Anatomy Of The Female Genital System

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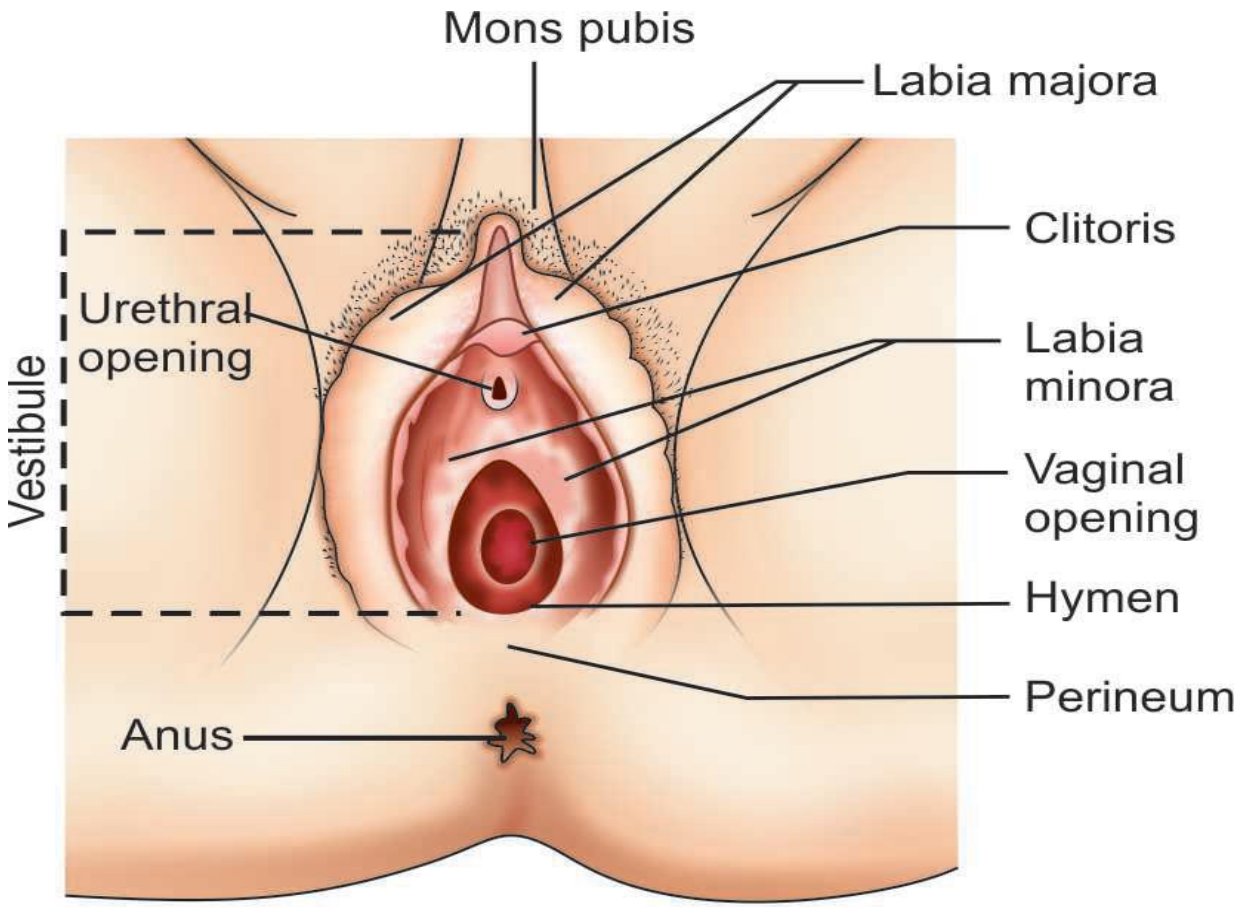
- OBSTETRICS & GYNAECOLOGY (JBOG)

External Female Structures

- **Mons Pubis.**
- **Labia Majora & Minora.**
- **Clitoris.**
- **Vestibule.**
- **Perenium.**



External Genatalia

- All the structures which are visible externally, surrounding the **urethral and vaginal openings**, make the external female genitalia.
- These structures are collectively named ***the vulva***.
- The boundaries of vulva include the mons pubis anteriorly, the rectum posteriorly, and the genitocrural folds (thigh folds) laterally.
- The vulva consists of the following organs: mons pubis, labia minora and majora, hymen, clitoris, vestibule, urethra, Skene glands,greater vestibular (Bartholin) glands, and vestibular bulbs.

Internal Genitalia

1. Vagina
2. Uterus
3. Fallopian tubes
4. Ovaries

Structures closely related to genital structures are:

1. Urethra and urinary bladder
2. Ureter
3. Pelvic colon
4. Rectum and anus.

The vulva

The vulva is the external female genitalia and is composed of:

Mons pubis: The mons pubis is a thick,hair-covered, fatty and semi-rounded area overlying the symphysis pubis.

The function of the fatty tissue in the mons pubis is to protect the woman's pubic area from injury during intercourse.

Labia Majora:

The labia majora are two elongated, hair-covered, fatty skin folds that enclose and protect the other organs of the external female genitalia.

They contain *apocrine, sebaceous and sweat gland*.

They are analogous to the male scrotum.

Labia Minora:

- ***The labia Minora*** are two thick skin folds that contain no fat or hair.
- They **protect** the opening of the vagina and the urethra.
- The labia Minora normally have an elastic nature, which enables them to distend and contract during sexual activity, and labour and delivery.
- The labia Minora enclose the clitoris anteriorly.
- They also enclose the vagina and fused posteriorly forming the fourchette.
- The labia Minora are homologous to the male penile urethra.

The Vestibule :

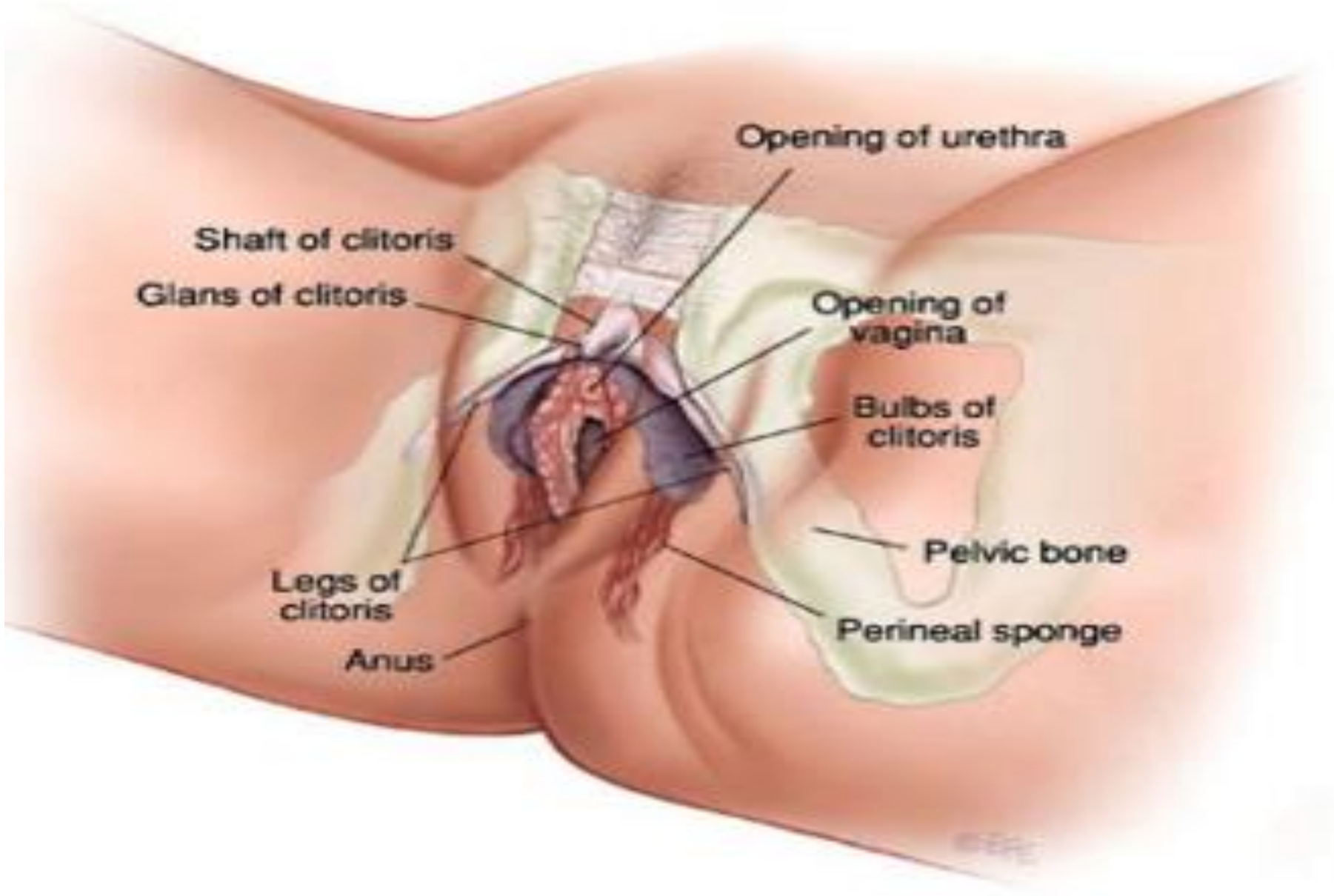
The vestibule is the area between the labia Minora, and consists of the clitoris, urethral opening and the vaginal opening.

The clitoris is a short (2 cm) erectile organ at the top of the vestibule, which has a very rich nerve supply and blood vessels.

The clitoris is made up of **2 Crura**, which attach to the periosteum of the Ischiopubic rami.

Its function is sexual excitation and it is ***very sensitive to touch***.

Its anatomical position *is similar* to the position of the male penis.


Opening of urethra
Shaft of clitoris
Glans of clitoris
Opening of vagina
Bulbs of clitoris
Pelvic bone
Legs of clitoris
Perineal sponge
Anus

The Urethral Opening

The urethral opening is the opening of the urethra, which is a small tubular structure that drains urine from the bladder.

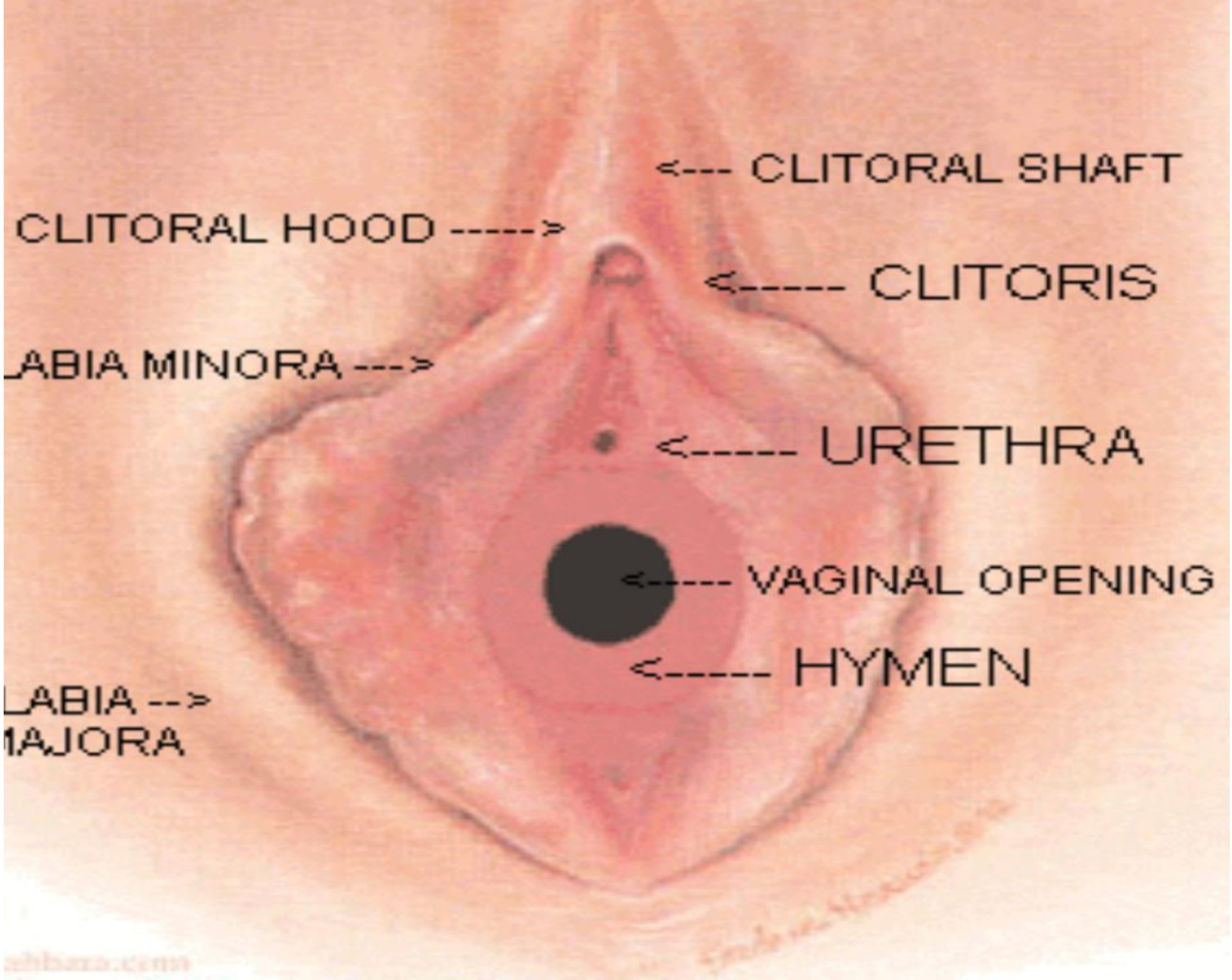
A female urethra ranges in length from **3.5 to 5.0 cm** (*average 4 cm*).

The vaginal opening is the entrance to the vagina.

Hymen is a thin and incomplete membrane covering the vaginal orifice in a virgin.

A woman with intact hymen is said **to be virgin**.

TO BE CONTINUED..


<--- CLITORAL SHAFT
CLITORAL HOOD ----->
<----- CLITORIS
ABIA MINORA --->
<----- URETHRA
<----- VAGINAL OPENING
<----- HYMEN
ABIA -->
AJORA

CONTINUATION

The hymen has **one or more openings**.

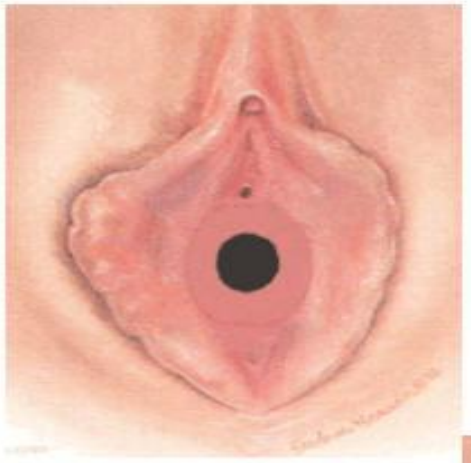
The hymenal openings can be annular, crescent, septate or cribriform.

The hymenal opening allows **menstrual blood to escape during menstruation.**

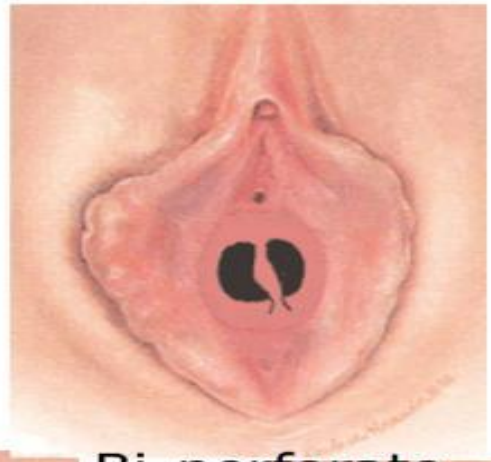
The hymen is torn during **intercourse and/or child birth**.

The tags of torn hymen are known as **‘curunculae myrtiformes’.**

Types of hymen



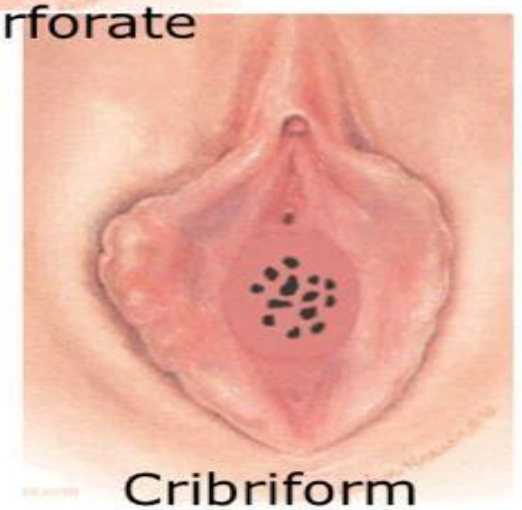
Virgin



Bi-perforate

imperforate

Deflorated



Cribriform

Bartholin’s gland and Skene’s gland:

Bartholin’s glands are responsible for secreting lubrication to the vagina, with openings just outside the hymen, bilaterally, at the posterior aspect of the vagina.

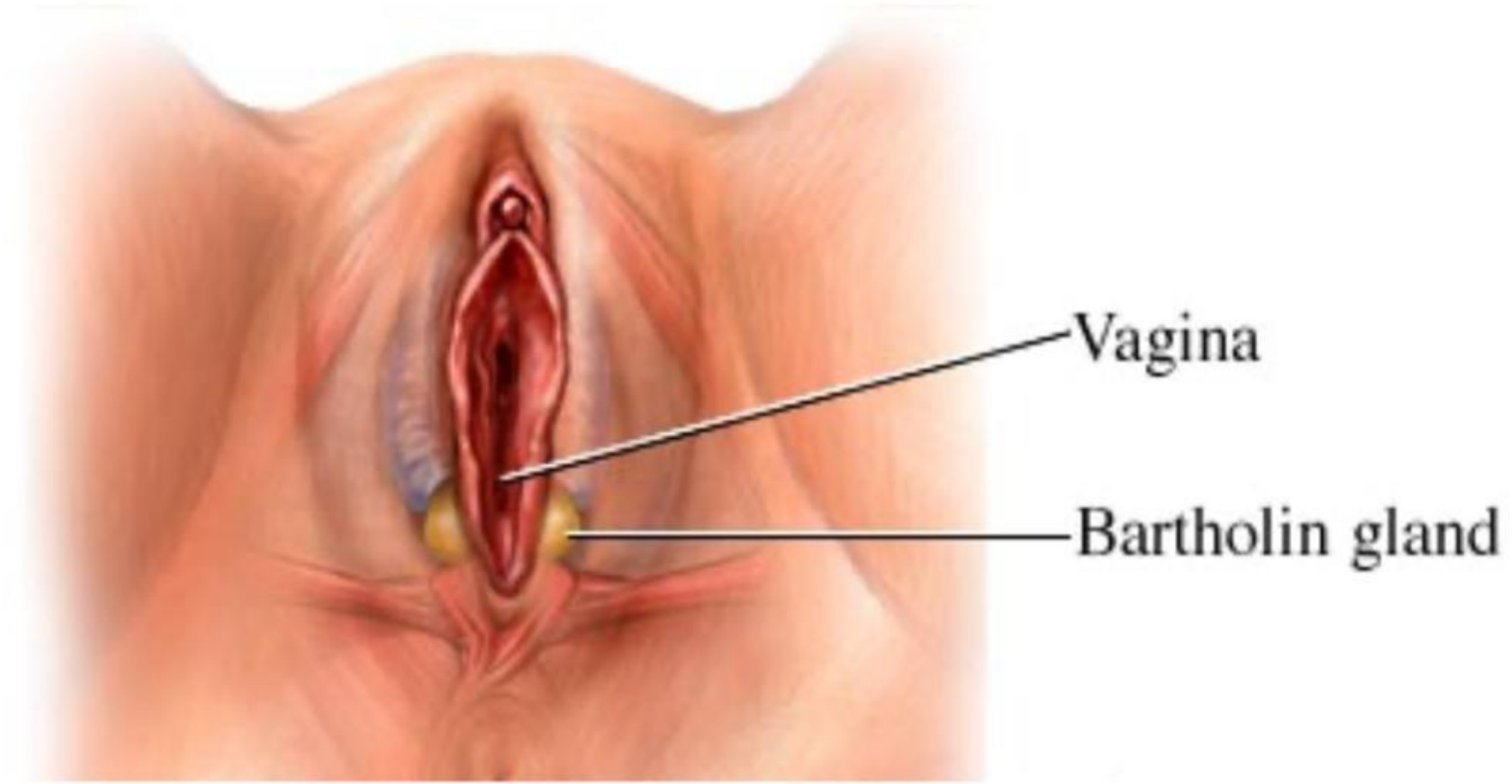
Each gland is small, similar in shape to a kidney bean.

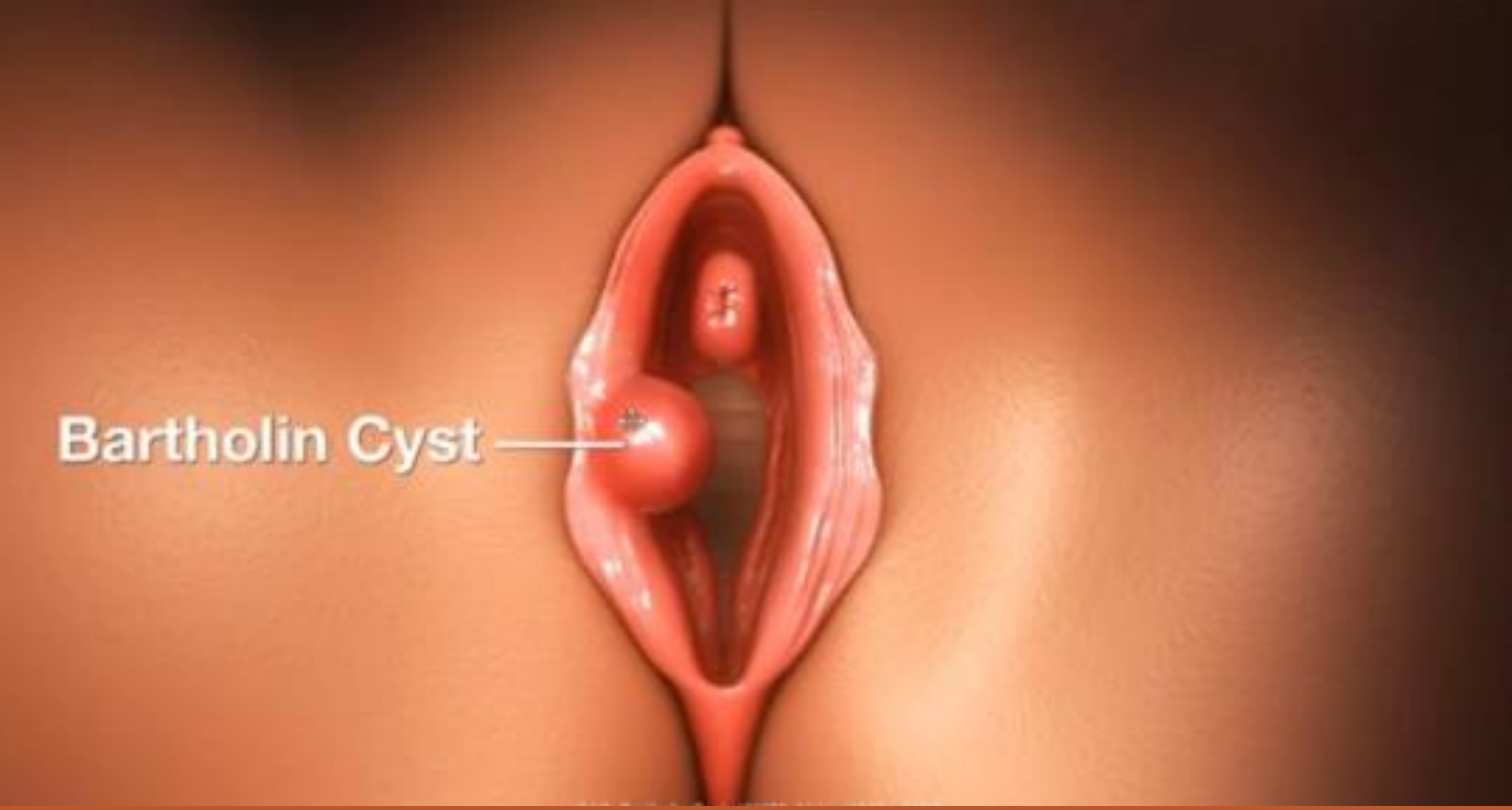
The Bartholin’s duct is homologous to male Cowper’s duct.

The Skene’s glands also secrete lubrication at the opening of the urethra.

Vestibular bulbs:

The vestibular bulbs are **2 masses of erectile tissue** that lie deep to the bulbocavernosus muscles bilaterally.


Vagina
Bartholin gland


Bartholin Cyst

Perineum

The skin-covered muscular area between ***the vaginal opening and the anus*** is called the perineum.

It has strong muscles and its own nerve supply, and it helps to support the **contents of the pelvic cavity**.

Vulval Blood supply & Lymphatic drainage

The vulva is highly vascularised and it gets its blood supply from:

1. Vaginal artery which is a branch of internal iliac artery.
2. Superficial pudendal artery which is a branch of the femoral artery.
3. **Vulval lymphatic drainage:** The main drainage site of the vulva is the superficial inguinal lymph nodes.
4. The lymphatic drainage extends to the deep inguinal lymph nodes, then to external iliac lymph nodes and the common iliac lymph nodes.
5. There is a contralateral lymphatic drainage of the labia.

Internal female Genitalia

Vagina:

The vagina is the tube like passage connecting the vulva and the uterus.

The vagina is lined with rugae which allow it to expand during sexual intercourse and childbirth.

The structure of the vagina is a network of connective, membranous, and erectile tissues.

The vagina is always moist, the fluid being derived from cervical secretions and Bartholin's glands.

This fluid has an acidic reaction (**pH 3.5–4.5**) making it capable of resisting infection .

The vagina is divided into four areas in relation to the cervix.

The four vaginal areas are called fornices.

1. Anterior fornix is shallowest of the fornices and the length of anterior vaginal wall measures around 7.5–9 cm in an adult female.

2. Posterior fornix is the deepest of all fornices and the length of posterior vaginal wall measures around 9–11 cm in adult female

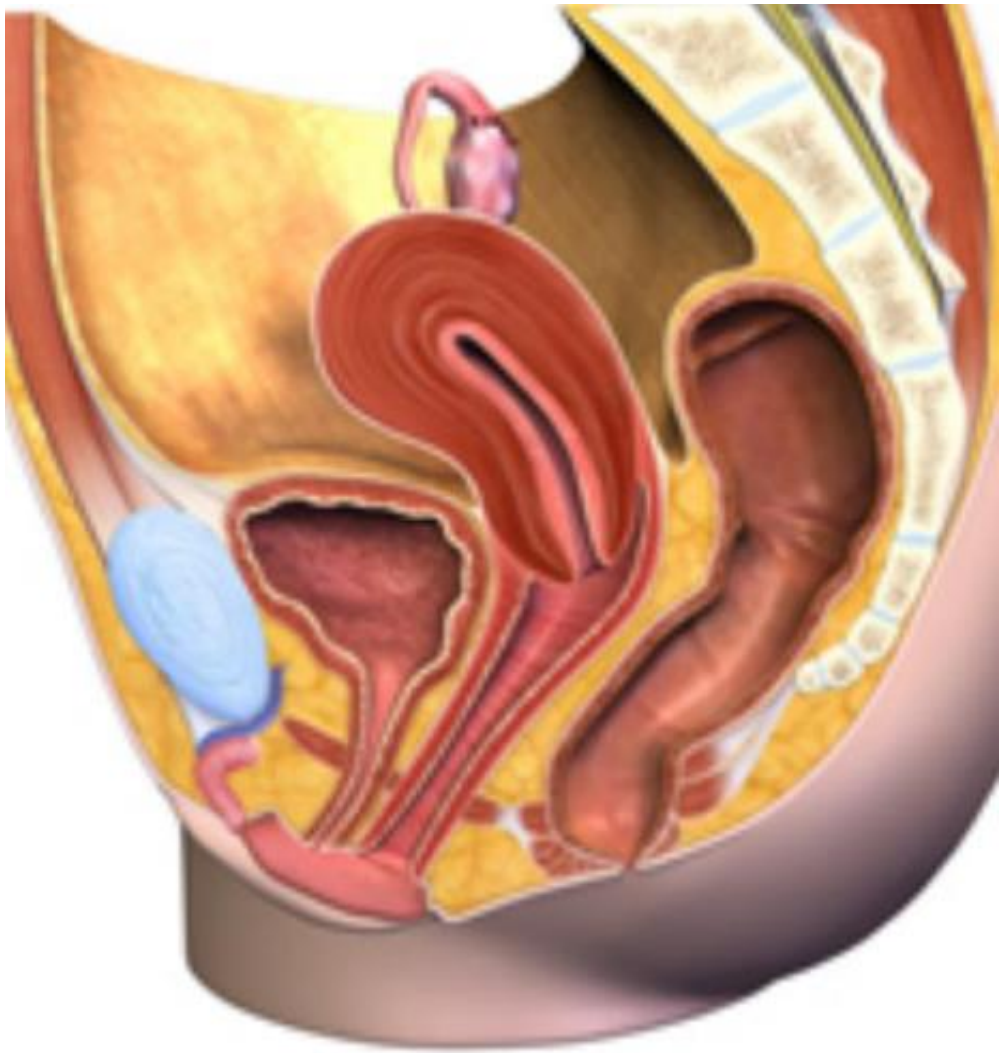
3. Two lateral fornices

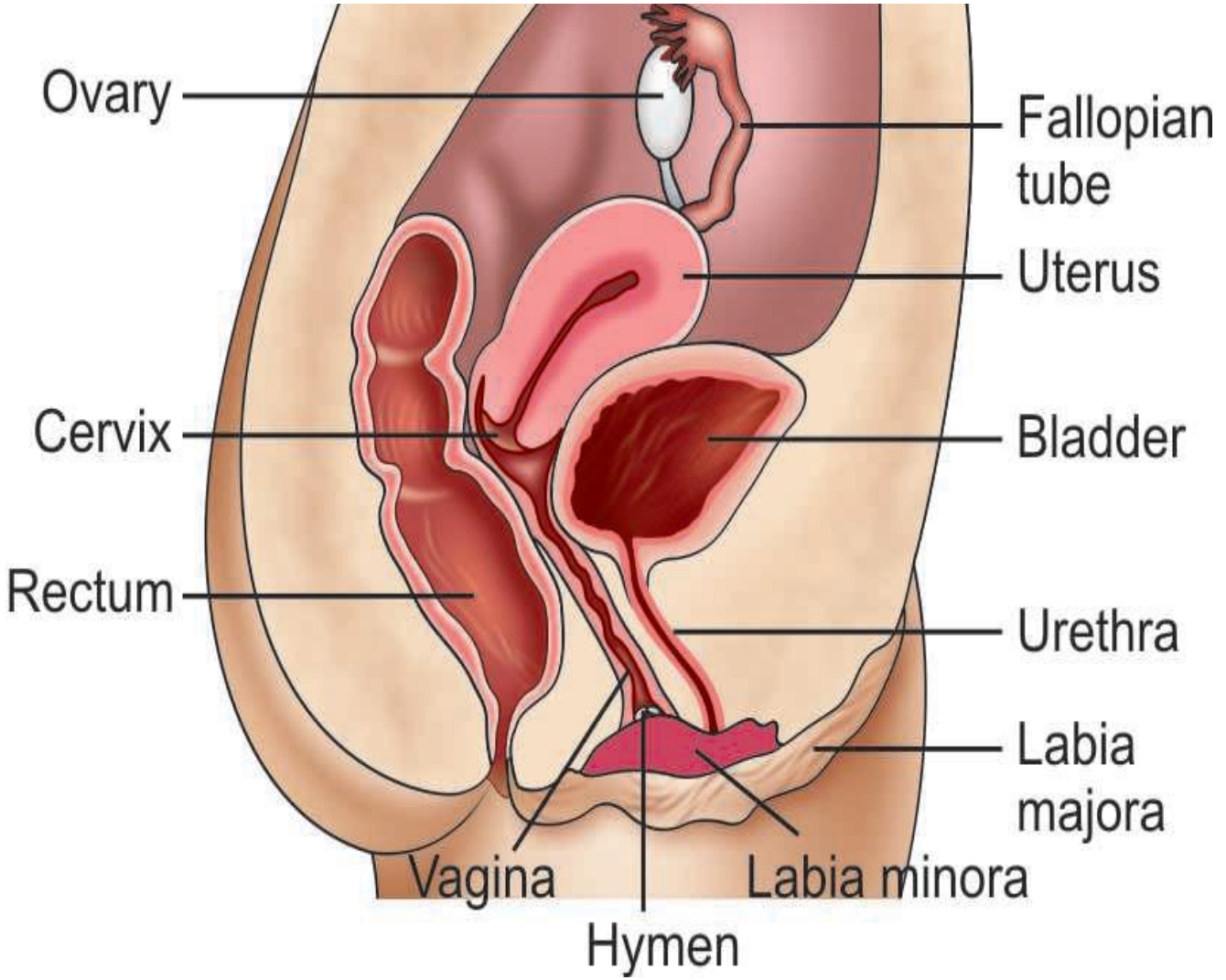
The relationship of the vagina with surrounding structures is :

1. Anteriorly there is the urethra and urinary

bladder.

2. Posteriorly there is perineal body, rectum and peritoneum of the Pouch of Douglas.




Ovary
Fallopian tube
Uterus
Cervix
Bladder
Rectum
Urethra
Labia majora
Vagina
Labia minora
Hymen

CONTINUATION

3. Laterally there are sphincter vaginae **(pubococcygeal muscles act as a sphincter for the vagina**), Levator ani muscles, Bartholin's glands.

The lateral fornix of the vagina is related to the ureter and uterine artery.

4. Superiorly is the cervix.

The vagina has three functions:

1. It is a receptacle for the penis, where sperm are deposited during sexual intercourse.

2. It is the outlet for the menstrual flow every month in the non-pregnant woman.

3. It is the passage way down which the baby passes at birth.

Vaginal blood ,lymphatic & nerve

Vaginal blood supply:

The vagina gets its blood supply from the vaginal artery, branches of the pudendal artery and twigs from middle and inferior rectal artery.

Vaginal lymphatic drainage: The lower one third of vagina has the same lymphatic drainage as the vulva while upper two-thirds have the same lymphatic drainage as that of cervix.

Nerve supply of vagina:

The nerve supply to the vagina is primarily from the autonomic nervous system.

Sensory fibers to the lower vagina arise from the pudendal nerve, and pain fibers are from sacral nerve roots.

The uterus

- The uterus is the thick walled, hollow pear shaped female reproductive organ that lies within the pelvis between the bladder and the rectum.
- **In an adult female it is 9 cm long, 3 cm thick and 6 cm broad at its widest part.**
- The average weight of a non pregnant, nulliparous uterus is approximately **40–50 g**.
- A multiparous uterus may weigh slightly more than this, *with an upper limit of approximately 110 g.*
- A menopausal uterus is small and atrophied and typically ***weighs much less.***

The uterus can be divided into 3 parts:

- **Body:**

The major portion, which is the upper two-thirds of the uterus (corpus uteri).

Body extends from the fundus to a constriction known as the isthmus which corresponds with internal os of cervical canal.

- **Fundus:**

The domed area at the top of the uterus, above the insertion of the two fallopian tubes.

Cervix:

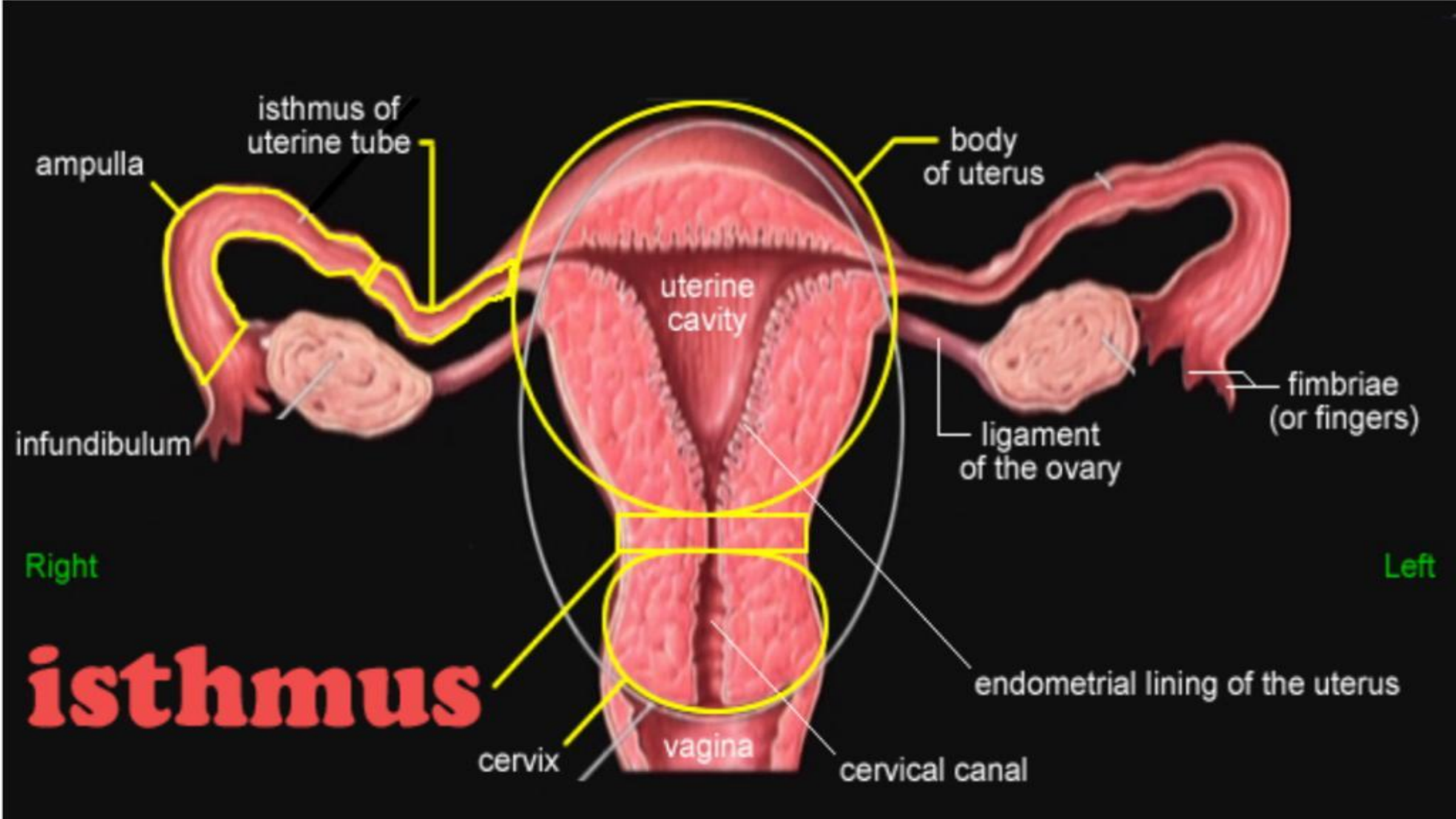
Cervix lies below the isthmus.

The cervix may be subdivided in two parts:

1. A supravaginal portion superior to the limits of the vagina and
2. A vaginal portion, which projects into the cavity of the vagina.

The region between the body and cervix is referred to as the isthmus, a short area of constriction.

During pregnancy, it is known as the **“lower uterine segment.”** The cavity of the isthmus is called the **“internal os.”**


isthmus of
uterine tube
ampulla
body
of uterus
uterine
cavity
fimbriae
(or fingers)
infundibulum
ligament
of the ovary
Right
Left
isthmus
endometrial lining of the uterus
cervix
vagina
cervical canal

▪ The wall of the uterus has three layers of tissue.

The wall of the uterus has three layers of tissue.

The perimetrium:

The outermost thin membrane layer covering the uterus.

The myometrium:

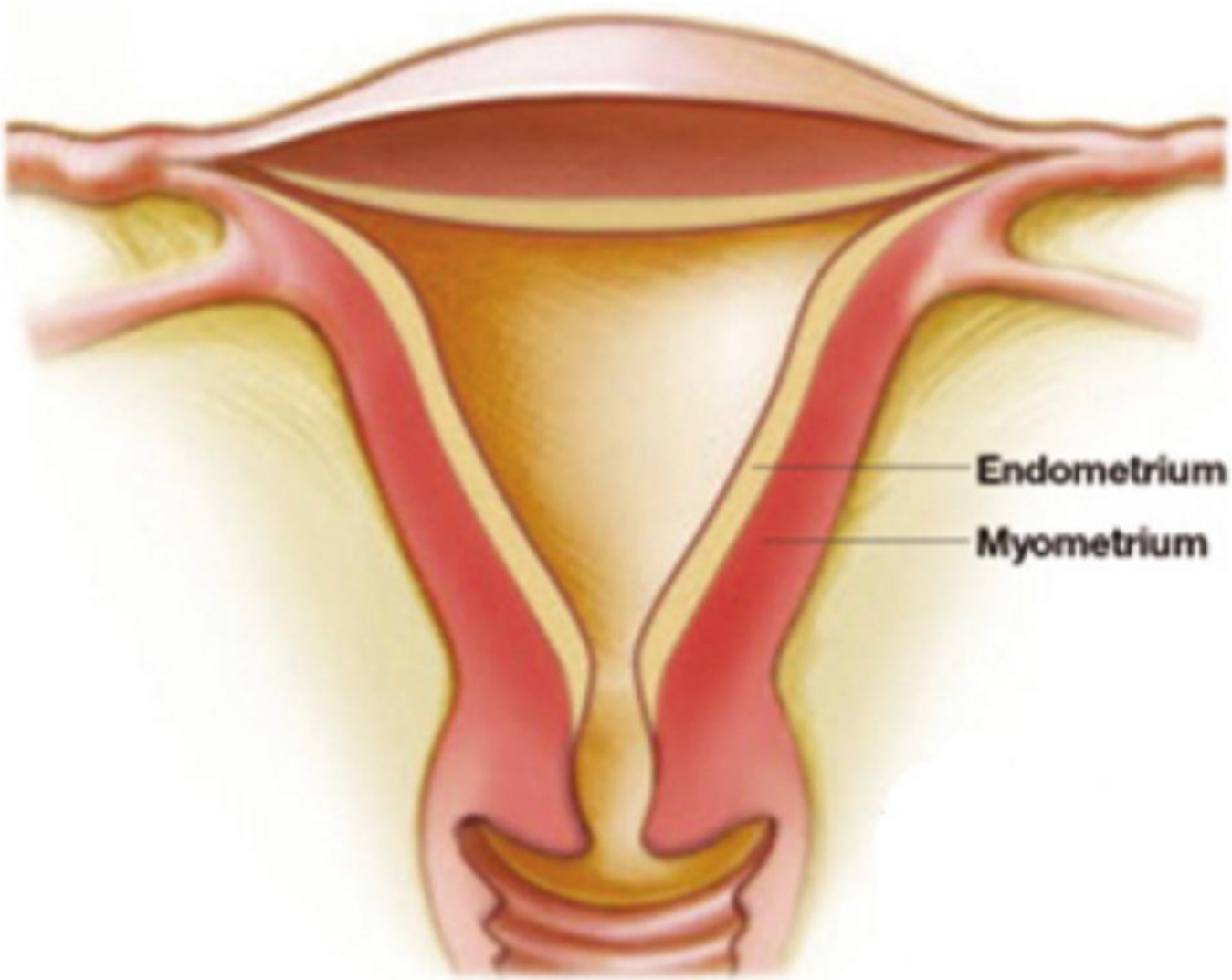
The thick, muscular, middle layer.

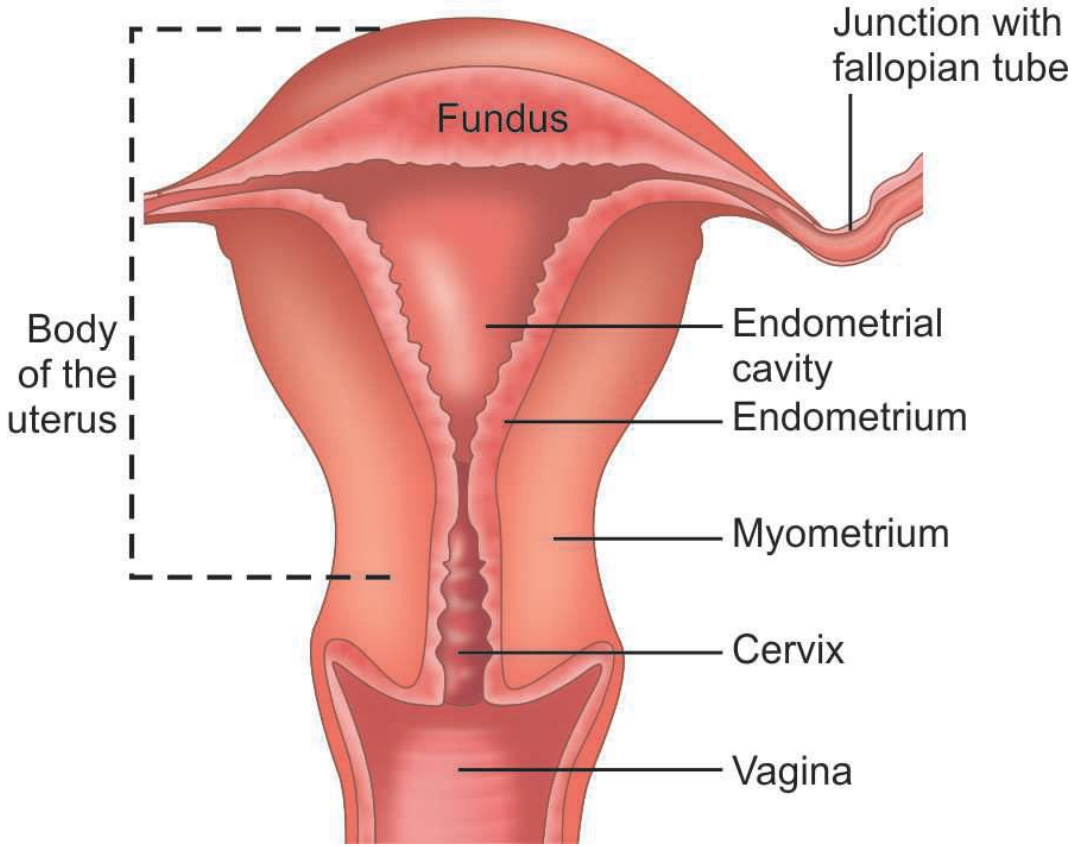
The endometrium:

The thin, innermost layer of the uterus, which thickens during the menstrual cycle.

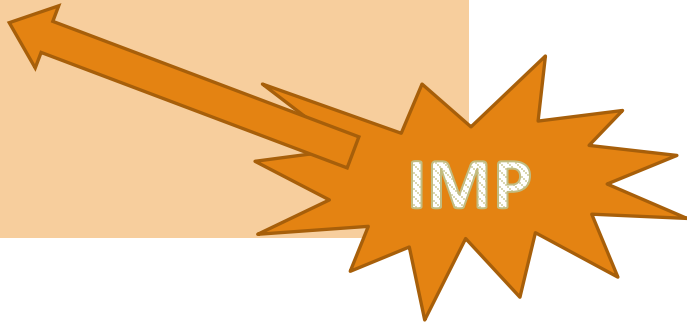
This is the tissue that builds up each month in a woman of reproductive age, under the influence of the female reproductive hormones.

There are two layers :a superficial functional layer which is shed monthly and a basal layer which is not shed and from which new functional layer is regenerated.


Endometrium
Myometrium

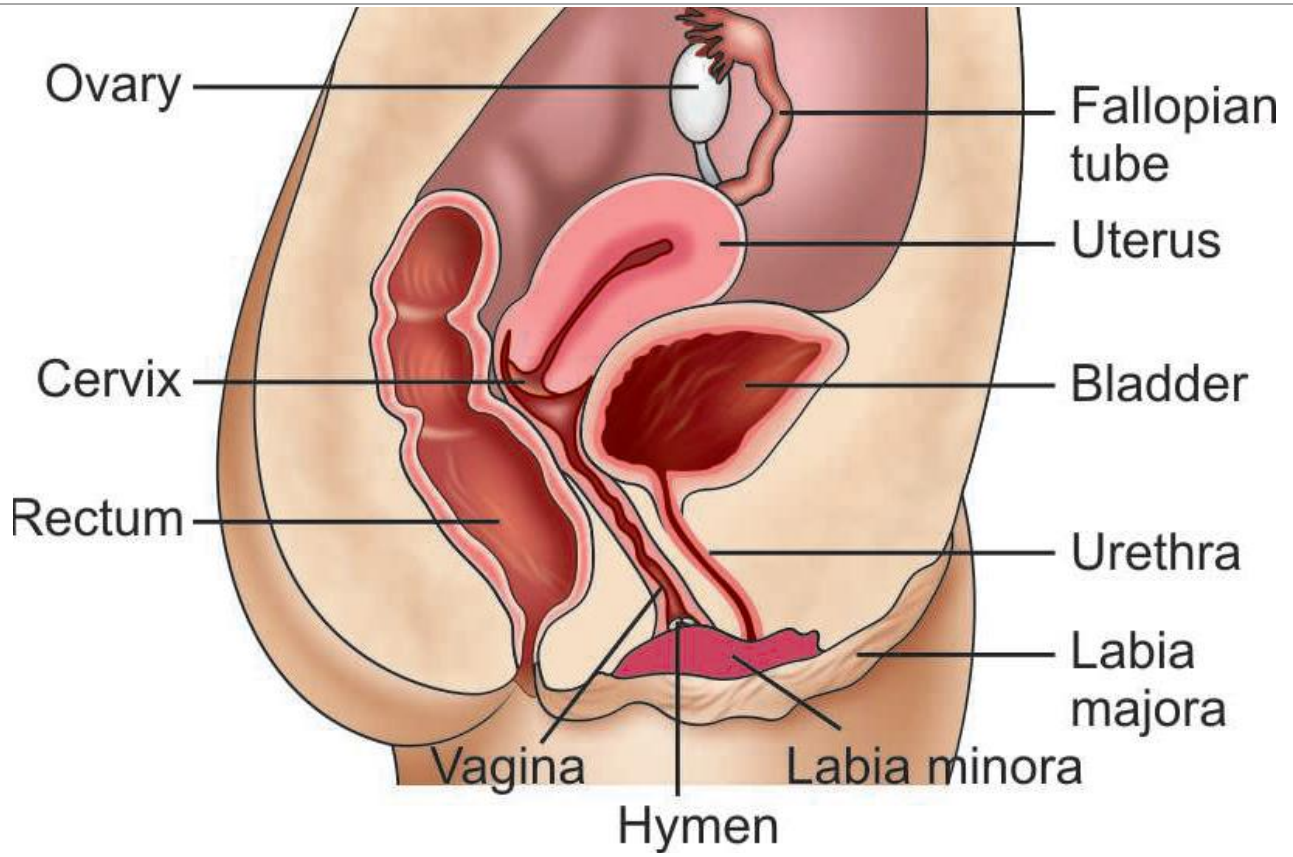

Junction with
fallopian tube
Fundus
Body
of the
uterus
Endometrial
cavity
Endometrium
Myometrium
Cervix
Vagina

- The cavity of the uterus is flattened and triangular and is around 6–7 cm in length.
- The uterine tubes enter the uterine cavity bilaterally in the superolateral portion of the cavity.
- The body of the uterus is usually angled forward in relation to the cervix (***anteflexion***), while the uterus and cervix as a whole lean forward from the upper vagina (***anteversion***).
- The normal anatomical position of uterus is anteflexion and anteversion.
- In about **15%** women the uterus is ***retroverted*** and in most instances retroversion is an asymptomatic variant of normality.



- The peritoneum is reflected from the front of uterus over the superior surface of bladder and forms the uterovesical pouch.
- The posterior surface of the uterus is completely covered by peritoneum, which passes down over the posterior fornix of the vagina into the pouch of Douglas.
- Anteriorly peritoneum **is reflected off the uterus at a much higher level into the superior surface of bladder.**
- **The relationship of the uterus to its surrounding organs is as follows:** Anteriorly there is the uterovesical peritoneum and urinary bladder.
- Posteriorly there is pouch of Douglas and coils of intestine .
- Laterally is the parametrium.
- Uterine artery crosses over the ureter **(water under the bridge) 2 cm** lateral to the cervix.

- **Superiorly there are coils of intestine and omentum.**
- **Inferiorly is the vagina.**



Blood supply &Lymphatic drainage

Blood supply of the uterus:

The uterus gets its main blood supply from the uterine artery which is branch of anterior division of internal iliac artery.

The ovarian artery which is a branch of the abdominal aorta also nourishes the uterus.

The arteries anastomose along the fallopian tube.

Lymphatic Drainage

From the fundus and upper part of the body

1. Most of the lymphatic vessels drain into pre-aortic and lateral aortic lymph nodes following the ovarian blood vessels.

2. A few lymphatic vessels from lateral angles drain into superficial inguinal lymph nodes passing along the round ligamants of uterus.

Uterine supports

- **Uterine supports which prevent the uterus from prolapsing, are seen in pairs:**

The cardinal ligaments, also known as transverse cervical ligaments or Mackenrodt's ligaments.

These are strongest of all uterine supports.

The cardinal ligaments are essentially dense condensations of connective tissue around the venous and nerve plexuses which extends from the pelvic side walls toward the genital tract.

Medially they are firmly fused with the fascia surrounding the cervix and upper part of the vagina.

They pass upwards and backwards towards the root of the internal iliac vessel.

These condensation of fibrous and elastic tissue, together with plain muscle fibers, are sometimes referred a parametrium.

They support the upper vagina and cervix, helping to maintain, anteflexion.

Inferiorly they are continuous with the fascia on the upper surface of the levator ani muscle.

Uterosacral ligaments:

- The uterosacral ligaments pass upwards and backwards from the posterior aspect of the cervix toward the lateral part of the second piece of the sacrum.
- In their lower part they contain plain muscle along with fibrous tissue and autonomic nerve fibres.
- In their upper part they dwindle to shallow peritoneal folds
- The ligaments divide the pouch of Douglas from the para rectal fossa from each side.

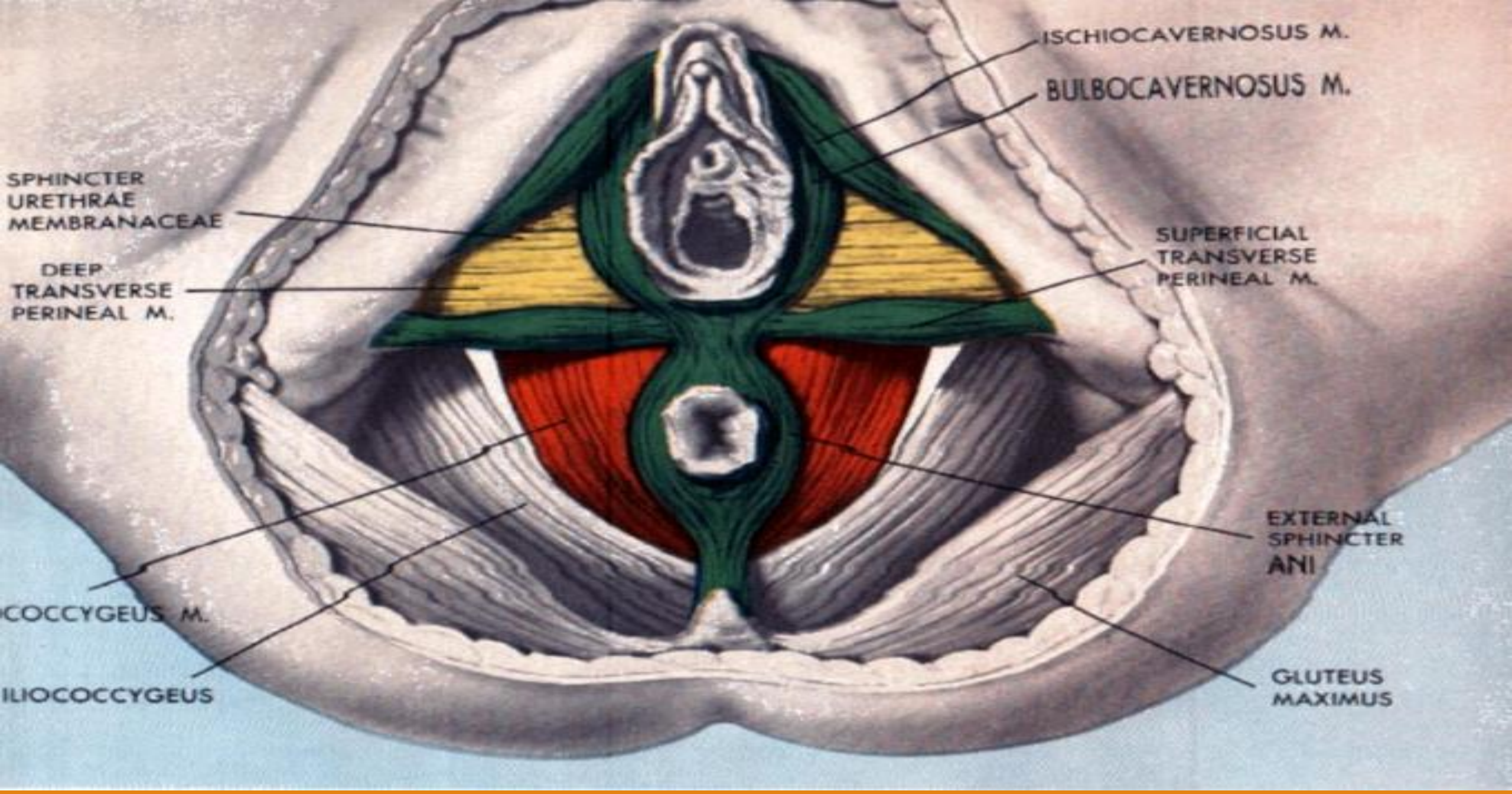
Pubocervical ligaments are the weakest.

These are a pair of thin fibrous bands which extend from the cervix to the pubic bones along the infero lateral surfaces of the bladder.

The ligaments pull the cervix forward countering the pull of uterosacral ligament backwards.

Apart from the above mentioned ligaments there are other ligaments, the **round ligaments** (**Prevent the uterus from axial rotation and maintain its anteflexion state**) and the **broad ligaments** through which blood vessels nourishing the uterus and fallopian tubes pass.

The **levator ani** muscles which act as pelvic floor support and prevent the uterus from prolapsing.


ISCHIOCAVERNOSUS M.
BULBOCAVERNOSUS M.
SPHINCTER URETHRAE MEMBRANACEAE
DEEP TRANSVERSE PERINEAL M.
SUPERFICIAL TRANSVERSE PERINEAL M.
EXTERNAL SPHINCTER ANI
COCCYGEUS M.
ILIOCOCCYGEUS
GLUTEUS MAXIMUS

The cervix

The cervix connects the uterus and vagina, and projects into the upper vagina.

The ‘gutter’ surrounding the projection comprises the vaginal fornices—lateral, anterior and posterior.

The cervix is 2.5 cm long.

Vaginal part is **1.25 cm** and supravaginal part is **1.25 cm**.

The endocervical canal is fusiform in shape between the external and internal os.

After child birth external os looses its circular shape and resembles a transverse slit.

The epithelial lining of the canal is a columner mucous membrane with an anterior and posterior longitudinal ridge.

There are numerous glands secreting mucus which becomes more abundant and less viscous at the time of ovulation in mid cycle.

The vaginal surface of the cervix is covered with stratified squamous epithelium.

The squamo columner junction commonly does not correspond to the anatomical os.

This ‘tidal zone’ within which epithelial junction migrates at different stages of life, is termed the **transformation zone** .

The shifting of the squamo columner junction is influenced by the estrogenic stimulation.

In cases , **where the cervix has under gone deep bilateral laceration during childbirth, the resulting anterior and posterior lips tend to evert, exposing the glandular epithelium of the canal widely.**

This appearance is termed **ectropion.**

Lymphatic Drainage of cervix

On each side the lymphatic drain in three directions:

a. Laterally some vessels pass through parametric tissue and drain into external iliac and obturator lymph nodes.

A few lymphatic vessels are intercepted by para cervical lymph nodes which are situated at the crossing of the ureter and uterine artery.

b. Posterolaterally, the lymphatics pass along the lateral pelvic wall and drain into internal iliac nodes.

c. Posteriorly some of the lymphatics pass along the uterosacral ligaments and drain into sacral lymph nodes.

Fallopian tubes

There are two fallopian tubes each of which measures about **10 cm** long.

Each fallopian tube is divided in four major parts:

Interstitial portion is the part of fallopian tube (**1.25 cm**) which is within uterine muscle.

The interstitial portion opens into the uterine cavity.

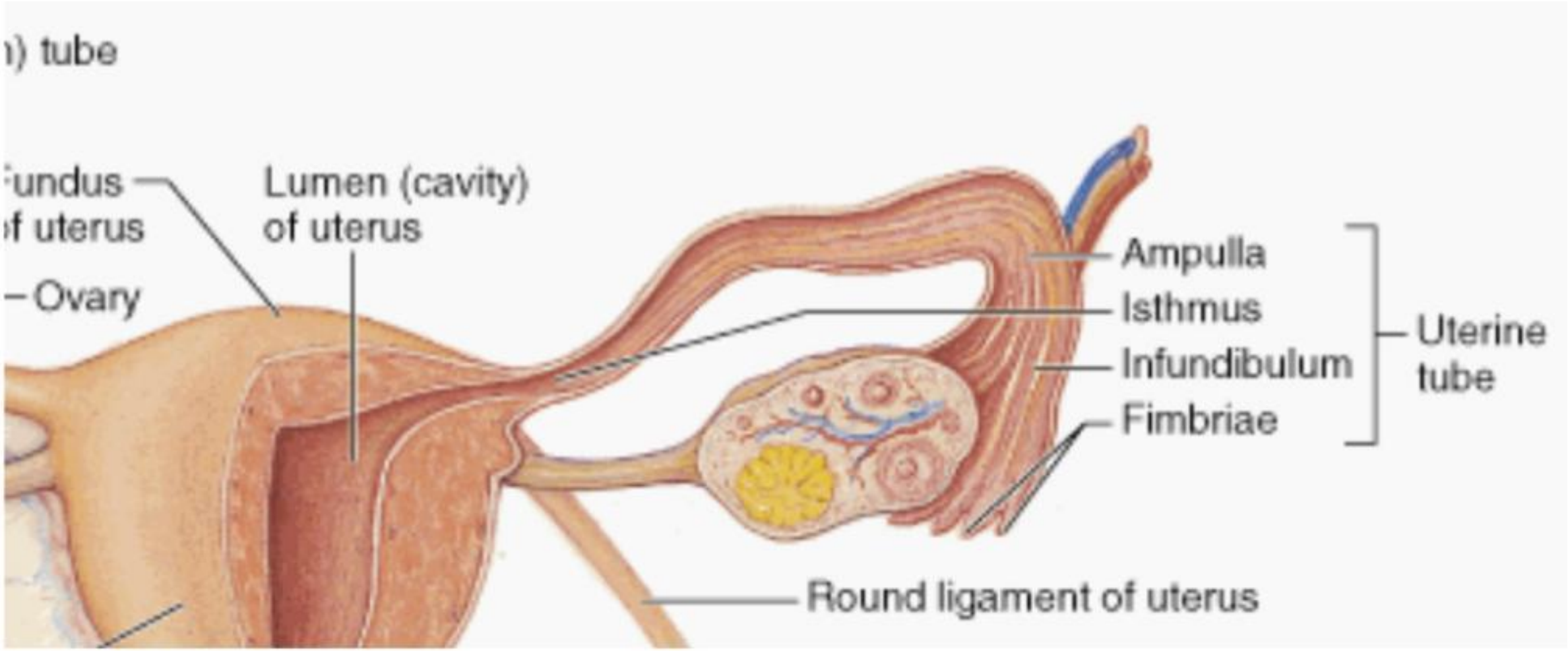
It is the narrowest part of the fallopian tube.

The isthmus extending out of the cornu for about **2.5–3 cm** is also narrow.

Ampulla: It is thin walled, dilated and tortuous, and measures about ***5 cm***.

Infundibulum: It is trumpet like and about **1.25** cm long.

The bottom of the infundibulum presents pelvic ostium, then circumference of which is provided within the fimbriae.


) tube
undus
f uterus
Ovary
Lumen (cavity)
of uterus
Ampulla
Isthmus
Infundibulum
Fimbriae
Uterine
tube
Round ligament of uterus

Blood supply

- The fallopian tube has a dual blood supply,
- The medial half from the tubal branch of uterine artery and lateral half from the tubal branch of ovarian artery.

The ovary

- The ovaries form the gonads of the female.

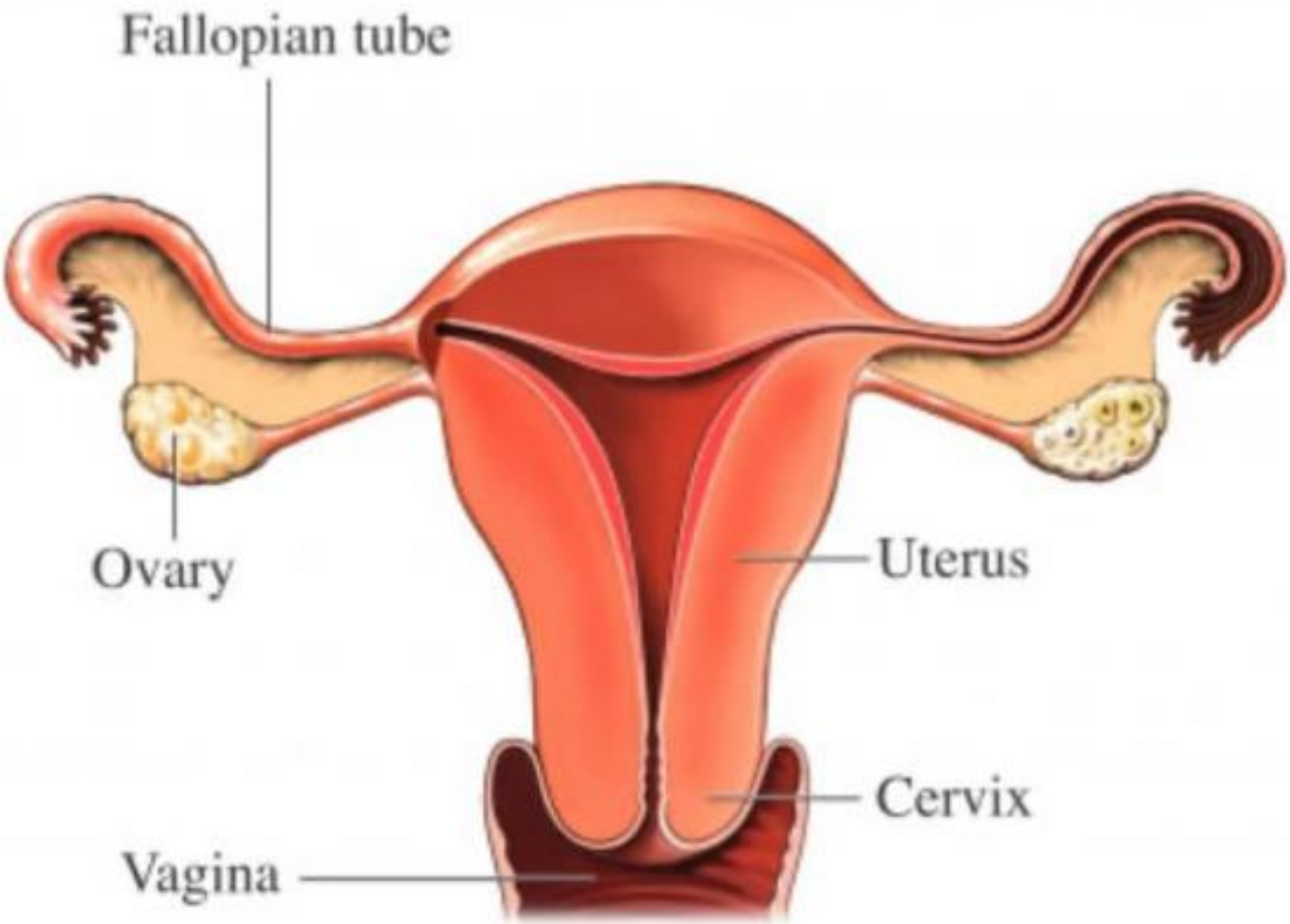
Each ovary is ovoid structure measuring about **3.5 cm × 2 cm × 1.5 cm**.

They are a dull white and are attached to the superior aspect of the broad ligament by a short peritoneum fold called meso-ovarium.

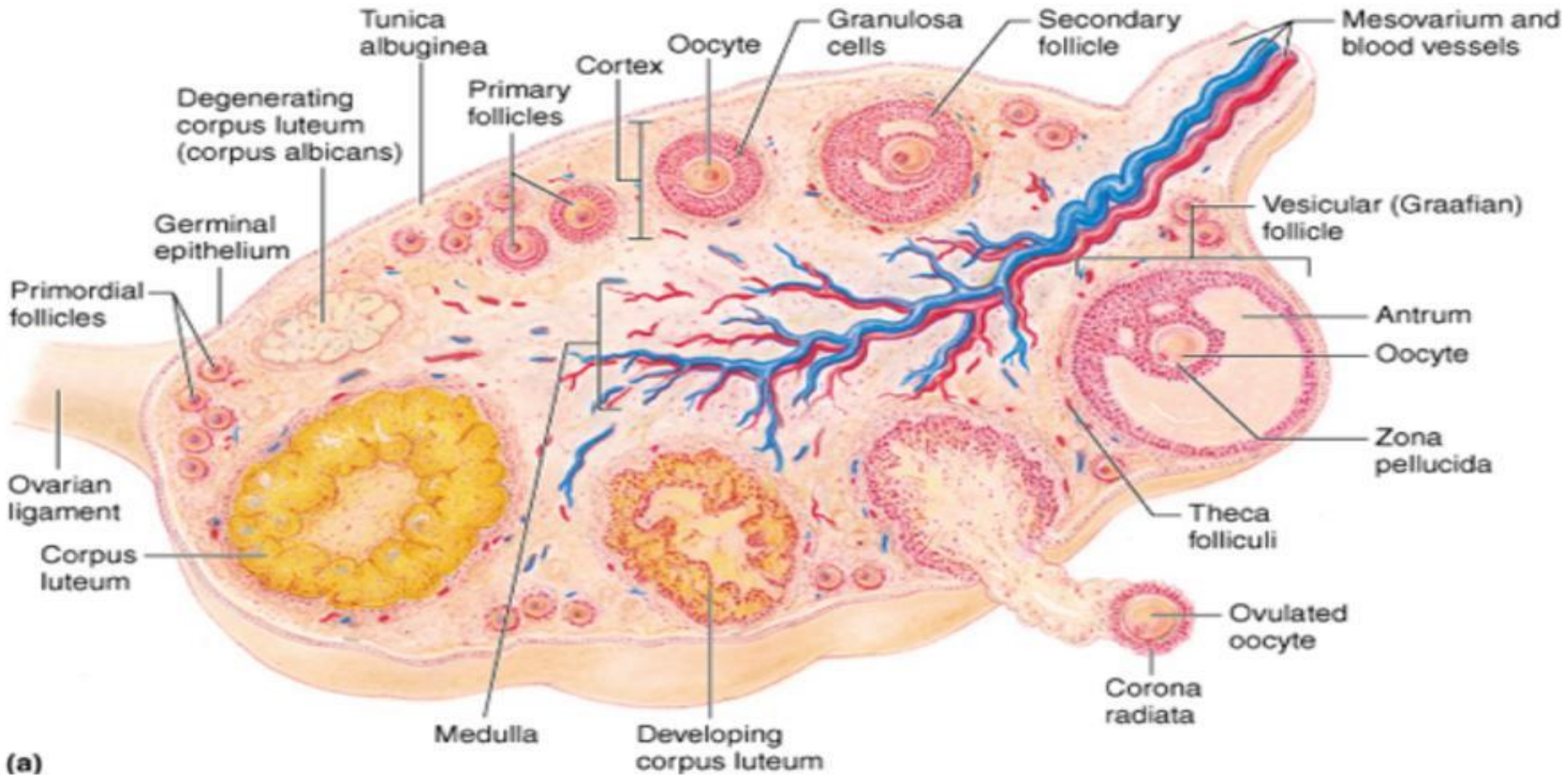
Follicle or corpus **leuteal cysts** may be seen on surface of the ovary.

Its lateral border is free but anteriorly is attached to the broad ligament at the hilum through which ovarian vessels and nerves enter or leave the organ.

- Medially the ovarian ligament connects it to the uterine cornu and laterally ovarian fimbriae of the tube.


Fallopian tube
Ovary
Uterus
Cervix
Vagina

Histology of the Ovary



Blood supply &Lymphatic drainage

The blood supply of ovary is through the ovarian artery, a branch of abdominal aorta and uterine artery and numerous anastomosis.

The venous drainage is through the pampiniform plexus to the ovarian veins.

The right ovarian vein drains into the inferior vena cava and left ovarian vein drains into the left renal vein.

Lymphatic drainage:

Primarily through the aortic nodes.

Rarele they may drain through iliac lymph nodes.

Clinical aspects

- The endometrium and uterine cavity can be examined by **hysteroscopy**.
- The tubal ostia can be seen.
- Because the anterior and posterior wall are normally in contact, the cavity must be inflated with gas or fluid to obtain an adequate view of surfaces.
- It is specially important to distinguish retroversion from anteversion before introducing a sound or similar instrument into the uterine cavity to avoid perforation of uterine wall.
- **Because the uterus lies behind the bladder**, and between the lower parts of ureters, particular care must be taken not to damage these structures during hysterectomy.

Clinical aspects

The transformation zone is typically the area where precancerous change occurs.

This can be detected by microscopic assessment of **cervical cytological smear.**

If the duct of a cervical gland is occluded, gland distends with mucous to form a retention cyst (***Nabothian follicle***).

The tubes and ovaries often collectively called uterine adnexa and are so intimately related that when the tube is inflamed the ovary is also affected resulting I salpigo-oophoritis.

Clinical aspects

The ovary is most common site of endometriosis and rarely become seat of extrauterine gestation.

Besides providing ova, it is an important *endocrine gland producing estrogen, progesterone and androgens*.

Its histology and histogenesis is of interest in understanding of complex varities of ovarian neoplasms.

THANK YOU FOR YOUR ATTENTION