LUTEAL DEFICIENCY AND VAGINAL CYTOLOGY

by

PRAVIN V. MEHTA, M.D., D.G.O., M.I.A.C.

and

ARUN R. CHITALE,* M.D., D.A.B.P. (U.S.A.)

The luteal phase defect is responsible for sterility and first trimester abortions. In this condition, the progesterone production is defective due to the impaired function of the corpus luteum. On early detection it can be treated with the replacement therapy of progesterone to prevent pregnancy wastage. In the present study, 300 infertile women were investigated with various clinical parameters including vaginal cytology, changes in the cervical mucus and histological dating of the endometrium. Twenty cases were identified as having luteal phase defect when endometrial histology lagged behind by two or more days between expected and observed findings. In 15 of these 20 cases the K.I. showed an inconsistent fall during day 19 to 23 of mid luteal phase when progesterone secretion is at the peak levels. The relative value of this observation of irregular slope of K.I. fall is discussed in evaluation of luteal function.

Material and Methods

The study subjects were 300 women between years 20 to 34, attending infertility clinic at Mother and Child Hospital, undergoing evaluation for infertility. The characteristics of the study population is shown in Table I.

TABLE I

Characteristics of the Study Population

Sterility	No. of patients	Mean age in years	Cycle length in days 26-32	Duration of infertility		Recurrent aborters
			Mean	Years	Mean	
Primary	256	26.12	27.5	1-14	6.48	
Secondary	44	29.68	28.5	1-12	6.72	5

A complete infertility work-up was carried out in all cases which included husband's semen analysis, serial vaginal cytology and laparoscopy on day 24 of the cycle. Tubal patency test was done with methylene blue followed by endometrial curettage. Histological dating of the endometrium was done according to the criteria of Noyes *et al* (1950). The presumed ovulation date was retrospectively calculated by subtracting 14 days from the onset of the next menstrual period. The interpretation of the slides was done

*Surgical Pathology Centre, Kala Bhavan, Mathew Road, Bombay-400 004, India.

Mother and Child Hospital, Gita, Pandita Ramabai Road, Gamdevi, Bombay-400 007, India.

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by two gynaecological histopathologists. Only when both of them agreed, the histological dating was assigned. In all the smears, the K.I. was counted and the cellular morphology especially folding and clumping of the cells were noted. The K.I. curve was constructed from the serial colpocytology readings and ovulation day was decided from the peak.

Results

The histopathological findings of 300 women is shown in Table II.

TABLE II
Endometrial Histology in 300 Women

	Secretory	Proliferative	Deficient Luteal Phase
	191	83	20
Tuberculous Endometritis	4	2	
Total	195	85	20

A representative graph (Fig. 1) of the

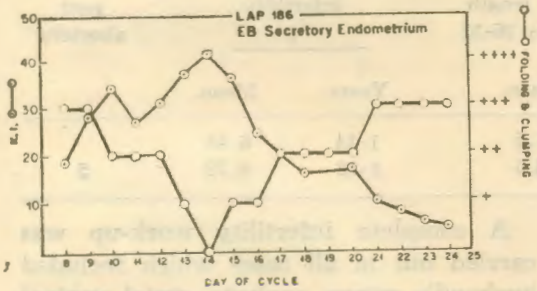

Fig. 1

serially plotted K.I. readings in the secretory cycle shows a typical biphasic curve with a rise of K.I. during the late proliferative phase till ovulation and then a steady fall becoming steep in the mid-luteal phase. Clumping and folding of the cells and the other elements such as WBC, histiocytes and D. bacilli seen in the late proliferative phase decrease with increase in K.I. and disappear completely at ovulation.

In contrast the proliferative cycle does not show a distinct mid-cycle peak and the presence of unopposed estrogen is indicated throughout. (Fig. 2).

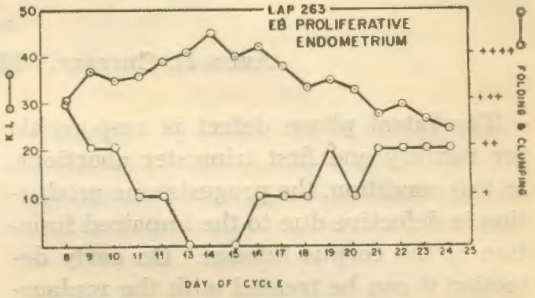

Fig. 2

In comparison to the above two pictures, the graph (Fig. 3) seen in the

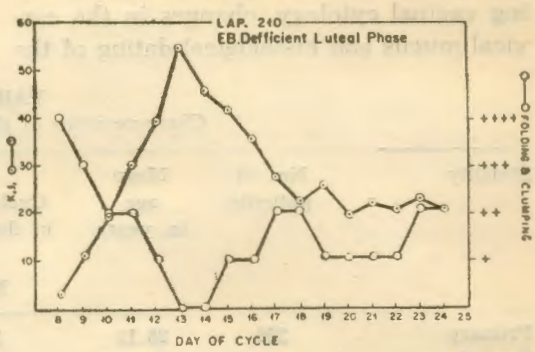

Fig. 3

women with defective luteal phase varies. Among the 15 cases of luteal phase deficiency it was observed that the K.I. increased till it reached a peak at ovulation. The folding and clumping also slowly disappeared giving a clean picture. After ovulation the K.I. started to fall with the appearance of folding and clumping till about day 20. This trend did not continue further as in normal cycles, but some rise or a cessation of further fall of K.I. along with the regression in folding and clumping was observed, indicating a

poor progesterone effect. This led us to suspect the deficient corpus luteum which was confirmed by the endometrial histology showing lag of two days or more from the expected postovulatory day of the cycle. However, in the remaining 5 cases luteal deficiency proved by endometrial histology, the K.I. curve did not alert us at all for prevailing poor progesterone secretion.

Discussion

The peak value of the progesterone secretion of normal luteal function is between 19 and 23 days (Cooke *et al* 1972; Radwanska and Swyer, 1974; Shepard and Senturia, 1977). In women having deficient corpus luteal function therapy delayed until after a missed period is too late as perhaps the most important function of corpus luteum secretions in reproduction is to provide for implantation and therapy should be begun as soon as ovulation is diagnosed.

According to Jones (1949) endometrial histology is the most accurate method of diagnosing corpus luteum insufficiency and established the criterion of a lag in endometrial histology of 2 or more days between expected and observed findings in at least two cycles. Shepard and Senturia (1977) observed a delay in the post ovulatory increase in progesterone or a failure to demonstrate an increase much above basal levels in the patients with retarded biopsies. Similarly Dodson *et al* (1975) found in a group of 7 infertile ovulatory women the slope of the increase in progesterone not as acute as the slope in normally fertile women and that peak levels (although normal) were achieved later than those for normally fertile women.

Cooke *et al* (1972), Radwanska and Swyer (1974) and Tredway *et al* (1973) emphasised on the relationship between glandular and stromal histology as a better morphologic indicator of defective corpus luteum function than a lag in the endometrial dating as they noticed the lack of correlation between endometrial development and plasma progesterone levels.

In view of the disparity in the development of the endometrium and the circulating progesterone level, it is necessary that an additional parameter like serial vaginal cytology or BBT is done to alert the suspicion of existing luteal deficiency. But Radwanska and Swyer (1974) were able to detect only in 28% of the deficient luteal phase cases atypical BBT record, which correlated with poor plasma progesterone values. While in the present study 75% of the cases of deficient luteal, phase the vaginal cytology correlated with endometrial histology. It is universally agreed that the estrogen progesterone ratio is important for normal corpus luteum function. Due to defective progesterone production, the estrogenic effect is more conspicuously seen by a rise or poor fall of K.I. in the luteal phase of the cycle. Also the dirty background of the full blown progesterone effect is not observed.

In our opinion vaginal cytology is a good supplementary parameter which not only can alert one's suspicion of the presence of defective corpus luteum but also would allow the early initiation of therapy immediately on detecting the ovulation from K.I. curve in subsequent cycles.

Summary

Luteal deficiency is one of the established causes of infertility. If diagnosed it can be successfully treated in some of these patients preventing recurrent pregnancy wastage characterised by repeated abortions in the first trimester.

In the present study, 20 cases of histologically confirmed luteal deficiency were encountered among 300 infertile regularly menstruating women, studied by single biopsy on 24th day. The serial vaginal smears studied in these 20 cases were compared with those in 85 women with proliferative endometrium and 195 women with secretory endometrium.

The difference in the serial smear pattern in these three groups of women is presented pointing out the important role of vaginal cytology in suspecting the hormonal imbalance.

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