Term labor induction by prostaglandin (PG) E₂ oral administration prior to amniotomy

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Term labor induction was attempted by testing, prior to amniotomy, the uterine reactivity to the oral administration of twice one tablet of 0.5 mg PGE₂ at 1 h interval. In presence of a positive test (i.e., in case of any progress in the Bishop score and/or of occurrence of at least 10 contractions in 1 h), labor induction was thereafter continued by low amniotomy, further oxytocic treatment was given only if required by dyskinetic labor progress.

Out of 70 cases (44% of nulliparous and 56% of multiparous) with a Bishop score at least equal to 3, 59 patients exhibited a positive test and were thus eventually delivered. After amniotomy, 47% of these cases did not require any further drug administration; since the protocol did not allow the administration of total doses of PGE₂ greater than 3.0 or 3.5 mg, 4 patients (7%) required oxytocin. Delivery was achieved in all cases within 12 h of drug administration. Maternal side-effects were very infrequent (6%); no uterine hypertony was recorded in any case and the Apgar scores were equal to or greater than 7 in 92% of the cases.

amniotomy; PGE₂ side-effects; dyskinetic labor; labor induction

Introduction

The efficacy of prostaglandins (PG) for the induction of labor has well established by several investigators (Rosa, Delbovier, Ley and Feronotte, 1972; Caballero, Garcia-Albertos, Correderra, Alonso-Magnan, Guerra and Gandara, 1974; Thiery and Amy, 1975). Such drugs can induce maternal side-effects and, occasionally, fetal distress following excessive uterine stimulation (Barr and Naismith, 1972; Friedman, Sachtleben and Green, 1975; Gabert, Brinton and Brown, 1976). Most authors consider PGE₂ as the most suitable agent for term labor induction by oral administration, with success rates ranging from 80 to 100% (Thiery, de Hemptinne, Vanderheyden, Yo Le Sian, Derom, Van Kets and Martens, 1973; Yip, Ma and Ng, 1973; Caballero et al., 1974; Friedman and Sachtleben, 1974; Thiery, Yo Le Sian, de Hemptinne, Derom, Martens, Van Kets and Amy, 1974; Basu, Edin and Rajan, 1975; Friedman et al., 1975; Gabert et al., 1976; Nelson and Bryans, 1976).

The aim of the present study was to assess the feasibility of oral PGE₂ administration prior to amniotomy for term labor induction.

* Preliminary results were presented at the International Conference on Prostaglandins held in Florence (May 26–30, 1975) by De Witte, Winnepenninckx and L’Hermite (1976).
Materials and methods

Selection criteria. Normal patients (17–41 yr old) with a vertex presentation, and a Bishop score (Bishop, 1964) of at least 3, were selected for the present study at a gestational age ranging from 38 to 43 wk, provided pregnancy had been normal.

Experimental protocol. The protocol used is schematically represented in Fig. 1. Upon admission, recording by external monitoring of the presence of any uterine contraction and of the fetal heart rate (FHR) was performed during 1 h in order to exclude spontaneous labor and/or previous fetal distress.

A tablet of 0.5 mg PGE_2 (Upjohn; Puurs, Belgium) was given twice orally at a 1 h interval. In case of any progress in the Bishop score and/or in case of occurrence of ‘adequate’ contractions (arbitrarily defined as contractions occurring as least as frequently as 10 times in 1 h) 2 h after starting PGE_2 administration, the test was considered to be positive, low amniotomy was immediately performed and internal monitoring installed.

Labor progress was followed according to the normal partogram previously established by Rodesch, Ehman-Ellinger, Wilkin and Hubinont (1965). No more PGE_2 had to be administered after amniotomy unless dyskinesia occurred. Figure 1 summarizes the rate of vaginal examinations and of PGE_2 administration to be followed in that case: it can also be seen from the figure that the maximal doses of PGE_2 allowed to be administered were 3.0 or 3.5 mg; in the case of persistent dyskinesia, oxytocin had to be used.

Patients. 70 patients entered the study: 31 (44%) nulliparous and 39 (56%) multiparous (Table I). Bishop scores were equal to or greater than 6 in 47 cases (67%).

Results

As depicted in Table I, 6 nulliparae and 5 multiparae only (i.e. a total of 16%) exhibited a negative inducibility test: as planned in the protocol, labor induction of these women was postponed. The negativity of this test could not be related to the Bishop score, since only 3 of these 11 cases had a score lower than 6 (Table II).

The criteria used to continue labor induction by amniotomy were the occurrence of ‘adequate’ contractions (without progress in the Bishop score) in 38 cases and some progress in the Bishop score in 21 cases.

The total PGE_2 doses required in these 59 cases are outlined in Tables I and II with respect to parity and Bishop score. 47% of these cases did not require any additional PGE_2 administration after low amniotomy; there was no clear-cut relation of this lack of additional PGE_2 requirement to parity (52% of the nulliparous and 44% of the multiparous patients) or to Bishop score (40% with a score lower than 6 and 51% with a score greater than 5) (Tables I and II). Only 4

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Table I

| Doses of PGE_2 used with respect to parity and to the result of the inducibility test | Total | Number of patients |
|---|---|---|---|
| dose (mg) | Primiparous | Multiparous | Total |
| 1.0 | 13 (+6 a) | 15 (+5 a) | 28 (+11 a) |
| 2.0 | 9 | 11 | 20 |
| 3.0 | 3 b) | 7 c) | 10 |
| 3.5 | 0 | 1 | 1 |
| Total | 25 (+6 a) | 34 (+5 a) | 59 (+11 a) |

a) Inducibility test considered to be negative.
b) These 3 cases required oxytocin administration.
c) One of these cases required oxytocin administration.

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Fig. 1. Schematic representation of the experimental protocol used for the inducibility test with 2 x 0.5 mg oral PGE_2 before amniotomy and for subsequent labor management.
Table II
Total doses of PGE₂ used with respect to Bishop score and result of the inducibility test

<table>
<thead>
<tr>
<th>Dose (mg)</th>
<th>Number of patients</th>
<th>Bishop score (/13)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3&lt;</td>
<td>6&lt;</td>
</tr>
<tr>
<td>1.0</td>
<td>8</td>
<td>(+3 a)</td>
<td>20</td>
</tr>
<tr>
<td>2.0</td>
<td>6</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>5 b)</td>
<td>5 c)</td>
<td></td>
</tr>
<tr>
<td>3.5</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>20 (34%)(+3 a)</td>
<td>39 (66%)(+8 a)</td>
<td>59 (+11 a)</td>
</tr>
</tbody>
</table>

a) Cases with negative inducibility test.
b) Of these 5 cases, 3 required oxytocin administration.
c) One of these cases required oxytocin administration.
Numbers in brackets refer to the cases with a negative test, and were not utilized for calculation of the percentages.

Table III
Mean labor durations (L.D.) and induction—delivery (D.I.) vs. parity and Bishop scores.

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Nulliparous</td>
<td>8 h 14 min</td>
<td>8 h 42 min</td>
<td>6 h 17 min</td>
<td>7 h 35 min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiparous</td>
<td>6 h 13 min</td>
<td>7 h 34 min</td>
<td>6 h 9 min</td>
<td>6 h 50 min</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Patients for whom oxytocin administration had been required were excluded.

Fifty (85%) patients delivered spontaneously, while 9 (15%) were subjected to vacuum extraction: 4 for delayed expulsion, 1 for persistent occipito-posterior position, 3 for fetal distress during expulsion and 1 for fetal distress towards the end of cervical dilatation (8 cm). In the latter case, the FHR record showed variable decelerations which prompted us to do manual dilatation followed by vacuum extraction: at delivery, occurring 40 min after onset of these decelerations, there was a tight loop of umbilical cord around the neck, and the Apgar score was 9 at 1 min. Two other alterations of the FHR were noticed. In one case with some variable decelerations and a fetal pH at 7.29, the FHR alterations disappeared spontaneously; the Apgar score was 9 and there was no obvious reason for these FHR decelerations. Another case exhibited 3 late decelerations 2.5 h after the beginning of the test, the fetal pH was 7.28, and no further significant decelerations were observed during the first stage. The FHR decreased to 60 per min during the first 5 min of the expulsion which lasted 25 min. The Apgar score was 4 at 1 min and 8 at 5 min.

In 54 (92%) out of the 59 cases eventually induced, the Apgar scores were equal to or greater than 7; in the remaining 5 cases, the Apgar scores became greater than 7 at 5 min.
Discussion

The purpose of the present study was to ascertain the feasibility of oral administration of PGE₂ prior to amniotomy as an inducibility test. Indeed, all patients having exhibited such a 'positive' test were eventually delivered within 12 h without major trouble. It should be pointed out that, after low amniotomy, 47% of the patients failed to require any additional oxytocic treatment: it confirms the efficacy of low amniotomy as a method for term labor induction (Turnbull and Anderson, 1967; Ley, Rosa, Delbovier and Frerotte, 1972). A 'priming' effect of PGE₂ (Friedman and Sachtleben, 1975), potentiating that of amniotomy, cannot however be excluded. Our data partially demonstrate the validity of the guidelines proposed by Visscher, Struyk and Visscher (1977) for elective induction of labor with oral PGE₂, that amniotomy should be done after regular uterine contractions have been established, and that PGE₂ should be stopped once active labor has been established.

Our protocol implied the use of rather small PGE₂ doses in comparison with most other investigations. The low incidence (only 6% of moderate gastrointestinal discomfort) of maternal side-effects can be attributed to these low total PGE₂ doses used (Thiery and Amy, 1975). Similarly, no uterine hypotony was recorded in any case and the 4 cases of true fetal distress observed might be related to causes other than PGE₂ itself: expulsion in 3 cases and a tight nuchal umbilical cord in the last case.

Four patients (7%) required oxytocin administration after a total dose of 3.0 mg PGE₂ had already been administered. It should be emphasized that 3 of these patients were nulliparous with Bishop scores of respectively 5, 5 and 8; the multiparous patient had a Bishop score of 5. The correlation between the Bishop pelvic score and the duration of induced labor has again been recently assessed by Harrison, Flynn and Craft (1977) in a survey of 440 patients. It should also be recalled that Visscher et al. (1977) recommended that elective labor induction with oral PGE₂ should primarily be done on multiparous patients who have a Bishop score of 7 or more. The requirement of oxytocin administration was fixed by the present protocol: it does not, however, mean that these patients could not have been delivered without trouble by increasing the PGE₂ doses used; alter-natively, PGE₂ 'priming' might have potentiated the efficacy of oxytocin later administered (Friedman and Sachtleben, 1975).

Acknowledgements

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References

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