RADIOLOGICAL ASSESSMENT OF THE OVARIES

A Thesis

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Master Degree of Radiodiagnosis

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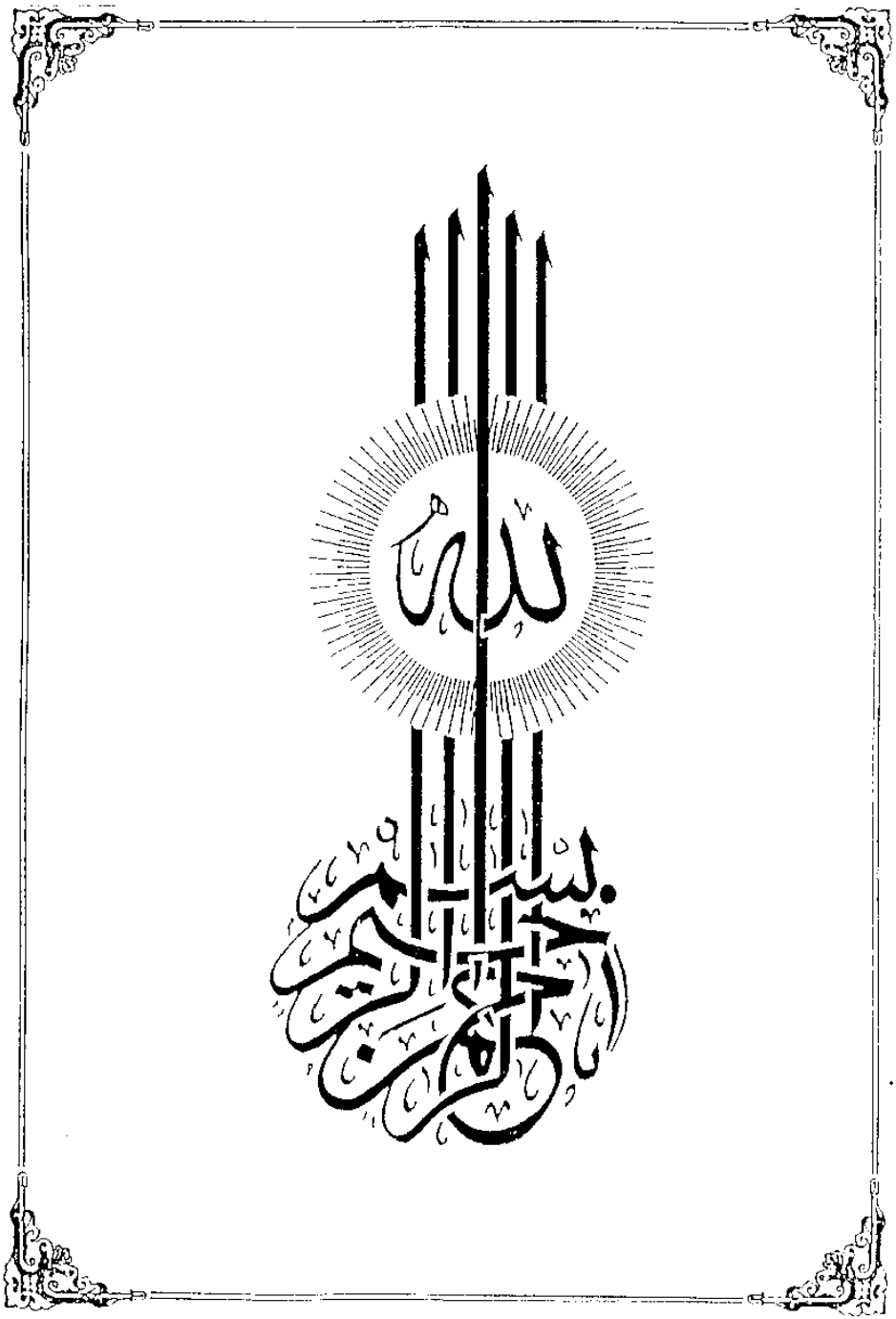

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INTRODUCTION AND AIM OF WORK

The ovaries do not lend themselves readily to physical examination and are inaccessible to palpation unless they are grossly enlarged. The different clinical manifestations associated with ovarian lesions are not often conclusive and may be misleading forming a problem for the examining physician.

This has stimulated the scope for other lines of investigations which may help to assess the ovaries and to show how they are responsible for the clinical state of the patient.

Radiological and imaging study have come to form an essential part for the investigation of the ovaries. Plain films may be helpful in the diagnosis particularly for large ovarian cysts or dermoid cysts and in some cases to differentiate them from calcified fibroids.

Hysterosalpingography may, in some cases, be resorted to as the dye may outline the ovaries and show if they are the site of a mass. However, this entails patent tubes and is not possible in virgins.

At one time, pelvic pneumography or gynaecography was an important method of examination to assess the ovaries. It often gave a good visual approach to the ovaries, their

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size, outline, and relation to the uterus. It was particularly helpful in virgins where clinical examination is often fruitless.

However, it is an invasive procedure and is not without risks or complications. It has been largely abandoned now with the advent of other safer techniques.

Ultrasound is now considered as the only safest and surest modality for assessment of the female pelvic organs particularly the ovaries and has largely replaced other lines of examination as it is simple, non-invasive and with no radiation hazards.

The aim of the present study is to discuss the various lines of investigation resorted to for ovarian assessment with particular emphasis on ultrasound. Besides, a brief description of the different criteria used for diagnosis is given. In addition, a note is made of the spectacular role of ultrasound in monitoring ova maturation and ovulation and in vitro fertilization (I.V.F.) in the investigation and management of infertility.

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ANATOMY
OF THE OVARIES

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ANATOMY OF THE OVARIES

The ovaries are 2 almond-shaped bodies, one on either side of the pelvis in a depression called the ovarian fossa. The position of the ovaries is somewhat variable but their long axis is usually vertical in the erect position. The right ovary is usually slightly larger than the left and the length varies from 2.5 to 5 cm. The width is ordinarily one-half the length and the thickness one half the width (Meschan, 1976).

Attachments of the Ovaries

1. They are attached to the back of the broad ligament by the mesovarium.
2. The Ovarian Ligament: which passes to the cornu of the uterus and is a rounded cord of fibromuscular tissue recognizable by its whitish appearance.
3. The Infundibuls Pelvic Ligament: which carries the ovarian vessels and lymphatics from the side walls of the pelvis.

Changes in the Ovaries With Age and Parity

In infancy and childhood the ovary is a tiny elongated structure with a smooth surface, situated near the pelvic brim, and packed with primary occytes. Although in the newborn baby, it may show small follicular cysts resulting from stimulation by chorionic grandotrophins; it later contains only primordial or atretic follicles.

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After the menopause the ovary becomes smaller in size and shrivelled in appearance, these changes are the results of atrophy of the medulla, and not of scarring following repeated ovulation as is sometimes stated. At a later age the surface becomes smooth again as in childhood. Very few follicles are found in old age (Jeffcoate, 1975).

The ovary is divided into 3 regions:

1. The Hilum: Is the small area which adjoins the mesovarian and which receives the twigs of the ovarian vessels, lymphatics and nerves which enter from the broad ligament. In addition it contains some scattered tubules, rete ovarii.

2. The Medulla: This subtends the hilum as a semilunar area enclosed by the cortex. It's structure is similar to that of the hilum.

3. The Cortex: This is the specialized functioning part of the ovary forming the main mass of the organ.

   It is composed of:

   a. Connective tissue stoma: Which consists of closely packed fibres which form a dense matrix for the vessels and Graffian follicles.

      Just under the covering epithelium, it is thickened to form the tunica albuginea, a dense connective tissue layer which encloses the ovary, and the

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presence of which gives the whitish color to the surface of the organ.

b. Epithelial structures:

These are:

1) Surface epithelium: A sheet of cubical cells one layer deep which covers the free surface of the ovary as far as the hilum, where transition into the endothelium of the peritoneum takes place.

2) The interstitial gland of the ovary : This consists of patches of epithelial cells scattered irregularly throughout the stroma which are inconspicuous.

3) The Graffian follicles: Formed around the ova which they enclose and nourish throughout their ovarian existence. The germ cell is surrounded by the granulosa cell layer and the stroma cells immediately related to this, form the theca interna.

Relation of the Ovary

Tubal end lies near the ext. iliac vessels, and the terminal part of the uterine tube curves around it. Uterine end is connected by the ligament of the ovary with the uterus.

Free border: is separated from ureter only by peritoneum.

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Mesovarian border: is attached to the broad ligament. Vessels and nerves enter at this border through a cleft called the hilum.

Medial surface largely overlapped by terminal part of uterine tube, is related to pelvic colon or ileum.

The ovary lies on the side wall of the pelvis, and its lateral surface is separated by peritoneum from the umbilical artery, obturater vessels and nerves and obturater internus muscle (Jameison, 1969).

Blood Supply of the Ovaries

1. Arterial : The ovarian arteries arise one on each side from the front of the abdominal aorta below the renal arteries. They enter the pelvis and passes between the layers of the outer end of the broad ligament.
It runs in the upper part of the broad ligament to the uterine cornu, where it anastomoses with the terminal branch of the uterine artery. On the way it supplies the ovary and the fallopian tubes.
Venous Drainage : To pampiniform plexus of veins from this plexus 2 ovarian veins emerge, only one of which drains the ovary. These later fuse to form a single ovarian vein, but, while the right vein passes into the Vena Cava, the left passes into the left Renal Vein.
These veins form the main drainage channels from the uterus especially in pregnancy.

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Lymphatic Drainage : Lymphatics from the ovary accompany the ovarian vessels to reach the para-aortic nodes. They are said to communicate with those from the opposite gonad by crossing the fundus uterii, this is doubtful but is put forward as one explanation for the tendency of ovarian cancer to be bilateral.

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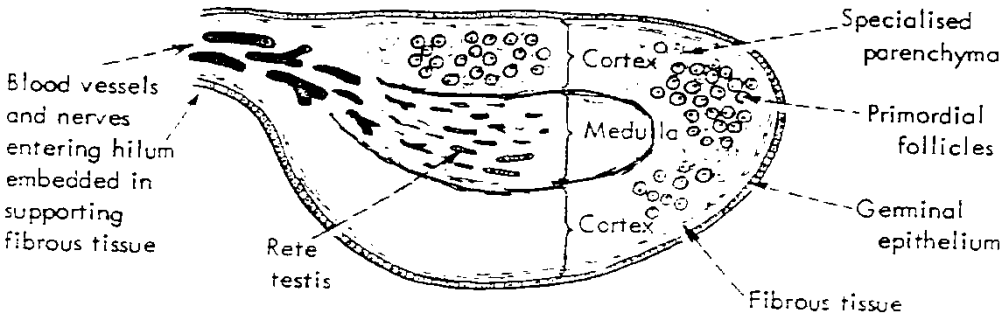
THE NORMAL OVARIAN CYCLE

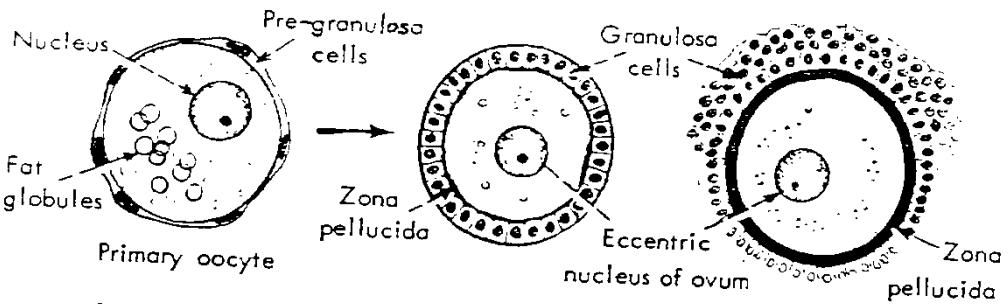
Ovulation

The ovary is covered by a cubical germinal epithelium which at the hilum is continuous with that lining the peritoneal cavity. This is supported by a thin layer of fibrous tissue beneath which is the true cortex.

The latter consists of a specialized stroma or parenchyma embedded in which are the primordial follicles.



The primordial follicle in the cortex consists of a primary oocyte surrounded by a single layer of flattened cells, the pre-ganulosa, said to be derived from the cells of the sex cords.



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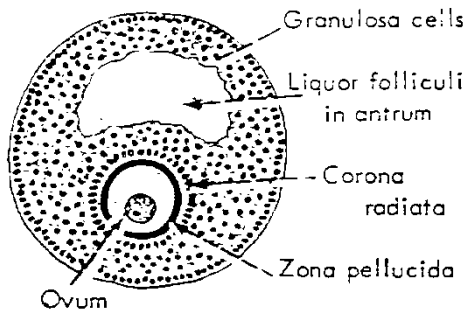
The pregranulosa cells become cuboidal and proliferate to form a shell several layers thick. At this stage a hyaline membrane is formed immediately around the ovum - the zona pellucida.

The granulosa cells continue to grow until the follicle is approximately 200 u in diameter. Fluid spaces now appear between the granulosa cells.

They coalesce to form a cavity, the antrum, pushing the ovum to one side.

The granulosa cells immediately surrounding the ovum are now known as the corona radiata and the whole mass of cells in this situation is termed the cumulus.



At the same time the surrounding parenchymal cells arrange themselves concentrically around the follicle and

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