

**The University Of Jordan
Faculty Of Medicine**



Anatomy Department

REPRODUCTIVE SYSTEM

By

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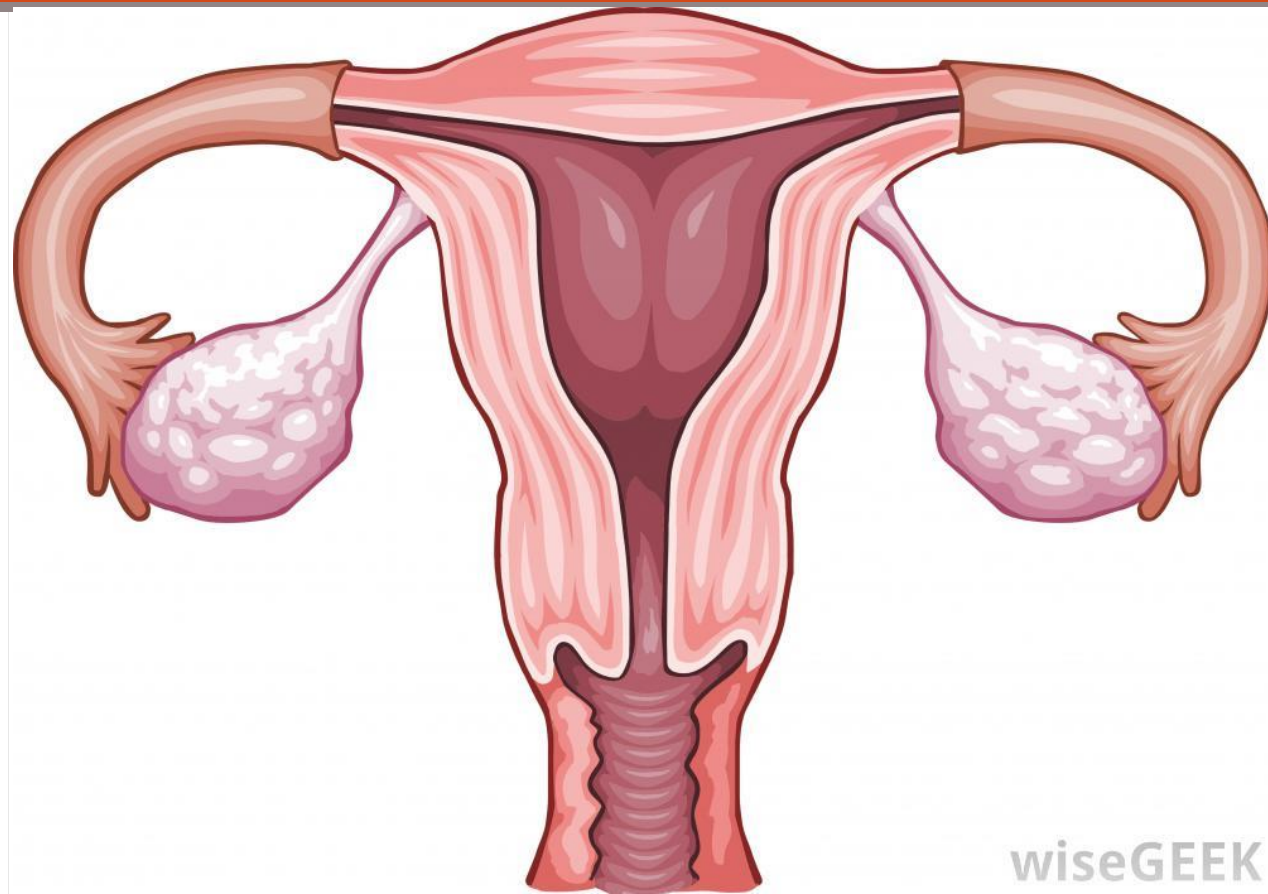
Female genital system

Female Genital Organs

This includes :

1. Ovaries
2. Fallopian tubes
3. Uterus
4. Vagina
5. External genital organs

Ovaries



Site of the Ovary: In the ovarian fossa in the lateral wall of the pelvis which is bounded.

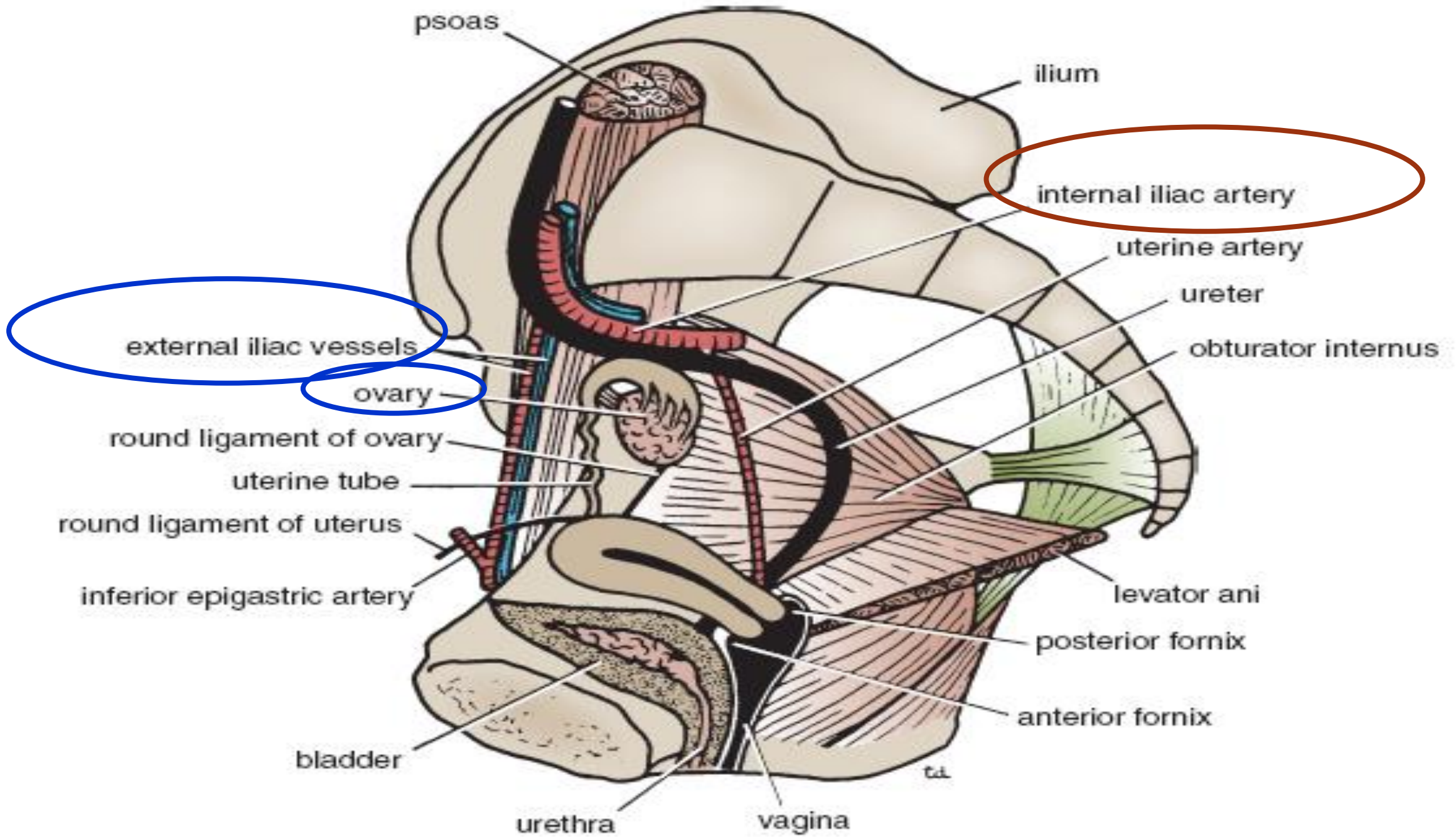
Anteriorly : External iliac vessels.

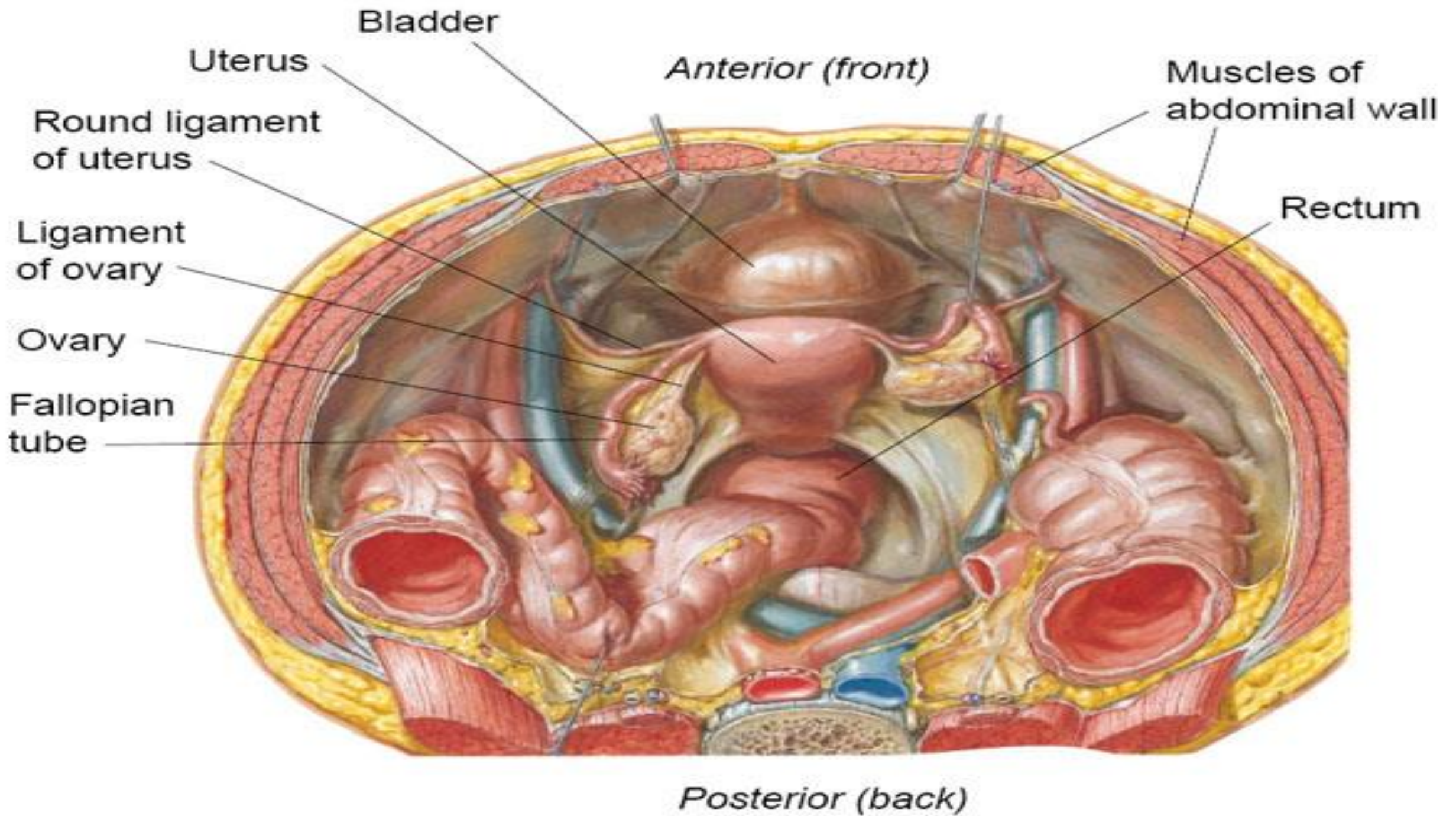
Posteriorly : Internal iliac vessels.

Shape : the ovary is almond-shaped.

External Features :

- **Before puberty** : Greyish-pink and smooth.
- **After puberty** with onset of ovulation, the ovary becomes grey in color with puckered surface.
- **In old age** : it becomes atrophic





Description : In nullipara, the ovary has :

Two ends : superior (tubal) end and inferior (uterine) end.

Two borders : anterior (mesovarian) border and posterior (free) border.

Two surfaces : lateral and medial.

A. Ends of the Ovary :

Superior (tubal) end : is related to the ovarian fimbria of the uterine tube and is attached to side wall of the pelvis by the ***ovarian suspensory ligament***.

Inferior (uterine) end : it is connected to superior aspect of the uterotubal junction by the ***round ligament of the ovary*** which runs within the broad ligament .

B. Borders of the Ovary :

Anterior (mesovarian) border :

It have the hilum of the ovary

Is attached to the upper layer of the broad ligament by a short peritoneal fold called the *mesovarium*.

Posterior (free) border :

Is related to the lateral curved end of the uterine tube.

C. Surfaces of the Ovary:

Lateral surface:

Is related to the parietal peritoneum of the ovarian fossa which separates the ovary from obturator nerve and vessels.

Medial surface:

Is related to the uterine tube.

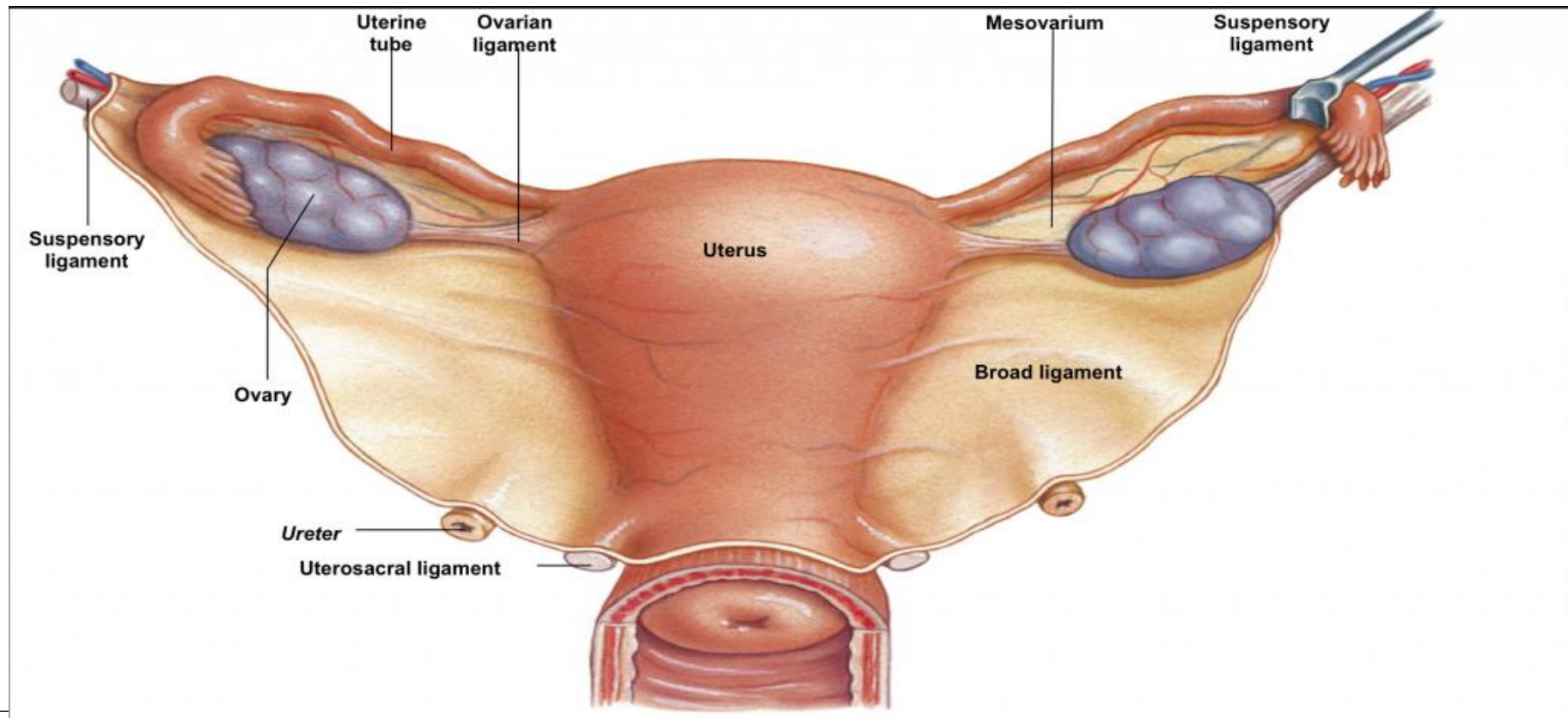
N.B: Uterine tube has triple relation to the ovary : the tube is related to the tubal end, the posterior border and medial surface of the ovary.

Ligaments of the ovary

1.Round ligament of the ovary : extends between the uterine end of the ovary and uterotubal junction.

2.Mesovarium : is a short peritoneal fold between the anterior border of the ovary and upper surface of the broad ligament.

3.Suspensory ligament of the ovary : is a short peritoneal fold between the superior end of the ovary and side wall of the pelvis (it is a part of the broad ligament). It conducts vessel ,nerves and lymphatics to and from the ovary



Arterial Blood Supply:

- By the ovarian artery .
- The artery passes through the suspensory ligament of the ovary, then through the mesovarium to enter the hilum of the ovary.

* Distribution : it supplies the ovary, lateral part of uterine tube and anastomoses with the uterine artery within the broad ligament.

Venous Drainage:

- The veins emerge at the hilum of the ovary as a pampiniform plexus which gives rise to the ovarian vein.
- The right ovarian vein → I.V.C., while the left → left renal vein.

Lymphatic Drainage : to lateral aortic lymph nodes

Nerve Supply :

- By autonomic nerves along the ovarian artery.
- They are derived from coeliac and aortic nerve plexuses.
- They are sensory and vasomotor.

Uterine Tubes

It lies in the medial 4/5 of the upper free border of the broad ligament.

Length: is about 10 cm.

Communications:

- Laterally, the tube pierces the upper layer of the broad ligament to open into the peritoneal cavity near the ovary (it is the abdominal ostium).
- Medially, it opens into the superior angle of the uterine cavity

Parts of the Tube:

From lateral to medial, it has four parts;

1. Infundibulum :

- It is the funnel-shaped lateral part of the tube which is closely related to the ovary.
- It is about 2 cm long.
- Its bottom presents the abdominal ostium
- Its margins have 20-30 irregular processes called fimbriae which spread over the surface of the ovary.
- During ovulation, the fimbriae trap the oocyte into the uterine tube.

2. Ampulla :

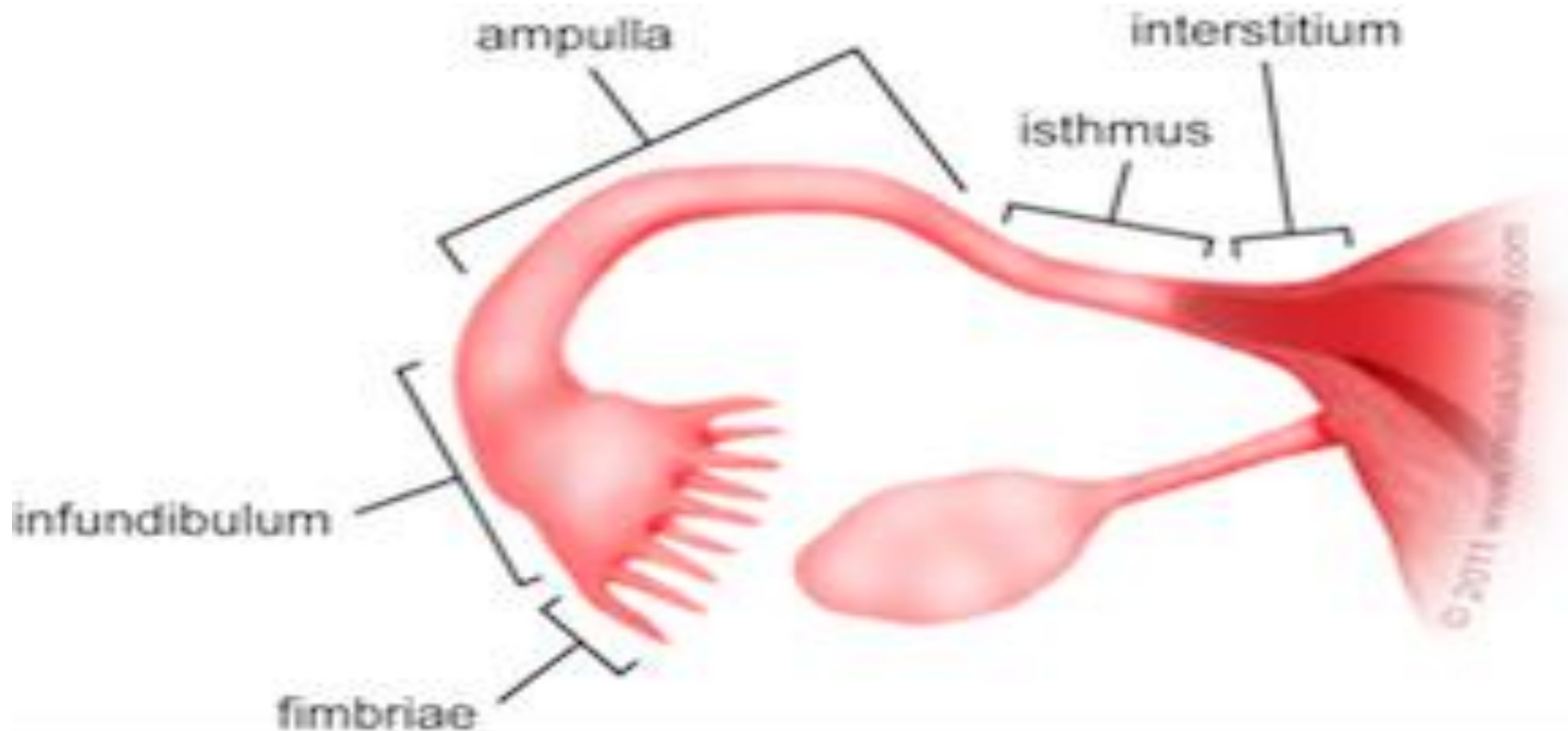
- ✓ It is the **widest** (4 mm in diameter) and **longest** part of the tube (about 5 cm long).
- ✓ It is thin-walled and tortuous.
- ✓ It is the site of fertilization.

3. Isthmus:

It is narrow (2 mm) , short (2 cm) and thick-walled.

4. Uterine (intramural) part :

- It is the **shortest** segment (1 cm) that passes through the wall of the uterus.
- It is the **narrowest** part of the whole tube (1 mm in diameter).
- It opens in the uterine cavity through the uterine ostium



Blood Supply :

Medial 2/3 by uterine vessels.

Nerve Supply :

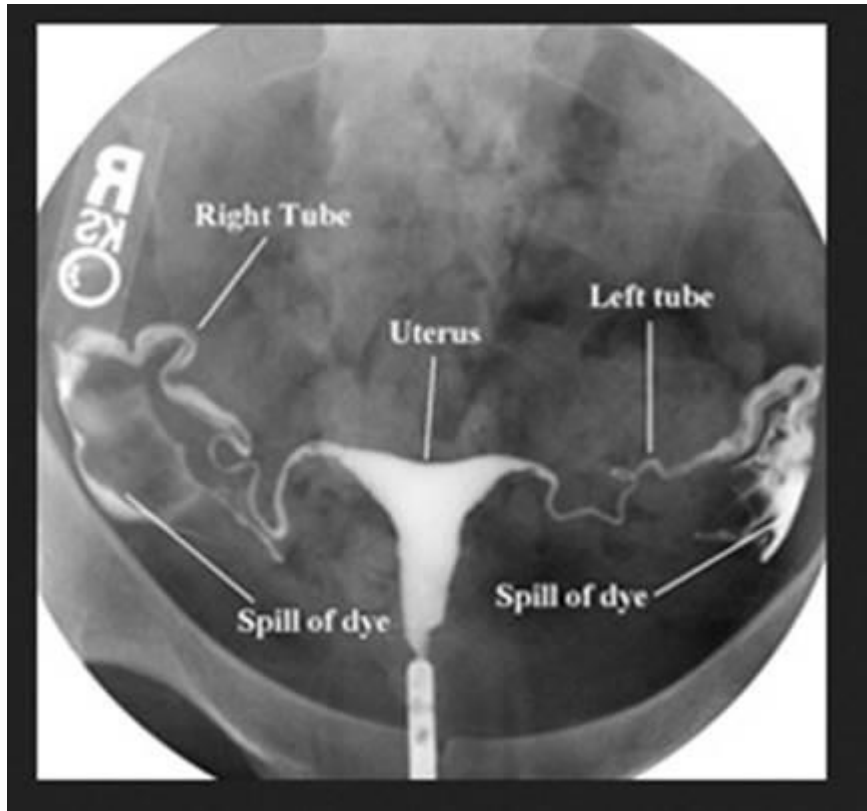
Medial 2/3 by uterine nerve plexus.

Lymphatic Drainage :

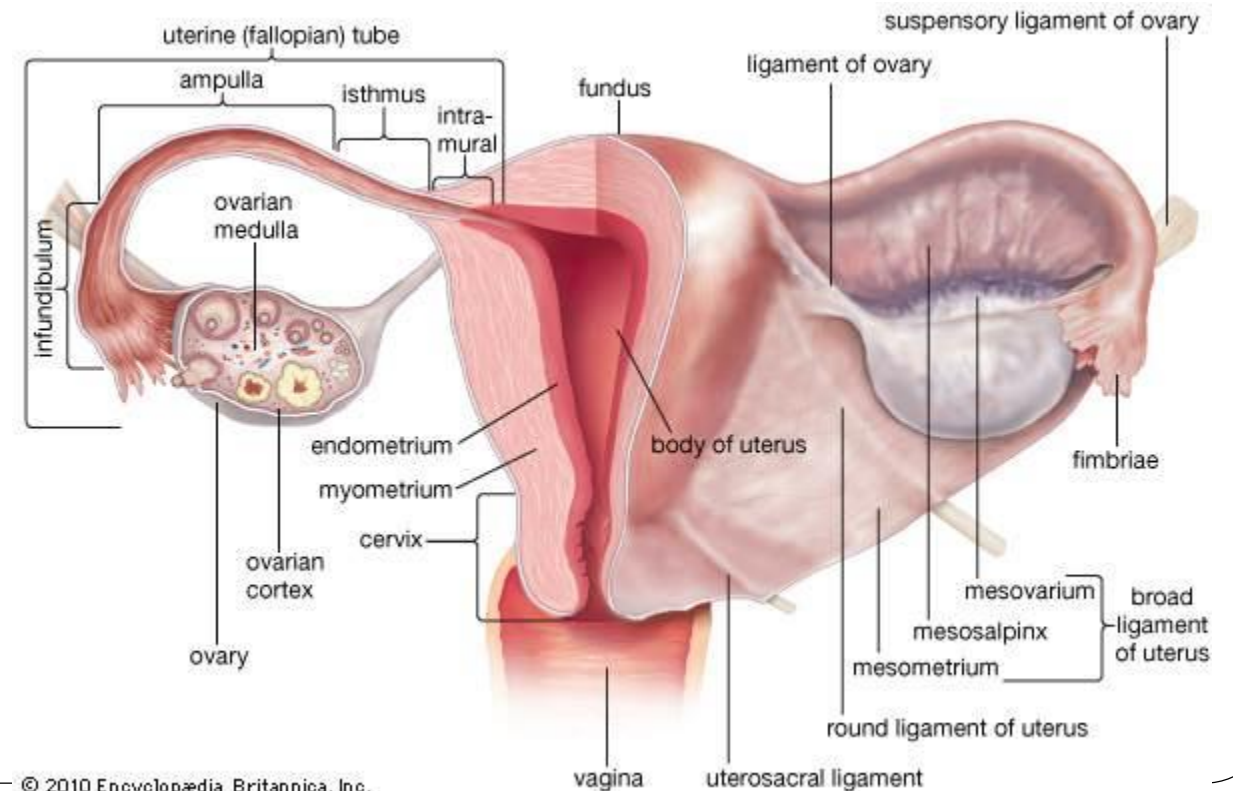
Lateral aortic lymph nodes.

Lateral 1/3 by ovarian vessels

Lateral 1/3 by ovarian nerve plexus



Hysterosalpingography



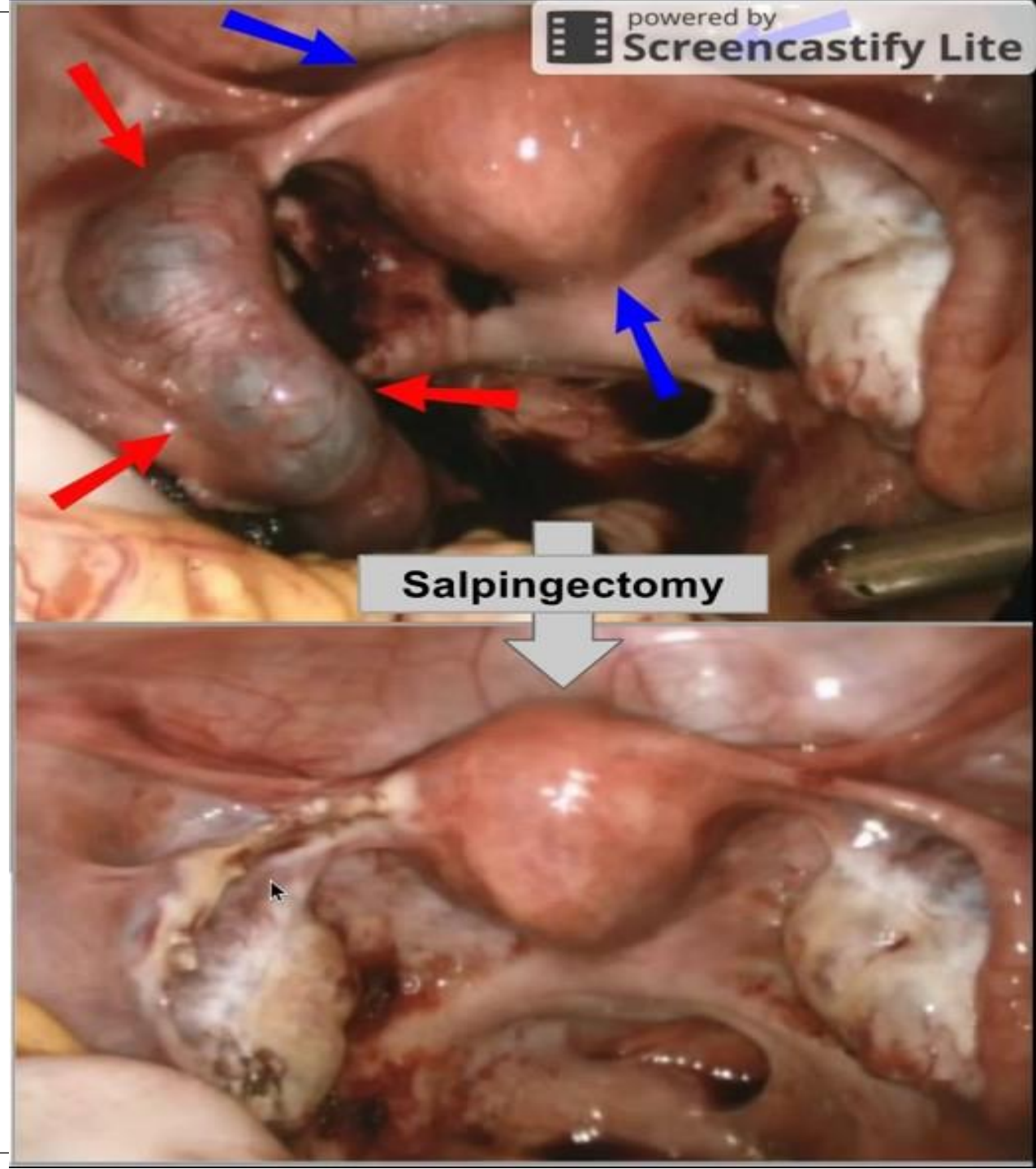
Functions of the Tube :

1. They carry the oocyte from the ovaries and sperms from the uterus to the ampulla which is the site of fertilization.
2. The uterine tube conveys the dividing zygote to the uterine cavity.

Applied Anatomy :

- 1.** Blockage of the tubes (due to infection) is the main cause of sterility in women.
- 2.** The tube is the most common site for ectopic pregnancy.
It usually ruptures with hemorrhage into the abdominal cavity.
- 3.** The abdominal ostium of the uterine tube communicates the female genital tract directly with the peritoneal cavity.
Infections in the uterus and tubes may result in peritonitis.
- 4.** Ligation of the uterine tubes is one method of birth control.

Tubal Ectopic pregnancy



UTERUS

The uterus is a hollow thick-walled, pear-shaped muscular organ situated in the lesser pelvis between the urinary bladder and rectum.

It is piriform in shape.

Communications :

Superolateral angles : the uterus receives the uterine tubes.

Inferiorly : it opens into the vagina at external os.

Normal Position of the Uterus :

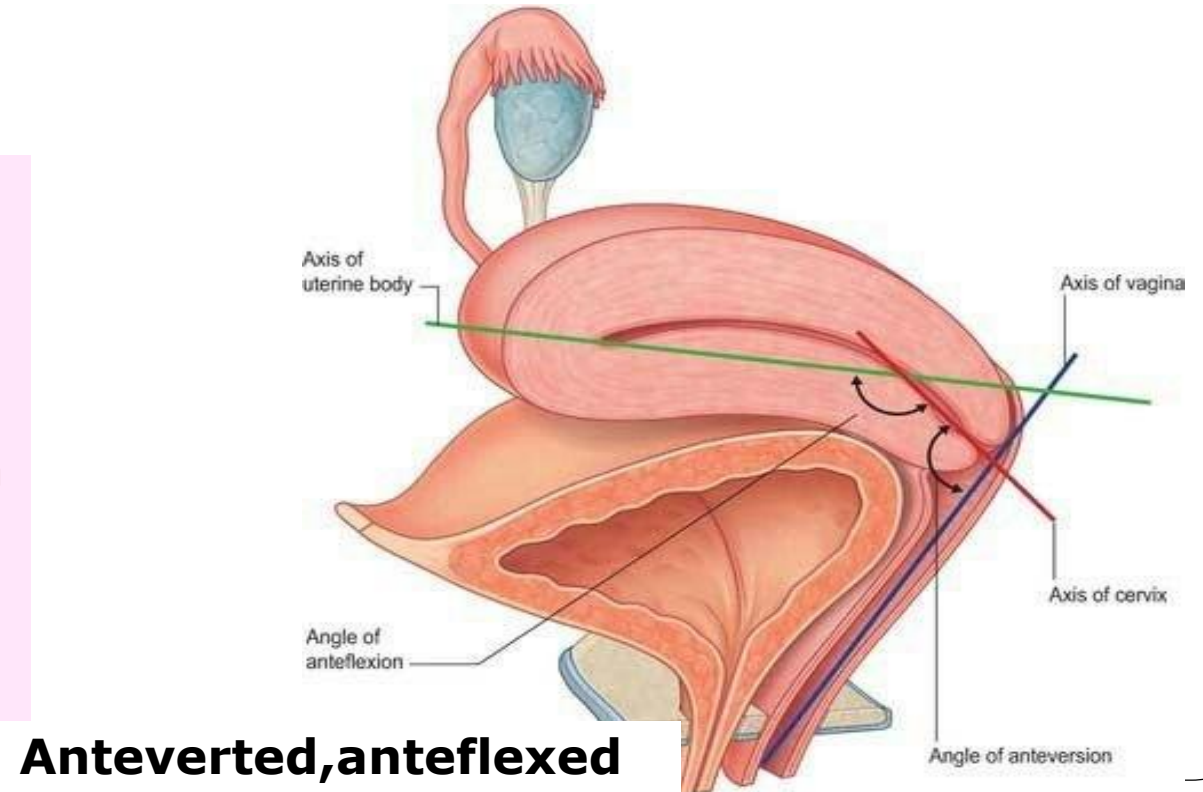
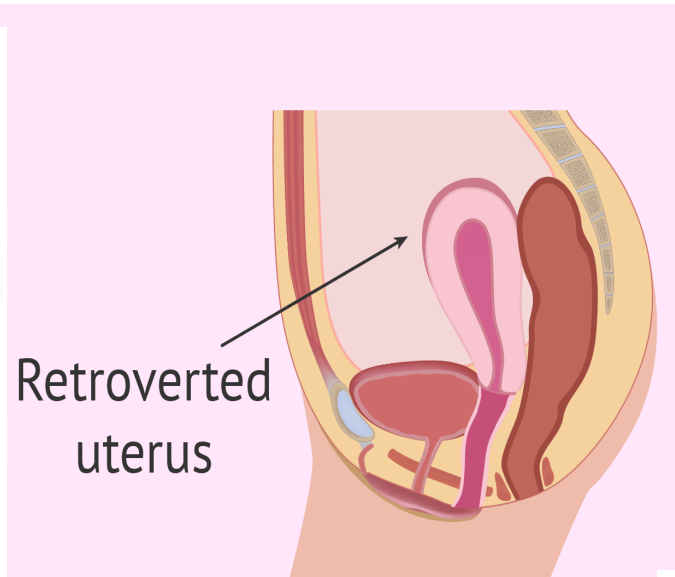
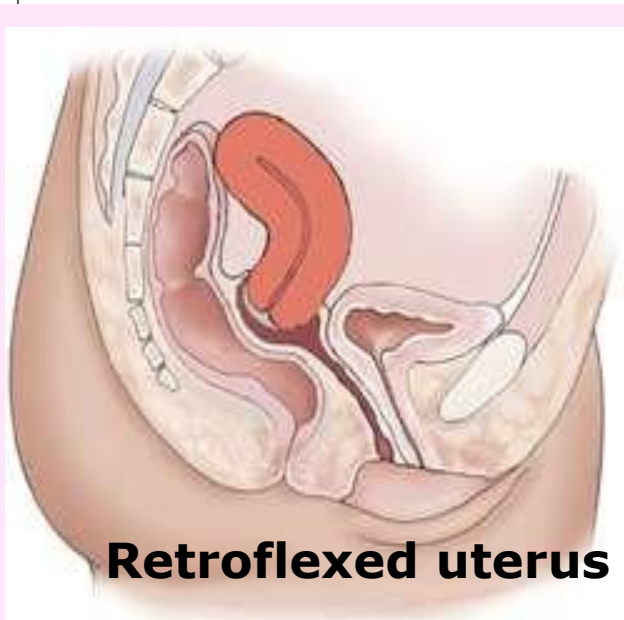
Normally, the uterus is anteverted, anteflexed.

- Angle of **anteversion** : it is the angle between the uterus and the **vagina**.

It is about 90°

- Angle of **anteflexion** : it is the angle between the body of the uterus and the **cervix**.

It is about 170°



Description of the Uterus :

The external surface of the uterus presents a transverse constriction called the *isthmus* which divides the uterus into a large upper part called the *body* and a smaller lower part called the cervix

A. Body of the Uterus :

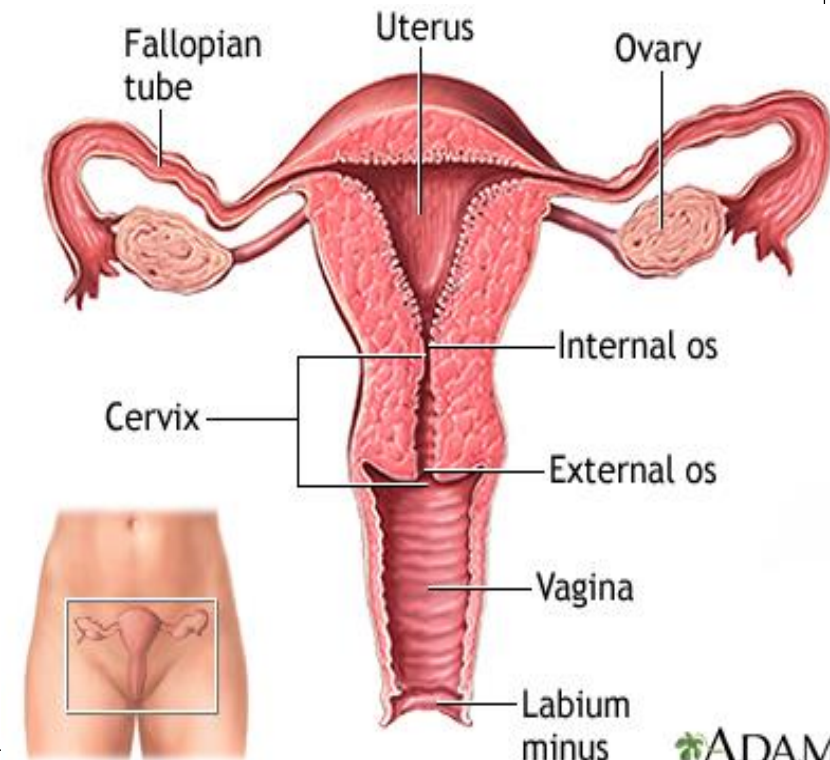
- It forms upper 2/3 of uterus.
- It has a fundus, two surfaces (anterior and posterior) and two lateral borders :

1- Fundus:

- * It is that part of the body above the entry of the uterine tube.
- * It is completely covered by peritoneum.
- * It is related to coils of small intestine and sigmoid colon

2- Anterior (vesical) Surface :

- * Is covered by peritoneum down to the level of internal os.
- * Is related to the urinary bladder, with uterovesical pouch in between.



3- Posterior (intestinal) Surface :

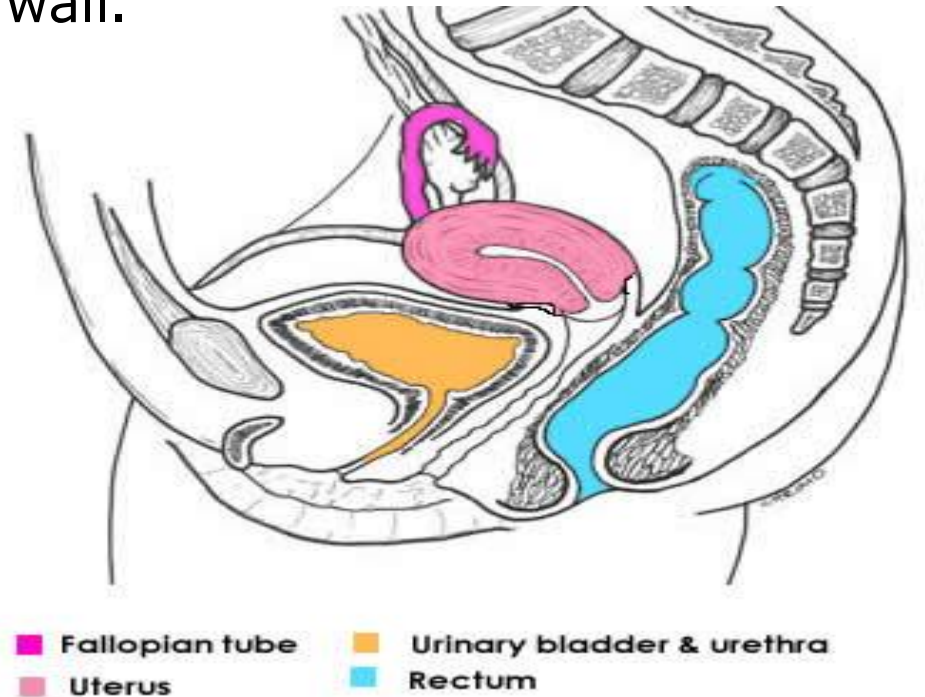
* Is covered by the peritoneum which is continued down onto the cervix and posterior vaginal fornix.

* Is related to sigmoid colon and coils of small intestine.

4- The lateral borders :

Each receives the uterine tube at its upper end.

- **Anteroinferior** to the uterotubal junction it is attached to **round ligament of uterus**
- **Posterosuperior** to the uterotubal junction, it is attached to the **round ligament of the ovary**.
- The uterine tube and the two ligaments are all running in the broad ligament which stretches from the lateral border to the lateral pelvic wall.



B- Cervix of the Uterus :

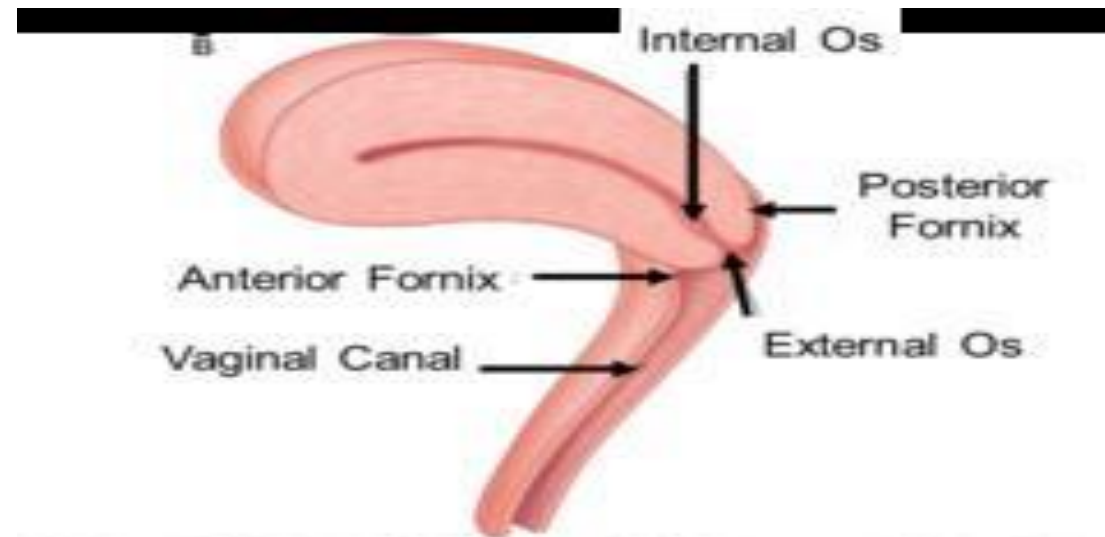
- It forms the lower 1/3 of the uterus. It is one inch long.
- Cervix protrudes into the upper part of the vagina, thus the cervix has supravaginal and vaginal parts :

1- The Supravaginal part of the cervix :

Anteriorly : it is *not* covered by peritoneum. It is related to urinary bladder with a cellular connective tissue in between called *parametrium*.

On each side : it is related to *parametrium*, in which the uterine artery *crossed by* the ureter 2 cm from the supravaginal cervix.

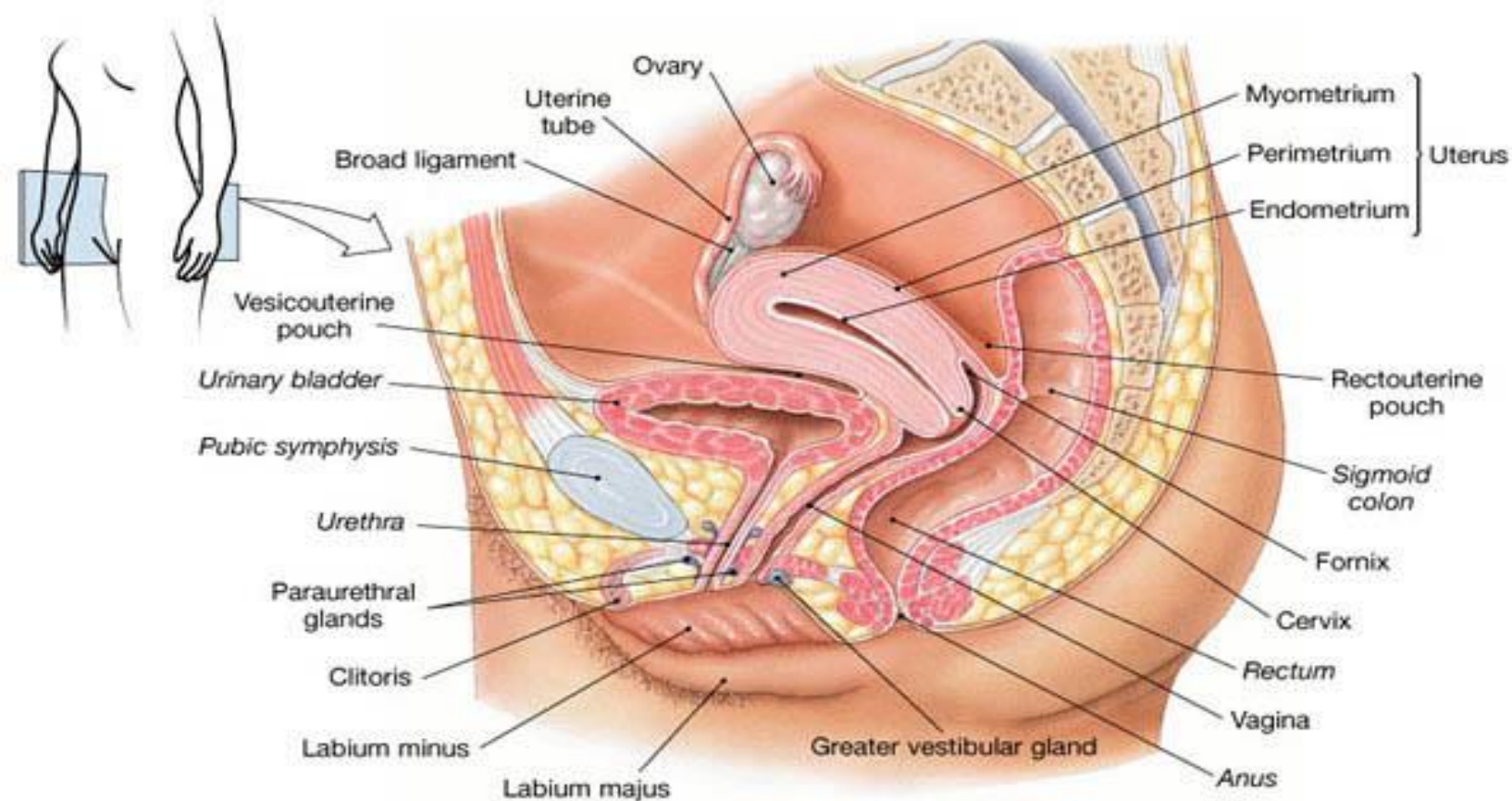
Posteriorly : is *covered* by peritoneum and related to the rectum with Douglas pouch in between.



2- Vaginal part of the cervix :

It projects into upper part of the vagina, dividing that part of vagina into four vaginal fornices

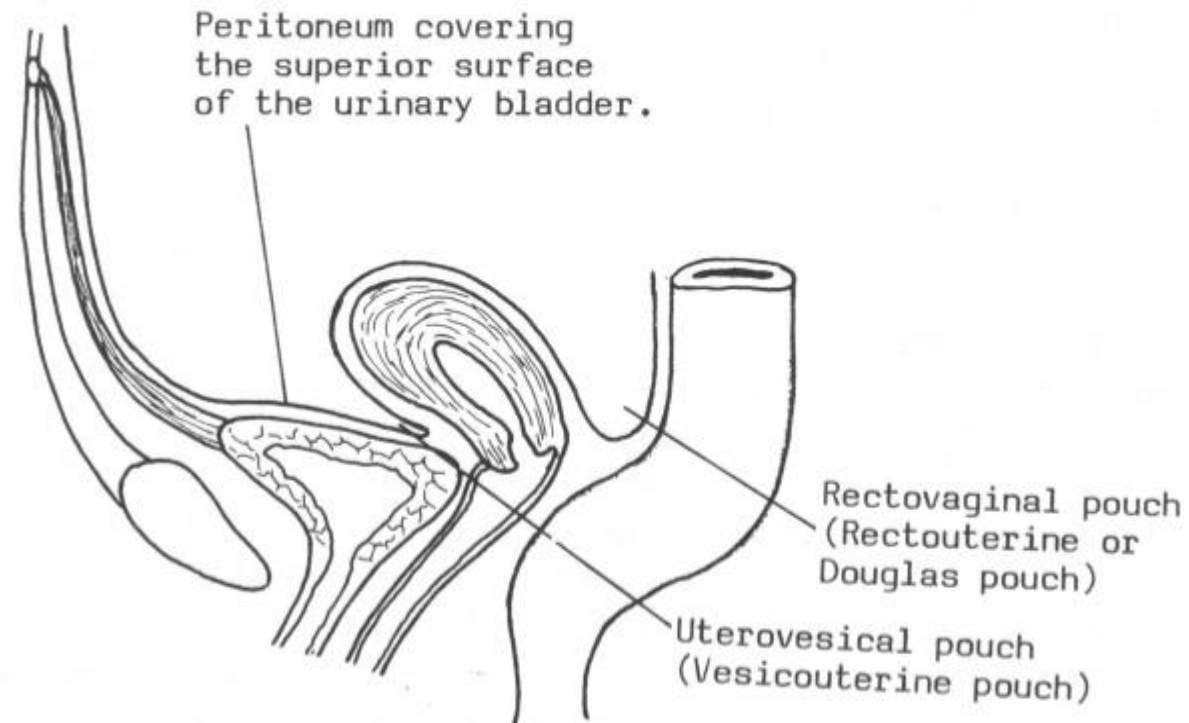
The posterior vaginal fornix is the **deepest** and the **only** one **covered by peritoneum**.



Peritoneal Covering of the Uterus :

- The posterior surface and fundus of body of uterus are covered by peritoneum which descends to cover its anterior surface down to the level of *internal os*, where it is reflected on to the bladder.
- The supravaginal cervix is covered by peritoneum *only posteriorly*.
- Its (The supravaginal cervix) front and sides are **bare** of peritoneum and related to cellular connective tissue, the parametrium.

Peritoneal covering of the uterus



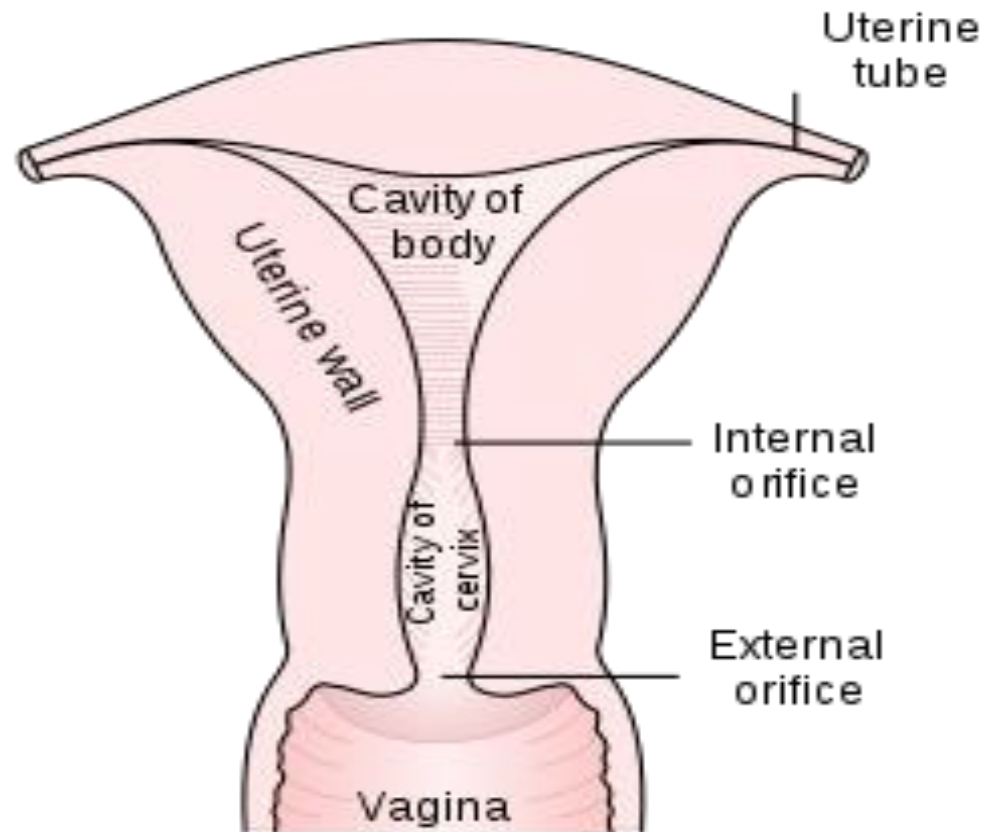
Uterine Cavity :

A. Cavity of the Body :

B. in coronal section is triangular, with its base between the openings of the uterine tubes and its apex is the internal os leading to the cervical canal .

B. The cervical canal:

- Is fusiform, broad at its mid-level.
- It communicates with the cavity of the body at the **internal os** and with the vagina by the **external os**.



Anatomical significance of the internal os :

- It corresponds to the isthmus of the uterus.
- It is the site of junction between uterine cavity and cervical canal.
- It is the level of the angle of anteflexion.
- It is the level at which the peritoneum is reflected anteriorly on to the bladder

Gynaecological significance of the external os :

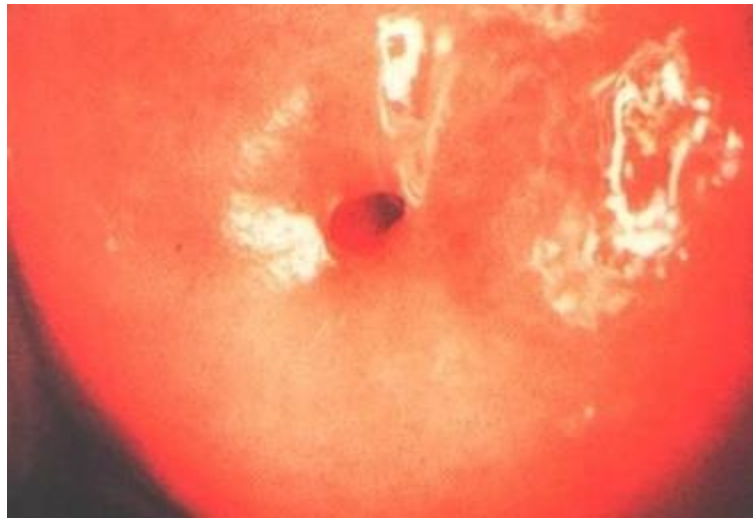
- In nulliparous women, it is small and *circular*.
- In multiparous women, it is a *transverse slit*.



Nulliparous cervix
with round os



Parous cervix
with slit os



nulliparous women



multiparous women



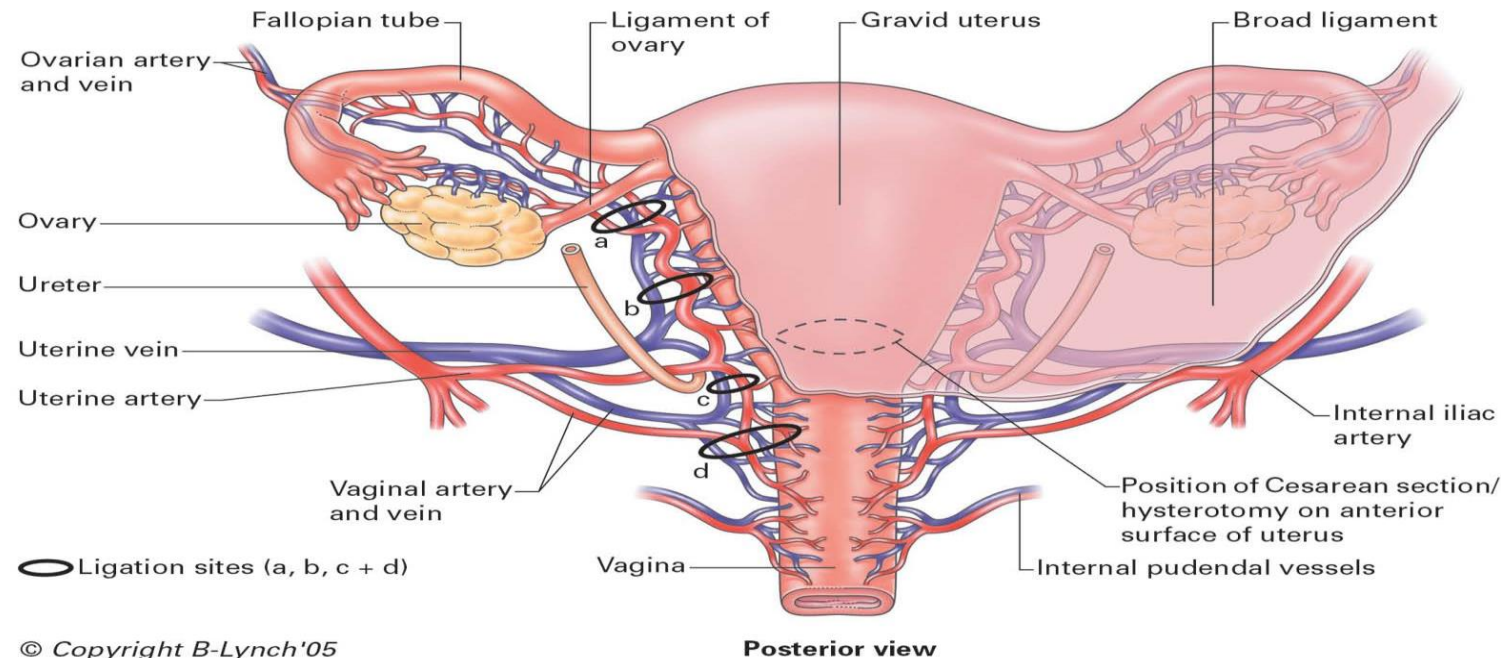
menopause narrow os

Arterial Blood Supply: by uterine artery

- It runs medially on the upper surface of the pelvic diaphragm to reach the root of broad ligament close to the lateral vaginal fornix.
- It enters the broad ligament and runs a tortuous course along the lateral margin of the uterus. It ends by anastomosing with the ovarian A.
- It gives branches to pelvic part of ureter, vagina (azygos arteries), cervix and of uterus, medial part of the uterine tube .

**➔ The ureters pass at lateral fornixes of the vagina, they cross the uterine arteries.
(like water underneath the bridge)**

So The ureters are at great risk during surgical procedures on the uterus and ovaries.



Venous Drainage :

- ❖ Begins by the uterine venous plexuses.
- ❖ The lower part of the plexus is drained by uterine veins which open into the internal iliac vein.
- ❖ The plexus communicates with the ovarian and vaginal venous plexuses.



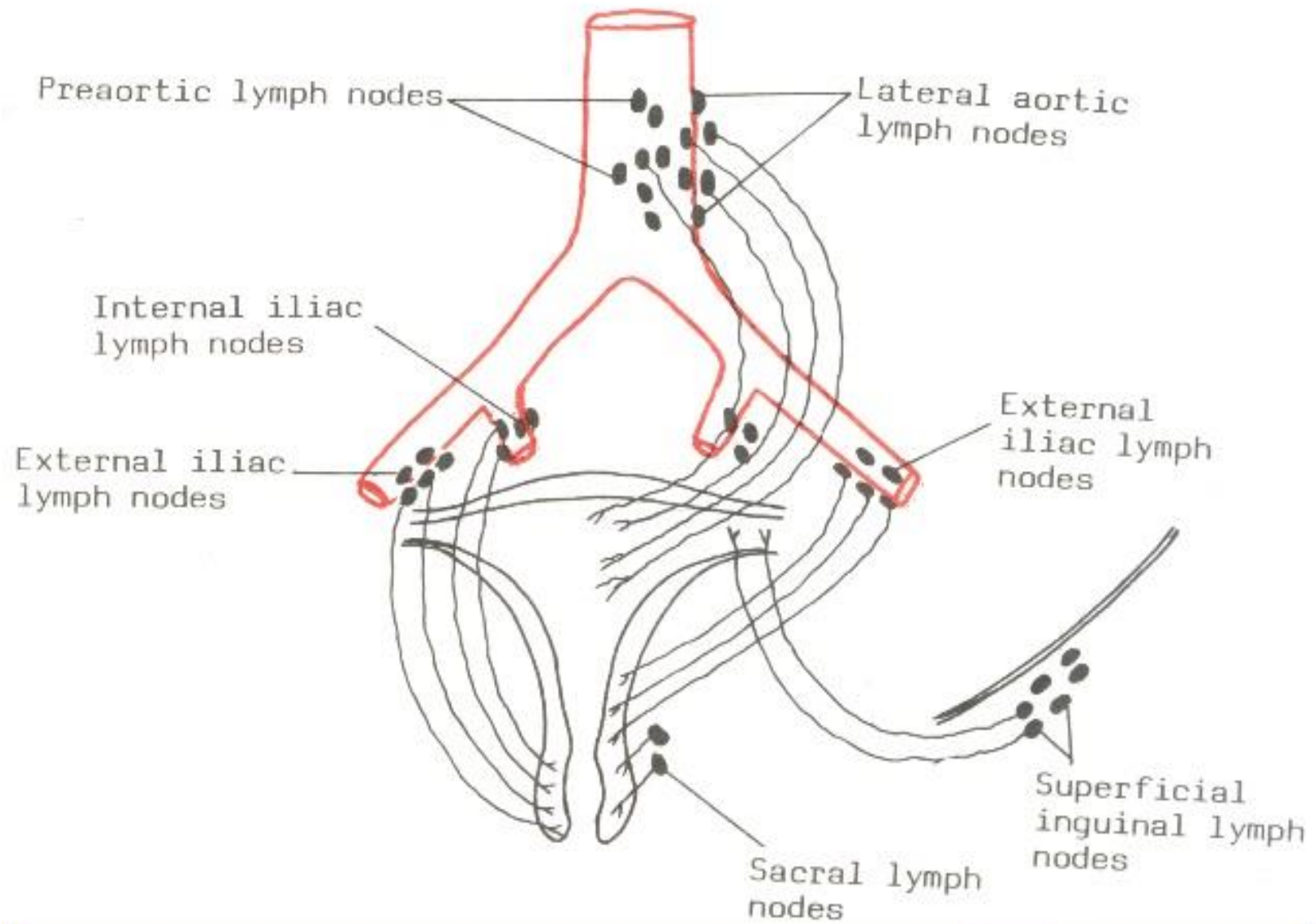
Lower limb Varicose Vein and hemorrhoids

is common during pregnancy due to compression of gravid uterus on inferior vena cava and inferior mesenteric vein

Nerve Supply : by the uterovaginal nerve plexus derived from the inferior hypogastric plexus.

Lymphatic Drainage :

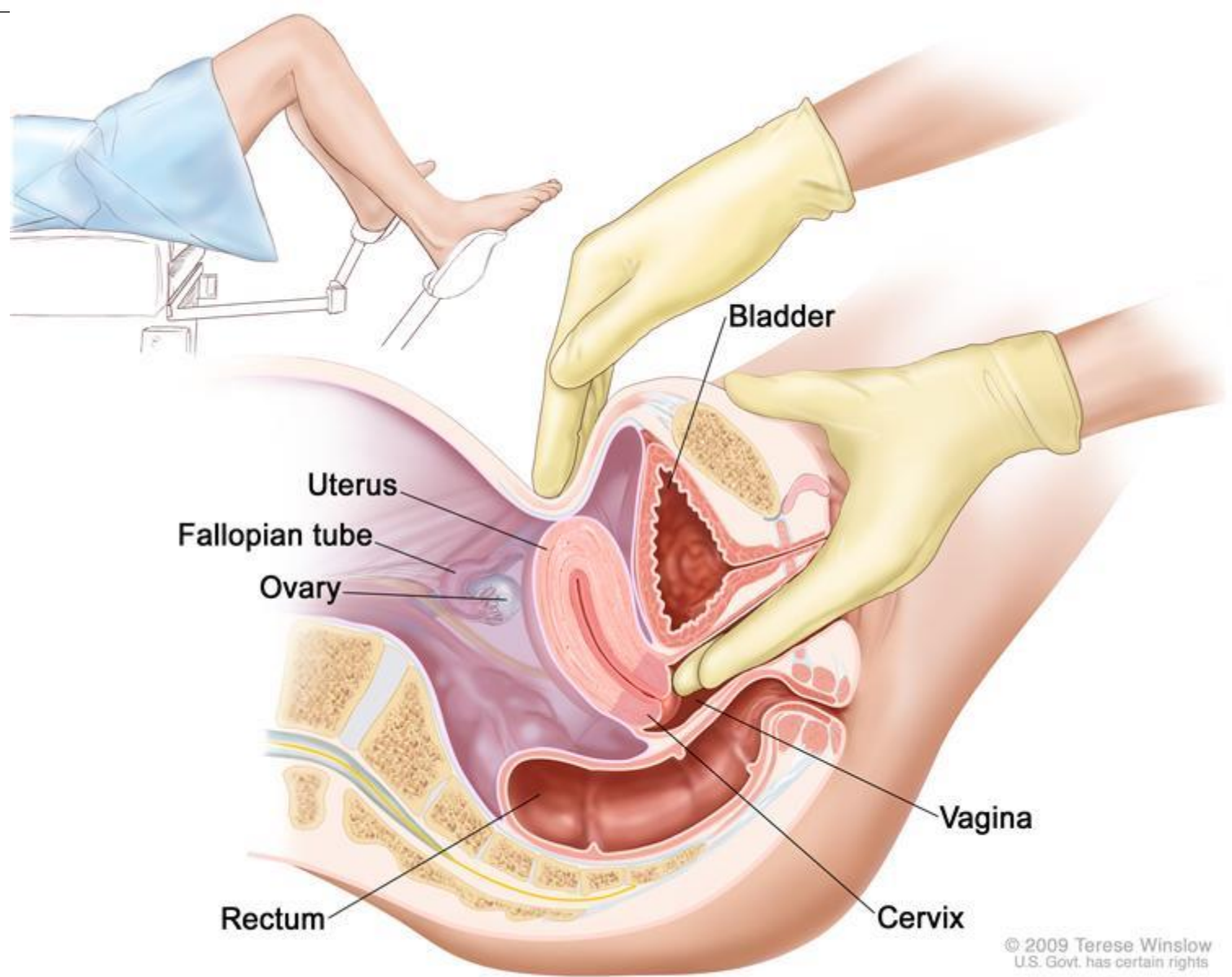
Area	Lymph group
Fundus	Lateral aortic lymph nodes
Uterotubal junction along the round ligament of the uterus	Superficial inguinal lymph nodes.
Body, lymphatics pass through the broad ligament	External iliac lymph nodes
Cervix	External, internal and sacral lymph nodes



Lymphatic drainage of the uterus



Fundus examination



Bimanual pelvic examination of uterus

Ligaments of the uterus



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graph TD; A[Ligaments of the uterus] --> B[Ligaments attached to the body of uterus]; A --> C[Ligaments attached to cervix of uterus]; B --> D["1. Round ligament of uterus<br/>2. Broad ligament."]; C --> E["1. Pubocervical ligaments<br/>2. Transverse cervical ligaments<br/>3. Uterosacral ligaments"]
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Ligaments attached to the body of uterus

1. Round ligament of uterus
2. Broad ligament.

Ligaments attached to cervix of uterus

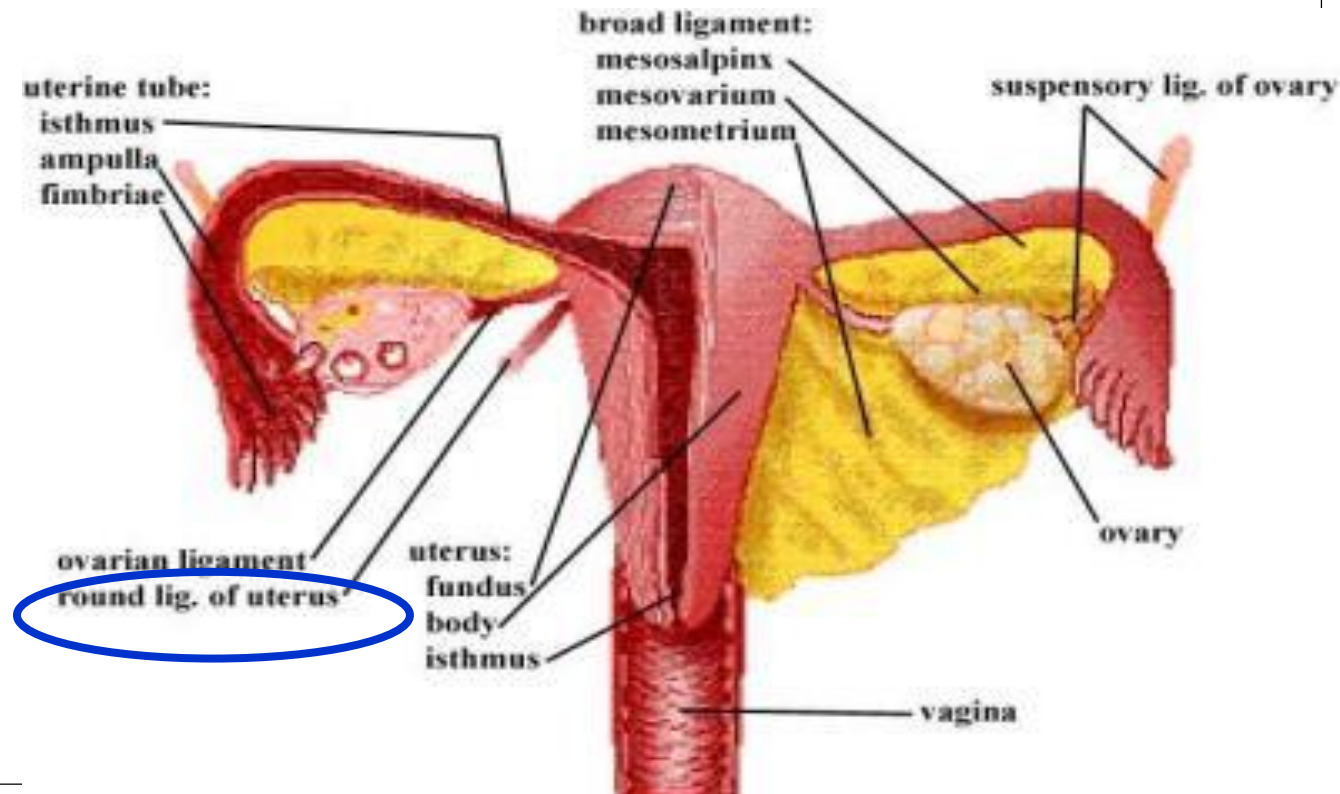
1. Pubocervical ligaments
2. Transverse cervical ligaments
3. Uterosacral ligaments

1- Round ligament of the uterus :

It extends from anteroinferior aspect of the uterotubal junction to the subcutaneous tissue of the labium majus.

Course :

- ❑ Its proximal part runs within the broad ligament.
- ❑ Its distal part crosses the structures in the side wall of the pelvis and hooks around the beginning of inferior epigastric A.
- ❑ Then it enters the deep inguinal ring and traverses the inguinal canal to end in the labium majus.

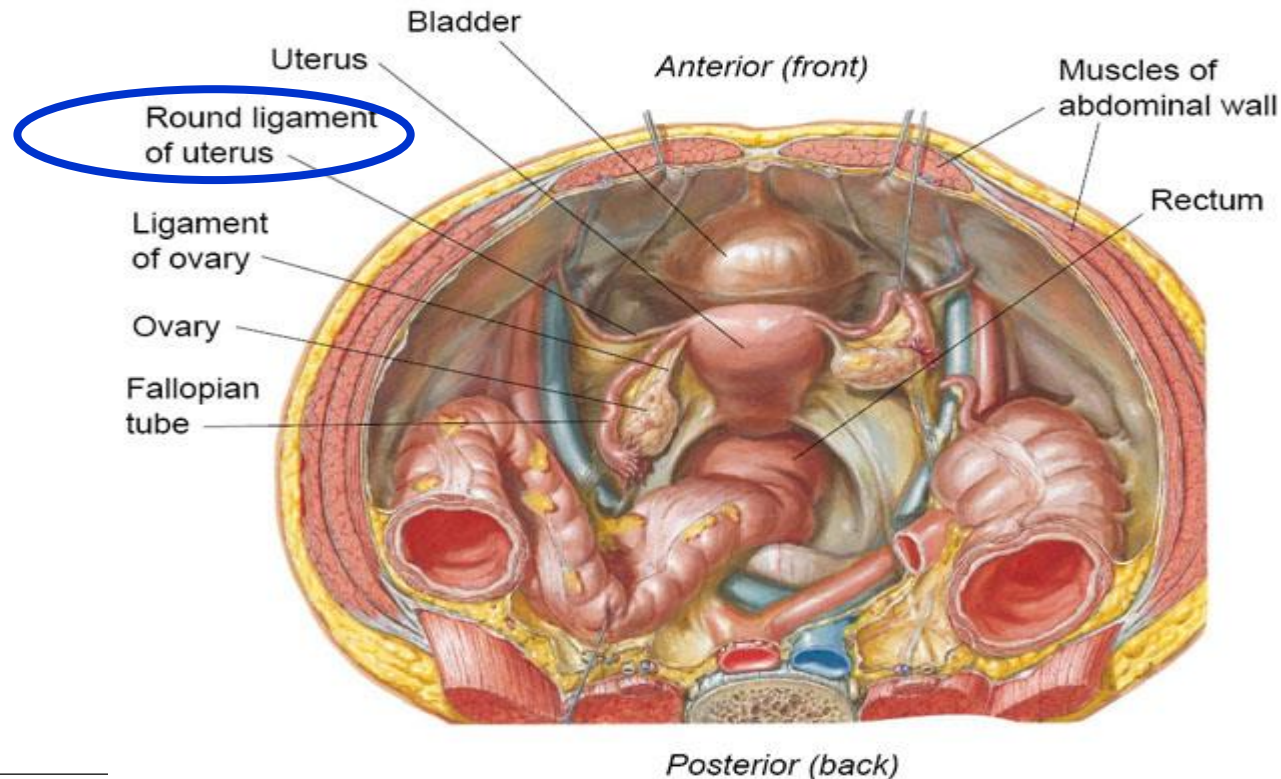


Structures accompany the ligament in inguinal canal :

- ❖ **Artery of the round ligament** (corresponds to the cremasteric A. in the male).
N.B it is a branch from inferior epigastric artery
- ❖ **Genital branch of genitofemoral N.** ; supplies the labium majus.
- ❖ **Lymphatics** from the uterotubal junction to the superficial inguinal lymph nodes.

Function :

it keeps the angle of anteversion against the backward pull of the uterosacral ligaments.



2. The broad ligament :

It is the double-layered fold of peritoneum which extends from the side of the uterus to the lateral wall and floor of the pelvis.

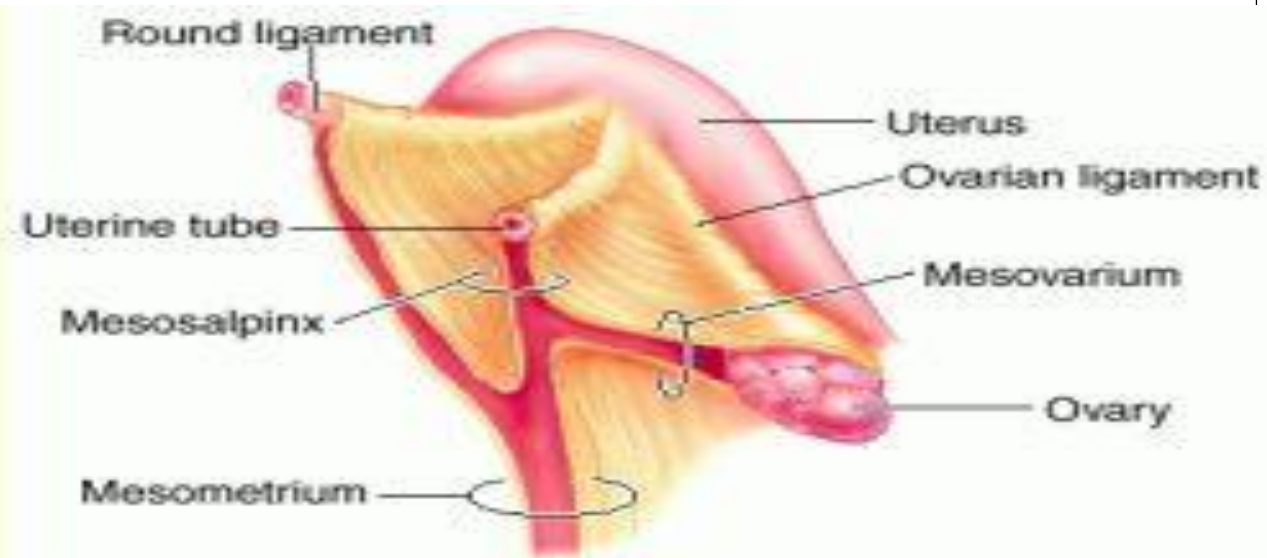
Description :it has 4 borders and 2 layers

1- upper free border :

- Contains the uterine tube in its medial 4/5.
- The lateral 1/5 represents the suspensory ligament of the ovary.

2- Lower attached border :

- Rests on the pelvic floor (levator ani).
- It is related to the ureter crossed by the uterine artery about 2 cm from the supravaginal cervix.

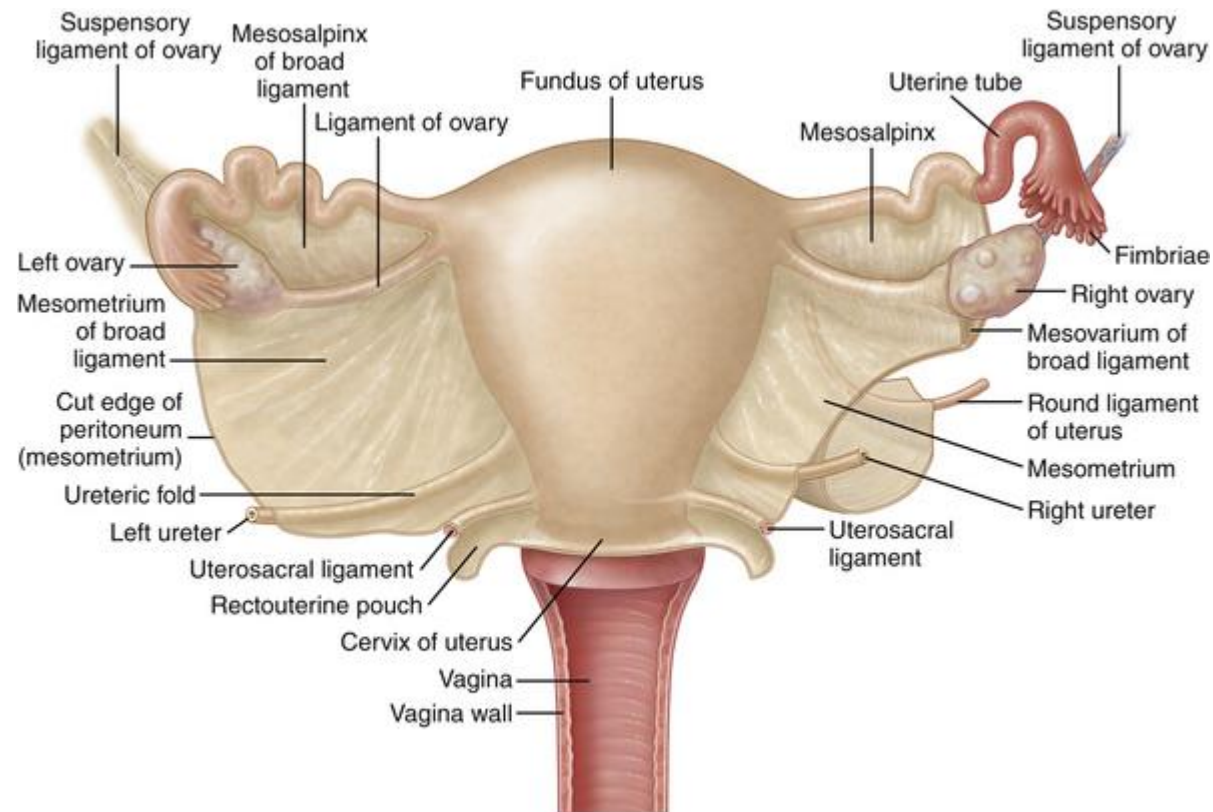


3-Medial border :

- Attached to the side of the uterus.
- The 2 layers of the broad ligament become continuous, with peritoneum of the body of the uterus .

4- Lateral border :

- Attached to the side wall of the pelvis.
- The 2 layers of the ligament become continuous with the parietal peritoneum of the lateral pelvic wall.



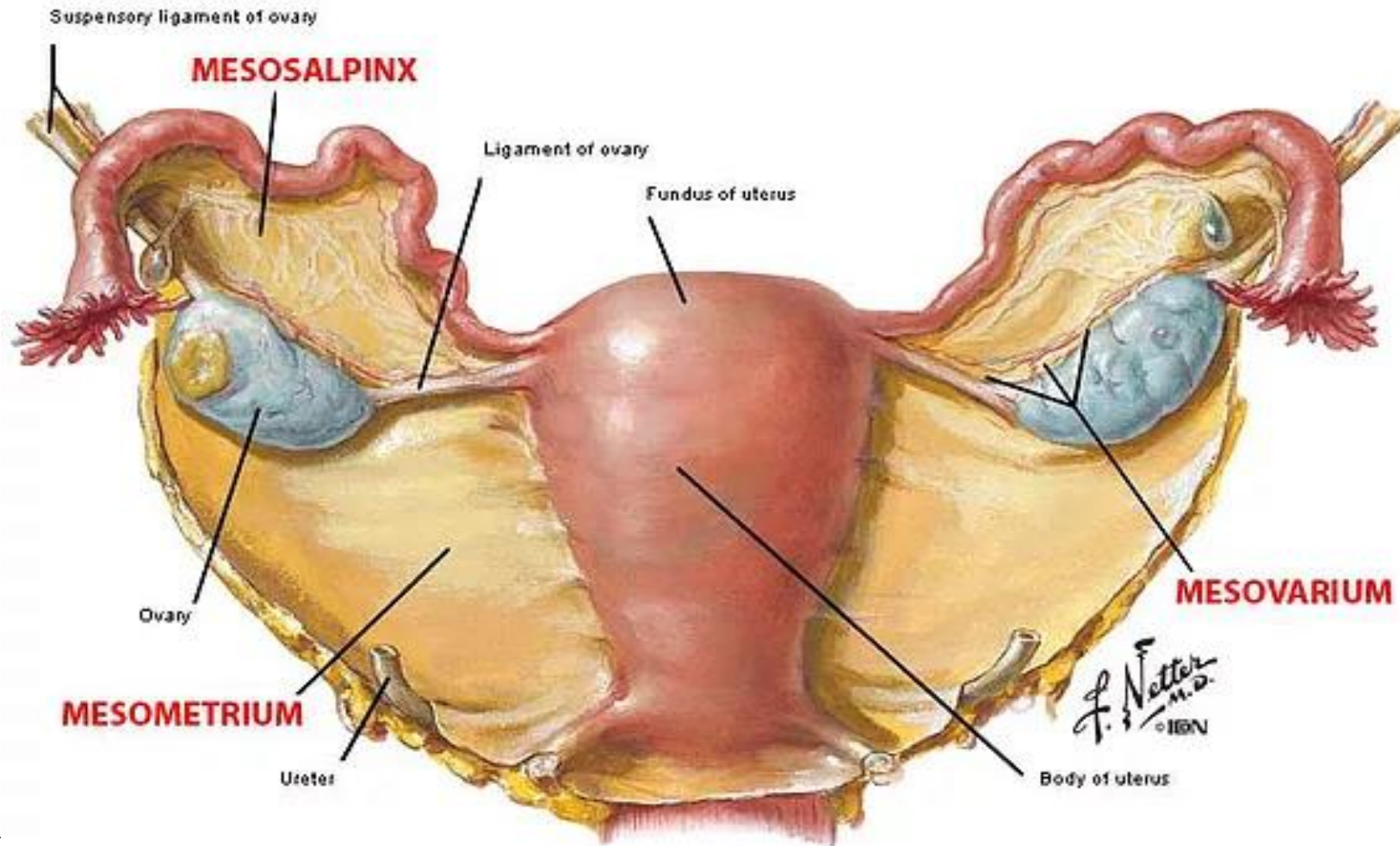
Uterus and broad ligament (posterior view)

5. Anterior layer :

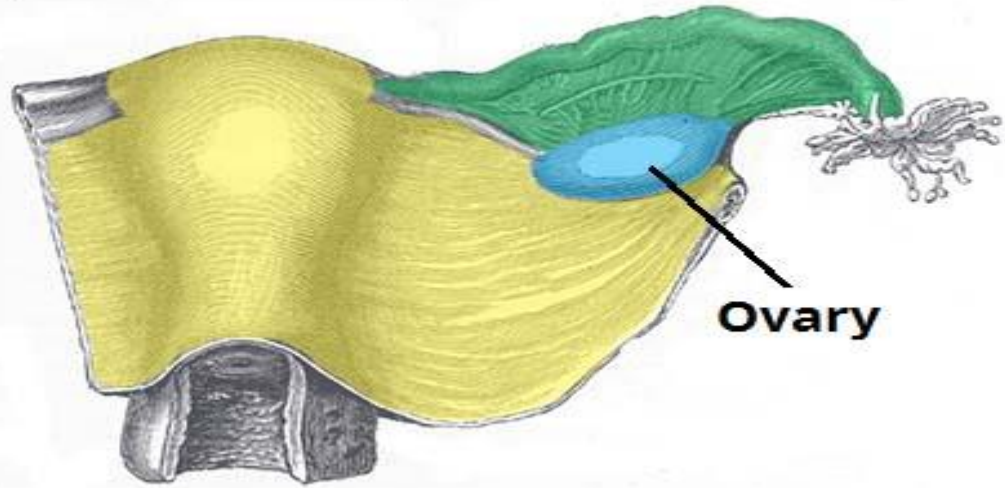
Is bulged by the round ligament of the uterus.

6. Posterior layer :

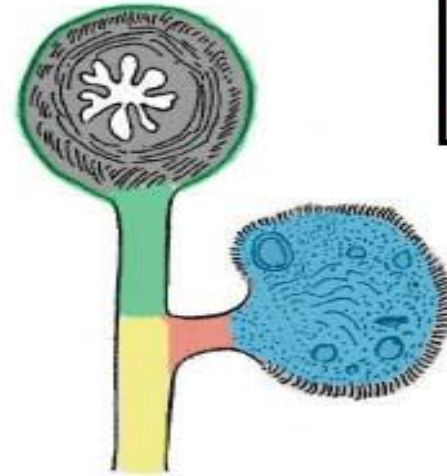
- Is connected to the ovary by the mesovarium.
- It is pierced by lateral end of the uterine tube



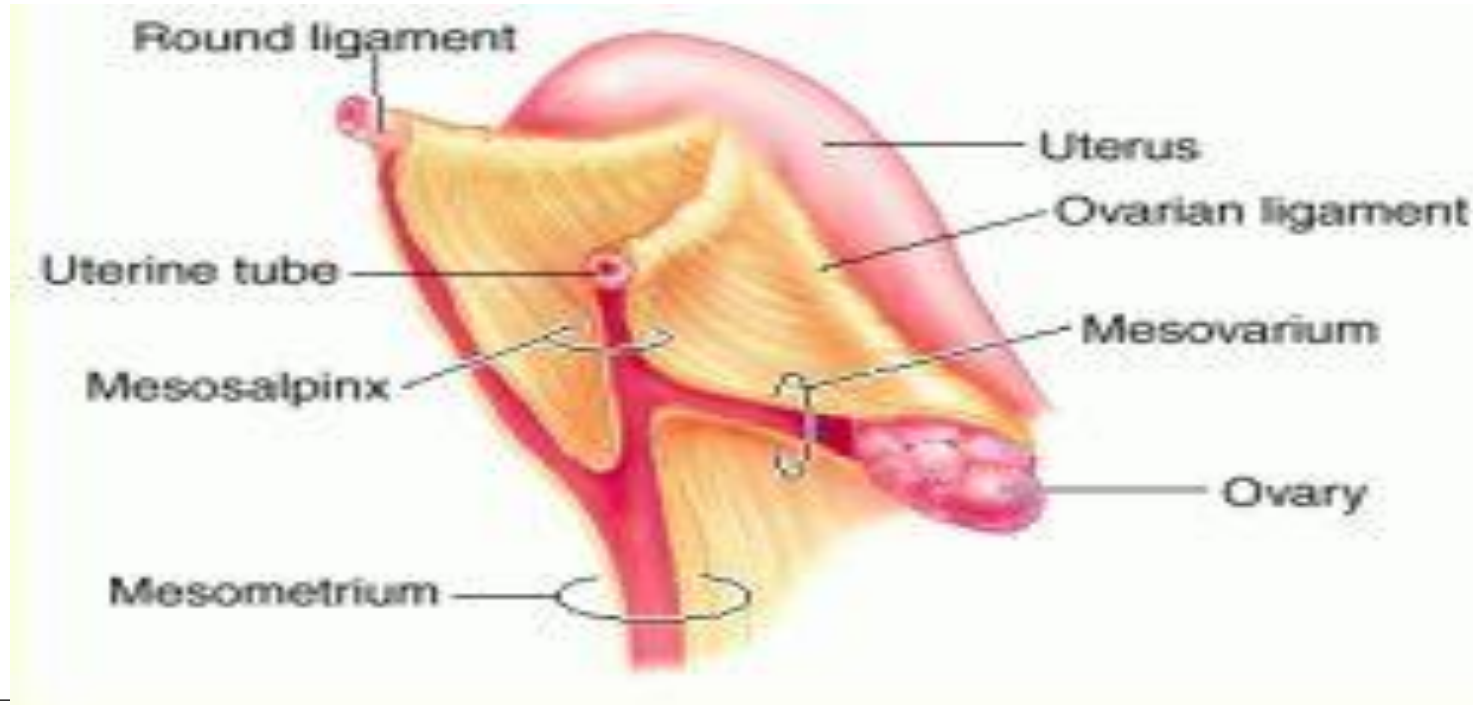
Coronal Plane:



Sagittal Plane:



- | | |
|---|-------------|
| ■ | Mesometrium |
| ■ | Mesosalpinx |
| ■ | Mesovarium |



Contents of the broad ligament:

1. Uterine tube .

2. Two ligaments :

Round ligament of the uterus.

Round ligament of the ovary.

3. Two vessels :

Uterine vessels .

Ovarian vessels.

4. Two nerve plexuses :

Uterovaginal plexus around the uterine A.

Ovarian plexus around the ovarian A.

5. Two embryological remnants :

Epoophoron and the duct of epoophoron (Gartner's duct).

Paroophron.

They are embryonic remnants of mesonephric tubules and mesonephric duct.

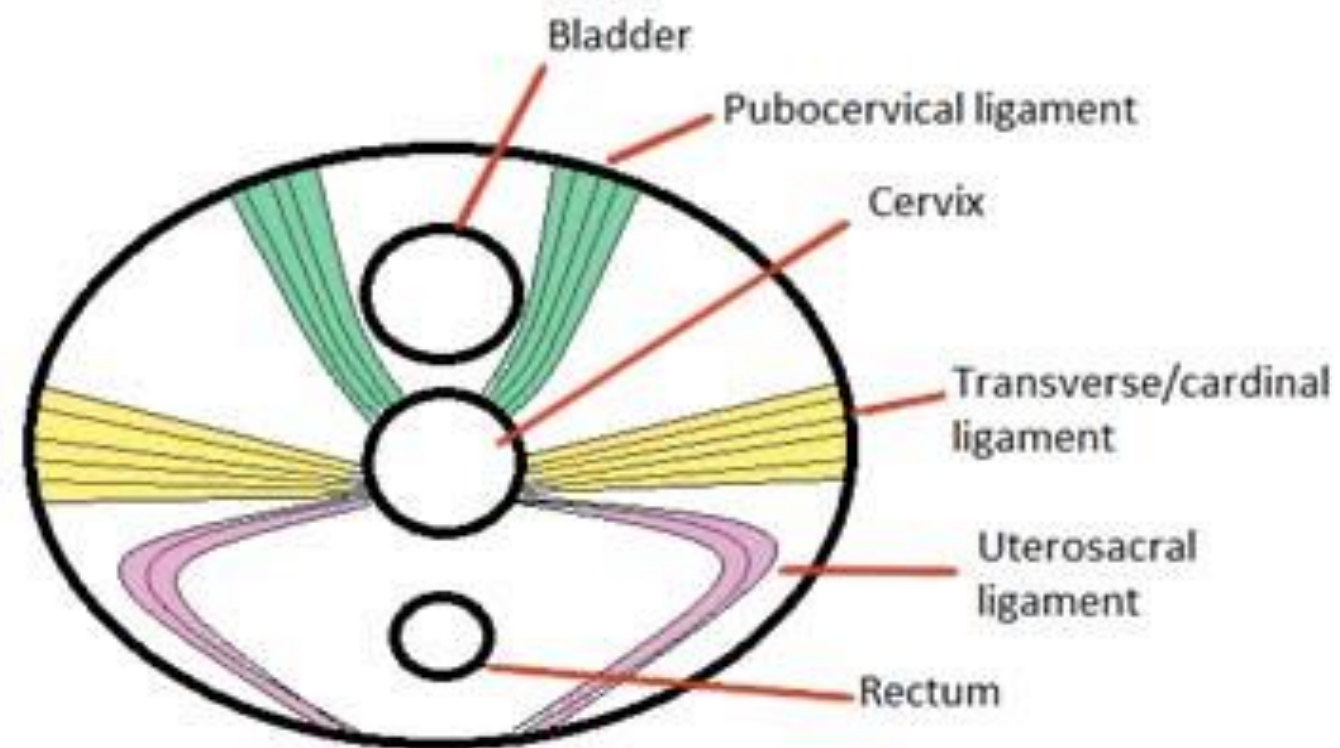
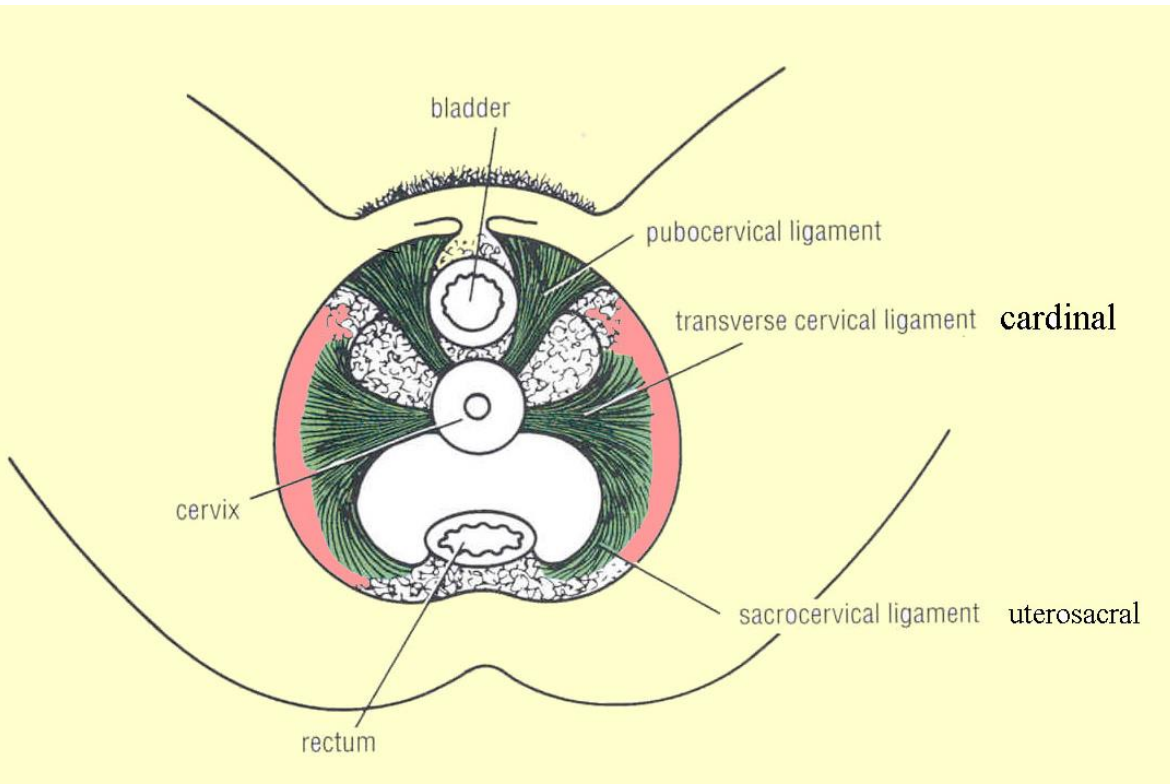
6. Two other structures

Lymphatic vessels.

Parametrium (cellular connective tissue) continuous with that around the cervix of the uterus.

Ligaments attached to cervix of uterus

- 1. Pubocervical ligaments:** extends anteriorly from the cervix of uterus to the pubis.
- 2. Transverse cervical ligaments (Mackenrodt's ligaments):** extend laterally from the cervix and upper part of vagina to the side walls of the pelvis.
They are the main ligaments for uterine support.
- 3. Uterosacral ligaments :** extend backwards from the posterolateral aspect of the cervix and the lateral vaginal fornixes to the front of S2, S3 vertebrae.



Supporting Factors of Uterus

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graph TD; A[Supporting Factors of Uterus] --> B[Ligaments]; A --> C[Muscles]; A --> D[Mechanical Factors]; B --> B1[1-Pubocervical ligaments]; B --> B2[2-Transverse cervical ligaments]; B --> B3[3-Uterosacral ligaments]; C --> C1[1-Muscles of the pelvic diaphragm]; C --> C2[2-Muscles of urogenital diaphragm]; C --> C3[3-Perineal body];
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Ligaments

- 1-Pubocervical ligaments
- 2-Transverse cervical ligaments
- 3-Uterosacral ligaments

Muscles

- 1-Muscles of the pelvic diaphragm
- 2-Muscles of urogenital diaphragm
- 3-Perineal body

Mechanical Factors

Supporting Factors of Uterus :

Prolapse of the uterus into the vagina (due to increased intra-abdominal pressure) is prevented by the following factors

A. Ligaments :

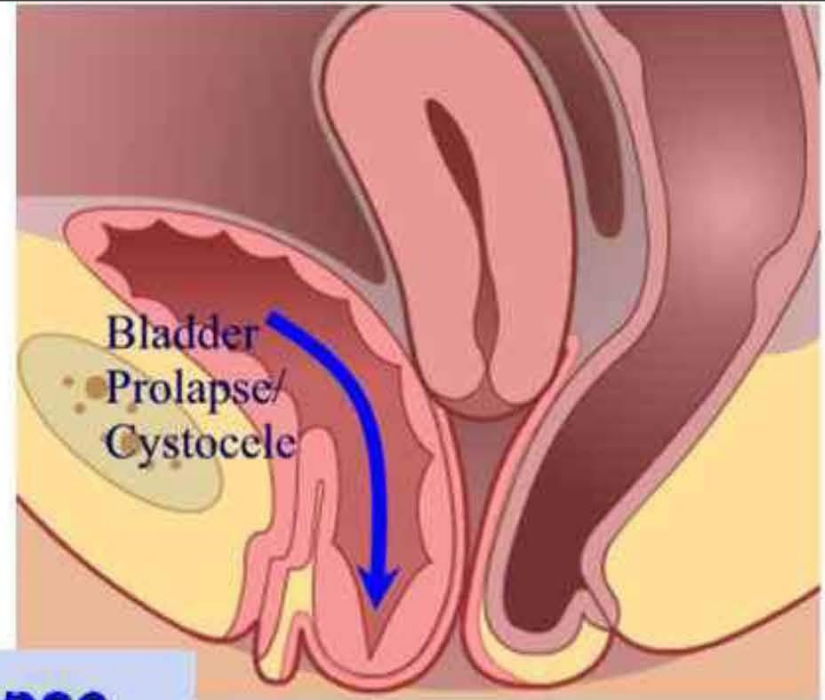
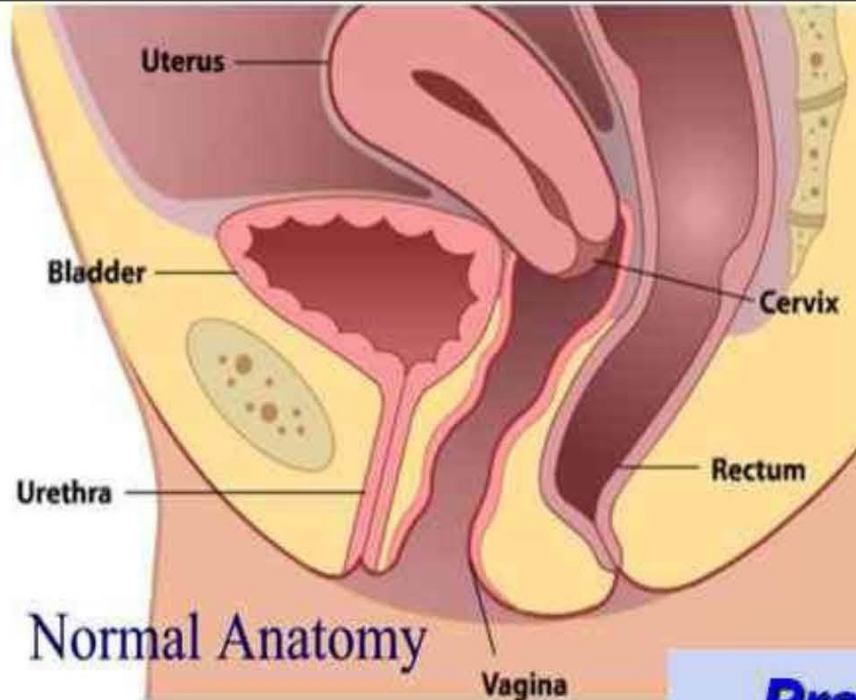
1. Pubocervical ligaments
2. Transverse cervical ligaments (Mackenrodt's ligaments)
3. Uterosacral ligaments

B. Muscles :

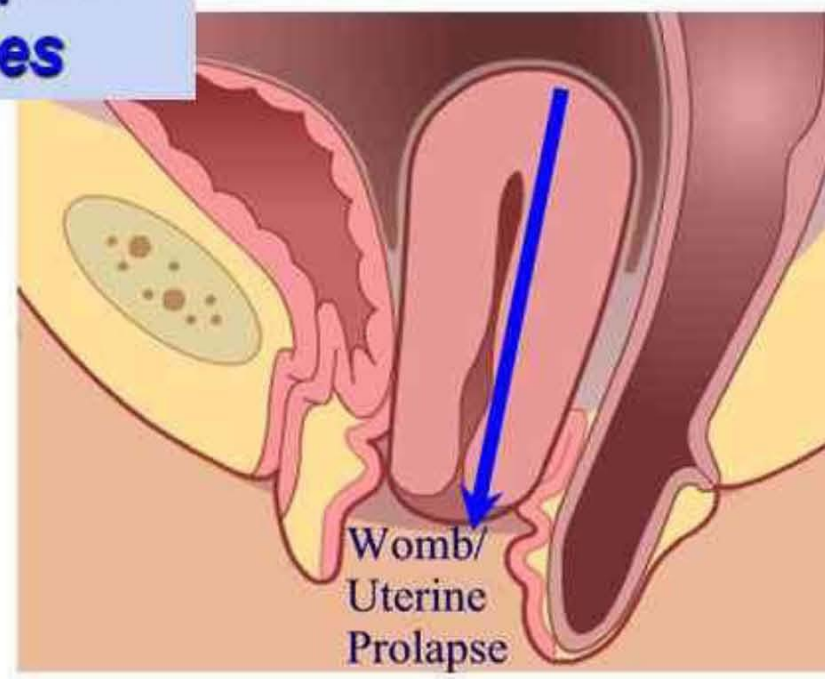
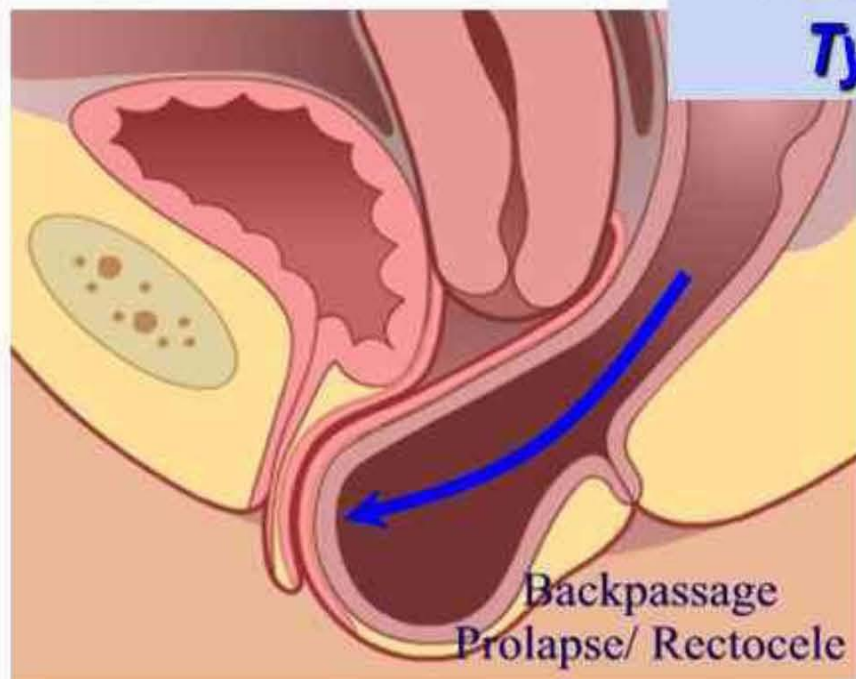
1. Muscles of the pelvic diaphragm (levator ani and coccygeus) especially sphincter vaginae part of levator ani.
2. Muscles of urogenital diaphragm in the deep perineal pouch.
3. Perineal body : it is the central tendon of perineum which keeps integrity of pelvic floor.
Rupture of the perineal body leads to prolapse of uterus.

C. Mechanical Factors :

- The angle of anteversion prevents prolapse of uterus into the vagina.
- The angle is maintained by the forward pull by round ligaments on the uterine fundus and the backward pull by the Uterosacral ligaments on the cervix.



Prolapse Types



Vagina

- ❑ It is a fibromuscular tube (8 cm long) lined with stratified squamous epithelium.
- ❑ It extends from the uterus down to the vestibule (it is a cleft between the 2 labia minora).
- ❑ Its axis makes a right angle with the uterus

Dimensions :

Anterior vaginal wall is about 7.5 cm.

Posterior vaginal wall is about 9 cm.

Relations of the Vagina :

1- Anterior wall related to :

- Base of the bladder
- Urethra

2- Posterior vaginal wall :

- **Upper 1/4** (covered with peritoneum) is related to rectum with Douglas pouch in between.
- **Middle 2/4** are related directly to rectum.
- **Lower 1/4** is related to anal canal with the perineal body in between

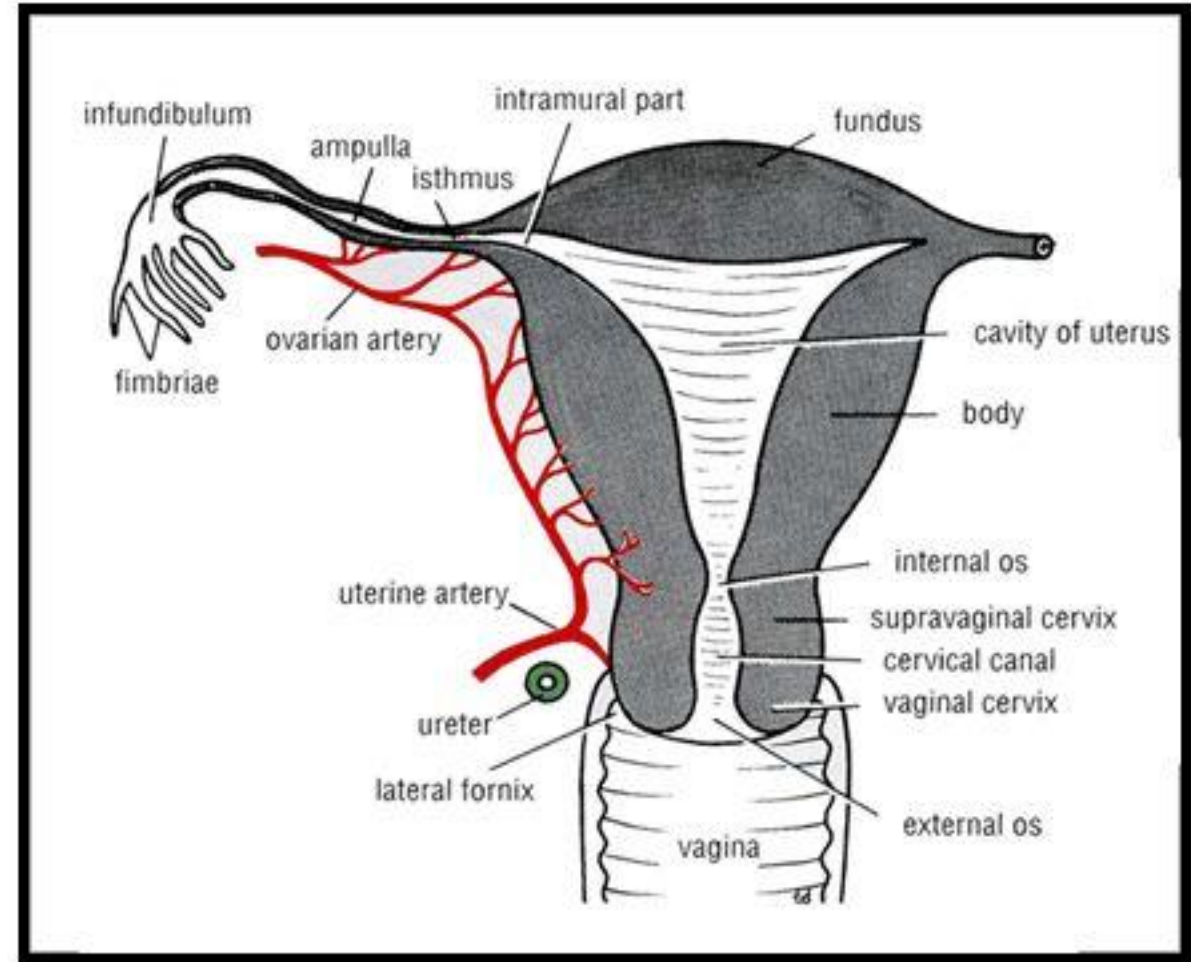
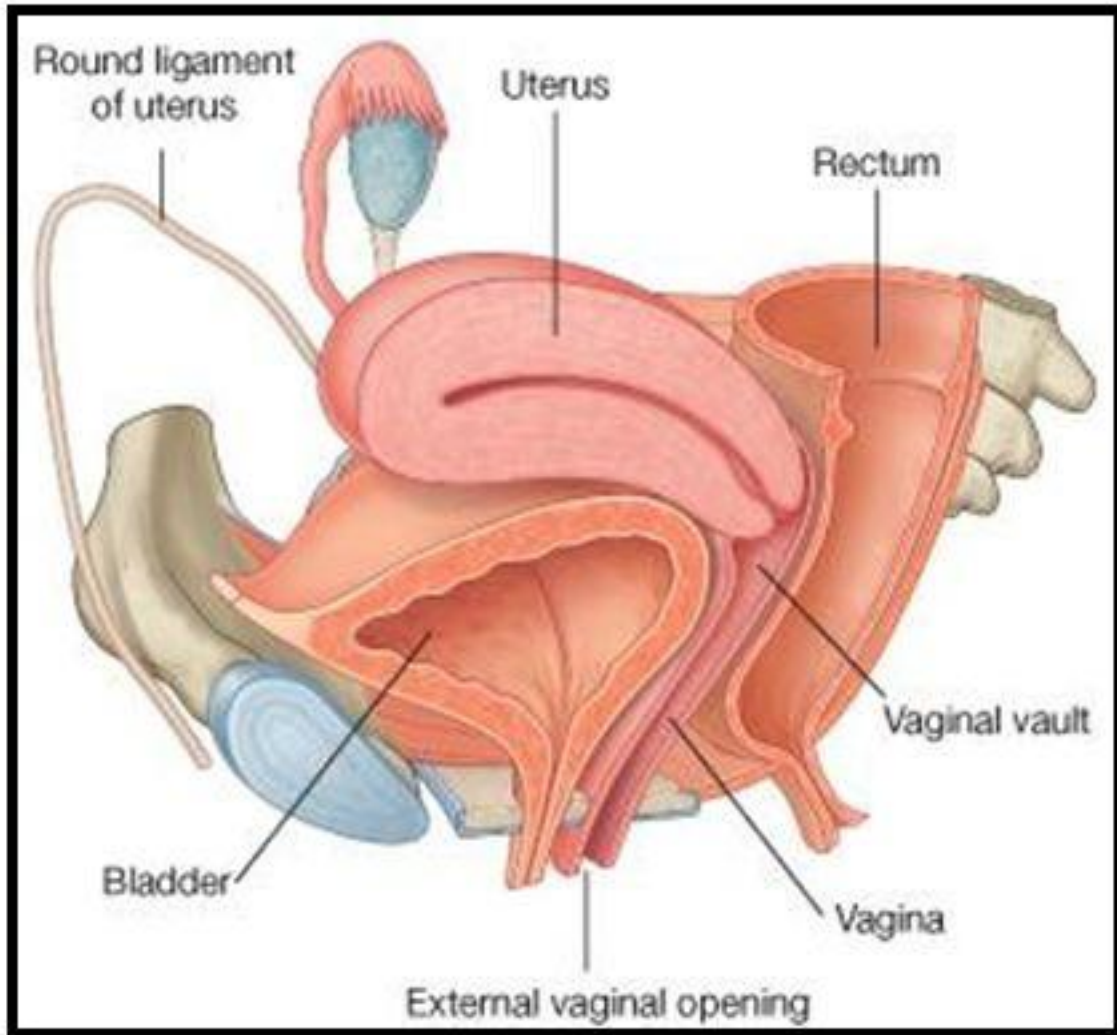
3- Lateral relations :

- **Upper part** : Ureter
- **Middle part** : Sphincter vaginae part of the levator ani.
- **Lower part** is related to muscles of urogenital diaphragm (in the deep perineal pouch), bulbs of vestibule and greater vestibular glands (in the superficial perineal pouch).

Cavity of Vagina :

- Its superior part surrounds the vaginal part of the uterine cervix and is divided into four fornixes.
- The posterior vaginal fornix is the ***deepest one*** and the *only* fornix **covered by peritoneum.**
- In virgins ; The vaginal orifice has a thin mucosal fold called the ***hymen*** which is perforated at its center.

RELATIONS OF VAGINA



Arterial Blood Supply : by uterine and vaginal arteries.

The vaginal A. supplies the base of the bladder and gives vaginal branches which anastomose with vaginal branches from uterine A.

These anastomoses form 2 median longitudinal vessels called azygos arteries which descend anterior and posterior to the vagina supplying it

Venous Drainage : by vaginal venous plexus on the side of vagina.

It is drained by the vaginal vein into internal iliac vein.

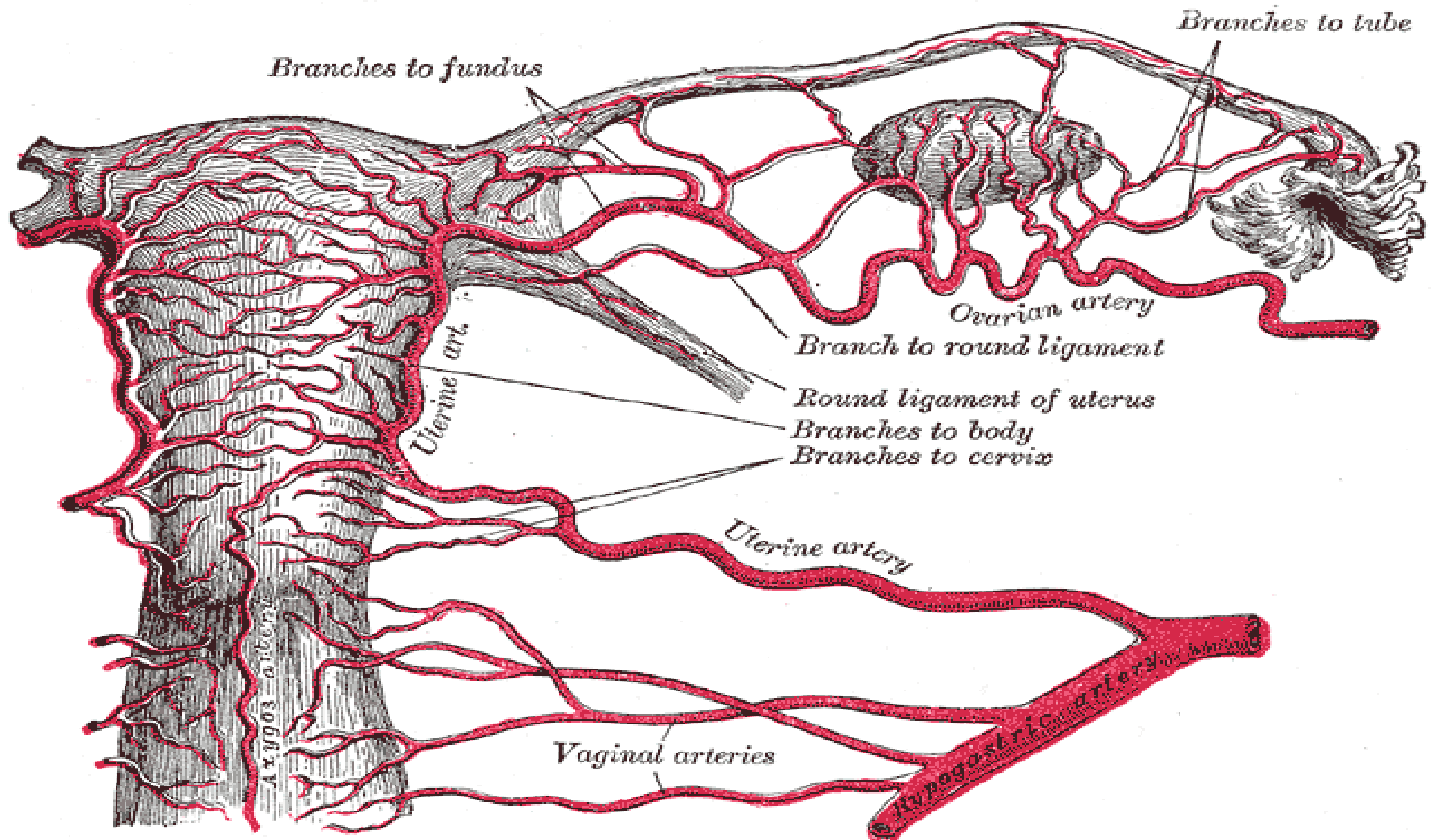
Lymph Drainage :

- **Above the hymen** → external, internal iliac lymph nodes.
- **Below the hymen** → superficial inguinal lymph nodes.

Nerve Supply :

- Autonomic fibres from the uterovaginal plexus derived from the inferior hypogastric plexus.

The **lower inch of** vagina is supplied by the pudendal nerve



Branches to fundus

Branches to tube

Ovarian artery

Branch to round ligament

Round ligament of uterus

Branches to body

Branches to cervix

Uterine art.

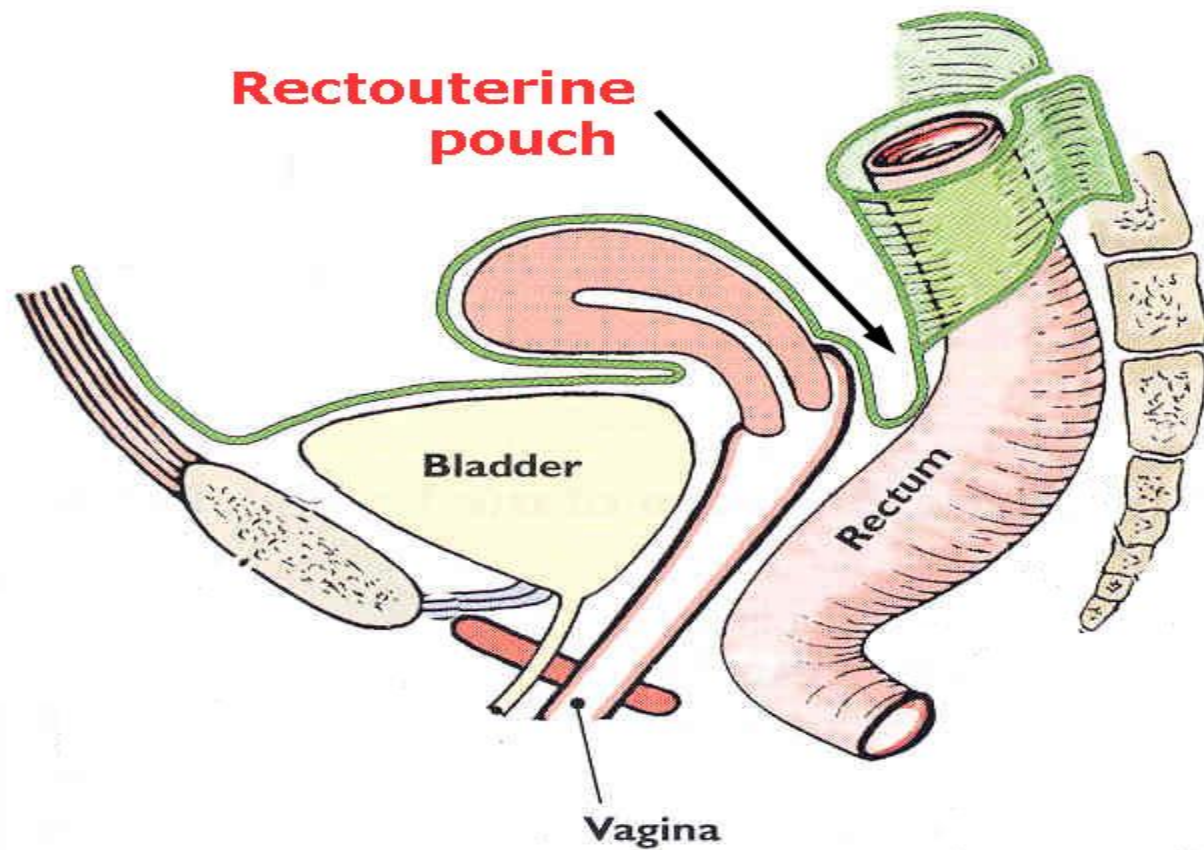
Uterine artery

Vaginal arteries

Hypogastric artery

Uterus

- ➔ The uterus is completely covered by peritoneum except the supravaginal cervix anteriorly and on the sides.
- The vagina has no peritoneum except its posterior fornix, which is covered by the peritoneum of Douglas pouch.

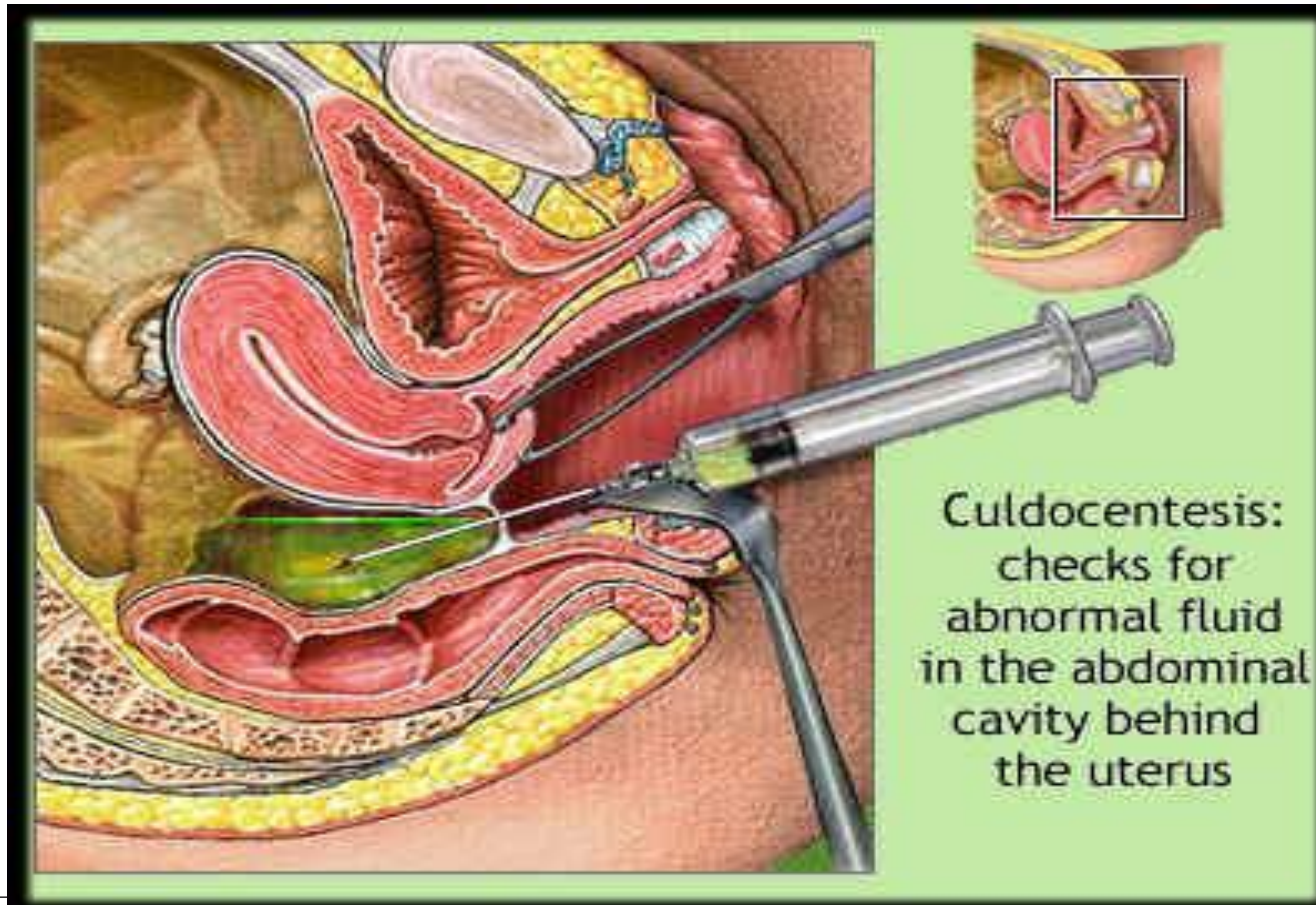


Culdocentesis

Drain a pelvic abscess or blood collection through the vagina by the passage of a needle through the posterior fornix.

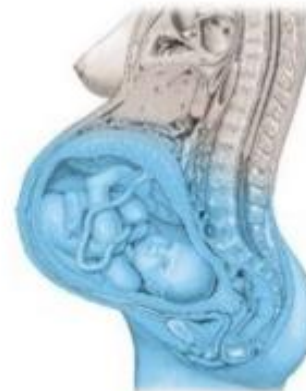
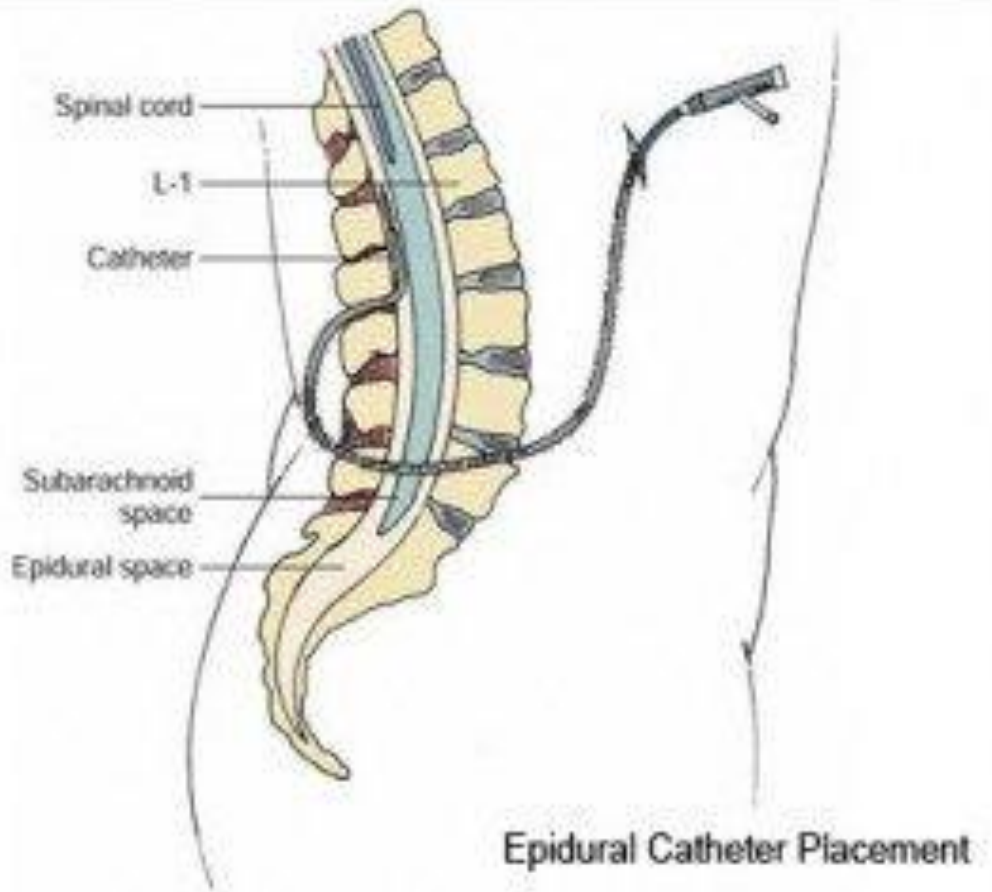
Misguided nonsterile instruments, which pierce the wall of the posterior fornix in a failed attempt at an illegal abortion.

This leads to Pelvic peritonitis, often with fatal consequences.



Painless Labour

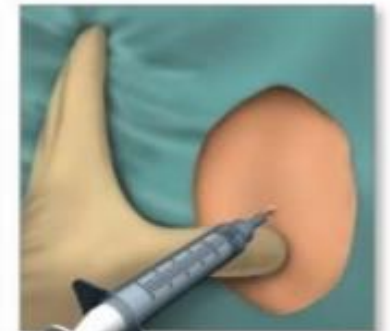
- Epidural anaesthesia provide analgesia during labour and control post partum pain
- The anaesthesia agent is administered using indwelling catheter into epidural space at L3-L4



General area of numbness



Injection site



Anesthetic shot



Epidural Analgesia (painless labour)

FEMALE EXTERNAL GENITALIA

It includes :

1-The mons pubis : It is the hairy skin anterior to the pubic bones.

It is rich in subcutaneous fat.

2-The labia majora :

They are a pair of rounded cutaneous folds (rich in subcutaneous fat),

Begin **Anteriorly** at mons pubis

Posteriorly meet each other anterior to the anus.

- They surround the ***pudendal cleft*** which in turn encloses the remaining genital structures described below.

3- The labia minora :

Are a pair of smooth pink folds,

Anteriorly : near the clitoris, each splits into 2 smaller folds :

- The upper pair unite *over* the tip of clitoris, forming the *prepuce of the clitoris*.
- The lower pair unite *below* the clitoris forming the *frenulum of the clitoris*.

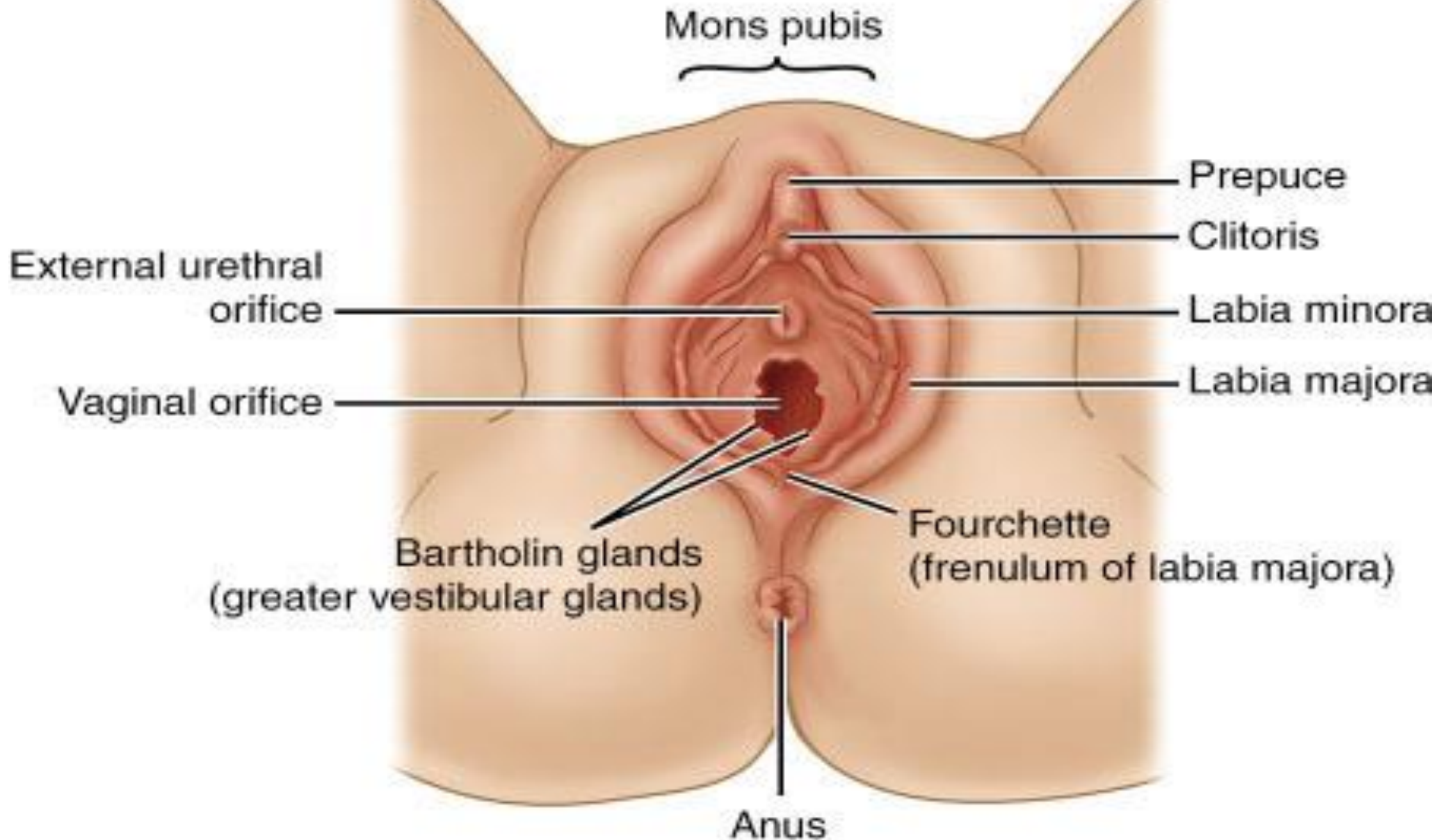
4- The clitoris :

Site : it *lies in* anterior part of the pudendal cleft. It resembles the penis, but differs in the following :

- Clitoris is formed only of 2 corpora cavernosa, each arises from side of pubis arch by a crus, so it has *no* corpus spongiosum.
- it is not traversed by the urethra.
- Its free end is sensitive and is called *glans clitoris*.

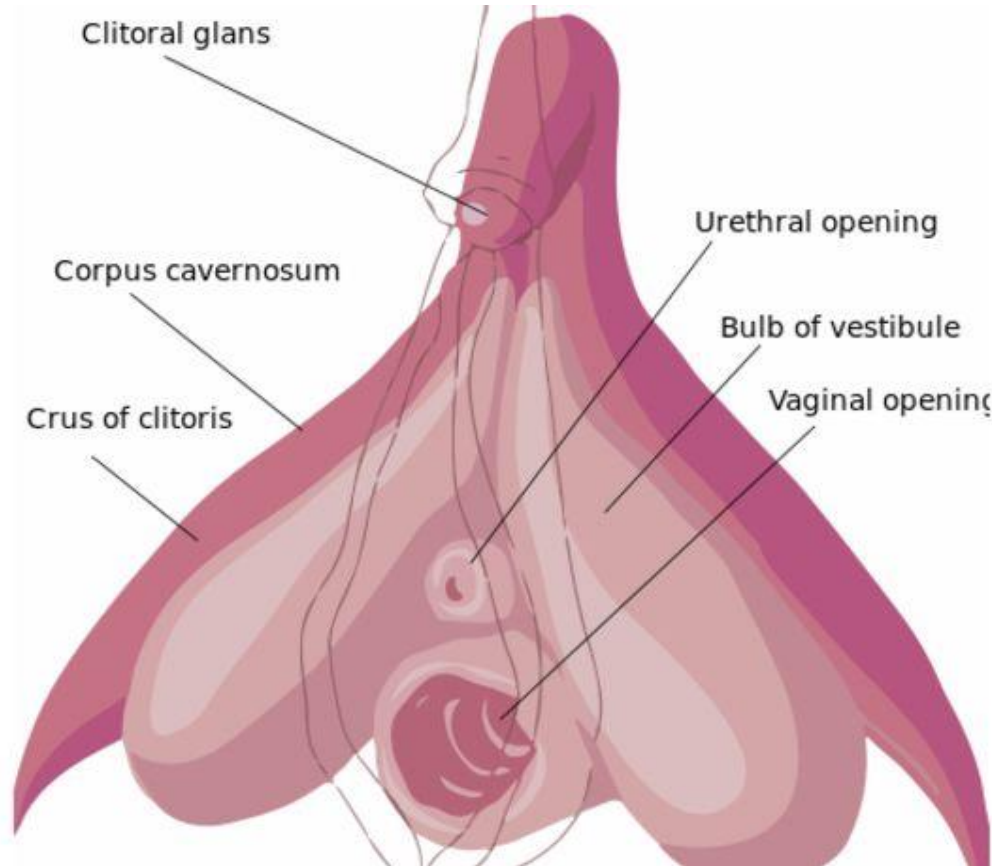
5- Vestibule :

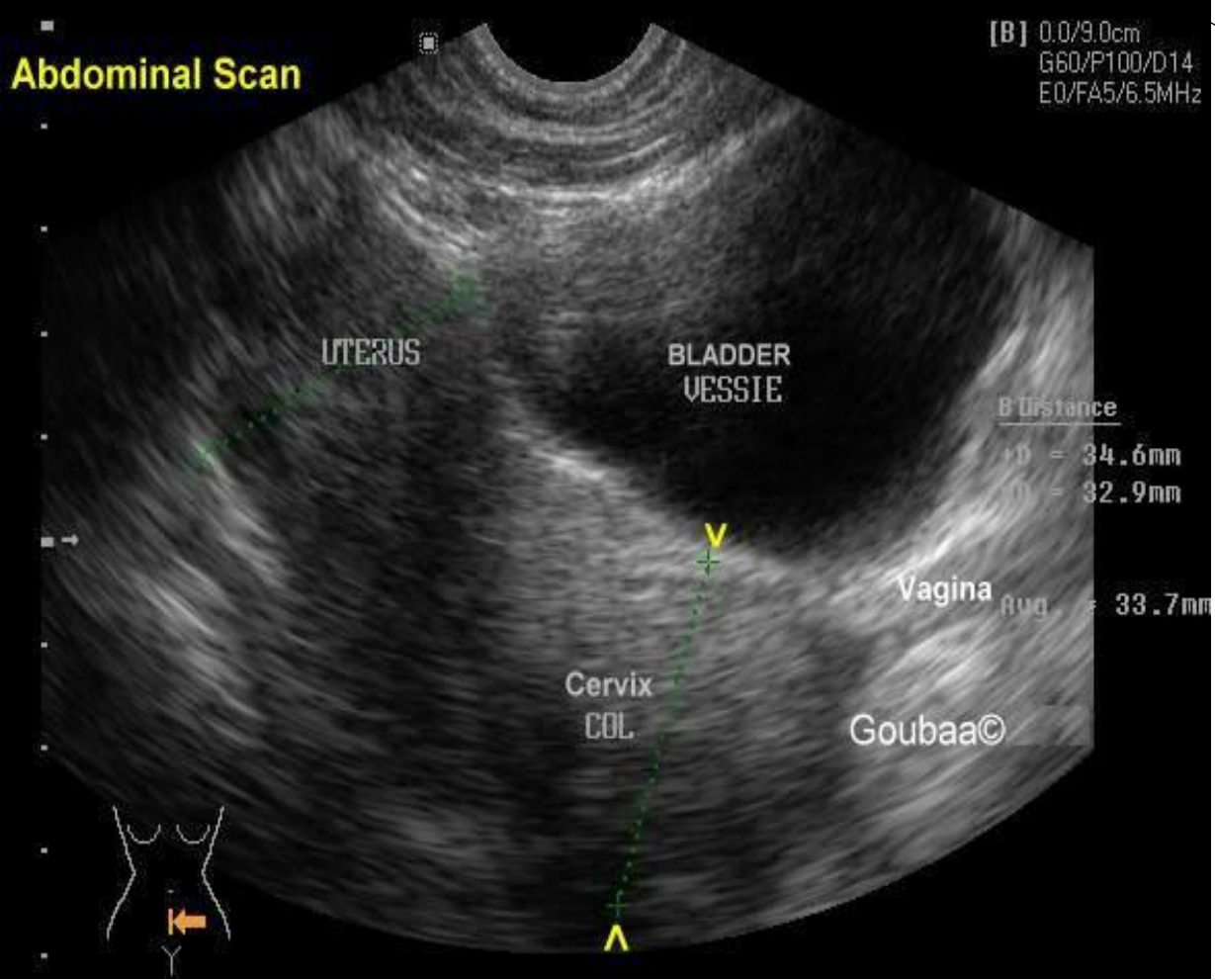
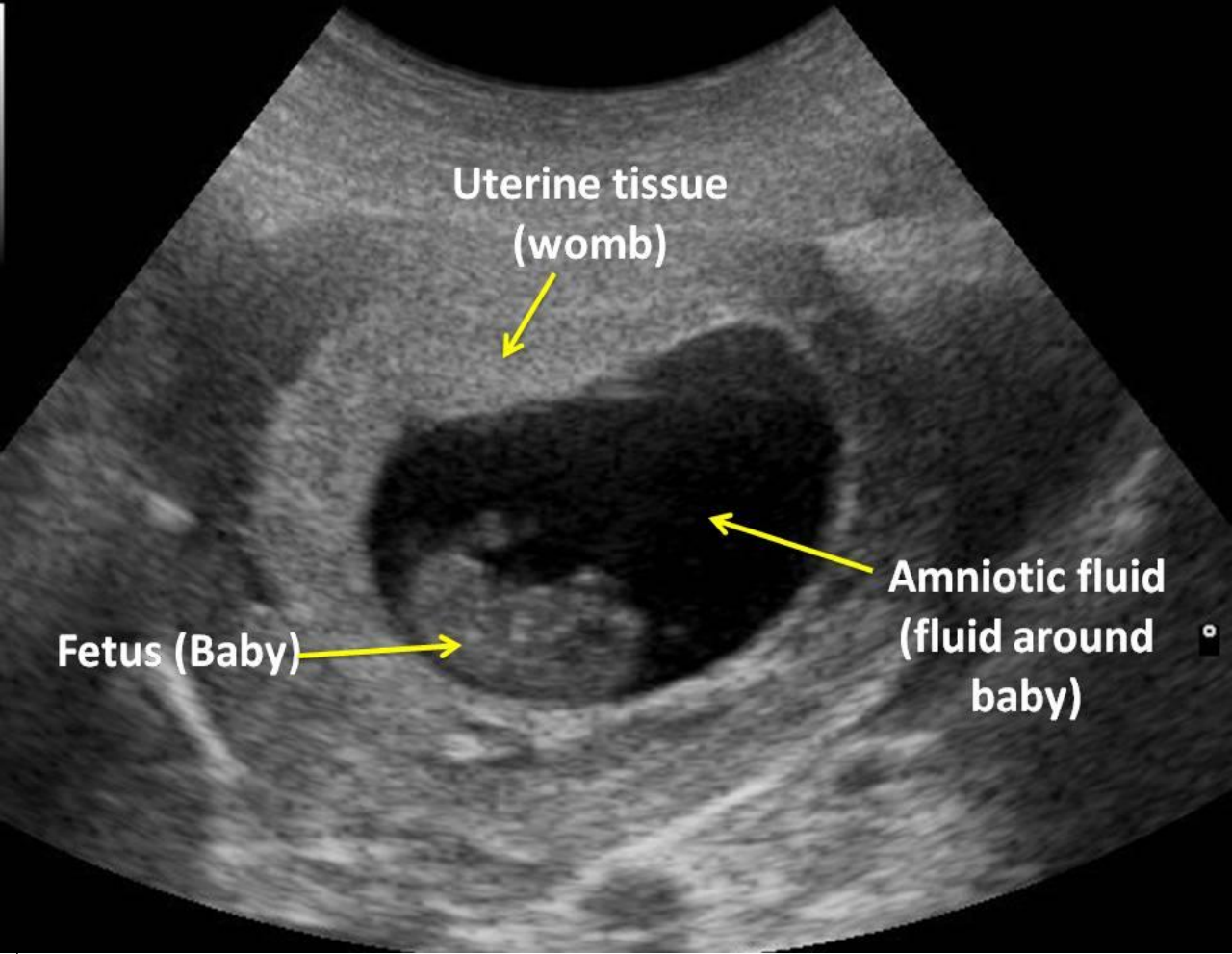
- It is the space between the two labia minora.
- It contains :
 - Urethral orifice ; lies 2 cm posterior to the clitoris but anterior to vaginal orifice.
 - Vaginal orifice : in the posterior part of the vestibule, it is closed in the virgin by the hymen.
 - Orifices of the greater vestibular glands (of Bartholin), one on each side of the vaginal orifice (these glands lie in the superficial perineal pouch).

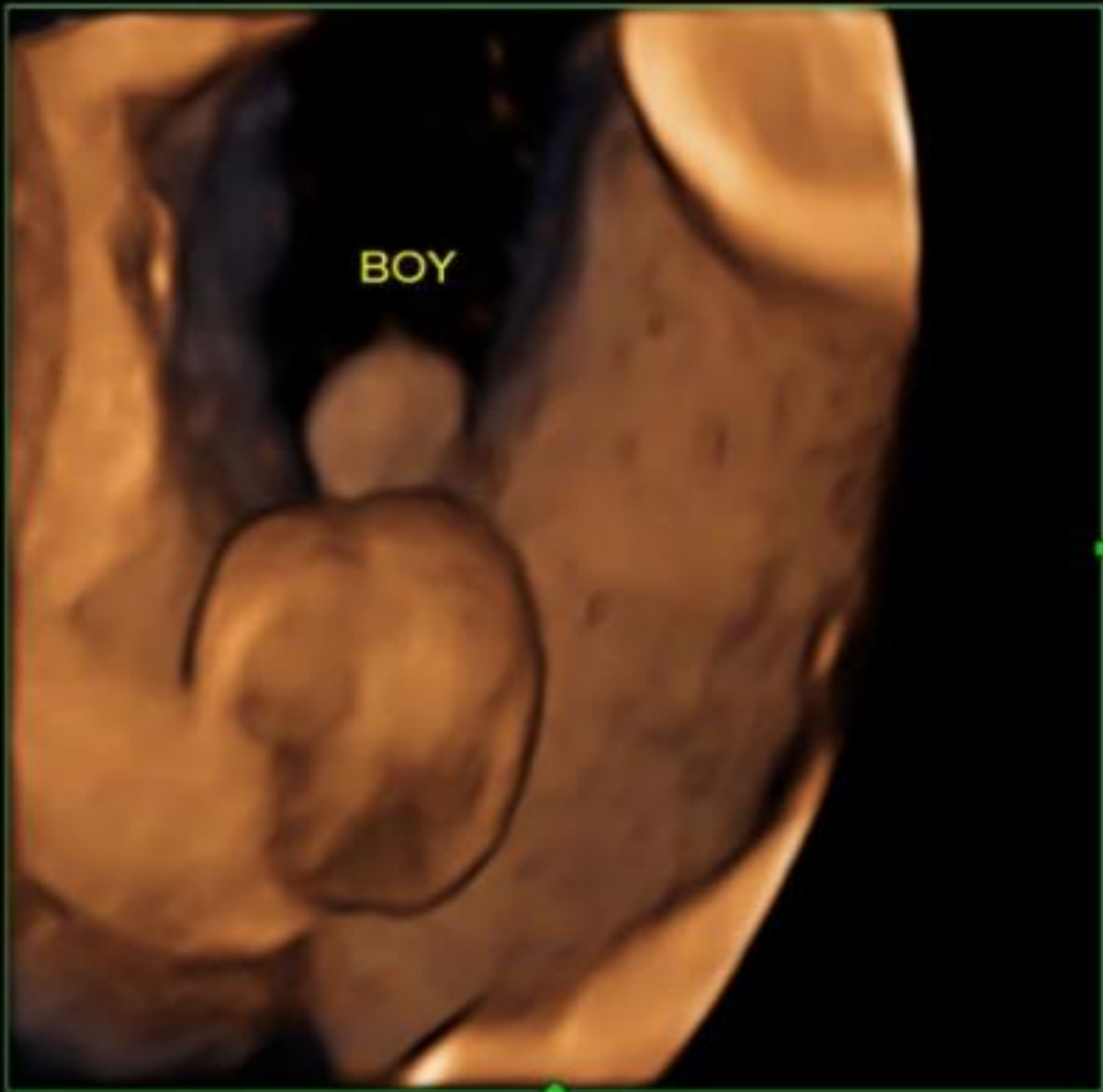


6- Bulbs of the vestibule :

- These are two large, elongated masses of erectile tissue.
- They lie along the sides of the vaginal orifice and are covered by bulbospongiosus muscles.
- They correspond to bulb of the root of penis, **but differ in 2 facts :**
The bulbs are separated from the clitoris.
The bulbs are separated by the vestibule, containing vaginal and urethral orifices.

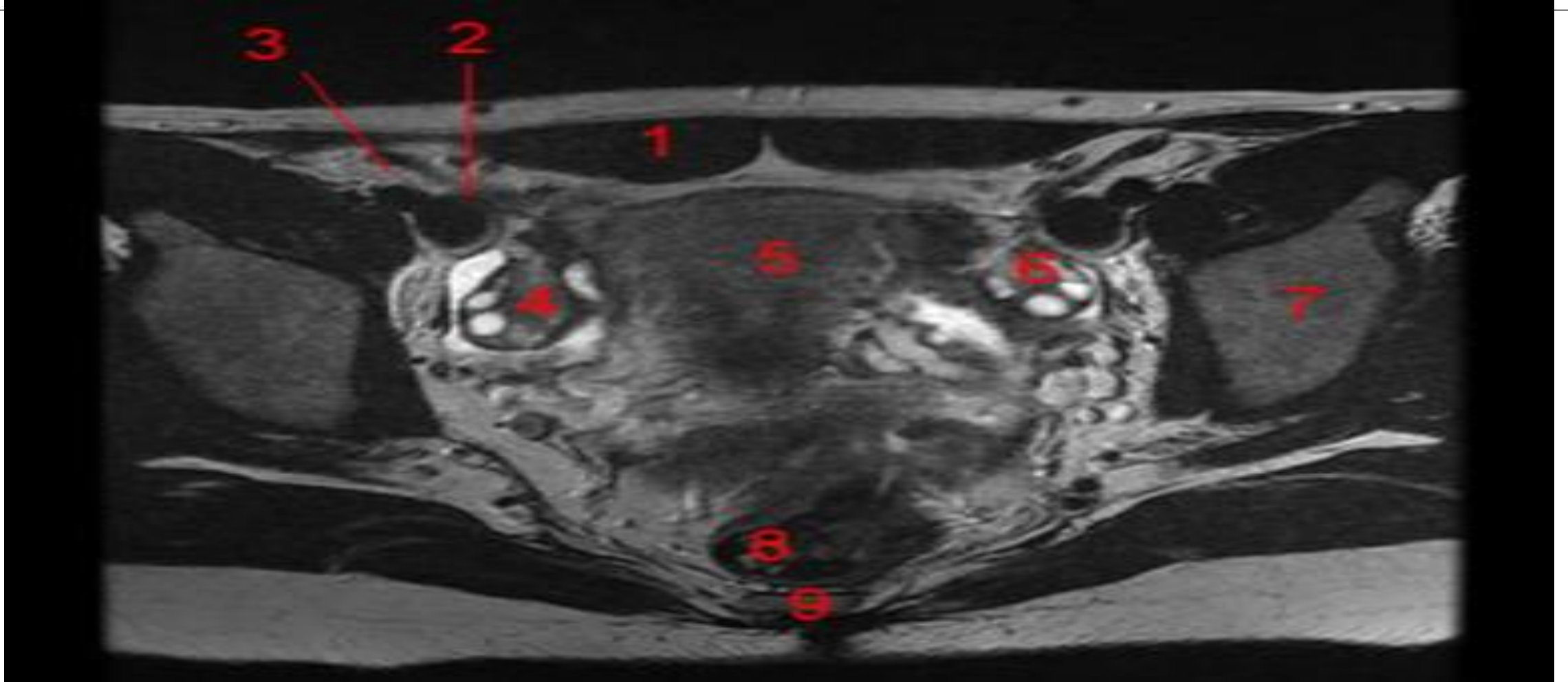




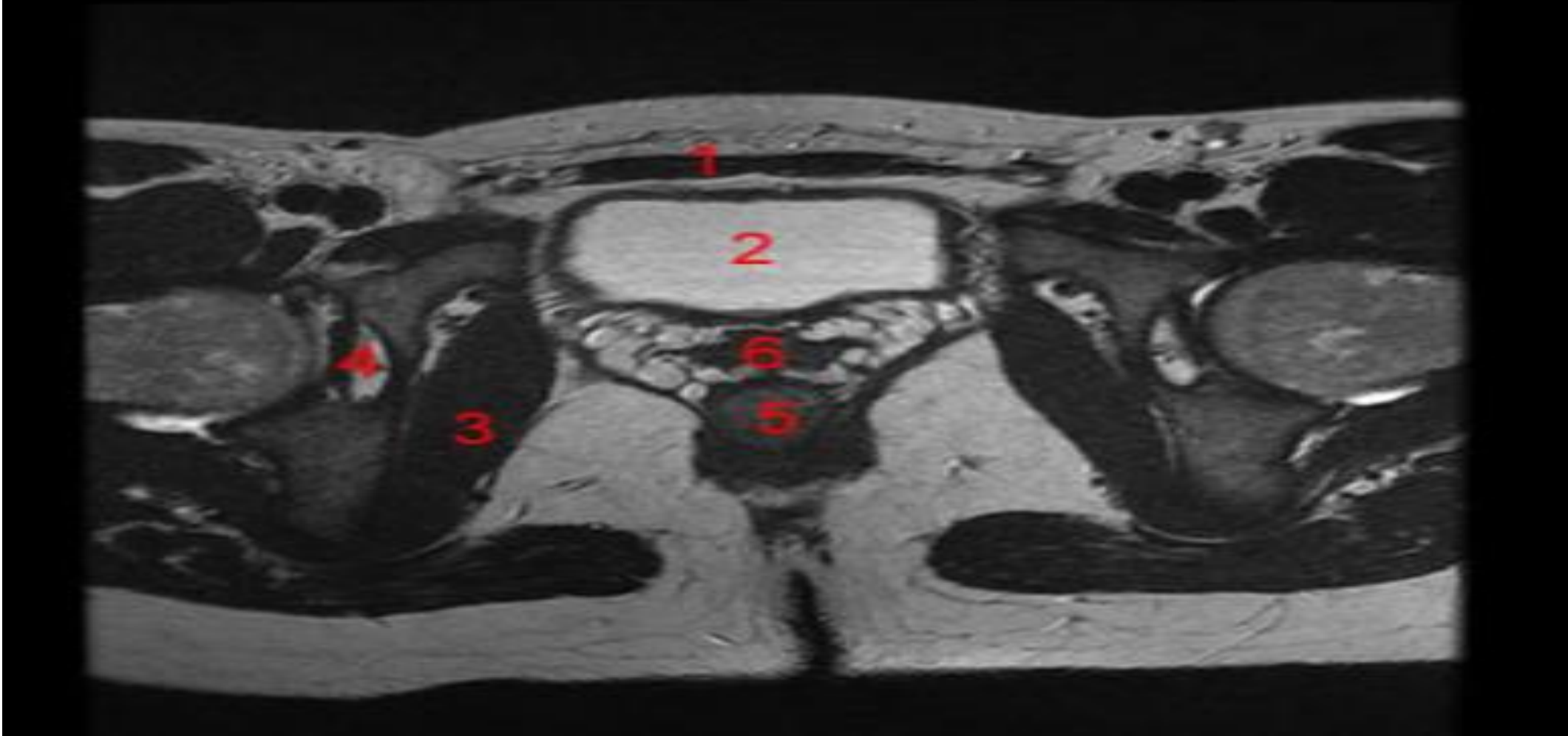


3D and 4D ultrasound

4D scans show moving 3D images, with time being the fourth dimension



MRI of the female pelvis: 1, Rectus abdominis m. 2, external iliac vein 3, external iliac artery 4, right ovary 5, uterus 6, left ovary 7, ilium 8, rectum 9, sacrum



MRI of the female pelvis: 1, Rectus abdominis m. 2, bladder 3, obturator internus m. 4, acetabular fossa 5, rectum 6, vagina

THANK
YOU

