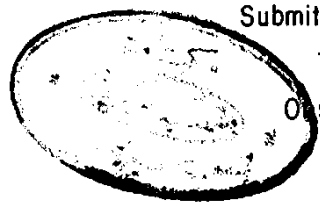
EVALUATION OF THE LUTEAL FUNCTION AFTER TUBAL STERILIZATION

THESIS

Submitted in Partial Fulfilment of
The Master Degree in
Obstetrics and Gynaecology



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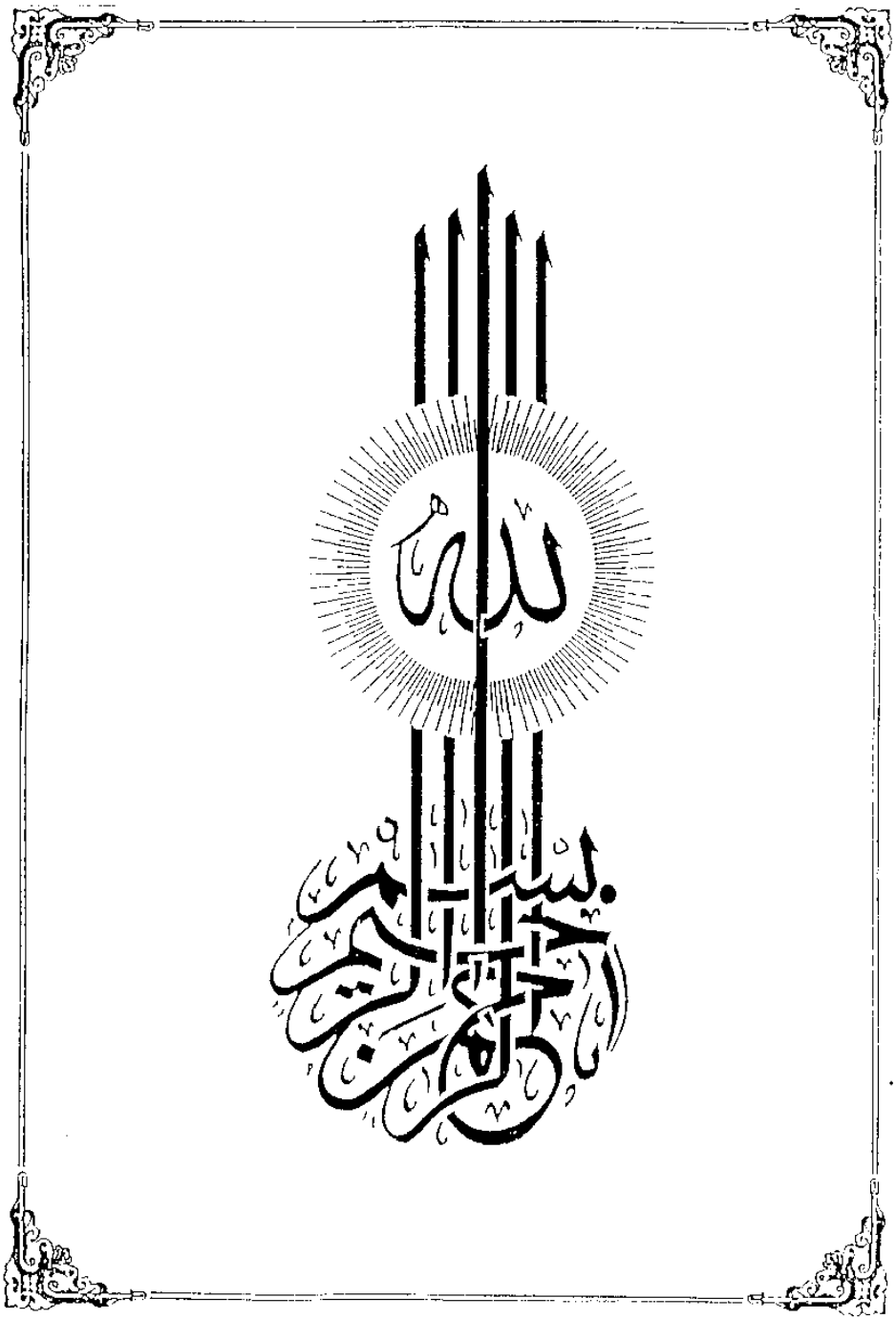

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INTRODUCTION

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Luteal insufficiency has been reported with a significant frequency among patients who had tubal sterilization (Berger and Hammond 1978 and Radwanska et. al., 1979).

It was more frequently encountered after tubal ligation or electrocoagulation than after tubal sterilization by Hulka-Clemens clips (Donnez et. al., 1981).

This study aims to evaluate luteal function after tubal sterilization through dating a mid-luteal phase endometrial biopsy with simultaneous plasma progesterone estimation by radioimmunoassay.

REVIEW OF LITERATURE

HORMONAL REGULATION OF THE OVARIAN CYCLE.

The endocrine control of the ovarian cycle involves an interaction between hypothalamus, pituitary gland and ovary. This has been reviewed by France, 1982. In the last few days of the preceding menstrual cycle, blood concentrations of estradiol and progesterone decline leading to release of the hypothalamus and pituitary gland from suppression with consequent secretion of the pituitary gonadotrophins, follicle stimulating hormone (FSH) and luteinising hormone (LH).

A new group of follicles in the ovary respond to the stimulus of these hormones and begin to ripe. During the early pre-ovulatory days of the new menstrual cycle, one of the developing follicles, for reasons that are unknown, becomes dominant, continues to grow to full maturation and then ovulates, while the remainder follicles become atretic.

Pituitary secretion of LH slowly rises from about the begining of the new menstrual cycle. The primary action of LH at this time is to stimulate the biosynthesis of androstenedione and testosterone in the theca cells of the active follicle. These androgens diffuse into the

follicular fluid and are aromatised to estrogens by the granulosa cells. Ovarian production of estradiol therefore slowly increases in response to the LH stimulus, and with ripening of the follicles.

When the estradiol reaches a critical level, it causes an explosive transient discharge of LH, LH surge, which results in ovulation. Associated with the LH surge, is a smaller but significant surge in the FSH. The LH surge also causes a redirection of steroid biosynthesis in the follicle from production of estrogen to production of progesterone.

Circulating progesterone levels begin to rise even before ovulation and show a small increase from preovulatory basal concentrations of about 0.5 ng/ml. plasma to 1.0 ng/ml. within 12 hours following the onset of the LH surge. The small preovulatory change in the level of progesterone may serve to amplify the gonadotrophins surge mechanism.

Ovulation occurs about 7 to 24 hours after the peak in the concentration of LH.

Following discharge of the ovum at ovulation the cells of the follicle are rapidly luteinised and evolve

into a new endocrine structure, the corpus luteum. The primary function of the corpus luteum is to produce progesterone but to a lesser extent it also produces estrogen. In the absence of pregnancy, it remains functional for about 14 days.

In the post-ovulatory phase of the cycle circulating blood levels of progesterone and estradiol rise to reach maximum values about 7 days after ovulation. The higher values are sustained for 3 or 4 days then falling during the last few days of the cycle as the corpus luteum regresses.

In response to the negative feedback effect on the hypothalamic-pituitary system exerted by the elevated concentrations of progesterone and estradiol, secretion of LH and FSH is reduced during most of the luteal phase of the cycle with blood levels declining to slightly below those of the preovulatory phase.

EVALUATION OF THE LUTEAL FUNCTION

Endometrial Dating :

Endometrial dating was extensively used by many investigators for evaluation of the luteal function. Most of them considered it as a valid method for studing the luteal function (Noyes et. al., 1950, Rosenfeld and Garcia 1976 and Shepard and Senturia 1977).

Rock and Bartlett 1937 studied in details the sequence of events of the histological changes in the endometrium throughout the secretory phase of normal menstrual cycle. They were able to specify the particular histological changes in each day of the secretory phase of the endometrium. By this meticulous study, they were able to design the endometrial dating chart starting from the day 15 to the day 27 of normal menstrual cycle. They considered the 1st day of the preceding menstrual cycle as the day 1, the day 14 as the possible day of ovulation, and the day 27 as the end of the examined cycle.

The authors evaluated the endometrial dating taking the onset of succeeding menstrual cycle as a point of reference. They found that it was accurate in 70% of the

cases, and with possibility of one day error it was accurate in 87% of the cases.

Noyes and Haman 1953 evaluated endometrial histologic dating in 1007 endometrial biopsies which had been taken from normal menstruating women during the secretory phase of the menstrual cycle. The dating was done without knowledge of the day of the biopsy. Although each endometrial specimen was dated by the two investigators, independently, the date given by each of them for any endometrial specimen was almost correlated. However, when the basal body temperature shift, and the onset of subsequent menstruation were used as points of reference in the evaluation, the accuracy of endometrial dating was 60% within one day error and 80% within two days error.

The investigators concluded that the histologic examination of the endometrium during the secretory phase gave more information about the time of ovulation, degree of progestational changes, and normality or abnormality of the endometrium than any other single test available at that time.

Tredway et. al., 1973 evaluated the acuracy of endometrial histological dating in 11 normal women. The

day of ovulation was used as a reference in their evaluation which was determined by defining the LH peak day in the examined cycle. They reported a significant correlation between endometrial dating and LH peak.

Novak and Woodruff 1974 reported the following chart notes in dating the secretory endometrium:

16th day : Subnuclear vacuoles
Pseudostratification
Mitoses in glands and stroma.

17th day : More or less orderly row of nuclei
Cytoplasm above nuclei and subnuclear vacuoles below
Gland and stromal mitoses
Extremely minimal secretion.

18th day : Vacuoles above and below nuclei
Improved linear arrangement of nuclei
Gland mitoses rare
Stromal mitoses rare
Bubbles of secretion seen at luminal border

19th day : Few vacuoles remain in cell, but mainly active evacuation with intraluminal secretion
No gland or stromal mitoses
May look like day 16 but no pseudostratification

20th day : Peak secretion with ragged luminal border
Vacuoles are rare.

21st day : Abrupt onset of stromal edema
Gland secretion prominent
"Naked" stromal nuclei begin to appear.

22nd day : Peak edema
Marked appearance of "naked" stromal nuclei
Active secretion, but subsiding
Rare stromal mitoses.

23rd day : Prominent spiral arterioles
Periarteriolar cuffing with enlargement of stromal cell nuclei and cytoplasm (earliest predecidual change)
Stromal mitoses.

24th day : Definite predecidual cells around arterioles with early subepithelial changes
Greater stromal mitoses
Ragged cell borders, i.e., secretorily exhausted.

25th day : Definite subcapsular predecidua
Inspissated secretion noted to begin
Early stromal infiltration with lymphocytes and occasional polymorphonuclear leukocytes.

26th day : Generalized decidual reaction
Polymorphonuclear leukocytic invasion
Inspissated secretion.