

of the fetus may be interpreted as an emergency life-saving mechanism preventing fetal exsanguination into the placenta; this is obviously obtained at the costs of altered placental perfusion, but the chances are that fetal movements induced by asphyxia will soon relieve the mechanical compression of the umbilical vein.

The mechanism described may not be the only one preventing fetal blood to be trapped in the placenta; however all existing mechanisms must be very active, as intrauterine fetal death secondary to cord obstruction is very rare as compared to the high number of babies born with the cord around the neck.

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Diagnosis of pelvic congestion in the female

by

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The difficulties encountered in the diagnosis of the pelvic congestion-fibrosis syndrome are well known. It is a female disorder with greatest number of subjectives and the least number of objective symptoms (¹). Among the examinations made in these cases phlebography is most widely used although it does not always provide reliable data. Moreover it is sometimes an unsafe intervention, disproportionate to the disease it is supposed to demonstrate.

We have spught to work out new diagnostic techniques which we describe here:
a) study of the acid-base balance of the capillary blood of the uterine cervix;
b) cervico-uterine clearance of ¹³³Xenon; *c)* ultrasonic visualization of the pelvic vessels; *d)* thermographic study of the hypogastric-perineal area.

MATERIALS AND METHOD

The multifarious nature of the investigation did not always allow us to submit each patient to all four diagnostic thecniques.

The study of the acid-base balance of the capillary blood of the uterine cervix was carried out in 56 patients with gynaecological lesions of varied nature. In 37 of these cases the diagnostic was checked on the operating table. Fourteen cases

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who underwent all the examinations showed no pelvic pathology and served as controls.

This technique is based on the premise that variations in the speed of circulation in the presence of pelvic congestion can impair the oxygen supply and presumably the acid-base equilibrium of the uterine blood, and hence also the blood of the ectocervix. The patient should preferably be in the postmenstrual phase to avoid the changes induced by the ovarian cycle and, in particular, premenstrual congestion.

The patient is placed in the lithotomy position and cervix examined with a speculum, taking care to avoid bleeding. Using a tampon impregnated with physiological saline the cervix is carefully cleansed.

It is then dried and covered with a thin layer of vaseline. The ectocervical surface is then punctured if possible on the anterior lip in an area covered with squamous epithelium, using for this purpose a blood lancet mounted on Pean forceps inserting the tip into the cervica mucosa with one complete rotatory movement. The blood which emerges from the small wound is at once aspirated in a previously heparinized, thin, polythene tube. The next immediate step is to examine the blood taken by the Astrup micromethod to determine the pH, $p\text{CO}_2$ and the metabolic components of the acid-base equilibrium.

The cervico-uterine clearance of $^{133}\text{Xenon}$ was studied in 36 patients with varied gynaecological lesions. Of these only 16 were later submitted to surgery; 12 non-surgical cases showed an uterine retrodisplacement of variable degree; 8 non-surgical patients who on gynaecological examination displayed no obvious pelvic pathology were taken as control cases.

This technique is based on the assumption that visual evaluation of the slowing down of the flow of contrast medium (one of the most significant findings in the phlebographic diagnosis of pelvic varicocoele) may be replaced by proper measurement by injecting into cervix an inert and readily diffusible isotope.

Its rate of disappearance, in absence of recirculation, must depend on the blood flow of the tissue itself.

A vaginal speculum is applied to the patient in the lithotomy position so as to demonstrate the cervix. After cleaning the cervix with a tampon impregnated with physiological saline, 50 microcuries of $^{133}\text{Xenon}$ in aqueous solution is injected through an insulin syringe with a short thin needle.

At suprapubic level the curve of elimination of radio-isotope is recordered with a scintillation counter fitted with a collimator. (Fig. 1).

The ultrasonic visualization of the pelvic vessels was carried out in 35 patients of whom 8 showed no pelvic pathology of note, 10 had various gynaecopathies, 12 at intervention displayed signs of pelvic varicocities and finally, 5 were pregnant.

This technique is based on the assumption that among the radiological signs of pelvic varicosities one of the most important is the dilatation of the veins of the parauterine plexuses. Some of these venous vessels may figure together with the arterial component and ureter in the transverse tomoechogram recorded at the level of the fornices (Fig. 2).

We used an endovaginal ultrasonic probe in which the piezo-electric plate is mounted perpendicular to the end of the probe itself. The technique is as follows: the probe is introduced into the vagina in such a way that its end is in the anterior fornix (Fig. 3); transverse scanning is then carried out by slowly rotating the probe. The ultrasonic beam performs one rotation of 360° and encompasses in the

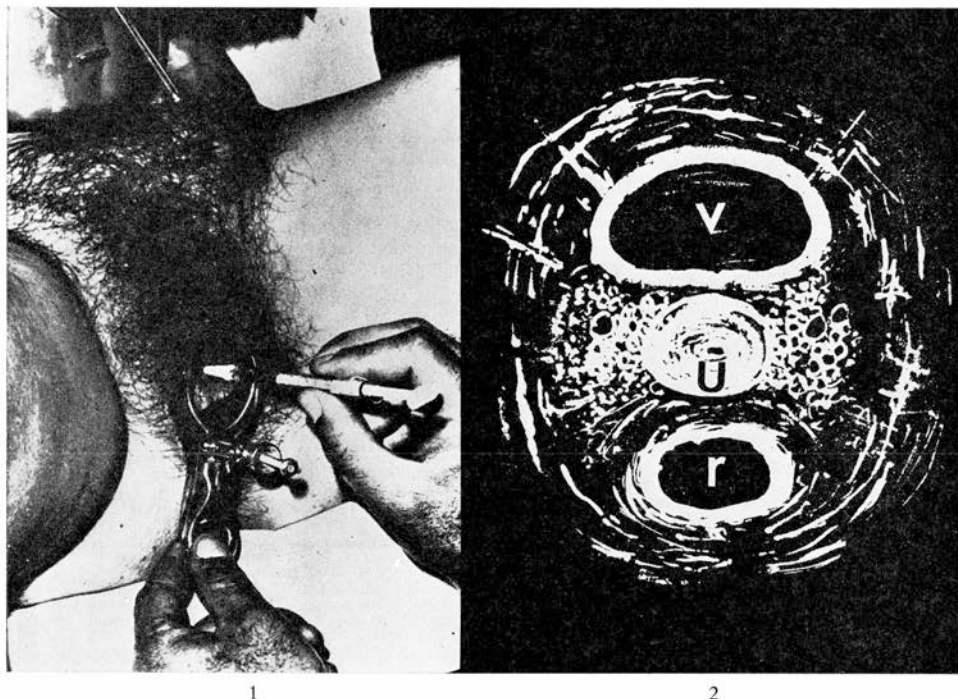


FIG. 1 - Injection into the thickness of the cervix of the isotope. The collimator of the scintillation counter can be seen over the pubes.

FIG. 2 - Schematic view of the pelvic structures which figure in the tomoechogram recorded in the region of the anterior fornix.

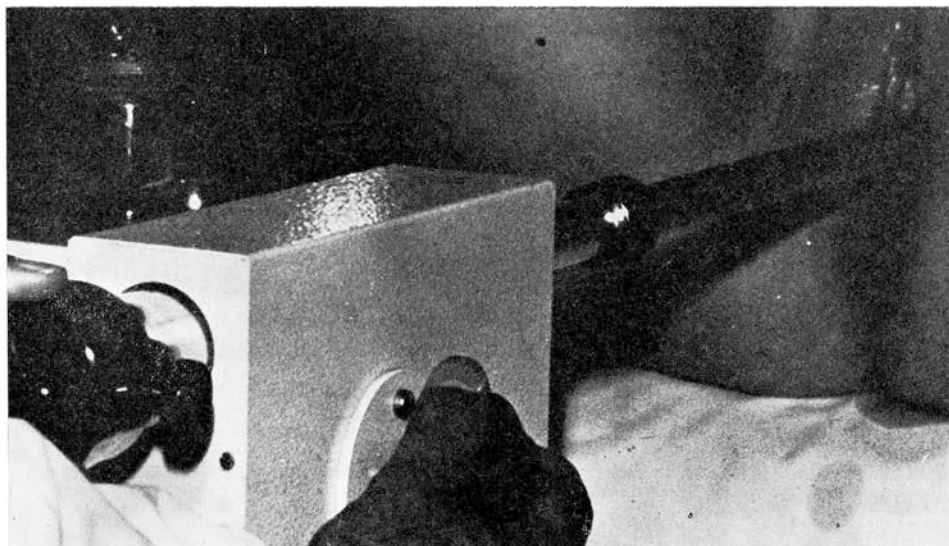


FIG. 3 - The endovaginal ultrasonic probe is introduced into the vagina in such a way that its end is in the anterior fornix.

section all the pelvic structures and viscera existing at the given level. The examination gives the best results when made a full bladder as it constitutes a reference image for investigating parauterine vascular structures. The tomoechographic images observed in the oscilloscope (B-scan) may be photographed. The apparatus for echography used by us is the Kretz Technik 4100.

Termography was employed to examine 26 patients of whom 18 suffered from genital pathological conditions such as might modify circulation.

In the remainder undergoing all the examinations no current gynaecological pathology was in evidence and these cases served as controls.

This technique is based on the assumption that the thermal variations in the tissues and underlying organs are transmitted to skin. Thermographic localization of the placenta offers an example.

The shaved patient after voiding the bladder is placed in the lithotomy position and without clothing for at least 15 min. at a constant temperature of 21°C.

The thermographic recording covers an area ranging from the umbilicus to the vulva. The apparatus used in the Barnes Medical Thermograph.

RESULTS

The diagnostic techniques tested by us in the cases showing no pelvic vascular pathology (cases considered as controls) gave the following results.

The capillary blood of the portio taken without arterialization has a pH intermediate between that of the arterial and venous blood, a concentration of CO₂ which approaches that of the arterial blood and base deficit which indicates light metabolic acidosis (Table I).

Table I. *Acid-base Equilibrium of the capillary blood of the uterine cervix in normal control cases.*

	pH	pCO ₂	BE
Arterial blood	7.38	38.1	— 1
Cervical blood in normal cases	7.36	39.1	— 6.2
Venous blood	7.32	51.0	— 1.5

The clearance of ¹³³Xenon measured in the uterine cervix gives a curve of elimination of the radio-isotope with a mono-exponential course. The radioactivity expressed by such a curve always rapidly falls both on a linear and semi-logarithmic scale (Figg. 4-5).

The ultrasonic tomoechogram brings into relief the uterovaginal venous plexuses together with the ureter and arterial vessels. These plexuses appear in all cases as small cavities, on near the other, of more or less uniform section and situated lateral to the uterus and under the bladder. They form zones of cribiform aspects (Fig. 6).

The cutaneous surface of the hypogastric-perineal area shows uniform irradiation unless recent cicatrices or intestinal loops adhering to the abdominal wall are present (Fig. 7).

The same diagnostic techniques in the cases of pelvic congestion confirms by surgical findings gave the following results.

In conditions of circulatory stasis the oxygen supply to the tissues diminishes

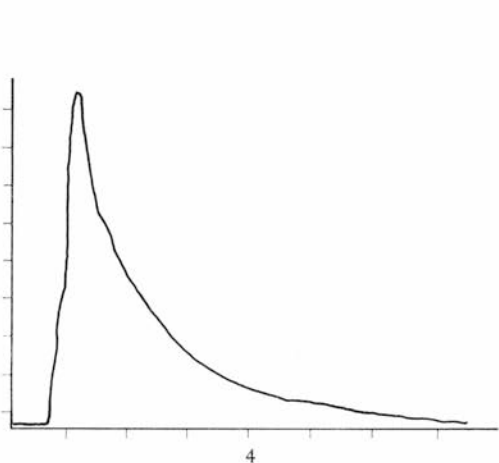


FIG. 4 - Elimination of radioactivity on a linear scale in control patient with normal myometrial blood flow.

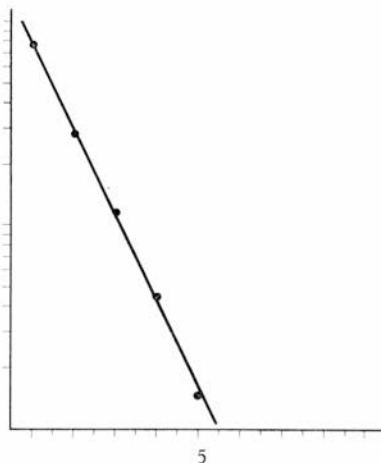


FIG. 5 - Elimination of radioactivity on a semi-logarithmic scale in the same control patient.

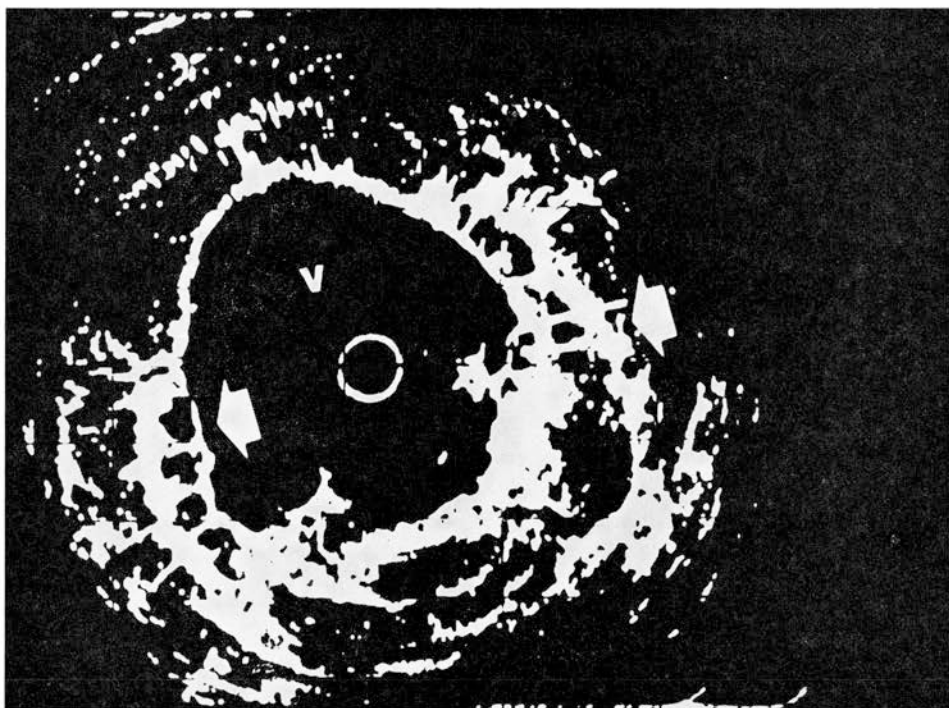


FIG. 6 - Normal tomoechogram showing the full bladder (V); on the both side of the uterus (→) vascular lacunae of normal volume can be seen.

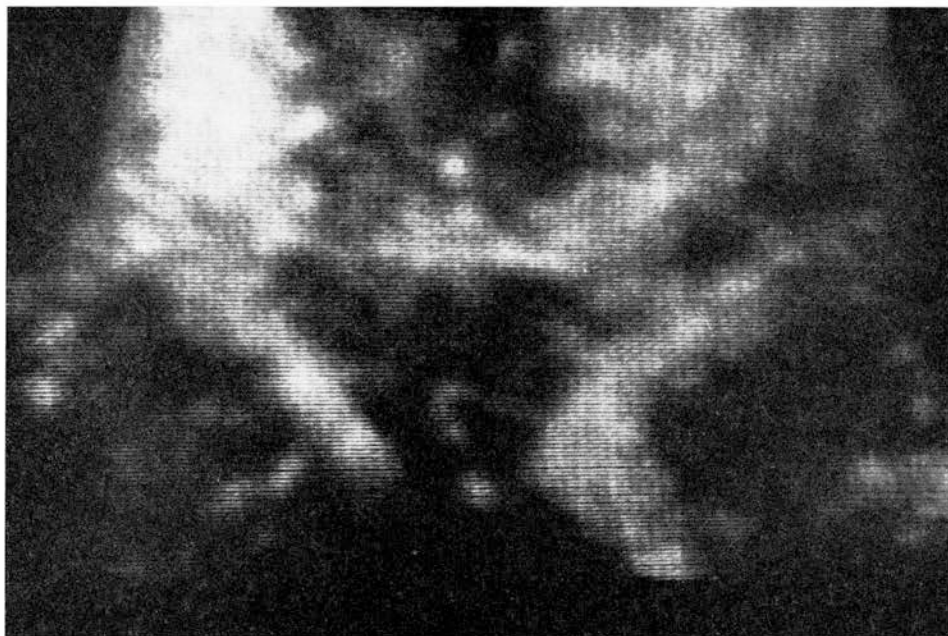


FIG. 7 - Thermogram of the hypogastric-perineal area in a patient with negative gynecological examination.

with accumulation of carbonic dioxide. Consequently tissue metabolism becomes predominantly anaerobic with increased formation of non-volatile acids. Depending on the prevalence and persistence of these factors the situation is marked by acute or chronic, metabolic or mixed acidosis. In fact, in all patients with pelvic congestion, irrespective of its cause, acidosis was found (Table II).

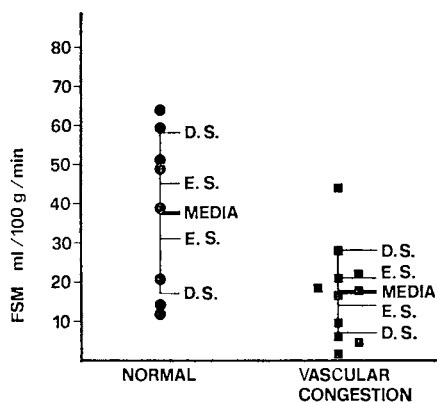
Table II. *Acid-Base equilibrium of the capillary blood of the uterine cervix in cases of pelvic congestion and normal control patients.*

	pH	pCO ₂	BE
Cervical blood in cases of congestion	7.26±0.01	44.5±4.8	-8.2±1.5
Cervical blood in normal cases	7.36±0.02	39.1±1.7	-8.2±0.6

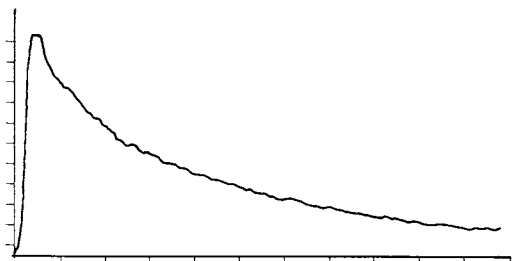
The myometrial blood flow measured by technique of cervico-uterine clearance of ¹³³Xenon in 8 of 12 patients with pelvic congestion was found to be significantly less than that noted in the normal controls (Fig. 8).

In fact, the curve of radio-isotope shows a slow decrease indicating lengthening of the time of its disappearance, varying from case to case (Fig. 9-10).

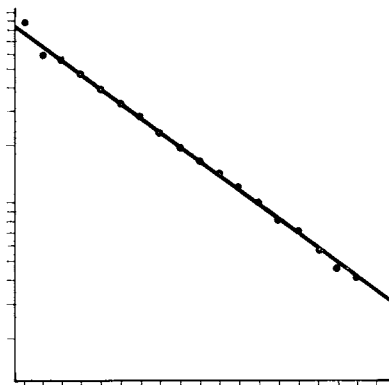
The ultrasonic tomoechogram in the region of the anterior fornix showed in 12 of 17 cases (and in all the pregnant women) a clear increase in the dimension of the lacunal images probably ascribable to the cervico-uterine venous plexuses. The diameter of these wide parauterine lacunal formations may vary on shifting



8



9



10

FIG. 8 - Myometrial blood flow (FSM) of women with pelvic congestion compared with normal.

FIG. 9 - Elimination of radioactivity on linear scale in a patient with pelvic congestion.

FIG. 10 - Elimination of radioactivity on semi-logarithmic scale in a patient with pelvic congestion.

the probe in the cranio-caudal direction. Vascular ectasia not always bilateral may be demonstrated again of varying dimensions (Fig. 11).

Only in 2 of 7 cases with the pelvic congestion syndrome did the thermogram show hyperthermic areas at the level of the pelvis (Fig. 12).

In none of the other cases was thermography of diagnostic significance.

DISCUSSION

The four diagnostic techniques applied to the problem of diagnosis of pelvic congestion in the female gave promising results to differing degrees.

Their use might replace or supplement in some cases phlebographic investigation which is not always free from drawbacks and dangers (false positives, thrombophlebitis, sepsis, irritation of the tissues on passage of contrast media, shock).

The advantages they offer over the latter method is that are not traumatizing, always painless and free of danger.

The disadvantages are mainly the high cost of the apparatuses and the use of trained technicians.

The diagnostic accuracy appears to be maximal for evaluation of the acid-base

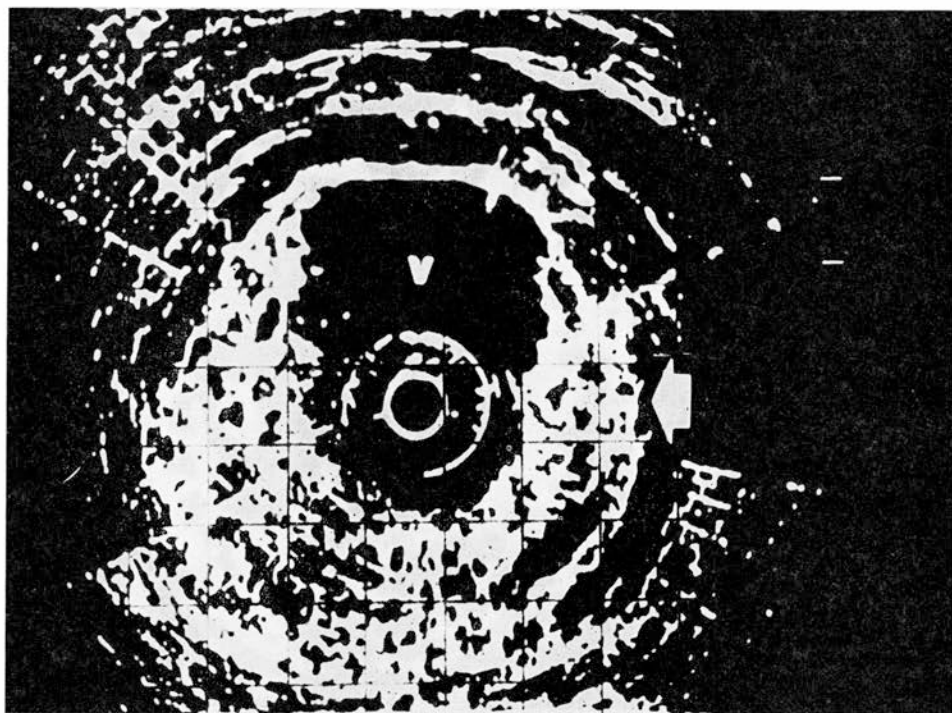


FIG. 11 - Bilateral parauterine vascular ectasia in a patient with pelvic varicocoele (→).

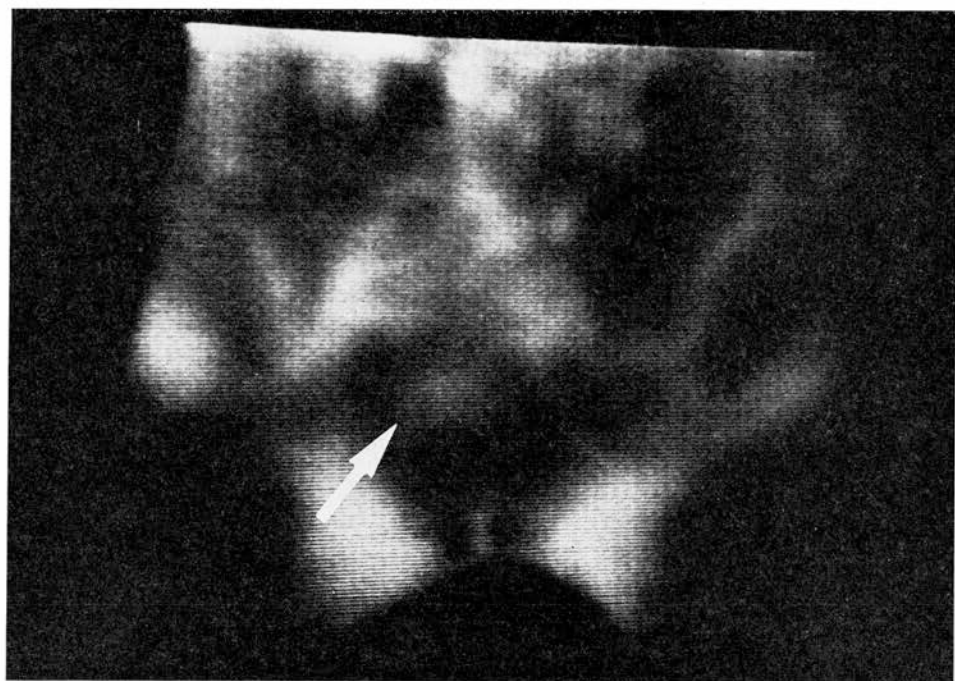


FIG. 12 - Hyperthermic area in the uterine fundus in a patient with vesicular mole and intense uterine congestion at intervention.

equilibrium of cervical blood, good but with wide individual variations, for the clearance of $^{133}\text{Xenon}$ and for ultrasonic tomoechography and manifestly less satisfactory 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 $^{133}\text{Xenon}$; 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 $^{133}\text{Xenon}$ but diminishes for thermography.

These methods could be useful for overcoming the difficulties which 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 studied, 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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