THE ROLE OF ULTRASONOGRAPHY IN THE EVALUATION OF POLYCYSTIC OVARY DISEASE

ESSAY

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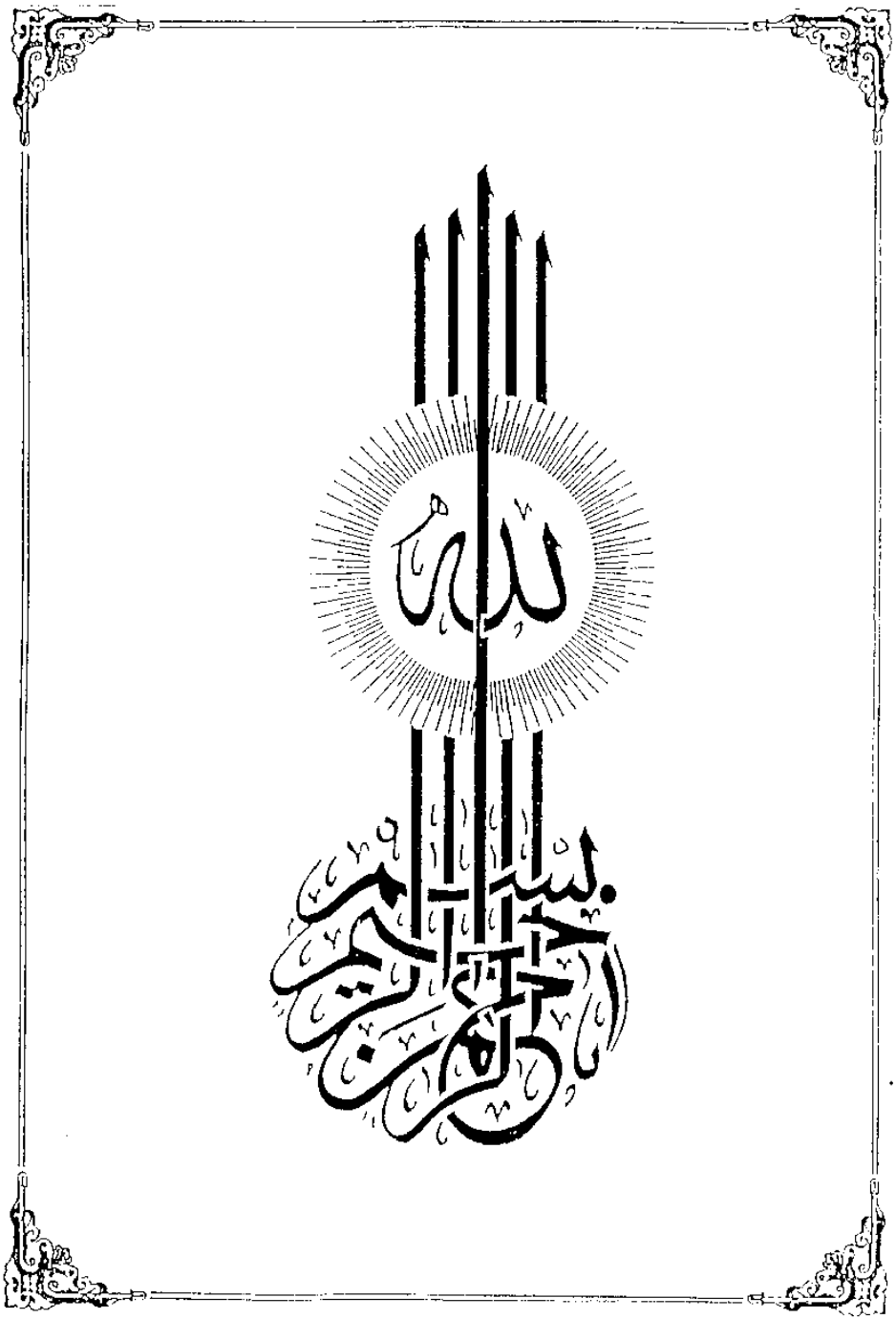
بسم الله الرحمن الرحيم

وَأَن لَّيْسَ لِلْإِنسَانِ إِلَّا مَا سَعَىٰ.

صدق الله العظيم

سورة النجم آية(٣٩)



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INTRODUCTION AND AIM OF THE STUDY

Polycystic Ovarian Disease (PCOD) is a complex endocrinologic disorder that is manifested by menstrual irregularities and infertility resulting in chronic anovulation.

The anatomic abnormalities seen in this disease are related to the endocrinologic imbalance due to absence of normal Follicle Stimulating Hormone (F.S.H), Luteinizing Hormone (L.H), estrogen and progesterone interactions.

Historical background:

The gross sclerotic changes in the human ovary were clearly described by *Chereau in 1845,* and partial resection of such ovaries has been practiced before 1897 in Europe by *Gusserow, Martin, Wiedow, Zweifel,* and others. *(Goldzieher, 1981).* In the American literature, *Findley,* (1904) described wedge resection of (cystic degeneration of the ovary).

Although occasional reports about this condition continued to appear over the years, more interest was aroused in 1935

when this anatomical abnormality was related by *Stein and Leventhal* to a clinical syndrome consisting of 'menstrual irregularity featuring amenorrhea, a history of sterility, masculine type hirsutism and, less consistently, retarded breast development and obesity'. The delineation of such a syndrome, and especially the report of good results produced by wedge resection, made polycystic ovarian disease (PCOD) a happy hunting ground for theorists, whose field of speculation was not encumbered by too many facts, as well as for surgeons, who were delighted with a functional disorder that was amenable to such a straight forward approach.

Little of significance occured to alter the situation until the last two decades, when a continuing evaluation of PCOD and a revolution of our knowledge of hypothalamic pituitary ovarian relationships began to shed new light on the problem.

Ultrasound has an increasing role in the assessment of this condition since the clinical and laboratory spectrum in this entity can be diverse. In addition the originally classic triad of oligomenorrhea, hirsutism, and obesity in *Stein - Leventhal* syndrome is not universally present.

In this disorder, there is a spectrum of sonographic findings, ranging from the commonly encountered bilateral ovarian enlargement to the less common findings of unilateral ovarian enlargement or even normal sized ovaries.

Evaluation of the ovarian size, and morphology by ultrasound may help to differentiate PCOD from other endocrinopathies and other causes of bilateral ovarian enlargement.

The aim of this study is to emphasize the role of ultrasound in this common ovarian disorder and its role in the follow-up of such condition.

In order to fulfill this aim a short account on the anatomy, sonographic anatomy, physiology, and pathology of the ovaries and the factors regulating it, is first given.

GROSS ANATOMY

GROSS ANATOMY OF THE OVARY

The ovaries are homologous with testes and like these they develop from the genital ridges. Situated one on each side of the uterus close to the lateral pelvic wall, they are attached to the postero-superior aspect of the broad uterine ligament, postero-inferior to the uterine tube (Fig. 1).

They are greyish-pink and smooth before ovulation begins but thereafter are distorted by the degeneration of successive corpora lutea. Each is almond shaped, about 3 cm long, 1.5 cm wide and 1 cm thick. Its position varies much in parous women, because it is displaced in the first pregnancy and probably never returns to its original location. Also variably mobile, it may change position according to the state of surrounding organs, such as the intestines.

In nulliparous women and, in the upright position, its long axis is vertical. It has lateral and medial surfaces, tubal and uterine extremities, mesovarian and free borders *(Williams et al., 1989).*

It occupies the ovarian fossa, on the lateral pelvic wall, bounded anteriorly by the obliterated umbilical artery and posteriorly by the ureter and internal iliac artery.

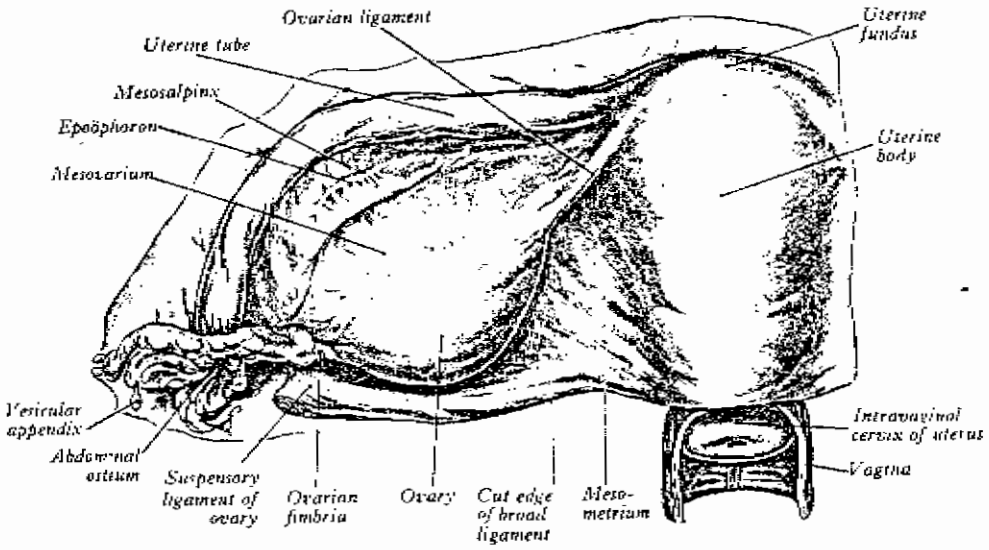

Fig. (1): Posterosuperior aspect of the uterus and the left broad ligament. the 'ligament' has been spread out and the ovary is displaced downwards. *(Quoted from Gray's anatomy, 1989).*

To the tubal (superior) extremity, near the external iliac vein, are attached the ovarian fimbria of the uterine tube and a peritoneal ovarian suspensory ligament, which contains the ovarian vessels and nerve, and passes over the external iliac vessels to join the peritoneum on the psoas major, posterior to the caecum or descending colon.

The uterine (inferior) extremity faces downwards towards the pelvic floor; it is usually narrower than the tubal extremity and is attached to the lateral uterine angle postero-inferior to the uterine tube by a round ovarian ligament which lies in the broad ligament and contains non-striated myocytes.

The lateral surface contacts parietal peritoneum in the ovarian fossa and is separated by it from the extraperitoneal tissue and the obturator vessels and nerve *(Williams et al., 1989)*.

The uterine tube largely covers the medial surface; the peritoneal recess here, between the ovary and overlapping mesosalpinx is termed the ovarian bursa. The mesovarian border, straight and facing the obliterated umbilical artery, is attached to the back of the broad ligament by a short peritoneal

fold, the mesovarium, in which blood vessels and nerves reach the ovarian hilum. *(Williams et al., 1989).*

In embryonic and early fetal life the ovaries are, like the testes, juxtarenal in the lumbar region but they gradually descend into the lesser pelvis. Accessory ovaries may occur in the mesovarium or in the adjacent broad ligament.

Structure of the ovary:

The surface is covered, in young females, by a layer of cuboidal cells which flatten in the later life. This so-called germinal epithelium gives the ovary a dull grey colour, contrasting with the shining, smooth peritoneum; the transition between peritoneum and ovarian epithelium is usually marked by a white line around the anterior, mesovarian border.

After puberty the ovary has a thick cortex containing ovarian follicles and corpora lutea surrounding a vascular medulla, except at the hilum. The dense cortical stroma contains woven reticular fibers and many fusiform cells, resembling non-striated myocytes. These cells contribute to growth of the theca folliculi and may secrete estrogens.

Medullary stroma consists of a looser connective tissue, with many elastin fibers, non-striated myocytes and numerous blood vessels, particularly veins.

At the hilum, strands of myocytes enter the medulla from the mesovarium. The cortex is much less vascular than the medulla. Beneath the germinal epithelium, the cortical connective tissue condenses into a delicate tunica albuginea, increasing in density with age. It is collagenous, unlike the general ovarian stroma. The prenatal cortical stroma contains small groups of interstitial cells, persisting after puberty only in thecae of atretic follicles *(Williams et al., 1989)*.

Ovarian follicles:

At birth, the ovarian cortex contains many primary ovarian follicles. Each has a large central oogonium surrounded by a single layer of small cuboidal or flat follicular cells. Many degenerate during childhood and after puberty, some developing each month as vesicular ovarian (Graffian) follicles, one usually maturing and rupturing (ovulation). During the childbearing period the cortex contains ovarian follicles, corpora lutea and atretic follicles.