. Another patient had a retained placenta without post-partum haemorrhage. She too gave a history of a similar complication previously.

Side Effects

There was no report of uterine hypertonus though admittedly the monitoring was only clinical. Similarly there was no significant effect on the foetal heart rate or rhythm. Of the two failed induction which resulted in Caesarean section for foetal distress one was 18 days past due date and the other had two loops of cord round the baby's neck at operation.

After delivery the foetal well being was assessed by Apgar score at one and ten minutes, and the figure ranged from 8 to 10. One baby had severe jaundice requiring exchange transfusion but it is doubtful if this could be attributed to the prostaglandin.

Maternal gastro-intestinal symptoms of vomiting and/or diarrhoea were completely absent in this series. The wide variation in the incidence of these undersirable side-effects: 2 per cent (Karim and Sharma 1971) 9.7 percent (Ratnam 1973) and 36 percent (Craft 1972) with somewhat similar dosage schedule suggests a racial/ethnic susceptibility. The results of all post delivery investigations were within normal limits.

Discussion

The findings of this study corroborate with earlier observations that oral prostaglandins E2 was effective and safe to induce labour. A striking feature of our experience has been the complete absence of side effects leading to very high patient acceptablity bordering enthusiasm. The minimal clinical monitoring required – no more than the usual observations by the nursing staff in a normal labour – is highly relevant in situations where work load is heavy and adequacy of staffing marginal.

We undertook to perform amniotomy at the onset of induction fully appreciating that it would accelerate the progress of labour when used in conjunction with prostaglandins (Craft 1972). It is felt justified, however, as the object of the exercise is to study the feasibility of wider clinical usage of oral PGE2 rather than to evaluate deliverately its effectiveness as a uterine stimulant.

The mode of action of prostaglandins in human parturition remains to be elucidated. Gillispie,

Brummer and Chard (1972) produce evidence of oxytocin release by direct stimulation of the pituitary. Alternatively it could act by an enhancement of the response of the myometrium to oxytocin endogenous or administered. (Brummer 1971) (Gillespie 1972). The ease with which two of the PGE2 failures in this study responded to oxytocin infusion would appear to support the latter view.

Acknowledgements

We wish to thank the Director-General of Health, Malaysia, for permission to publish, Dr. Shamsuddin Abdul Rahman and Dr. B. Mehra for including their patients, doctors and nurses of Hospital Bersalin, Kuala Lumpur for their help, May & Baker Ltd., for making the prostaglandin available and Mrs. S.L. Mah for secretrial assistance.

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