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equilibrium of cervical blood, good but with wide individual variations, for the clearance of ^{133}Xenon and for ultrasonic tomoechography and manifestly less sactisfactory for thermography of the hypogastric-perineal cutaneous area.

SUMMARY

Four new diagnostic methods have been employed to diagnose the syndrome of pelvic congestion: the acid- base equilibrium of the non arterialized capillary blood of the uterine cervix; the cervico-uterine clearance of ^{133}Xenon; ultrasonic tomoechography with a vaginal probe, and thermography of the hypogastric-perineal cutaneous area. The diagnostic accuracy is maximal for the first method, good for tomoechography and the clearance of ^{133}Xenon but diminishes for thermography.

These methods could be useful for overcoming the difficulties wich arise in establishing the diagnosis of the pelvic congestion syndrome.

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Prostaglandin E_2 in the induction of labour

by

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Our previous experience with prostaglandin $F_2\alpha$ given intravenously ([1]) demonstrated the usefulness of this drug in inducing labour also in cases which were resistant to oxytocin. The availability of a certain amount of prostaglandin E_2, which can be more conveniently administered orally, has allowed us to evaluate its clinical use in a selected number of patients.

MATERIAL AND METHODS

26 Patients were studies, of which 16 were primigravidae, and all showed the following features: regular course of pregnancy, blood chemistry examinations and arterial pressure within normal limits, no signs of placental insufficiency, normal urinary oestriol, gestational time known with certainty and not less than 37 complete weeks, one foetus in the cephalic non-deflexed presentation, absence of disproportion between foetus and pelvis, intact membranes and Bishop pelvic score ([2]) not above 4. For the multigravidae: a negative case history for obstetrical surgery, foetal malformations, perinatal mortality or hysterotomy. This selection, all patients *had definitely not started labour*, permitted the evaluations of the effectiveness of prostaglandin E_2 without dangers to the mother and

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foetus. Analogous studies has been carried out on a more heterogeneous group of patients which also included patients with a pelvic score of 10. In the present study amniotomy, a factor which can precipitate labour, *was never carried out* in order to assess the effectiveness of the drug more critically. Use of any other pharmacological therapy (analgesics, antispastics, etc.) was avoided. All patients were subjected to cardiotocographic monitoring, first externally and then internally (after spontaneous rupture of the membranes) and to vaginal examinations at regular intervals throughout labour. The dose of prostaglandin E_2 was always 0.5 mg every 30 min. by mouth until dilatation was complete. The induction was considered to be successful when delivery was completed within 12 hours, by vaginal route without any other therapy. When this did not happen, in order to avoid excessive prolongation of labour, oxytocin was given intravenously at a dose of 10 m-units per minute. In multigravidae the use of oxytocin was never necessary.

RESULTS

The induction of labour was successful in 16 out of 26 cases; in 8 out of 10 of the multigravidae and in 8 out of 16 of the primigravidae. The different findings regarding the state of parity are analyzed separately.

The multigravidae near to term (gestation time of 39 weeks), completely out of labour (pelvic score of 2.8) and with intact membranes, in 8 cases out of 10 a vaginal delivery was obtained in an average time of 5 hr 22 min. with an average dose of 2.68 mg. The two unsuccessful cases were patients 32 and 41 years old respectively, with pelvic score of 2; the oral prostaglandin was sus pended in both cases after reaching a considerable total dose (13 and 24 mg) because of the seriousness of the side effects in one case, who gave birth spontaneously the next day, and for insufficient uterine activity, in the other, where a Caesarean section was performed because of persistent foetal bradycardia.

In the 16 primigravidae near to term (41 weeks) definitely not in labour (pelvic score not above 4), the response to induction with prostaglandin E_1 was variable: half of the patients delivered spontaneously by vaginal route with an average dose of 4.18 mg in 8 hr 25 min. The other half who had analogous characteristics at the start, even with an average dose more than double (9.93 mg), had not delivered 12 hours after commencement of the induction. On the basis of our previous experience with prostaglandin $F_{2\alpha}$, in order to avoid useless prolongation of labour which can lead to well known complications, oxytocin was subsequently administered to these patients. 6 of these 8 patients delivered by vaginal route in an average total time of 28 hours; the other two had to undergo Caesarean section because of uterine hypertonus and slow progression of dilatation, respectively. If, in considering the success of the induction one adopts a less restrictive criterion, on could say that, whether or not subsequent oxytocin therapy was used 9 out of 10 of the multigravidae and 14 out of 16 of the primigravidae (90 and 87.5%) delivered without obstetrical surgery.

It is known that prostaglandins don't act only on the uterus but, as the first messenger, they modify the response of all the cells regulating the formation of the second messenger. Therapy with prostaglandins could therefore produce numerous side effects ([3]). Prostaglandins E_2 at doses of 0.5 mg every 30 minutes does not produce alterations in the cardiovascular system. Arterial pressure was only temporarily raised in two cases. In seven patients dyspnoea occurred; in

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Table 1. *10 Multigravidae treated with oral prostaglandin E_2.*

	Gestation time weeks	Pelvic score	Average total dose mg	Induction time hours-min.
Successful* (8 cases)	39 (37-41)	2.8 (2-4)	2.68 (1-4.5)	5 hr-22 min (2-10 hr)
Unsuccessful* (2 cases) (1 C.S.)**			18.5 (13-24)	

Table 2. *16 Primigravidae treated with oral prostaglandin E_2.*

	Gestation time weeks	Pelvic score	Average total dose mg	Induction time hours-min.
Successful* (8 cases)	41 (40-42)	2.25 (0-4)	4.18 (1.5-6.5)	8 hr-25 min (4-12 hr)
Unsuccessful* (8 cases) (1C .S.)** and subsequent therapy with oxytocin	41 (40-42)	2.37 (1-3)	9.93 (3-14.5)	28 hr (14-36 hr)

* When delivery by vaginal route was not completed 12 hours after the beginning of the therapy, the induction was not considered successful.
** Caesarean section.

one of these, who already suffered from attacks of asthma, therapy had to be stopped. Prostaglandin E_2 provoked nausea and vomiting in six patients, but profuse diarrhoea which often occours during infusion of prostaglandin $F_{2\alpha}$ was never seen. Body temperature was maintained within normal limits. Keeping the dose constant, even when uterine contractions were weak for some hours, two episodes of appreciable uterine hypertonus, with increased basal tonus occured. One has the impression that vomiting may often act as a protection against overdose. No other side effects on the mother were noted.

For the foetus, cardiotocographic monitoring carried out for the whole lenght of the therapy with prostaglandins showed 3 cases of transitory acceleration of the basal cardiac frequency and 2 cases of persistant bradycardia. The Apgar score was 9.44 on average one minute after birth and always 10, five minutes after birth, similar therefore to other deliveries. All the newborn underwent pediatric examination and no changes which could be attributed to the therapy were noted. The initial selection of the patients definitely reduced the risks for the foetus.

DISCUSSION

It is not possible to compare these results directly with those of other authors because of different criteria for selection of patients, variations in doses and different ways of assessing the effectiveness of induction ([4, 5, 6, 7, 8, 9, 10, 11]). The initial low pelvic score of the patients examined may indicate the requirement for higher doses and longer periods to reach delivery, as well as the relative insensitivity of the uterus to stimulation when compared with other cases at

the same stage of gestation. The low effectiveness of prostaglandin E_2 could in some cases be due to defective absorption on account of gastric disturbances or to the appearance of tachyphylaxis after a few hours of therapy.

The administration of constant low doses (instead of increasing doses), lower than those used by other authors, may have reduced the percentage of successes, with the advantage, however, of a reduction in the side effects. Only 3 patients in 26 were delivered by Caesarean section (11.5%), an incidence equal to the average in our clinic (10.18%) ([12]). Foetal distress does not appear to be more frequent than in labours induced with oxytocin. There is always a certain number of pregnancies which show some resistance to induction and therefore a prolonged labour. In these, following the initial therapy with protaglandin, intravenous administration of oxytocin was used in stimulating uterine activity until the completion of delivery. This had also been observed with prostaglandin $F_{2\alpha}$. The absence of use of early amniotomy had the definite effect of prolonging labour, as did also the absence of use of epidural anaesthesia. Induction by oral prostaglandin E_2 appears to be indicated in cases with very low pelvic score in which therapy with oxytocin is often ineffective. In comparison with $F_2\alpha$, prostaglandin E_2 is better tolerated by mother and foetus and is more widely accepted by patients and paramedical staff: intravenous therapy is restricted to use in bed and requires constant surveillance of the speed of infusion. The results on the ability to induce labour in primigravidae corresponds to the findings reported by Barr ([7]): half of the patients deliver within 12 hours and the others require infusion of oxytocin in order to deliver within 24 hours.

These results seem on the whole to be satisfactory.

SUMMARY

The effectiveness of oral prostaglandin E_2 in inducing labour in 26 patients nearing the end of pregnancy was studied. Prostaglandin induces labour in 90% of the multiparae and in 87.5% of the primiparae; however, in half of the latter cases subsequent infusion of oxytocin was necessary in order to bring delivery to completion. Side effects were: dyspnoea, vomiting and in two cases uterine hypertonus; there was no perinatal illness or death.

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