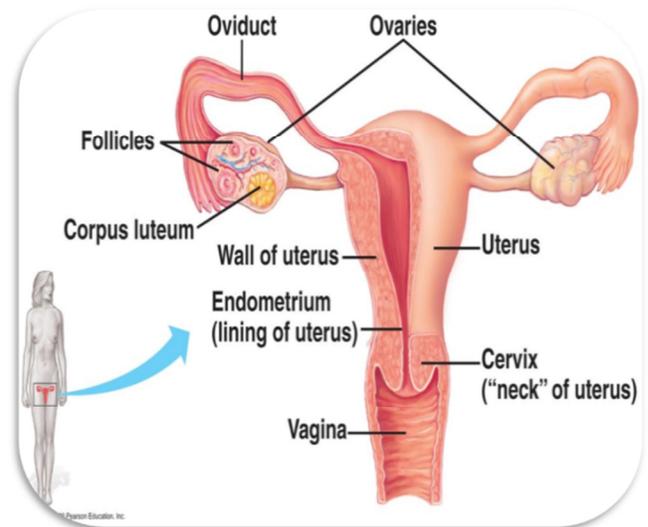


ANATOMY OF FEMALE REPRODUCTIVE ORGANS

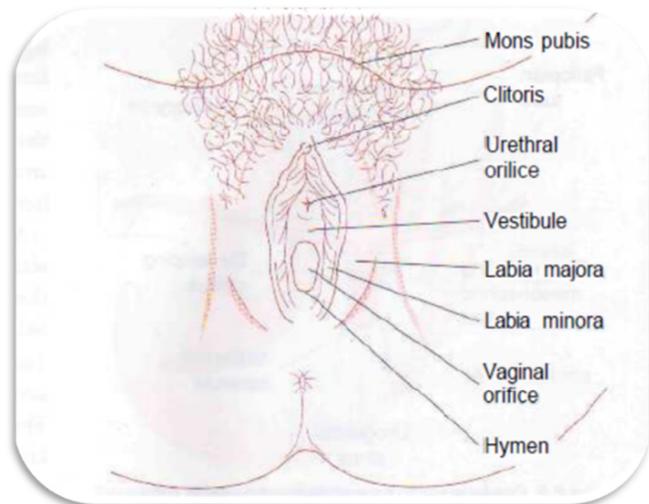
The female reproductive organs are composed form:

- 1-External genitalia
- 2-Vagina
- 3-Uterus
- 4-Fallopian tubes
- 5-Ovaries



External genitalia (Vulva)

- Mons pubis
- Labia majgra
- Labia minora
- Vestibule
- Clitoris
- Greater vestibular glands



Mons pubis : It is composed of fibro-fatty tissue, which covers the body of the pubic bones. Inferiorly it divides to become continuous with the labium majora on each side of the vulva. In the adult, the skin that

covers the mons pubis bears pubic hair, the upper limit of which is usually horizontal.

Labia majora : They are two folds of skin with underlying adipose tissue bounding either side of the vaginal opening. They contain sebaceous and sweat glands and a few specialized apocrine glands. In the deepest part of each labium is a core of fatty tissue continuous with that of the inguinal canal and the fibres of the round ligament terminate here.

Labia minora : They are two thin folds of skin that lie between the labia majora. Anteriorly they divide into two to form the prepuce and frenulum of the clitoris. Posteriorly they fuse to form a fold of skin called the fourchette. They contain sebaceous glands but have no adipose tissue. They are not well developed before puberty, and atrophy after the menopause. Their vascularity allows them to become turgid during sexual excitement.

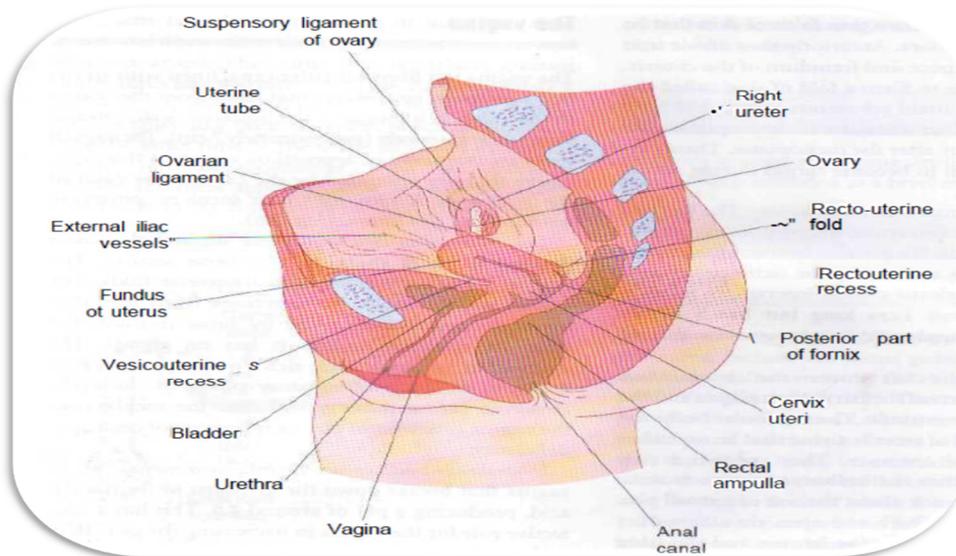
Clitoris: It is a small erectile structure. The body of the clitoris contains two crura, the corpora cavernosa, which are attached to the inferior border of the pubic rami. It is covered by the ischiocavernosus muscle; bulbospongiosus muscle inserts into its root. It is about 1cm long but has a highly developed nerve supply and is very sensitive during sexual arousal.

Vestibule: It is the cleft between the labia minora. The urethra, the ducts of the Bartholin's glands and the vagina open in the vestibule. The vestibular bulbs are two oblong masses of erectile tissue that lie on either side of the vaginal entrance. They contain a rich plexus of veins within the bulbospongiosus muscle.

Bartholin's glands: The size of a small pea. lie at the base of each bulb and open via a 2 cm duct into the vestibule between the hymen and the labia minora. These are mucus-secreting, producing copious amounts during intercourse to act as a lubricant.

Hymen: It is a thin fold of mucous membrane across the entrance to the vagina. There are usually openings in it to allow menses to escape. It is partially ruptured during first coitus and is further disrupted during childbirth. Any tags remaining after rupture are known as carunculae myrtiformes.

The internal reproductive organs



Vagina: It is a fibromuscular canal lined with stratified squamous epithelium that leads from the uterus to the vulva. It is longer in the posterior wall (around 9 cm) than anteriorly (approximately 7 cm). The vaginal walls are normally in apposition, except at the vault, where they are separated by the cervix. The vault of the vagina is divided into four fornices posterior, anterior and two lateral. The midvagina is a transverse slit and the lower portion is an H shape in transverse section. The vaginal walls are rugose, with transverse folds. The vagina is kept moist by secretions from the uterine and cervical glands and by some transudation from its epithelial lining. It has no glands. The epithelium is thick and rich in glycogen, which increases in the postovulatory phase of the cycle. PH of around 4.5The upper posterior vaginal wall forms the anterior peritoneal reflection of the pouch of Douglas. The middle third is separated from the rectum by pelvic fascia and the lower third abuts the perineal body.

Anteriorly, the lip of the vagina is in direct contact with the base of the bladder; the urethra runs down the lower half in the midline to open to the vestibule. Its muscles fuse with the anterior vaginal wall. Laterally, at the fornices, the vagina is related to the attachment at the cardinal ligaments. Below this are the levator ani muscles and the ischiorectal fossae. The cardinal ligaments and the uterosacral ligaments, which form posteriorly from the parametrium, support the upper part of the vagina.

The uterus: Is shaped like an inverted pear, tapering inferiorly to the cervix. In the non-pregnant state is situated entirely within the pelvis. It is hollow and has thick muscular walls. Its maximum external dimensions are approximately 7.5 cm long, 5 cm wide and 3 cm thick. An adult uterus weighs about 70 g. The upper part is termed the body or corpus. The area of insertion of each fallopian tube is termed the cornu. The fundus is the part above the cornu. It tapers to a small central constricted area, the isthmus, and below this is the cervix. The cervix projects obliquely into the vagina and can be divided into vaginal and supravaginal portions. The constriction at the isthmus where the corpus joins the cervix is the anatomical internal os. The site of the histological internal os is where the mucous membrane of the isthmus becomes that of the cervix. The uterus consists of three layers:

- the outer serous Layer(peritoneum)
- the middle muscular layer (myometrium)
- and the inner mucous layer (endometrium).

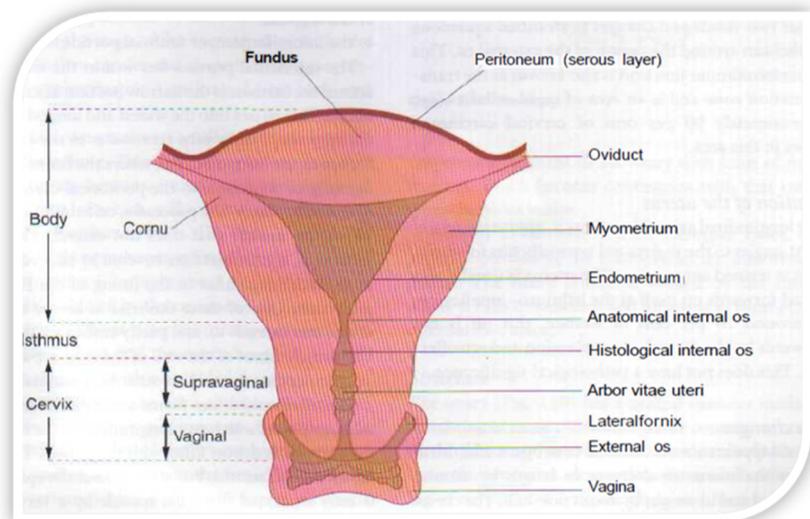
The peritoneum covers the body of the uterus and, posteriorly, the supravaginal portion of the cervix. The serous coat is intimately attached to a subserous fibrous layer except laterally, where it spreads out to form the leaves of the broad ligament. The muscular myometrium forms the main bulk of the uterus and comprises interlacing smooth muscle fibres intermingling with areolar tissue, blood vessels, nerves and lymphatics.

The inner endometrial layer has tubular glands that dip into the myometrium. The endometrial layer is covered by a single layer of columnar epithelium. This epithelium is mostly lost due to the effects of pregnancy and menstruation. The endometrium undergoes cyclical changes during menstruation and varies in thickness between 1 and 5 mm.

The cervix: The cervix is narrower than the body of the uterus. Approximately 2.5 cm in length. Due to anteflexion or retroflexion, the long axis of the cervix is rarely the same as the long axis of the body of the uterus. Anterior and lateral to the supravaginal portion is cellular connective tissue, the parametrium. The posterior aspect is covered by peritoneum of the pouch of Douglas. The ureter runs about 1 cm laterally to the supravaginal cervix. The vaginal portion projects into the vagina to form the fornices. The upper part of the cervix mostly consists of involuntary muscle, whereas the lower part is mainly fibrous connective tissue. The epithelium of the endocervix is cylindrical and is also ciliated in its upper two-thirds and changes to stratified squamous epithelium around the region of the external os. This squamocolumnar junction is also known as the transformation zone and is an area of rapid cell division; approximately 90 per cent of cervical carcinoma arises in this area.

Position of the uterus:

Anteversio when the longitudinal axis of the uterus is, approximately, at right-angles to the vagina and normally tilts forwards. The uterus is usually also flexed forwards on itself at the isthmus - anteflexion. In around 20 per cent of women, this tilt is not forward but backward retroversion and retroflexion.

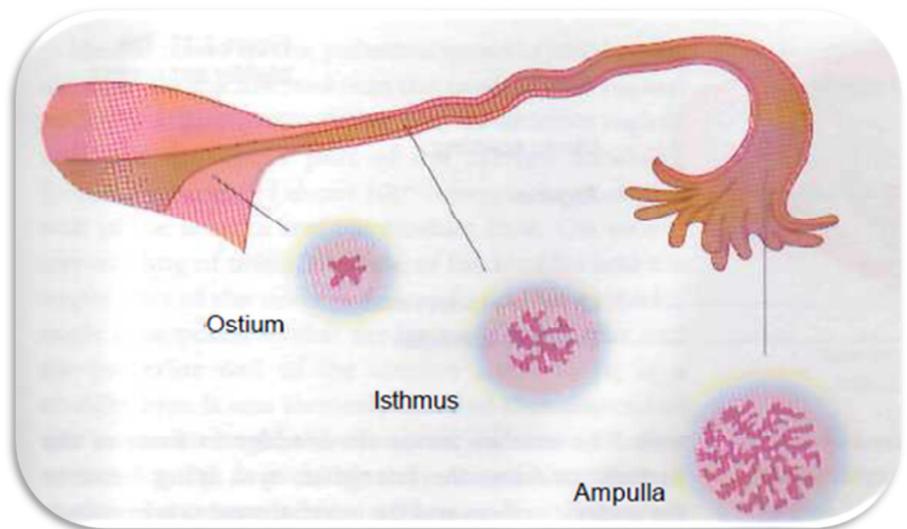


The Fallopian tubes: each tube extends outwards from the uterine cornu to end near the ovary. At the abdominal ostium, the tube opens into the peritoneal cavity, which is therefore in communication with the exterior of the body via the uterus and the vagina. The tubes (oviducts) convey the ovum from the ovary towards the uterus, which provides oxygenation and nutrition for sperm, ovum and zygote should fertilization occur.

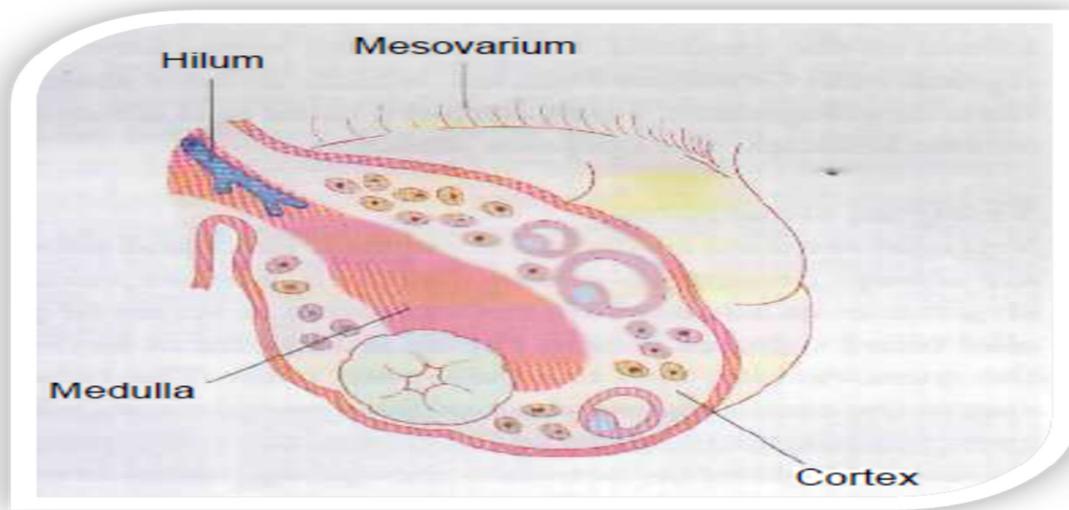
The Fallopian tubes runs in the upper margin of the broad ligament, part of which, known as the mesosalpinx, encloses it so that the tube is completely covered with peritoneum except for a narrow strip along this inferior aspect. Each tube is about 10 cm long and is described in four parts:

1. the interstitial portion lies within the wall of the uterus.
2. the isthmus is the narrow portion adjoining the uterus.
3. the ampulla the widest and longest portion.
4. the infundibulum, or fimbrial portion, the terminal part of the tube, where the funnel-shaped opening of the tube into the peritoneal cavity is surrounded by finger-like processes, called fimbriae.

The inner surfaces of the fimbriae are covered by ciliated epithelium, which is similar to the lining of the Fallopian tube itself. One of these fimbriae is longer than the others and extends to, and partly embraces, the ovary.



The ovary: Is the only intra-abdominal structure not to be covered by peritoneum. Each ovary is attached to the cornu of the uterus by the ovarian ligament, and at the hilum to the broad ligament by the mesovarium, which contains its supply of vessels and nerves. Laterally, each ovary is attached to the suspensory ligament of the ovary with folds of peritoneum, which become continuous with that overlying the psoas major. Anterior to the ovary lie the Fallopian tubes, the superior portion of the bladder and the uterovesical pouch. The ovary is bound behind by the ureter where it runs downwards and forwards in front of the internal iliac artery. In the young adult they are almond shaped, solid, a greyish pink and approximately 3cm long, 1.5cm wide and 1 cm thick. In the child, the ovaries are small structures, approximately 1.5cm long. They have a smooth surface. After the menopause, no active follicles are present and the ovary becomes a small, shrunken structure with a wrinkled surface. The ovary has a central vascular medulla consisting of loose connective tissue containing many elastin fibres and non-striated muscle cells. It has an outer thicker cortex, denser than the medulla, consisting of networks of reticular fibres and fusiform cells, although there is no clear-cut demarcation between the two. The surface of the ovaries is covered by a single layer of cuboidal cells, the germinal epithelium. Beneath this is an ill-defined layer of condensed connective tissue, the tunica albuginea, which increases in density with age.



Vestigial structures: Vestigial remains of the mesonephric duct and tubules are always present in young children, but are variable structures in adults. The epoophoron & the paroophorona series of parallel blind tubules, lies in the broad ligament. The duct of Gartner is a well developed caudal part of the mesonephric duct, running alongside the uterus to the internal os.

The pelvic diaphragm: Is formed by the levator ani muscles. The two muscles, one on either side. Each is a broad, flat muscle, the fibres of which pass downwards and inwards.

The muscle is described in two parts:

1-The pubococcygeus, which arises from the pubic bone and the anterior part of the tendinous arch of the pelvic fascia (white line).

2-The iliococcygeus, which arises from the posterior part of the tendinous arch and the ischial spine.

The muscle arises by a linear origin from:

1-the lower part of the body of the os pubis.

2-the internal surface of the parietal pelvic fascia along the white line.

3-the pelvic surface of the ischial spine.

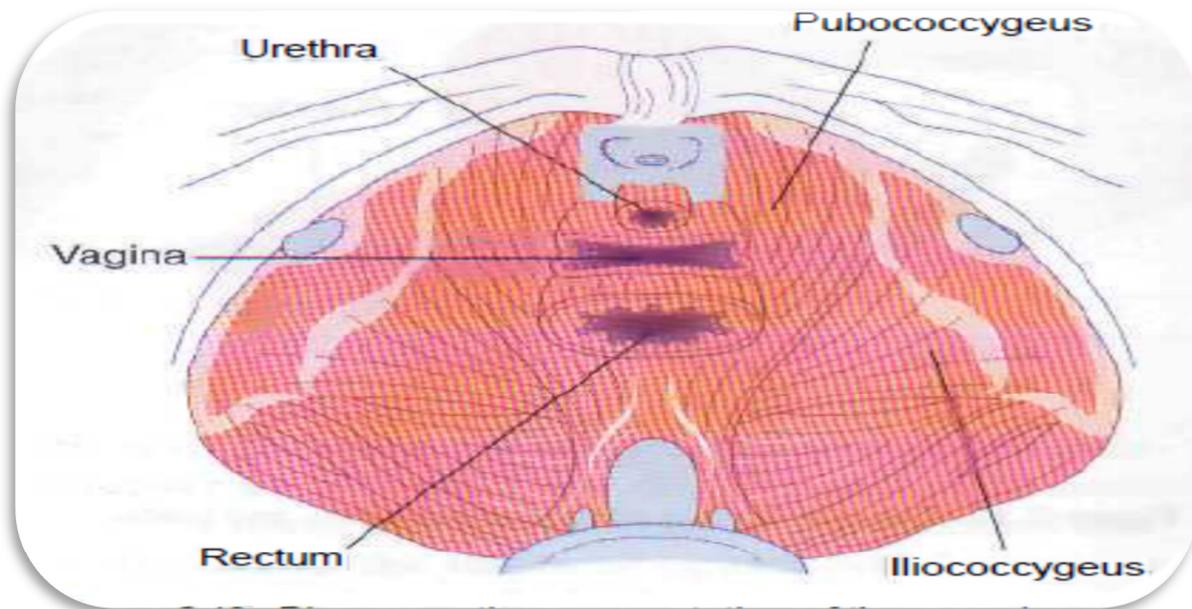
The levator ani muscles are inserted into:

1- the pre-anal raphe and the central point of the perineum where one muscle meets the other on the opposite side.

2- The wall of the anal canal, where the fibres blend with the deep external sphincter muscle.

3- the postanal or anococcygeal raphe, where again one muscle meets the other on the opposite side.

4- the lower part of the coccyx



Urogenital diaphragm:: The urogenital diaphragm (triangular ligament) lies below the levator ani muscles and consists of two layers of pelvic fascia, which fill the gap between the descending pubic rami. The deep transverse perineal muscle (compressor urethrae) lies between the two layers, and the diaphragm is pierced by the urethra and the vagina.

The perineal body: This is the perineal mass of muscular tissue that lies between the anal canal and the lower third of the vagina.

The pelvic peritoneum: The peritoneum is reflected from the lateral borders of the uterus to form, on either side, a double fold of peritoneum - the broad ligament. This is not a ligament but a peritoneal fold, and it does not support the uterus.

The ovarian ligament: lies beneath the posterior layer of the broad ligament and passes from the medial pole of the ovary to the uterus just below the point of entry of the Fallopian tube.

The round ligament : is the continuation of the ovarian ligament and runs forwards under the anterior leaf of peritoneum to enter the inguinal canal, ending in the subcutaneous tissue of the labium majus. Together,

the ovarian and round ligaments are analogous to the gubernaculum in the male.

The cardinal ligaments (transverse cervical ligaments): Provide the essential support of the uterus and vaginal vault. These are two strong, fan-shaped, fibromuscular expansions that pass from the cervix and vaginal vault to the side wall of the pelvis on either side.

The uterosacral ligaments: run from the cervix and vaginal vault to the sacrum. In the erect position they are almost vertical in direction and support the cervix.

The parametrium: is a considerable collection of cellular tissue in the wide base of the broad ligament and at the side of the cervix and vagina.

OTHER PELVIC ORGANS

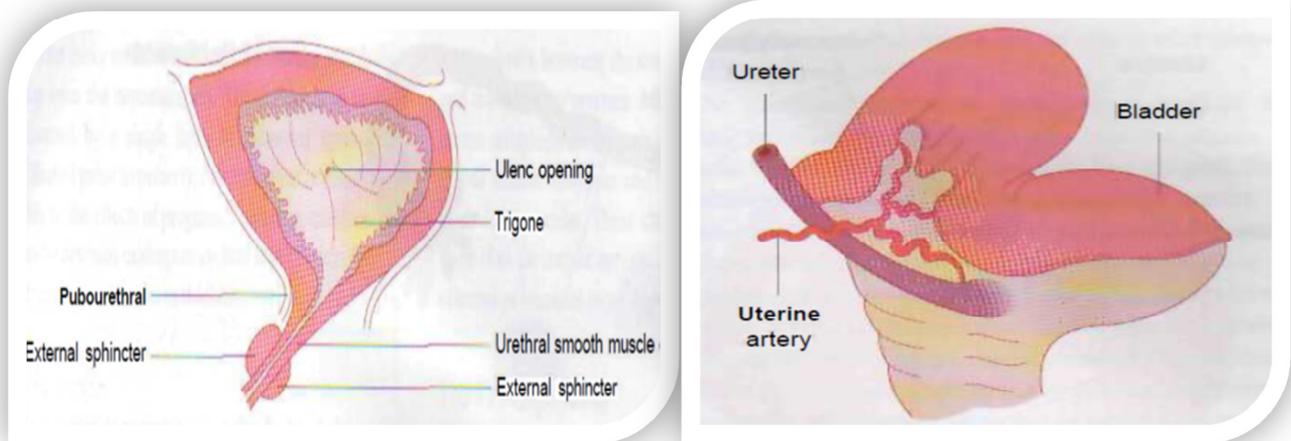
The rectum : extends from the level of the third sacral vertebra to a point about 2.5 cm in front of the coccyx, where it passes through the pelvic floor to become continuous with the anal canal. Its direction follows the curve of the sacrum and it is about 11 cm in length.

The bladder: The average capacity of the bladder is 400mL. Is lined with transitional epithelium. The ureters open into the base of the bladder after running medially for about 1 cm through the vesical wall. The urethra leaves the bladder in front of the ureteric orifices; the trigone is the triangular area lying between the ureteric orifices and the internal meatus. The base of the bladder is related to the cervix, with only a thin layer of connective tissue intervening. It is separated from the anterior vaginal wall below by the pubocervical fascia, which stretches from the pubis to the cervix.

The urethra:- The female urethra is about 3.5 cm long. Has a slight posterior angulation at the junction of its lower and middle thirds. It is lined with transitional epithelium. The smooth muscle of its wall is arranged in outer longitudinal and inner circular layers. As it passes through the two layers of the urogenital diaphragm, it is embraced by the striated fibres of the deep transverse perineal muscle (compressor

urethrae), and some of the striated fibres of this muscle form a loop on the urethra. Between the muscular coat and the epithelium is a plexus of veins.

Ureter: As the ureter crosses the brim of the pelvis it lies in front of the bifurcation of the common iliac artery. It runs downwards and forwards on the lateral wall of the pelvis to reach the pelvic floor, and then passes inwards and forwards, attached to the peritoneum of the back of the broad ligament, to pass beneath the uterine artery. It next passes forwards through the ureteric canal, in the upper part of the cardinal ligament. Finally it runs close to the lateral vaginal fornix to enter the trigone of the bladder.



The relationship of the uterine artery and ureter.

Arteries supplying the pelvic organs:-

A-The ovarian artery:It arises from the aorta just below the renal artery. The artery divides into branches that supply the ovary and tube and then run on to reach the uterus, where they anastomose with the terminal branches of the uterine artery.

B-The superior rectal artery: Is the continuation of the inferior mesenteric artery . It divides into two branches, which run on either side of the rectum and supply numerous branches to it.

C-The internal iliac (hypogastric) artery:- This vessel is about 4cm in length and begins at the bifurcation of the common iliac artery in front of the sacroiliac joint. It soon divides into anterior and posterior divisions; the branches that supply the pelvic viscera are all from the anterior division.

1-The uterine artery : provides the main blood supply to the uterus. The artery crosses above the ureter, at a distance of about 2 cm from the uterus, at the level of the internal OS. On reaching the wall of the uterus, the artery turns upwards to run tortuously to the upper part of the uterus, where it anastomoses with the ovarian artery. The artery supplies a branch to the ureter as it crosses it. Another branch is given off to supply the cervix and upper vagina.

2-The vaginal artery is supplying the vagina.

3-The vesical arteries are supplying the bladder and terminal ureter.

4-The middle rectal artery.

5-The pudendal artery : It leaves the pelvic cavity through the sciatic foramen and, after winding round the ischial spine. enters the ischiorectal fossa, where it gives off the inferior rectal artery. It terminates in branches that supply the perineal and vulval structures, including the erectile tissue of the vestibular bulbs and clitoris.

The pelvic veins

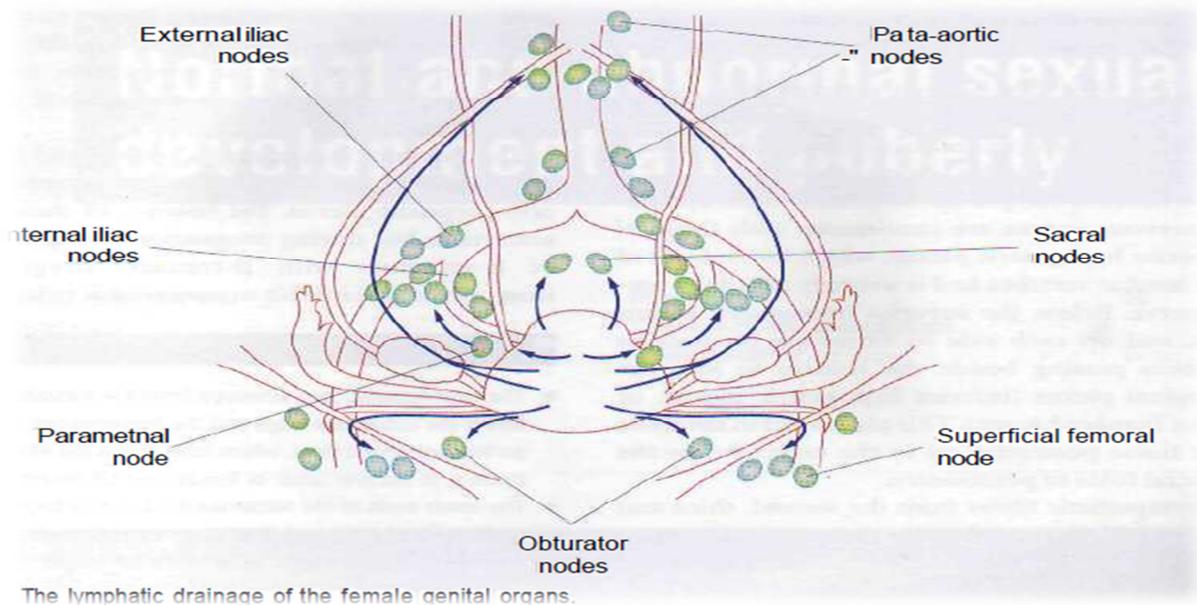
The veins around the bladder, uterus, vagina and rectum form plexuses which intercommunicate freely.

Venous drainage from the uterine, vaginal and vesical plexuses is chiefly into the internal iliac veins.

Venous drainage from the rectal plexus is via the superior rectal veins to the inferior mesenteric veins, and the middle and inferior rectal veins to the internal pudendal veins and so to the iliac veins.

The ovarian veins on each side begin in the pampiniform plexus that lies between the layers of the broad ligament, that on the right ends in the inferior vena cava and that on the left in the left renal vein.

The pelvic lymphatics drainage is shown in this figure



Nerves of the pelvis

1-Nerve supply of the vulva and perineum:

The pudendal nerve arises from the second, third and fourth sacral nerves. As it passes along the outer wall of the ischiorectal fossa, it gives off an inferior rectal branch and divides into the perineal nerve and the dorsal nerve of the clitoris.

The ilioinguinal and genitofemoral nerves, to the first lumbar carrying the sensory fibres from the mons and labia.

The posterior femoral cutaneous nerve carries sensation from the perineum to the small sciatic nerve, and thus to the first, second and third sacral nerves.

The main nerve supply of the levator ani muscles; comes from the third and fourth sacral nerves.

2-Nerve supply of the pelvic viscera:

-Nerve fibres of the pre-aortic plexus of the sympathetic nervous system of the superior hypogastric plexus.

-Parasympathetic fibres from the second, third and fourth sacral nerves.

THANK YOU & GOOD LUCK