

THE MEASUREMENT OF THE ORAL AND VAGINAL ELECTROLYTES AS A NEW METHOD OF PREDICTING OVULATION

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Summary: To be able to know with certainty the day of ovulation has always posed a major problem to the gynecologist, for various reasons.

Today, knowing the day of ovulation and, still better, being able to forecast it with some assurance, is even more necessary for the various fecundation programs.

The results are here presented of experimentation in a new method of prediction of ovulation which is based on the measuring of the electrolytes present in the saliva and in the cervical mucus in the first phase of the cycle, with the aim of being able to predict in advance the day of ovulation.

Predicting the moment of ovulation is far from simple; the various systems designed to this end have demonstrated that. Surely then, to be able to predict ovulation with a certain margin of anticipation is, even though desirable, much more difficult.

Nowadays to know the fertile phase in the menstrual cycle with this certain margin of anticipation and assurance has become still more necessary, not only in order to be able to regulate fertility with a period of voluntary abstinence or with the use of barrier contraceptives, but above all for the adequate treatment of infertile patients, especially within the scope of FIVET, GIFT, IPI or other types of program.

As is well known, the criteria of prediction of ovulation are diverse. They may be distinguished as follows:

- a) Biological methods:
 - basic temperature
 - cervical score
- b) Biochemical methods:
 - 17 β -Estradiol dosage
 - dosage of urinary LH
plasmatic
immunologic

c) Instrumental methods:

- echography
- laparoscopy.

To the above-mentioned methods, there is now inserted among the biological ones that of measuring the electrolytic concentration in the saliva and cervical mucus in the postmenstrual phase up to ovulation.

This method is based on the ever-increasing knowledge of how the variations of the hormonal rates, which are checked during the preovulatory phase, determine corresponding variations in the concentration of some ions such as Sodium, Calcium and Potassium.

This method, according to the most recent data in Literature, would help to identify the fertile period of the cycle with an anticipation of 6-7 days (^{1, 2, 3}).

The measuring of the variations of the ionic concentrations in the cervical mucus and saliva can be obtained by means of special withdrawal instruments, now commercially available.

The object of this study is to evaluate the potential utility of the method for predicting and confirming ovulation.

The physiological principle on which the method is based is the following: (fig. 1).

a) the concentrations of Na and K in the saliva are controlled by aldosterone;

b) therefore during the menstrual cycle the following conditions are verified:

1) a peak of the adrenocorticotrophic hormone exists synchronised with the maturation of the dominant follicle.

The ACTH peak, through its effects on the aldosterone and the balance of sodium, is the most probable cause of the peak of value registered in the saliva about a week before ovulation;

2) some days after follicular maturation growing rates of circulating estrogens determine the increase of renine substrate and the activation of the renine-angiotensine system. This is reflected in the increase of the oral values;

3) the increment of the estrogen changes the quantity and electrolytic content of the cervical mucus.

MATERIAL AND METHODS

To the end of determining early prediction of ovulation, obviously with a certain margin of assurance, an instrument, invented in America with this specific aim, has been used experimentally in Italy for the first time, in order to measure the eletrolytic concentration present in the saliva and cervical mucus, which, as results from a presupposed physiological theory,

undergoes modifications during the various phases of the cycle, and in regard to the present study, from the post menstrual phase up to ovulation.

This instrument is a portable mini-computer of small dimensions, provided with two sensors, one oral and the other vaginal.

The system identified as CUE does not in practice require preliminary or concomitant investigations to use; it is sufficient to make one application daily for a few seconds up to ovulation.

While the oral sensor is to be applied daily, the vaginal one is used only on particular days during the cycle.

The successive interpretation of the values expressed on the instrumental display, with numerical data easily readable and obviously registered opportunely on any form, establishes the day of ovulation with sufficient assurance.

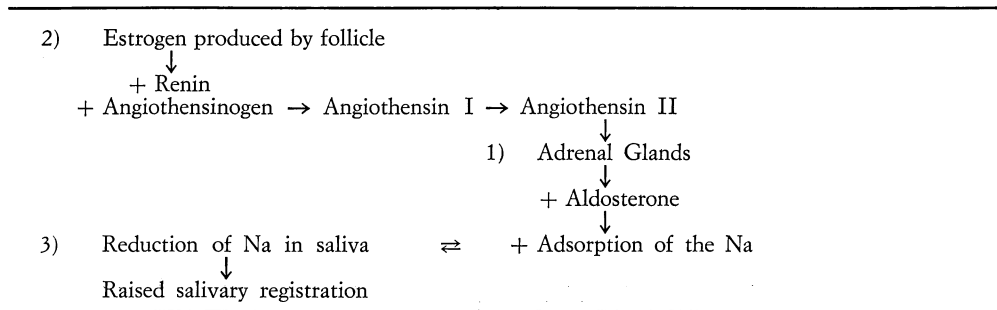
The numerical data will obviously vary from patient to patient, thus reflecting the physiology of each individual; however, the total complex of values obtained will be almost the same, even if not superimposable.

The survey of the data, which is independent of that of basal temperature, gives rise to characteristic curves.

The graph reported in fig. 2 is an example of the registration of numerical data, both oral and vaginal, which appeared on the display on the days of the cycle under consideration.

In practice, the ionic concentrations present of Na, Ca and K at the moment of registration by the instrument's computer give as resulting the numerical value on the display. As can be seen, the registration of the data gives rise to the characteristic curve.

The measurement of the salivary electrolytic values (oral registration) is carried out with the oral sensor as soon as menstruation stops and anyway not after the 6th day from the be-



(by Fernando R. S., Regas J., Betz G., modified, 1986).

Fig. 1. – Proposed correlation between estrogens and electrolytic variations.

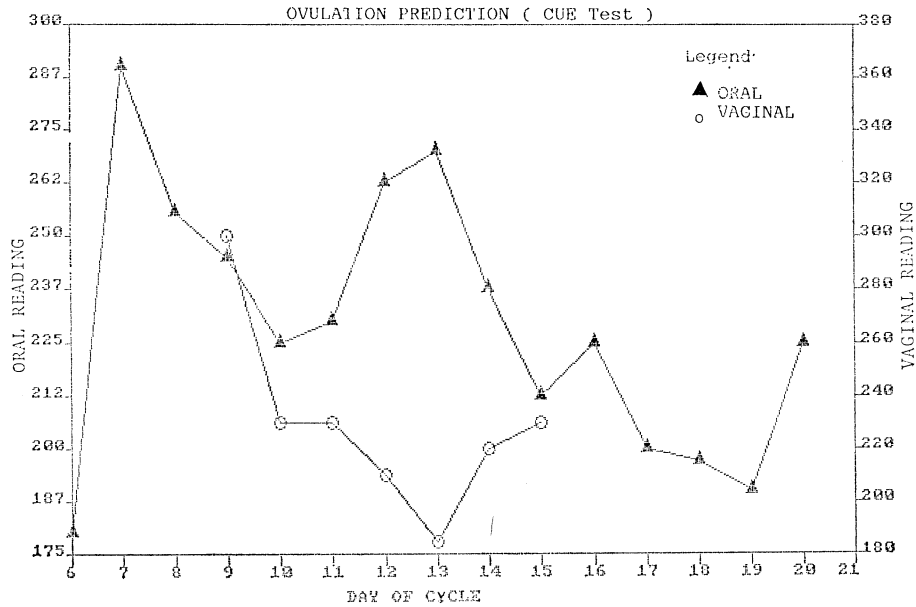


Fig. 2.

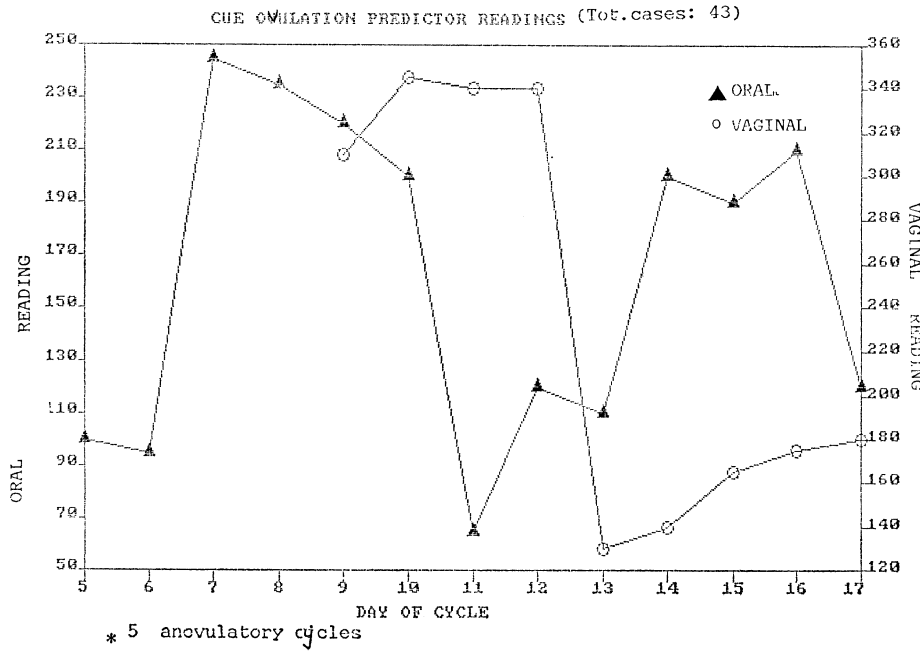


Fig. 3.

ginning of menstruation; instead, two days after the observation of the oral peak the vaginal measurement is to be daily until the numerical value rises to its peak and so indicates the imminence of ovulation.

Measurements must only be taken once a day, best in the morning, inasmuch as every stimulus stimulates salivation; that is to say variations may be checked in it of the proportion between water and salts.

Patients must be advised not to vary their alimentation, in practice not to take in more salty or antacid foods on an Na basis in the days of the cycle being examined, in order to avoid the registration of low values that may falsify the reading of the data.

The *oral peak* is the first sign that there will be ovulation in the cycle; this consists of a high oral value followed in the succeeding days by lower values, or anyway inferior to those of the peak.

Ovulation will be present about 7 days after the peak.

In practice if the menstrual cycle is of 26-30 days the oral peak will be registered between the 5th and 9th day from the beginning of the menstruation; in any case, however, ovulation will be verified after a week.

On the other hand, whenever the cycles are longer (for example, 35 days), a case may be checked in which one peak is followed by another, in such a case there will be two ovulations in succession. Instead, with regard to the recording of vaginal values which are carried out at the times and in the ways described, the lowest point (Nadir) is usually followed by a brusque return of the values, which usually happens after 4 days from the oral peak. The lowest point of the vaginal value indicates that ovulation is being verified. The brusque jump in vaginal values, on the other hand, indicates the day of ovulation.

With the aim and method above-mentioned we examined 43 patients affected by sterility and infertility. Figure 3 shows the average of the registration of those patients in whom ovulation was recorded. That is to say cycles in which no observation of ovulation was made by this predictive method.

In our experience it was possible to predict ovulation when it was registered 6 days and 19 hours from the survey of the oral peak. In 5 cycles no oral peak was registered and consequently on ovulation. In fact these were cases of anovulatory cycles and ovarian polycystosis.

CONCLUSIONS

There undoubtedly still exists today the problem of reliability, if not certain

prediction of ovulation, for various ends, and above all in order to be able to carry out FIVET, GIFT or IPI programs. The present day techniques available to us are diverse, as we have already shown. However, it seems to us that electrolytic measurements offer a valid and safe prediction of ovulation inasmuch as they present a low margin of error; in our experience the reliability was about 95%. This method of measuring the electrolytes (Na, Ca and K) in the saliva and cervical mucus during the end of the cycle phase (which, as we know, undergoes variations in the different phases of the menstrual cycle) may certainly raise some objections, especially regarding the possible causes of error or of failure.

On this point it is worth while recalling that the causes of failure may well be the same that determine the electrolytic variations, besides those of alimentation, already mentioned.

The possible causes of failure consist of infections or inflammations, both local and general; the use of drug administration, error in the use of the instrument, or of mistaken interpretation of the data.

The instrument can be used in an outpatients department or at home by the patient; it goes without saying that in such a case it is the patient herself who may contribute to errors in the interpretation of the data.

As to the administration of drugs which are not antacid, the possible influence may be determined by the hormones in cases with pharmacologically induced cycles. On this point we can report that in our case series the induction of ovulation in some cycles did not influence the electrolytic variations and consequently the measurement of values. In practice even in an induced cycle when ovulation has not occurred we noted that the oral peak was missing; in fact we registered almost a plateau of data, albeit high.

On the other hand, regarding the vaginal reading of induced cycles, these were

different from spontaneous cycles for the lowest values; but we always registered the Nadir, or the preovulatory lowering of values with the following peak. Other observations can be made as regards to the comparison with other methods of predicting ovulation.

The comparison with the LH dosage, the cervical score and echography usually used for the study of ovulation, these were adopted in almost all the cases examined in the present case series: the results will be the object of a further study.

After all, the data we have obtained up to date confirm those in the most recent – and rare – Literature, and induce us to consider valid such tests as a method of

predicting ovulation. Such a method in fact predicts reliable in advance (about 7 days), makes the raising of the basal temperature superfluous, considerably reduces the necessary for further diagnostic tests, both hematic and urinary, thus avoiding the stress caused to the patient by continual daily testing, and last, but not least, allows a comfortable therapeutic program both for the patient and the doctor.

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