

L'enseignement de l'anatomie des appareils digestif, urinaire et génital par l'utilisation de vidéos d'anatomie 3D en anglais, intérêts pédagogiques par rapport aux méthodes classiques d'enseignement



OVARY

I. INTRODUCTION

The ovary is a sexual paired heterocrine gland. It is intraperitoneal and constitute with the Fallopian tubes the adnexa of uterus. The endocrine function of the ovary consists of the production of sexual hormones when its exocrine function consists of egg production also known as oogenesis.

II. DESCRIPTIVE ANATOMY

A- SITUATION

The ovary lies on the lateral wall of the pelvic cavity at a level just inferior to the pelvic brim. It occupies the ovarian fossa, a shallow depression in the angle between the internal and external iliac vessels on the obturator nerve. The ovary is attached to the posterior leaf of the broad ligament by a double fold of peritoneum: the mesovarium.

B- ORIENTATION

The ovary has a long oblique axis, its tubal extremity is uppermost and lateral after childbirth when it is vertical in the nulliparous.

C- SHAPE

The ovary is ovoid in shape (almond-shaped) and firm to the touch with a hilly surface where the protrusions correspond to the follicles and the depressions to the post-ovulatory scars.

The ovary is whitish colored and thus, easily, distinguished from adjacent structures. It has two faces, medial and lateral, two borders, posterior free and anterior attached to the posterior leaf of the broad ligament by a double fold of peritoneum, the mesovarium, and two ends: superior tubar and inferior uterine.

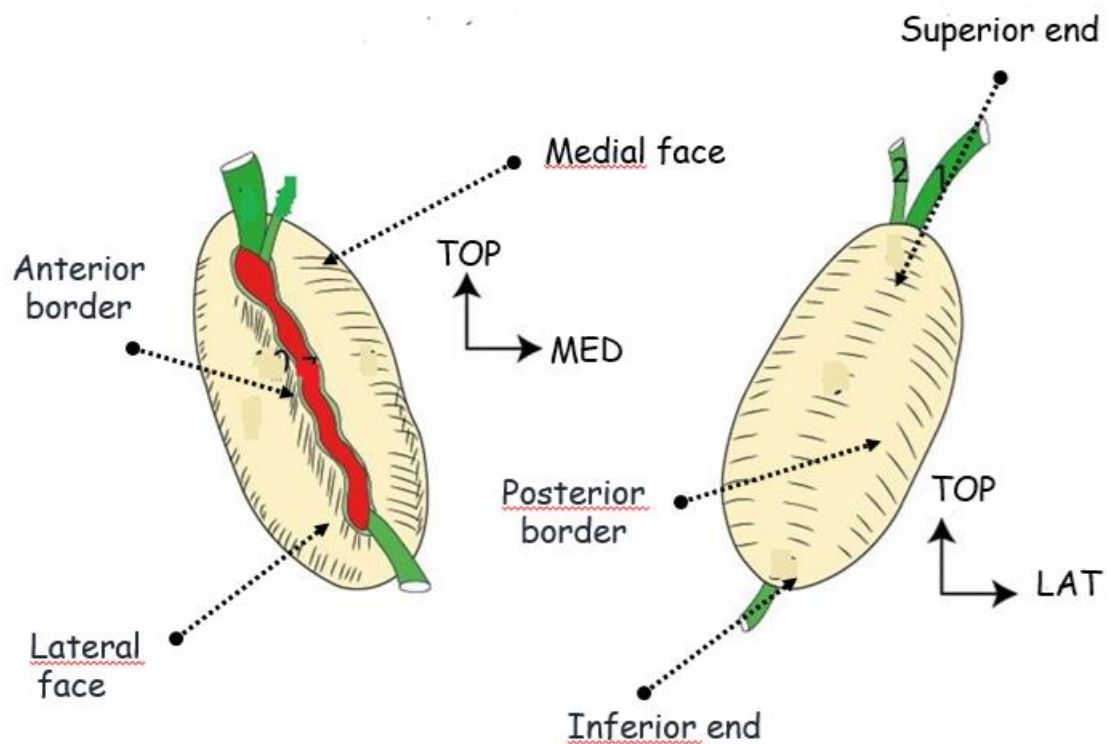


Figure 1: Overview of ovary: orientation and shape

D- DIMENSIONS

The ovary is smaller than the testis. It is four centimetres long, two centimetres wide and on centimetre thick and weighs eight grams. The volume of the ovary increases during ovulation and its weight decreases to one to two grams after the menopause.

III. STRUCTURE

The ovary consists of a fibrous stroma made of a central medullary zone containing vessels and representing the hilum of the ovary and a peripheral cortical zone that constitutes the manufacture of folliculogenesis covered by a layer of cubical cells, the superficial epithelium, that was originally but mistakenly called germinal epithelium; it has nothing to do with the formation of the primitive germ cells (oogonia) which are derived in the early embryo from endodermal cells of the hindgut (yolk sac) that migrate laterally into the developing gonad.

By mitosis and growth the oogonia become primary oocytes surrounded by granulosa cells derived from the stroma.

A primary oocyte with a single layer of granulosa cells is a primary follicle; when the granulosa cells proliferate to form more than one layer, the primary follicle becomes a secondary follicle.

In a five-month fetus there are about six million follicles, but many degenerate and by birth there are one million, reduced to about forty thousand by puberty.

Each month during reproductive life a follicle grows and accumulates fluid (liquor folliculi), to become an ovarian (Graafian) follicle. The stromal cells surrounding the follicle form the theca.

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Before ovulation the primary oocyte undergoes meiosis (halving the chromosome number) forming a secondary oocyte. It is this cell, commonly called the ovum, that is discharged at ovulation.

The liquor folliculi escapes and haemorrhage occurs into the collapsed follicle. The granulosa cells and some of the thecal cells now develop into a corpus luteum. This persists for one week if pregnancy does not occur, or for nine months if it does. At the end of either time it atrophies and becomes replaced by a fibrous scar, the corpus albicans. Since only about four hundred ova can be shed in the course of reproductive life, most oocytes and follicles are destined never to reach maturity, and they can undergo degeneration at any stage of their development, becoming known as atretic follicles.

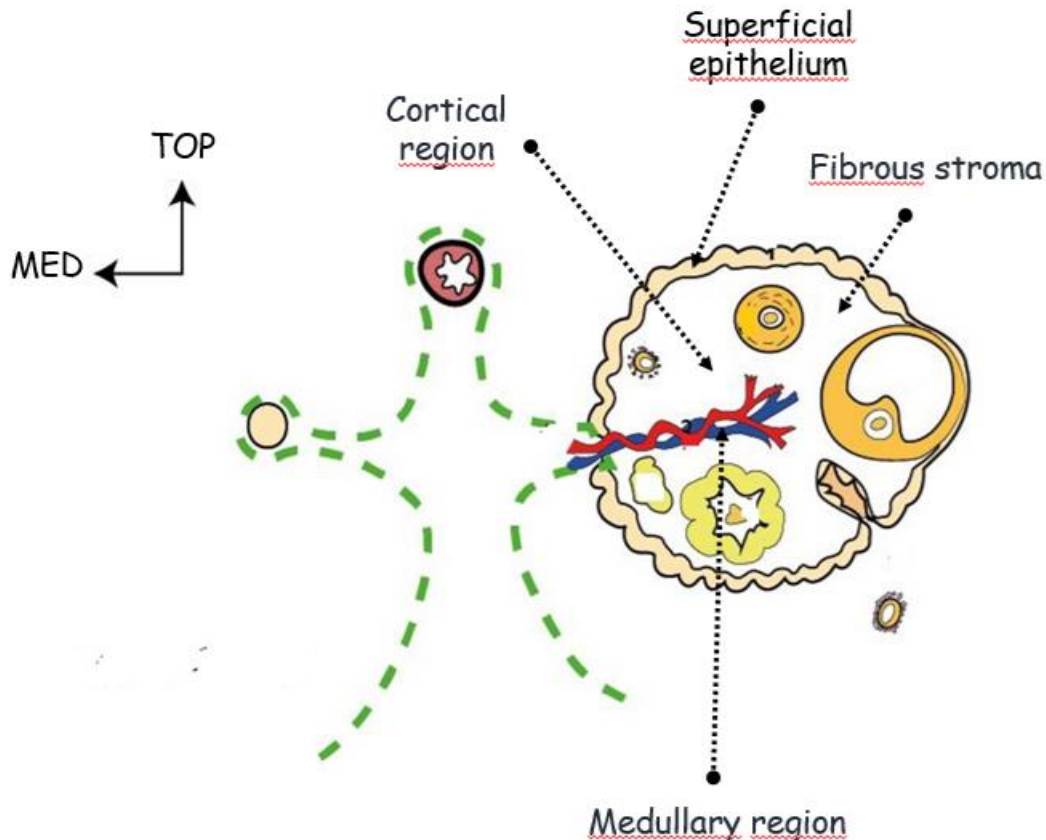


Figure 2: Sagittal section of ovary

IV. SUPPORTS

The ovary is free in the peritoneal cavity, although it is not peritonised and is relatively fixed by three main ligaments and one peritoneal fold.

The ligament of the ovary attaches its uterine extremity to the upper angle of the uterus in a distance of thirty millimetres under the tube.

The infundibulopelvic ligament also known as the suspensory ligament of the ovary fixes the tubal extremity of the ovary to the posterior parietal peritoneum and contains the gonadal vessels. It crosses in front the ureter at the level of L3 vertebra and then the external iliac vessels.

The infundibuloovarian ligament fixes the infundibulum to the tubal end of the ovary and contains the longest finger-like process of the infundibulum, it is continuous with the infundibulopelvic ligament.

The mesovarium is attached equatorially around the ovary, but does not invest the surface of the gland.

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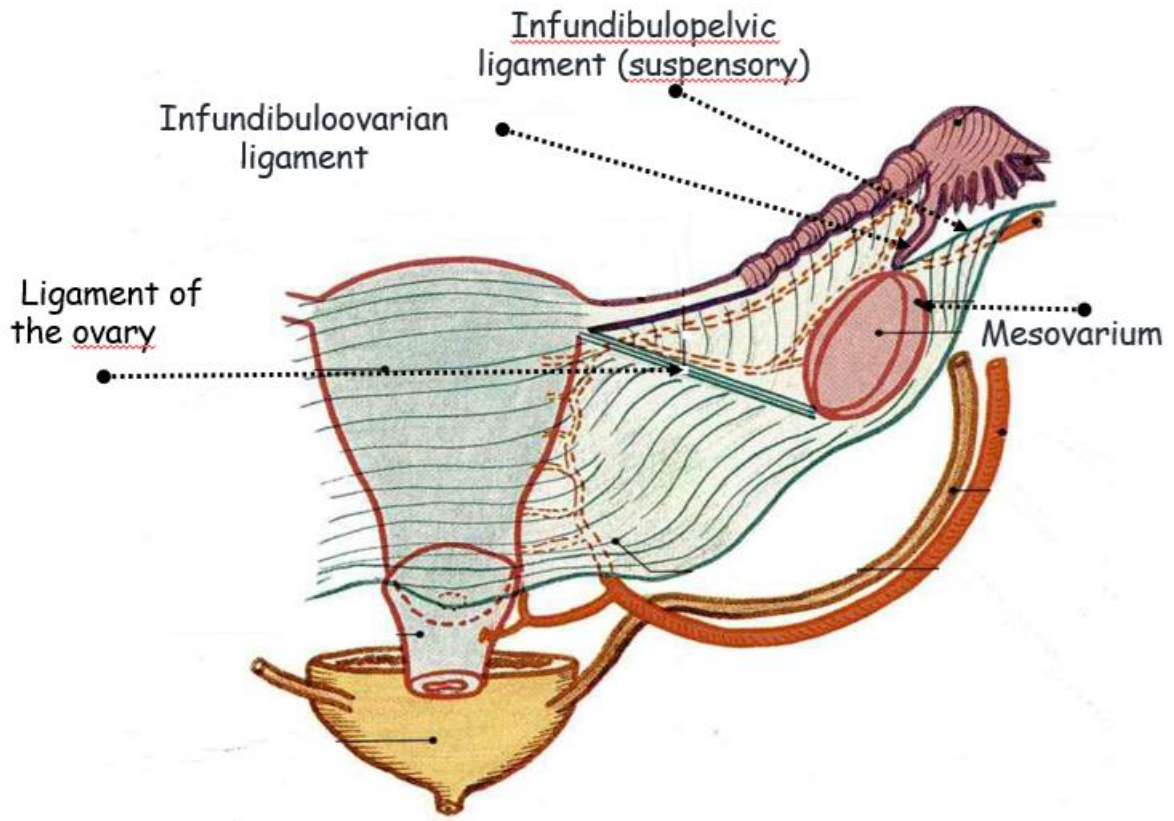


Figure 3: Posterior view of female internal genital organs showing the supports of ovary

V. ANATOMICAL RELATIONS

The anatomical relations of the ovary are greatly modified as the ovary folds down to the bottom of the pelvic cavity after childbirth.

In the nulliparous, the lateral face of the ovary lies on the ovarian fossa limited at the back by the internal iliac vessels and ureter, forwards by the posterior leaf of broad ligament, at the top by the external iliac vessels and at the bottom by the origins of umbilical and uterine arteries.

After childbirth, the ovary is in contact with the sacrum backwards, the ureter and the uterine artery forwards and the upper border of piriformis muscle at the bottom.

The medial face of the ovary is in contact with the infundibulum of uterine tube and, on the right, with intestinal coils, caecum and appendix and, on the left, with sigmoid colon.

Its anterior border lies on the mesovarium when its posterior border is in contact with the infundibulum of uterine tube.

The upper end is connected to the infundibulum of uterine tube and mesosalpinx when the lower end lies two centimetres above the pelvic floor.

VI. BLOOD SUPPLY, LYMPH DRAINAGE AND NERVE SUPPLY

A- ARTERIES

The ovary is supplied by the ovarian and uterine artery.

The ovarian artery is a branch of the abdominal aorta just below the renal artery, it runs down behind the peritoneum of the infracolic compartment and the colic vessels, crossing the ureter obliquely, on the psoas muscle.

In the pelvis, it crosses the brim of the pelvis and enters the suspensory ligament (formerly the infundibulopelvic ligament) at the lateral extremity of the broad ligament, it, then, gives off a branch to the uterine tube which runs medially between the layers of the broad ligament and anastomoses with the uterine artery, and it ends by entering the ovary in its tubal end.

The anastomosis between the ovarian artery and the ovarian branch of the uterine artery forms the infraovarian arterial circle. Three to four branches arise from the upper side of the infraovarian arterial circle supply the ovary. The microcirculation of the ovary consists of three orders of arterial capillaries and forms a perifollicular plexus.

B- VEINS

The ovarian veins form a plexus in the mesovarium and the suspensory ligament, the pampiniform plexus like the testis. The plexus drains into a pair of ovarian veins which accompany the ovarian artery. They usually combine as a single trunk before their termination. That on the right joins the inferior vena cava, that on the left the left renal vein.

C- LYMPH DRAINAGE

The lymphatics of the ovary drain to para-aortic nodes alongside the origin of the ovarian artery, just above the level of the umbilicus (L2). Clinical observation shows that it is also possible for lymph to reach inguinal nodes via the round ligament and the inguinal canal, and to reach the opposite ovary by passing across the fundus of the uterus.

D- NERVES

Sympathetic (vasoconstrictor) fibres reach the ovary from the aortic plexus along its blood vessels; the preganglionic cell bodies are in T10 and 11 segments of the cord. Some parasympathetic fibres may reach the ovary from the inferior hypogastric plexus via the uterine artery and are presumably vasodilator.

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Autonomic fibres do not reach the ovarian follicles; an intact nerve supply is not required for ovulation. Sensory fibres accompany the sympathetic nerves, so that ovarian pain may be periumbilical, like appendicular pain.

VII. CONCLUSION

The ovary is the organ of egg production. It occupies the shallow ovarian fossa and thus has several peritoneal, visceral and vascular relations that change overtime. In addition, the ovary is free in the peritoneal cavity and benefits from a rich anastomotic blood supply that leaves safe the ligation of uterine artery particularly in the management of post-partum haemorrhage. Lymph drainage is ensured mainly by paraortic nodes and can be variable through the reproductive life.
