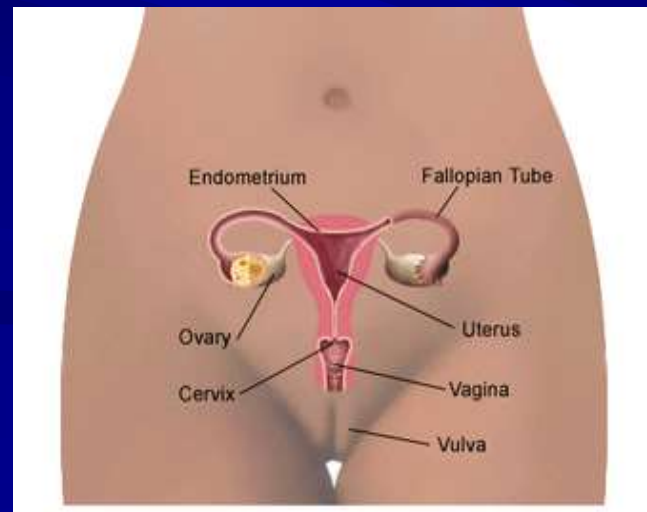


Abdominopelvic cavity – seventh part

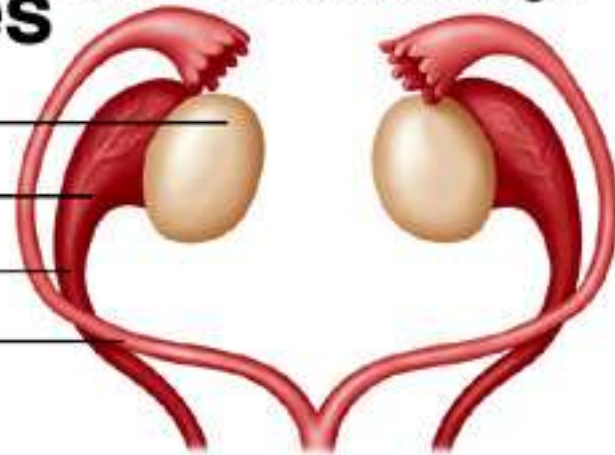
- Female internal genital organs
- Female external genital organs (clinically- vulva)
- Pelvic diaphragm
- Pelvic viscera
- Perineum
- Pudendal nerve



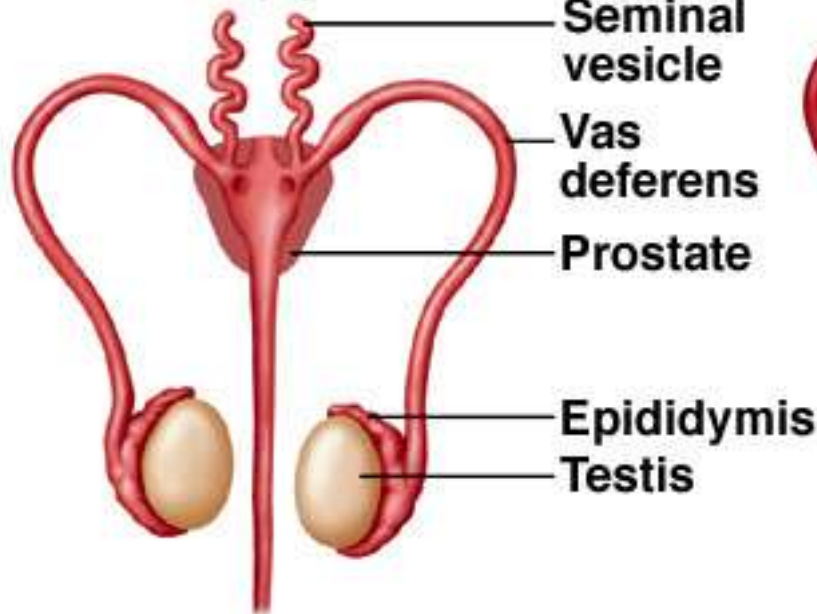
Prenatal Dev. of Internal Reproductive Structures

Undifferentiated stage

- Gonad
- Mesonephros
- Wolffian duct
- Müllerian duct

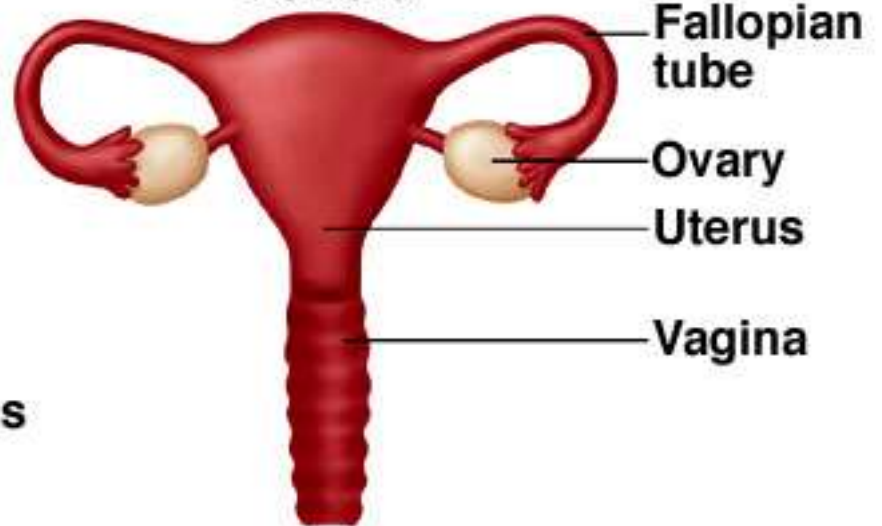


Male



- Seminal vesicle
- Vas deferens
- Prostate
- Epididymis
- Testis

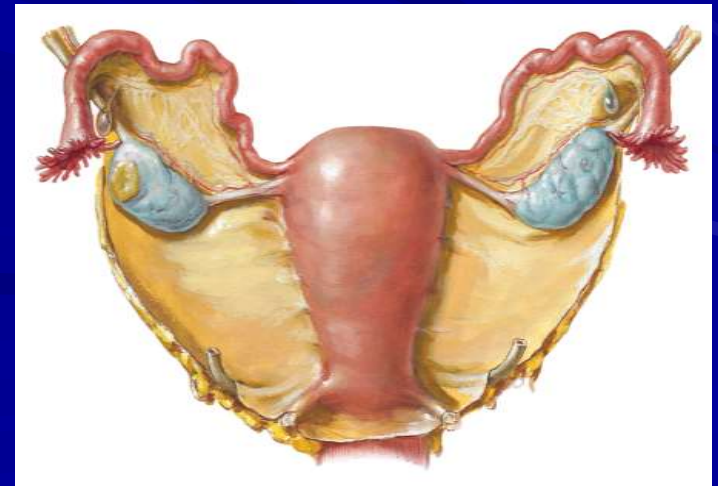
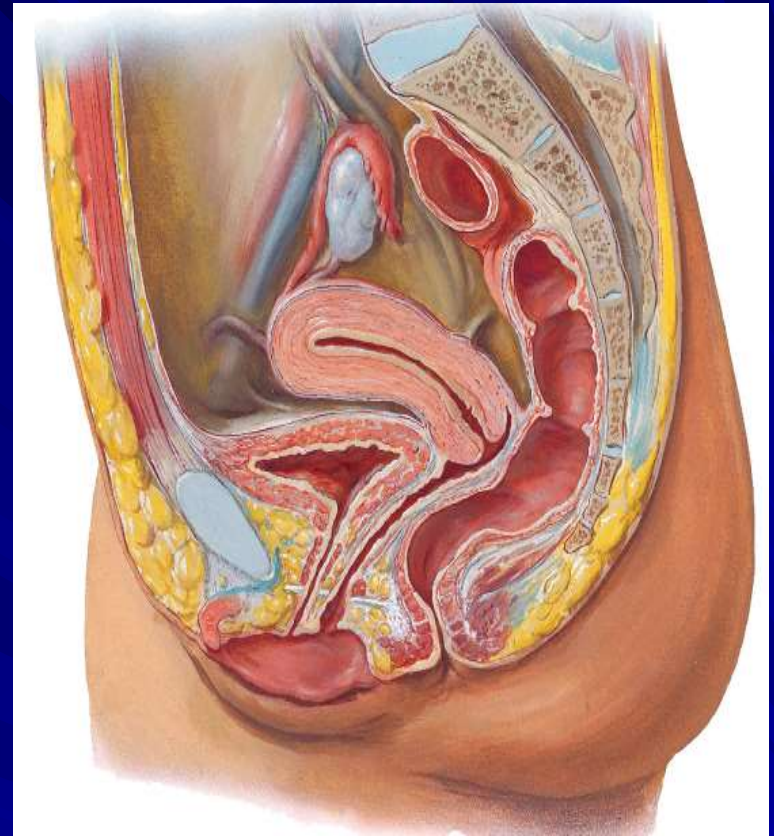
Female



- Fallopian tube
- Ovary
- Uterus
- Vagina

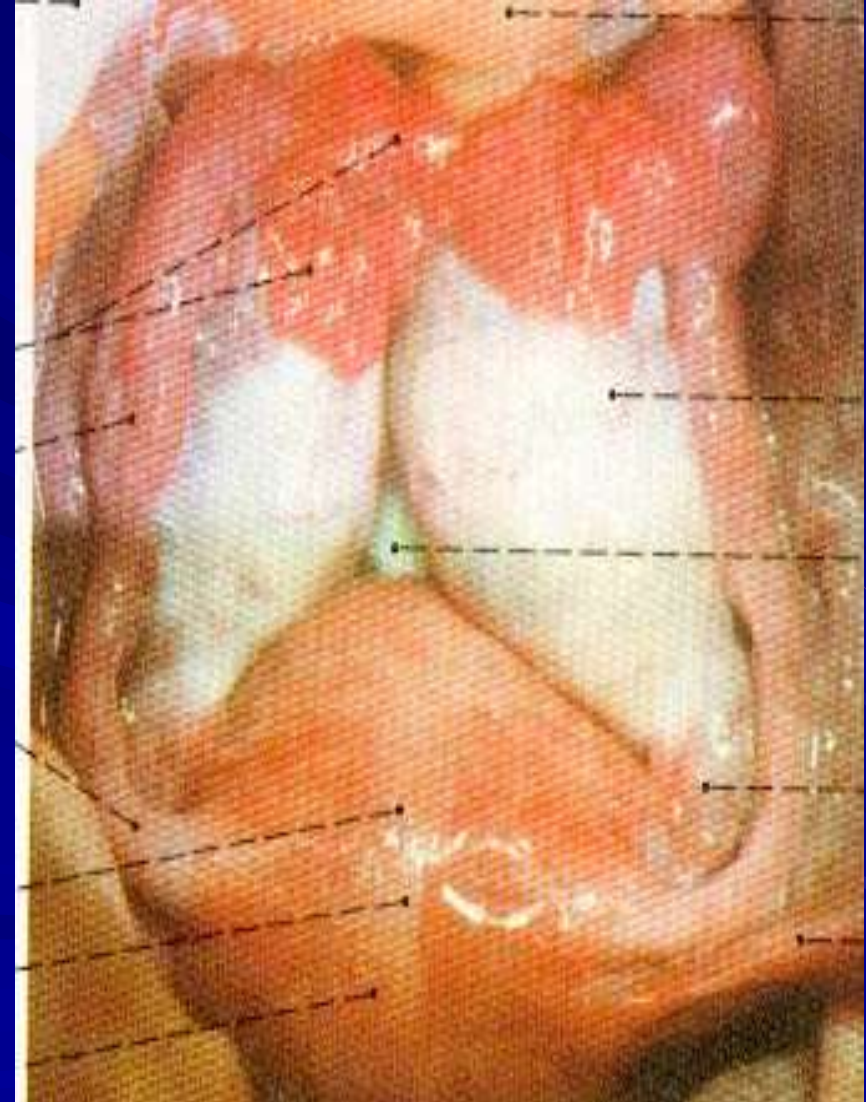
Ovary

- Organ for germ- cell (oocyte) and hormone production (estrogen, progesterone)
- Almond-shaped gland
- Occupies a fossa located just inferior to the division of the common iliac artery, close to the lateral pelvic wall
- Suspended by the mesovarium of the broad ligament of uterus
- Medial and lateral surfaces
- Proximal (uterine) and distal (tubal) ends
- Posterior (free) and anterior (mesovarian) borders



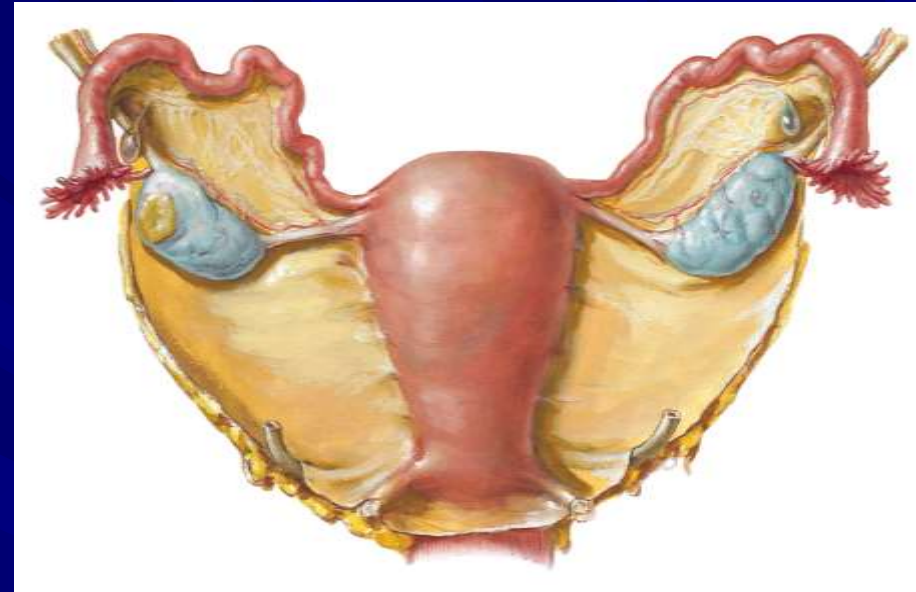
Ovaries- the surface

- In prepubertal females- covered by a smooth, single layer of ovarian surface epithelium, that gives the surface a dull, grayish appearance
- In puberty female- scarred and distorted because of the repeated rupture of ovarian follicles and discharge of oocytes (ova)- part of ovulation



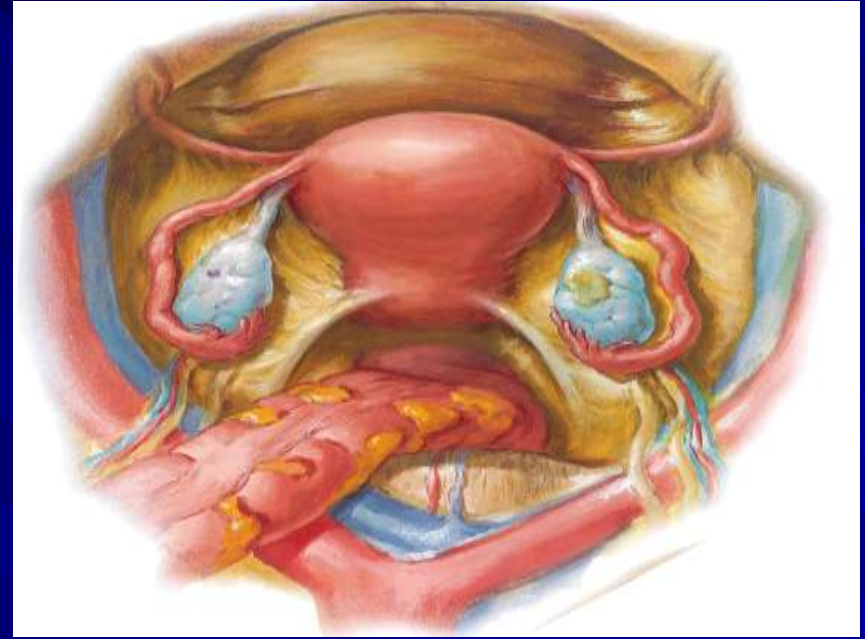
The ligament of the ovary (ovarian ligament)

- Attaches the ovary to the uterus
- Runs within the mesovarium
- Remnant of the uppermost part of the ovarian gubernaculum of the fetus
- Connects the proximal (uterine) end of the ovary to uterine horn, just inferior to the entrance of the uterine tube



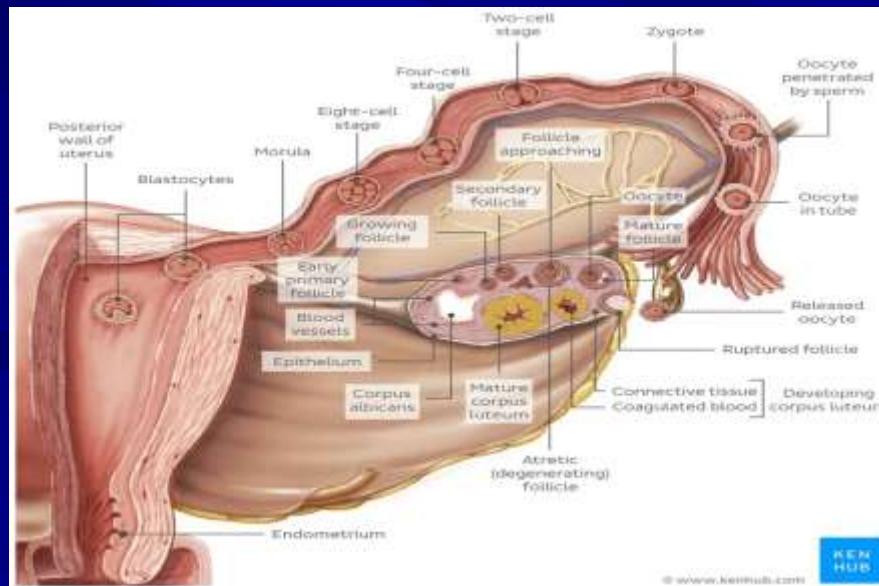
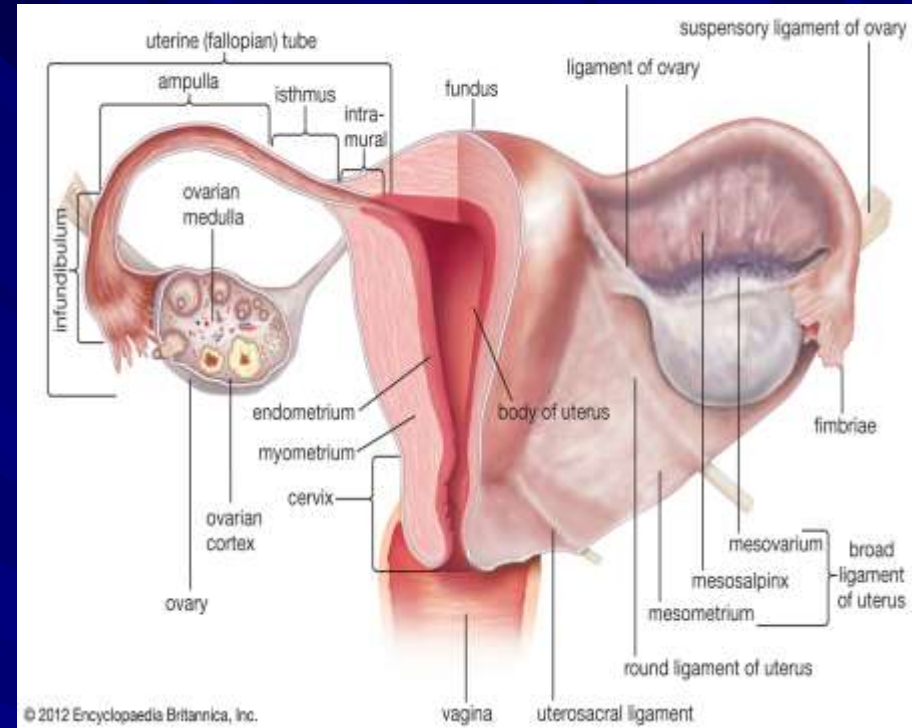
The suspensory ligament of the ovary

- Fold of peritoneum
- Connects the distal end of the ovary to the lateral wall of the pelvis
- Conveys the ovarian vessels, lymphatics and nerves to and from the ovary
- Lateral part of the mesovarium of the broad ligament of uterus
- Prolonged superiorly over the vessels



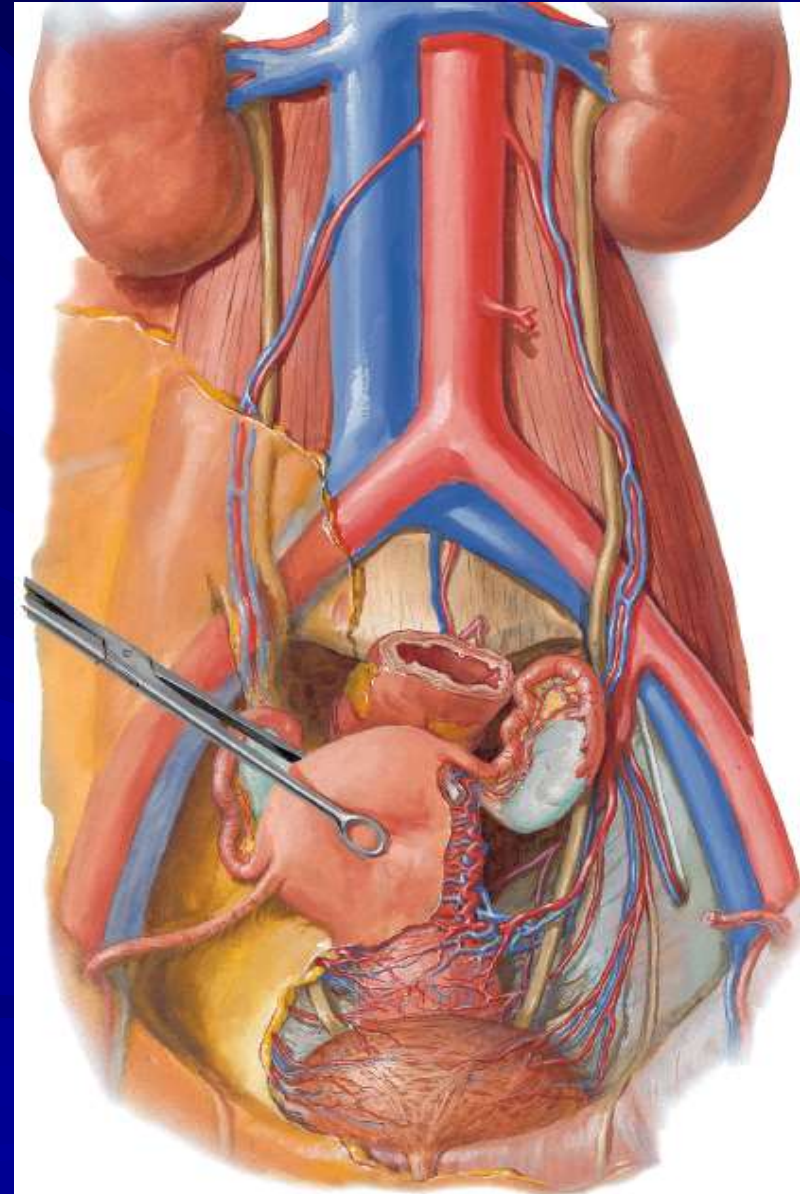
The oocyte

- Expelled at ovulation passes into the peritoneal cavity
- Usually trapped by the fimbriae of the infundibulum of the uterine tube
- Carried into the ampulla, where it may be fertilized



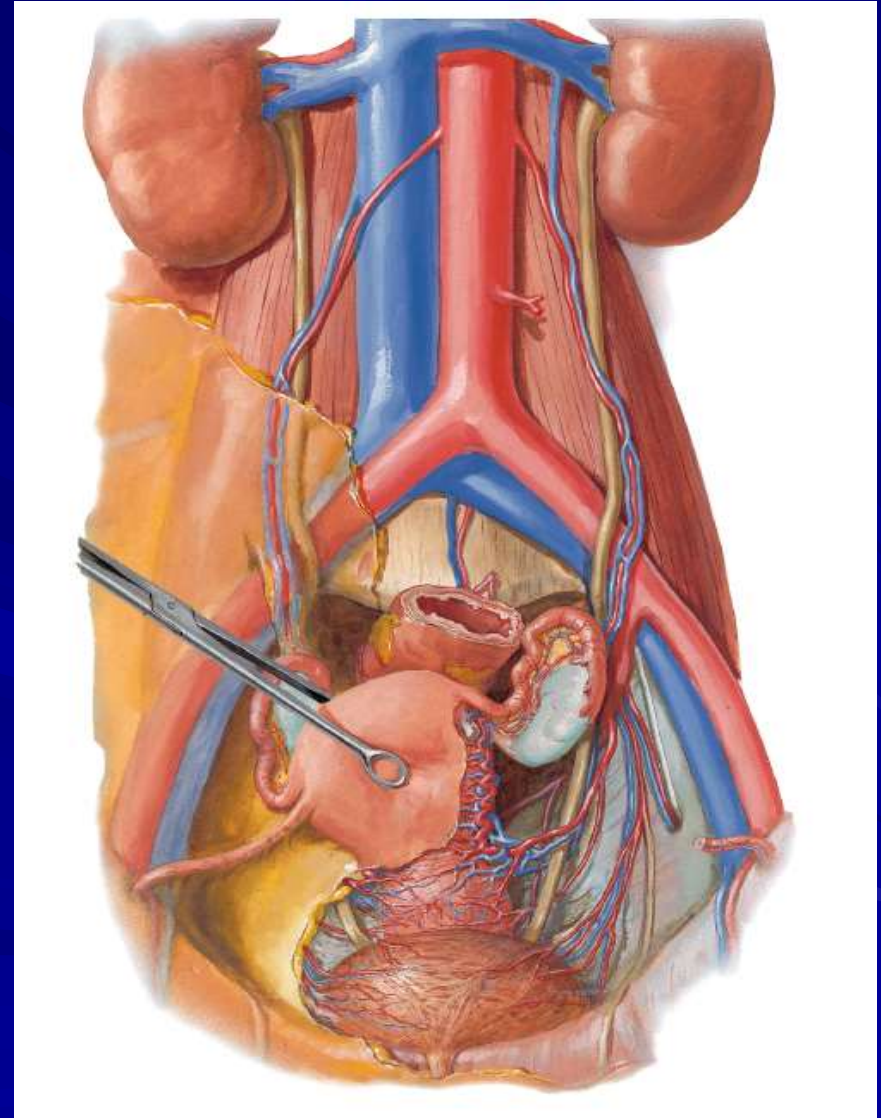
The ovarian arteries

- From the abdominal aorta, just inferior to the renal arteries
- Descend along the posterior abdominal wall
- Run anterior to the ureter
- At the pelvic brim cross over the external iliac vessels
- Lie lateral to the ureter
- Enter the suspensory ligaments
- Terminate by bifurcating into ovarian and tubal branches,
- Pass through the mesovarium to the ovary
- Anastomose with corresponding branches of the uterine artery

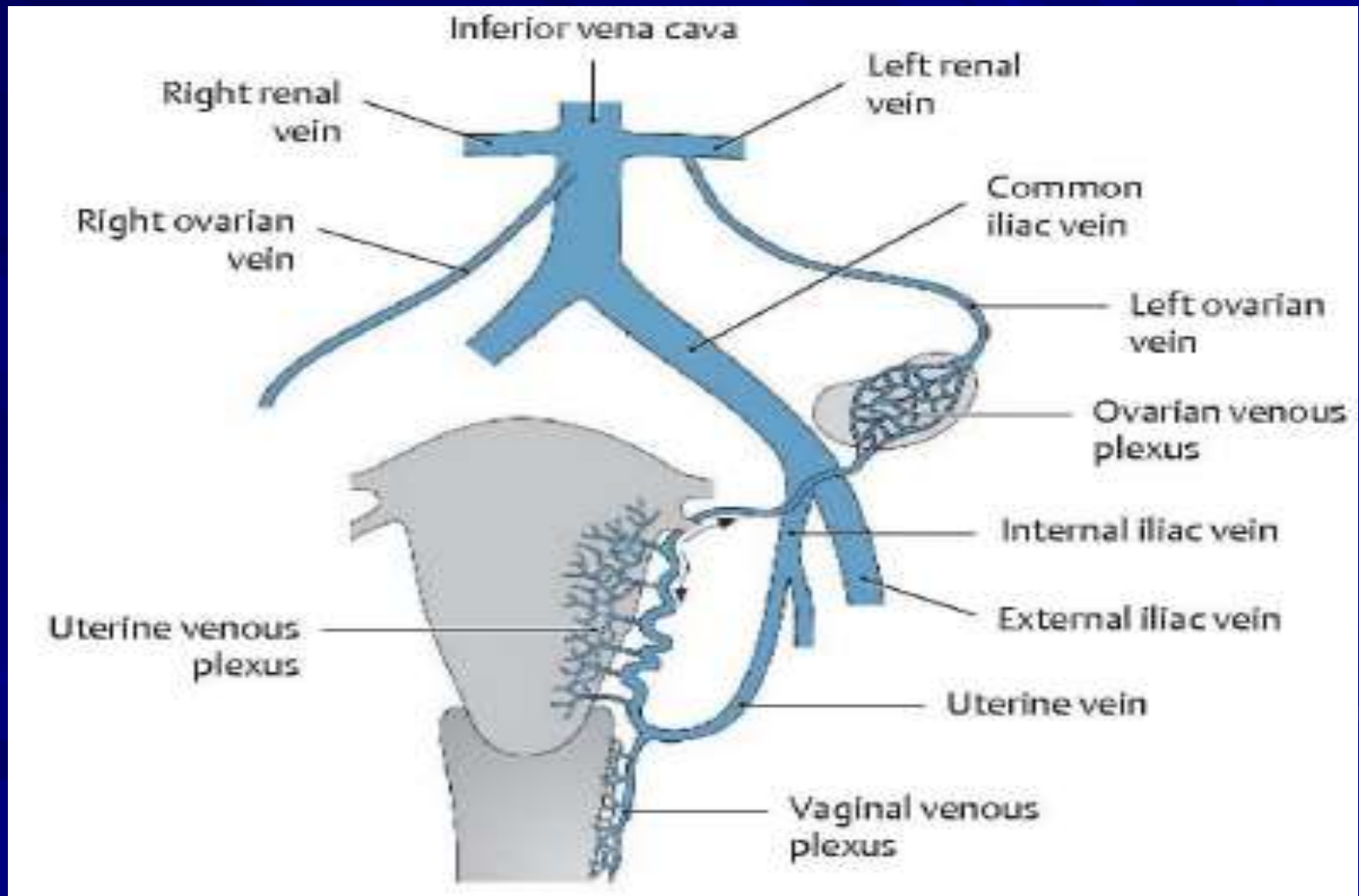


Venous drainage of the ovaries

- Form a vinelike pampiniform plexus of veins in the broad ligament of uterus near the ovary and uterine tube
- Next form usually a singular ovarian vein, which leaves the lesser pelvis with the ovarian artery
- The right ovarian vein ascends to enter the inferior vena cava
- The left ovarian vein drains into the left renal vein

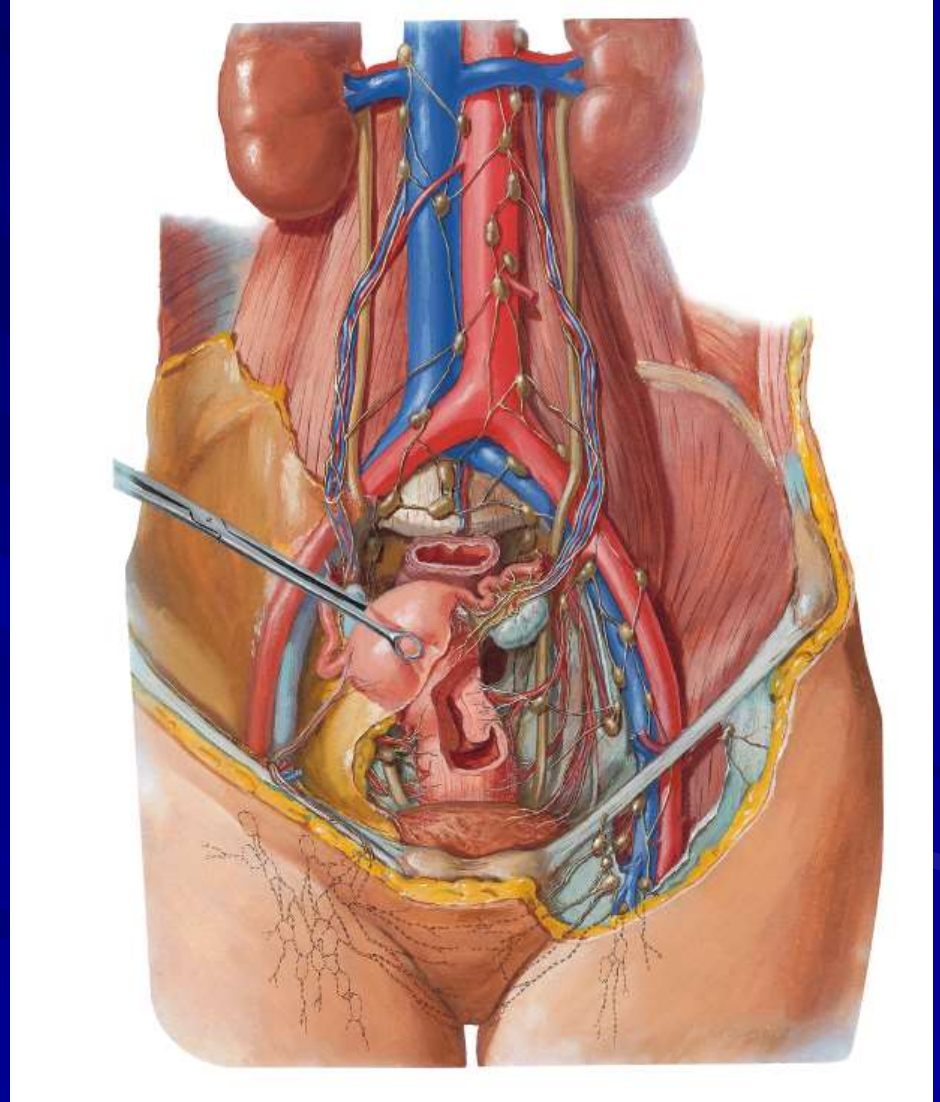


Venous drainage of the ovaries



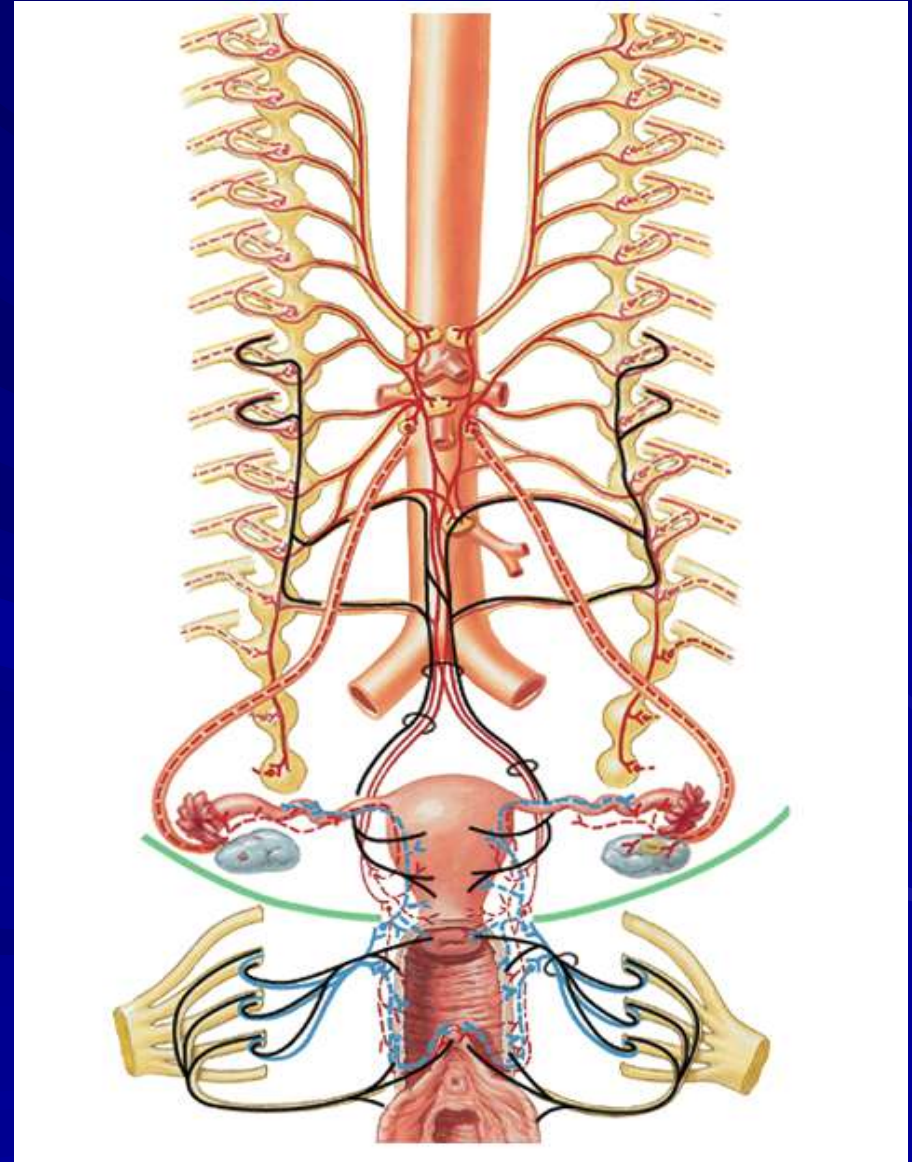
Drainage of the ovaries

- To the lumbar lymph nodes



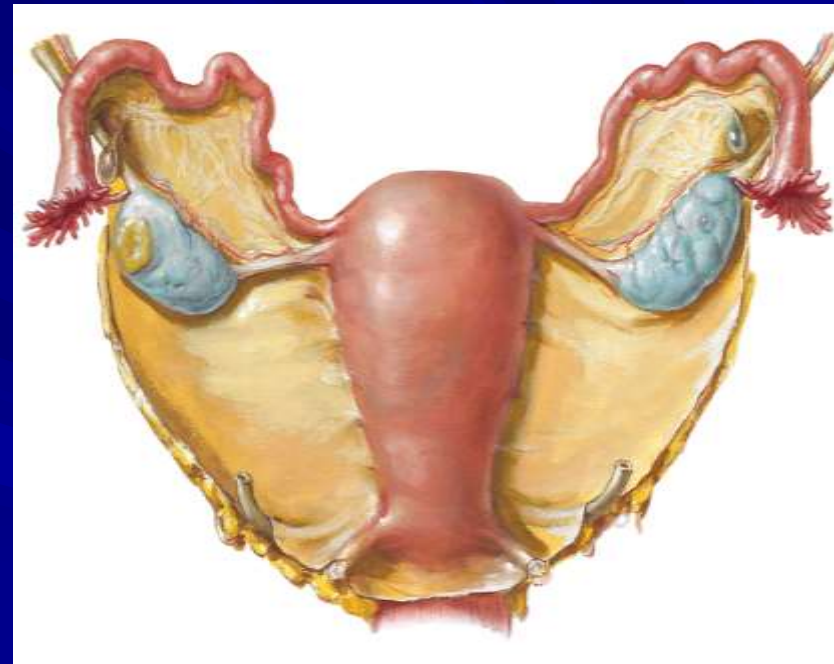
Nerves of the ovaries

- Sympathetic and afferent fibers reach the ovarian plexus by descending along the ovarian vessels and via communications from the pelvic (uterovaginal) plexus
- Parasympathetic fibers from the pelvic splanchnic nerves arising from the ventral primary rami of S2-S4
- Afferent fibers from the ovary enter the spinal cord through T10 and T11 nerves



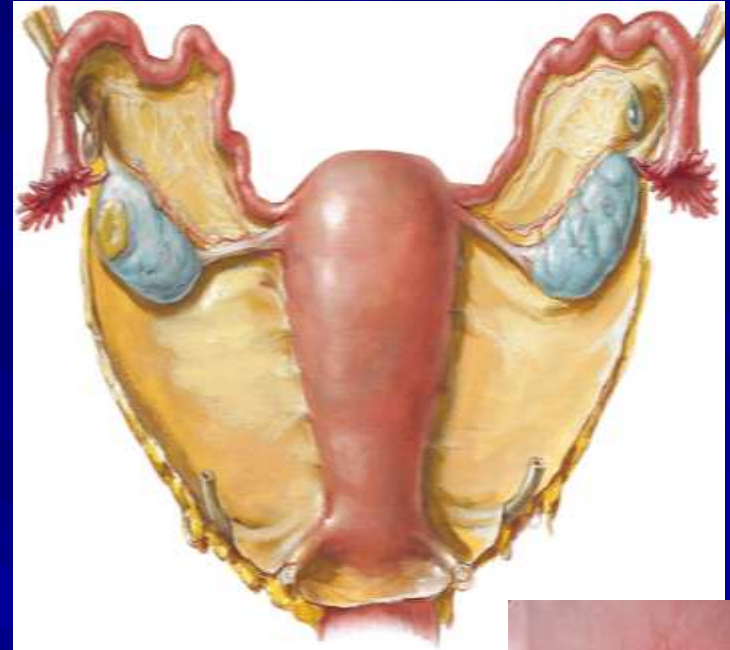
Uterine tube (salpinx, Fallopian tube)

- Extends laterally from the uterine horn and opens into the peritoneal cavity near the ovary
- Approximately 10 cm long
- Lies in the mesosalpinx formed by the free edge of the broad ligament of uterus
- Site of conception
- Conveys the fertilized or unfertilized oocyte to the uterus by ciliary action and muscular contraction, which takes 3 to 4 days



The parts of the uterine tube

- Infundibulum - the funnel-shaped distal end, opens into the peritoneal cavity through the abdominal ostium, has the fingerlike processes of the fimbriated end (fimbriae)
- Ampulla- the widest and longest part; oocytes expelled from the ovaries usually are fertilized (is formed zygote) in the ampulla
- Isthmus - the thick-walled part, enters the uterine horn
- Uterine part - the short intramural segment, opens through the uterine ostium into the uterine cavity



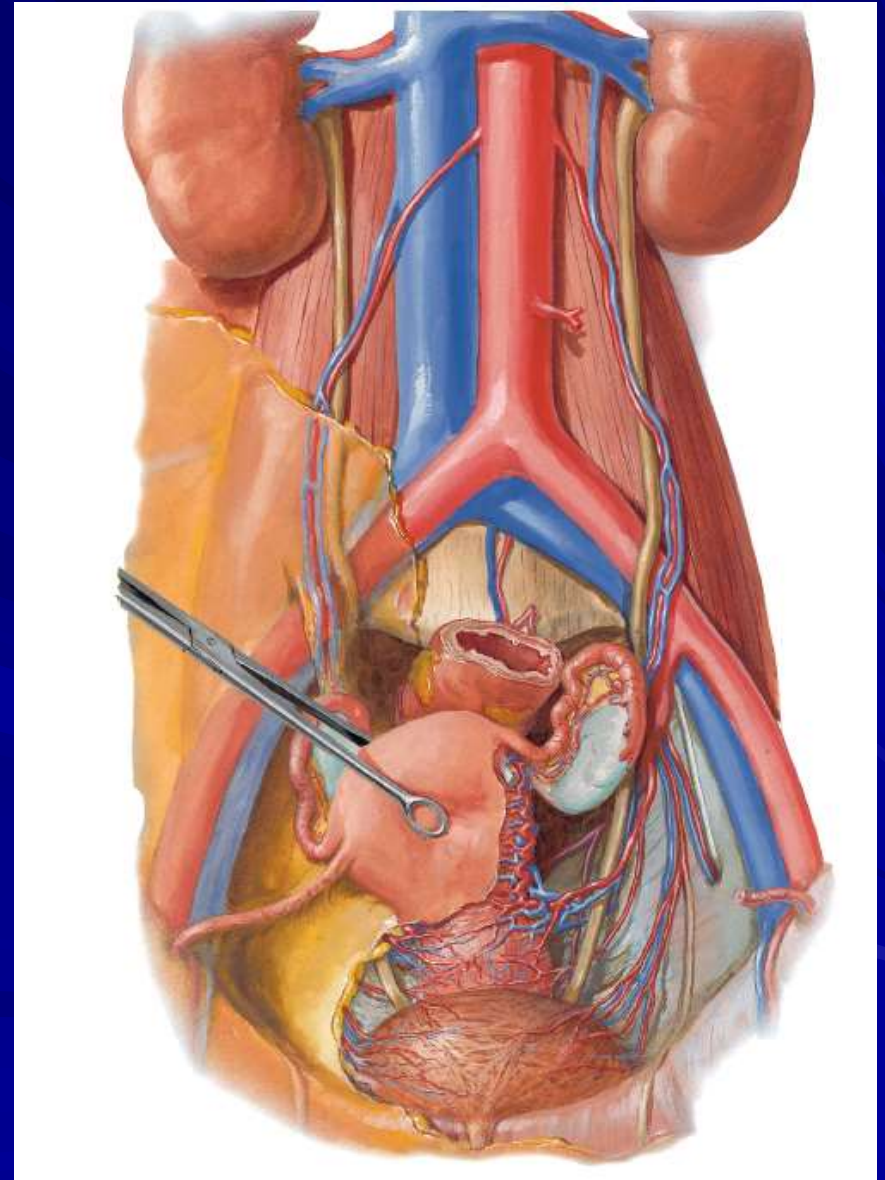
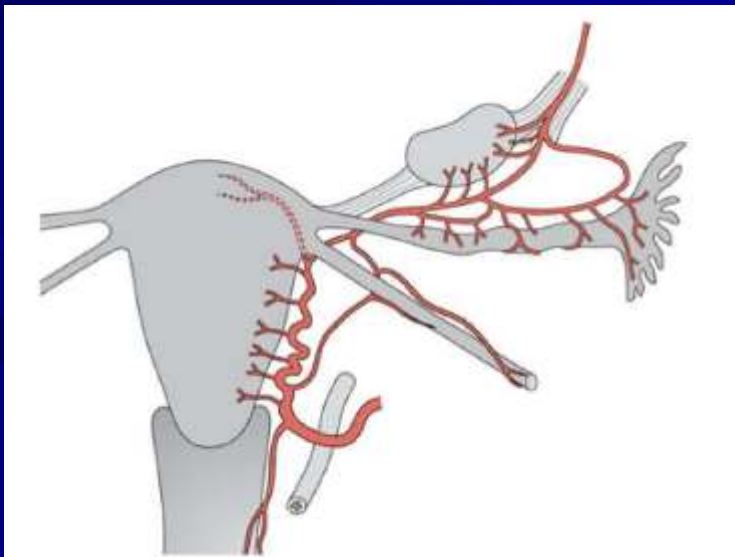
The abdominal ostium of the uterine tube



Arterial supply of the uterine tubes

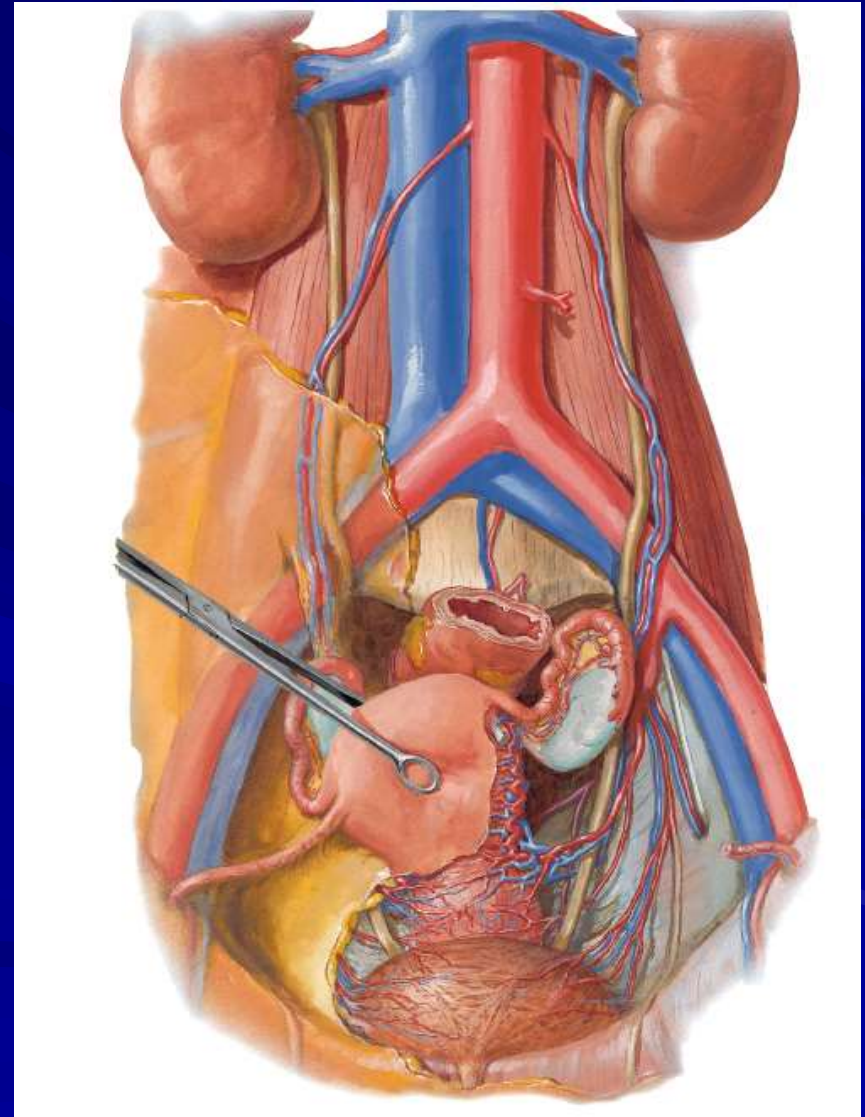
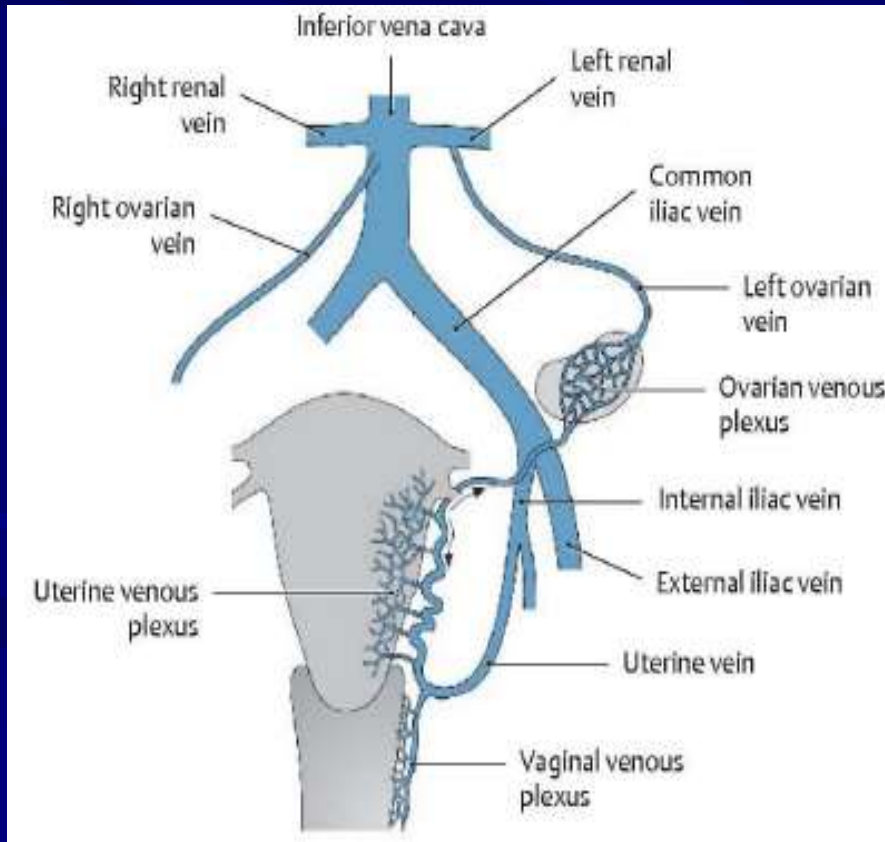
The tubal branches from:

- uterine arteries (terminal branches)
- ovarian arteries (terminal branches)



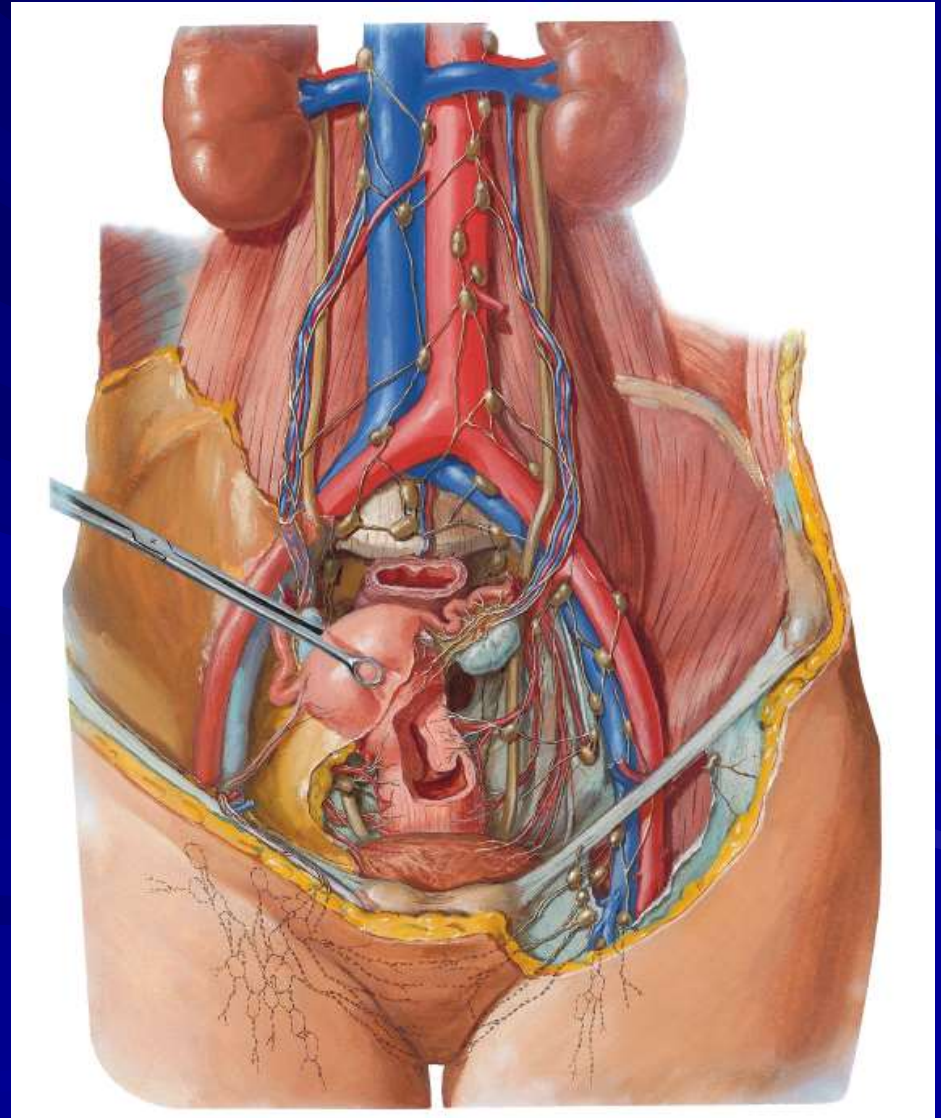
Venous drainage of the uterine tubes

- Tubal veins drain into ovarian veins and uterine venous plexus



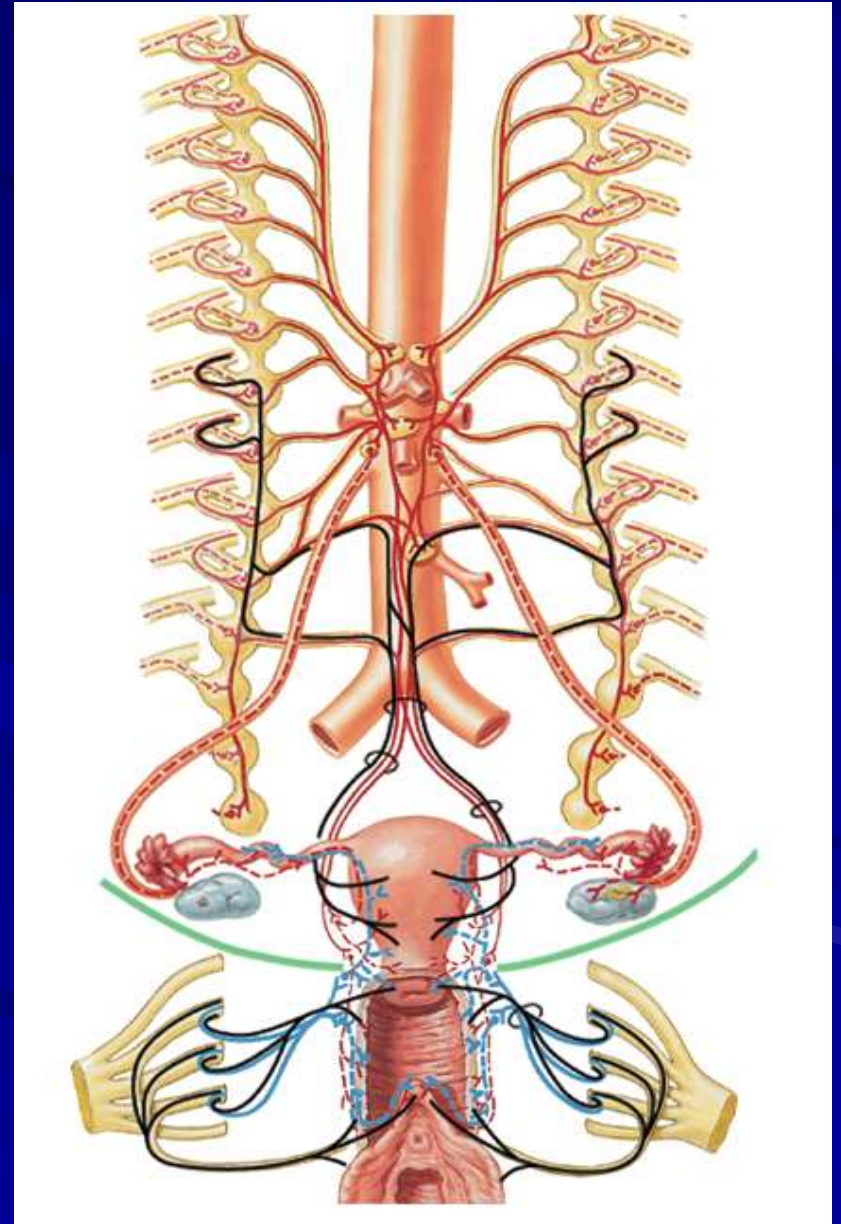
Lymphatic drainage of the uterine tubes

- To the lumbar lymph nodes



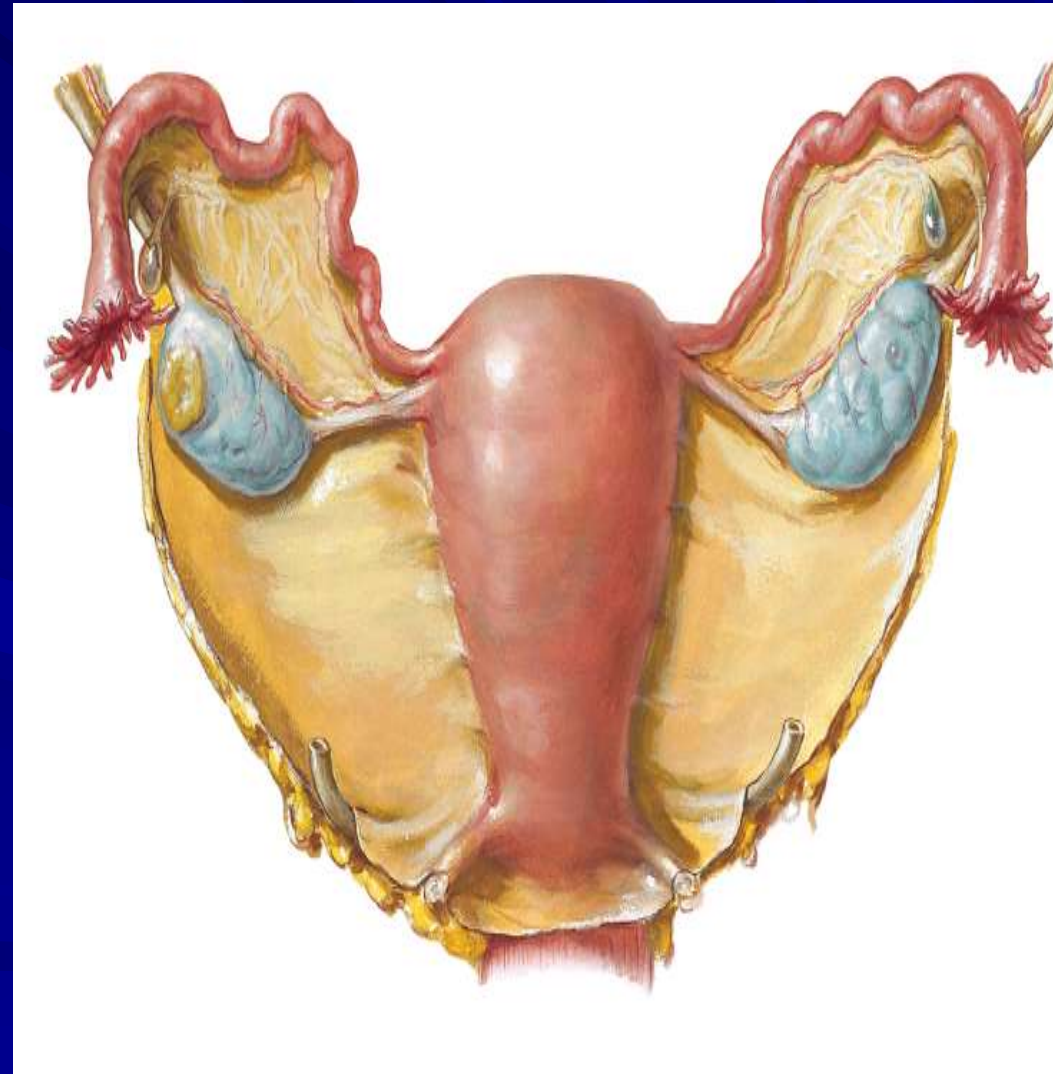
The nerves of the uterine tubes

- Derive partly from the ovarian and uterine plexus
- Afferent fibers ascend through the ovarian plexus and lumbar splanchnic nerves to cell bodies in the T11 through L1 spinal ganglia



Uterus

- Organ of incubation and parturition
- A thick-walled, pear-shaped, hollow muscular organ
- Approximately 7.5 cm long, 5 cm broad and 2 cm thick and weighs approximately 90 grams
- During pregnancy the uterus enlarges greatly to accommodate the fetus



Uterus

- Lies in the lesser pelvis
- Body lies normally on top of the urinary bladder
- Neck (cervix) lies between the urinary bladder and rectum
- The position changes with the degree of fullness of the bladder and rectum

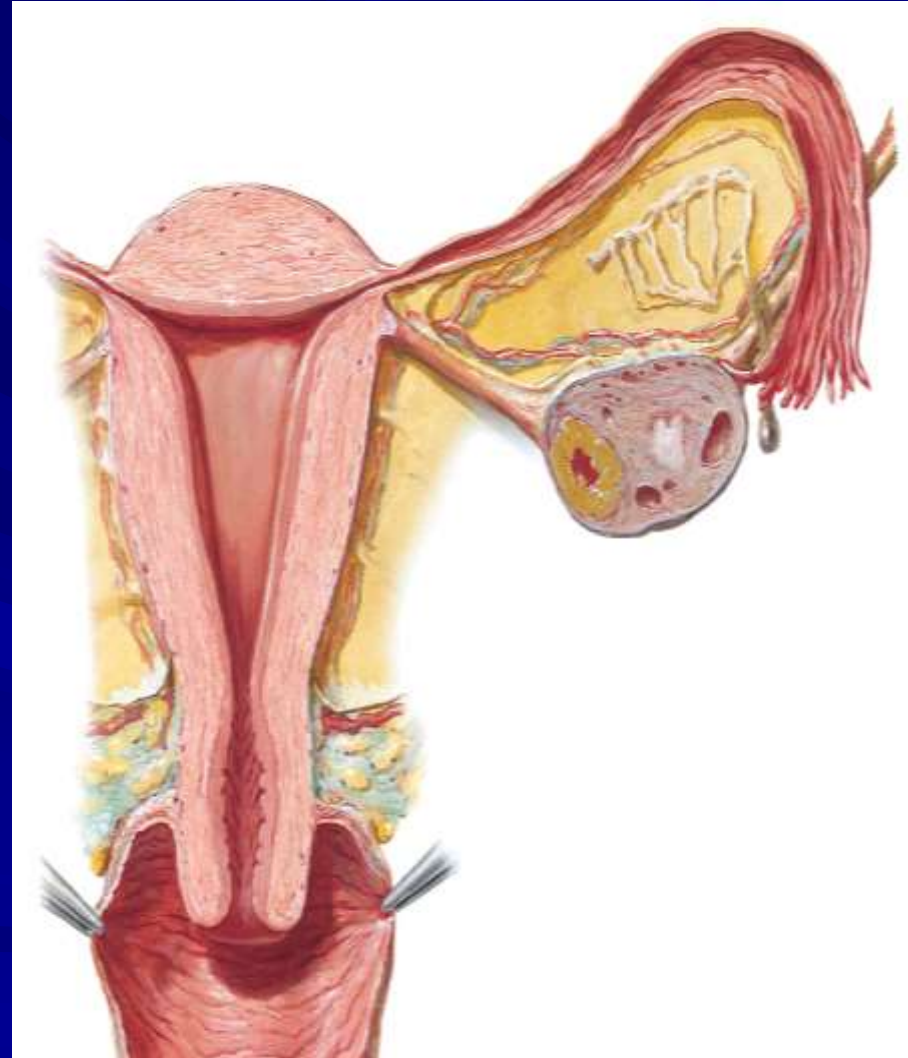


The parts of the uterus

- Fundus- the rounded part, lies superior to the orifices of the uterine tubes
- Body- the main part located inferior to the fundus and superior to the isthmus
- Isthmus- the relatively constricted region, approximately 1 cm long, just above the cervix between the body and cervix

The cervix:

- The cylindrical, narrow inferior part, protrudes into the uppermost vagina



The body of the uterus

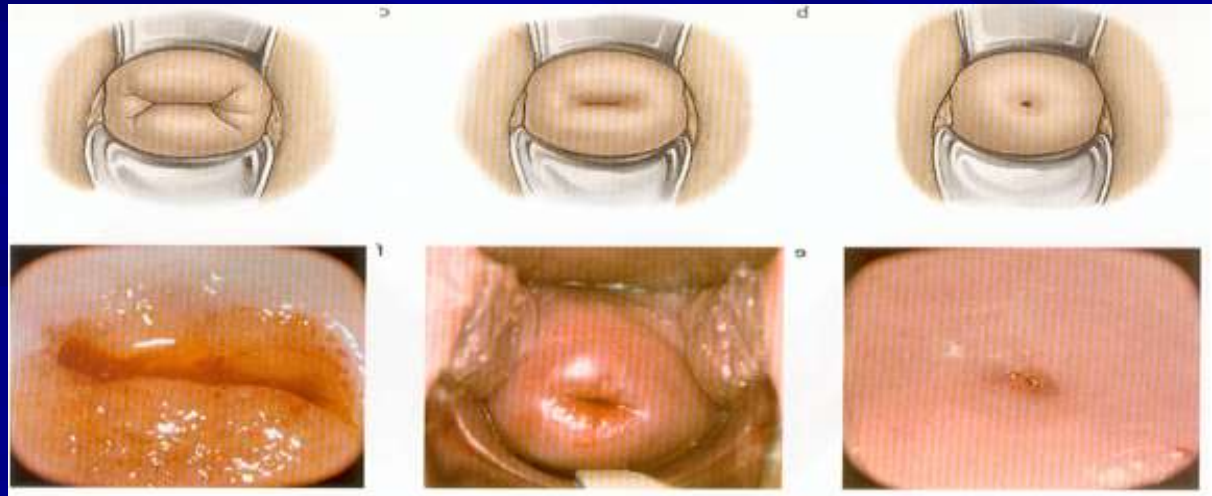
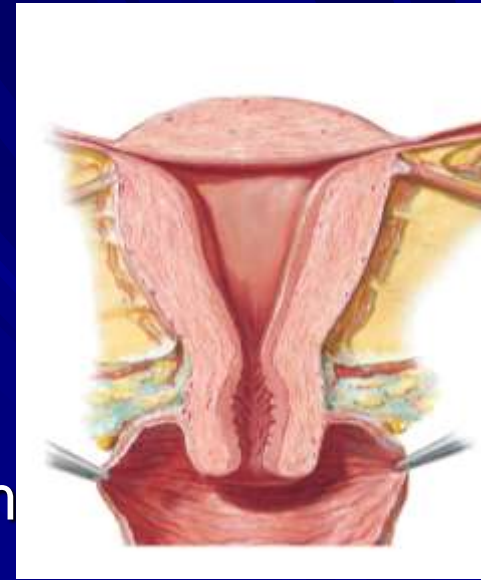


- Lies between the layers of the broad ligament
- Freely movable
- Two surfaces: vesical and intestinal
- The uterine horns- superolateral regions where the uterine tubes enter
- The uterine cavity- triangular shape in coronal section



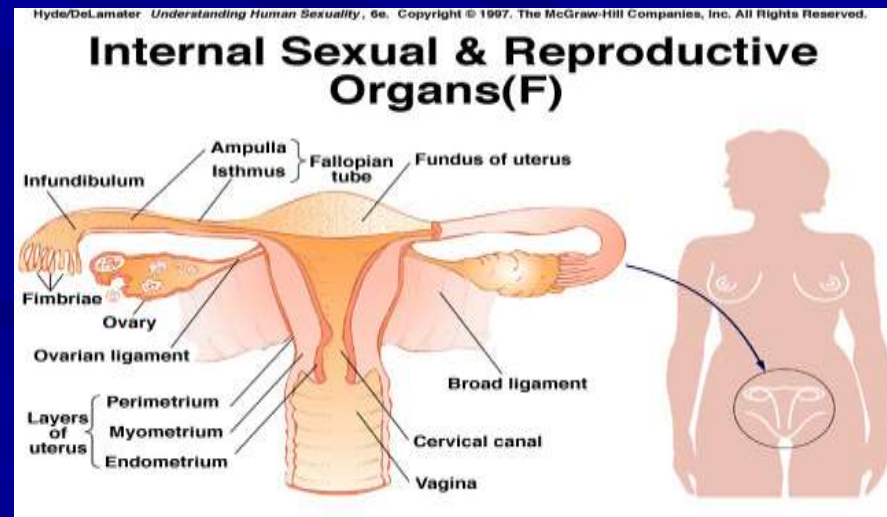
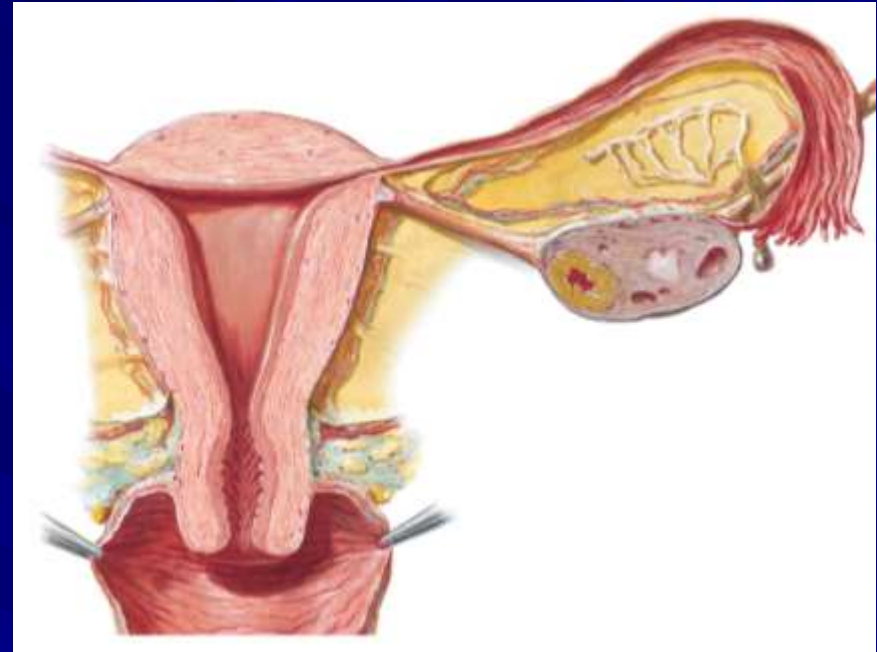
The cervix of the uterus

- Approximately 2.5 cm long in adult nonpregnant woman
- Parts:
 - **supravaginal-** separated from the bladder anteriorly by loose connective tissue and from the rectum posteriorly by the rectouterine pouch
 - **vaginal-** rounded, extends into the vagina and communicates with the external os
- Cervical canal



The wall structure of the uterus – the layers

- Perimetrium- the outer serous coat, consists of the peritoneum supported by a thin layer of connective tissue
- Myometrium- the middle muscular coat, greatly distended during pregnancy, contains the main blood vessels and nerves of the uterus, several smooth-muscle layers
- Endometrium- the inner mucous coat, firmly adherent to the underlying myometrium, single layer



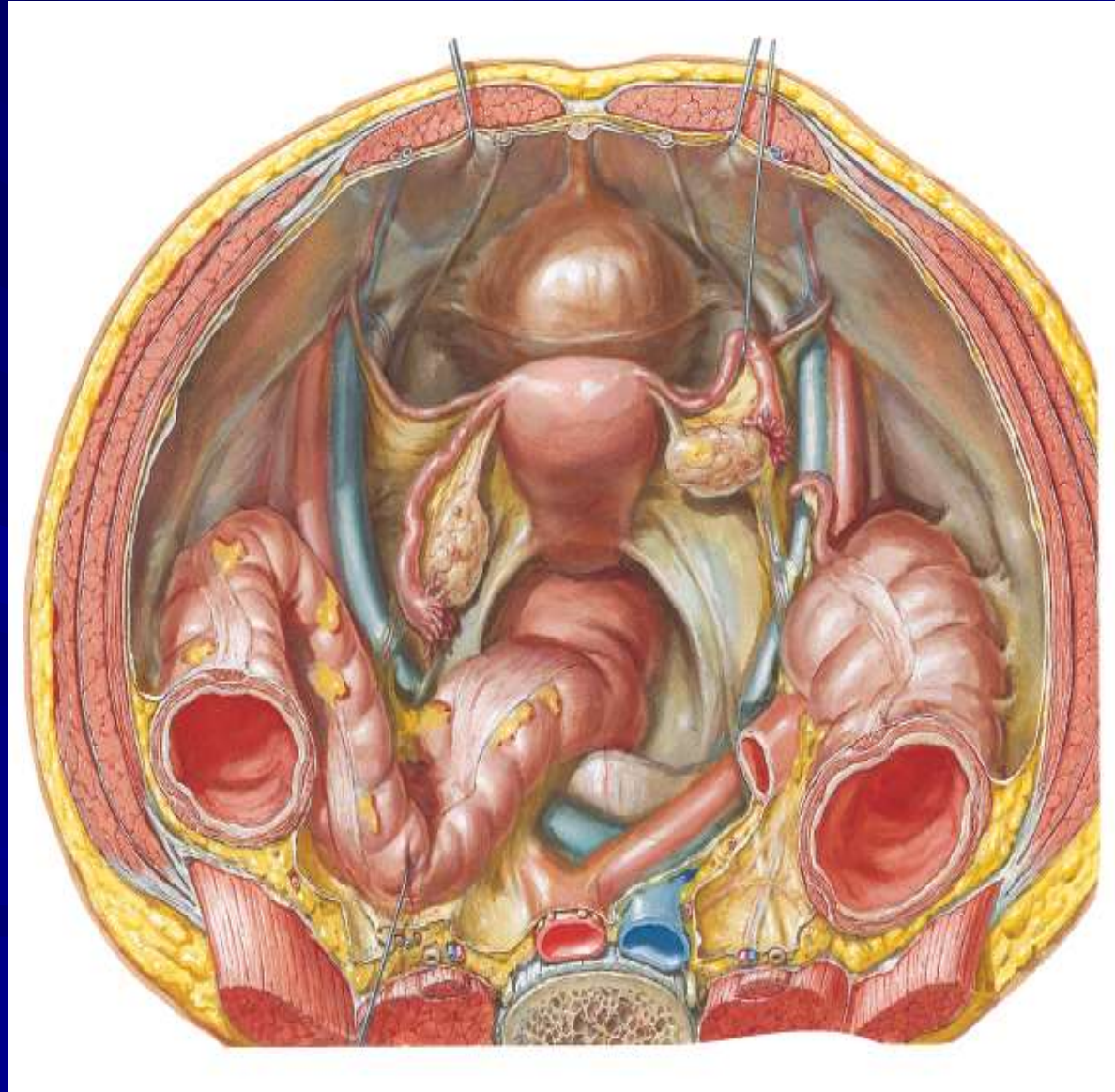
Placenta

- Mother side - cotyledons: lobules formed by villous tree structures
- Fetal side



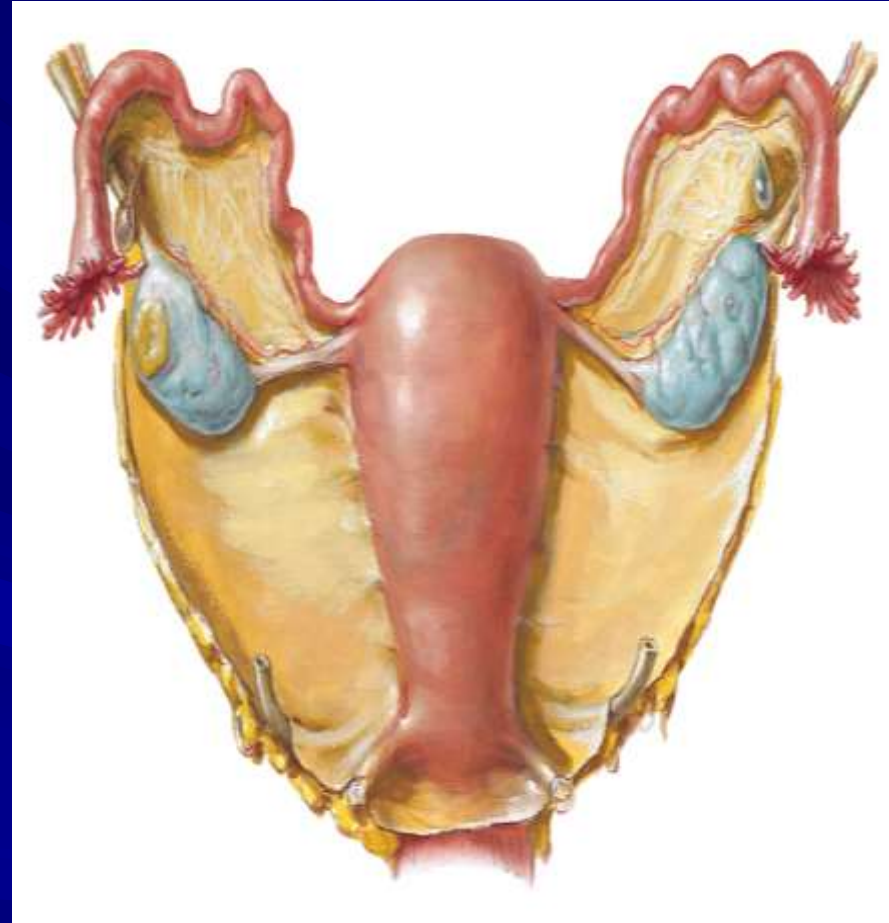
The broad ligament of the uterus

- Double layer of peritoneum
- Extends from the sides of the uterus to the lateral wall and floor of the pelvis
- Assists in keeping the uterus position



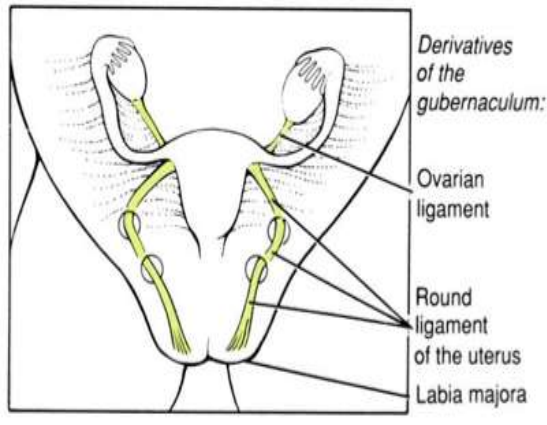
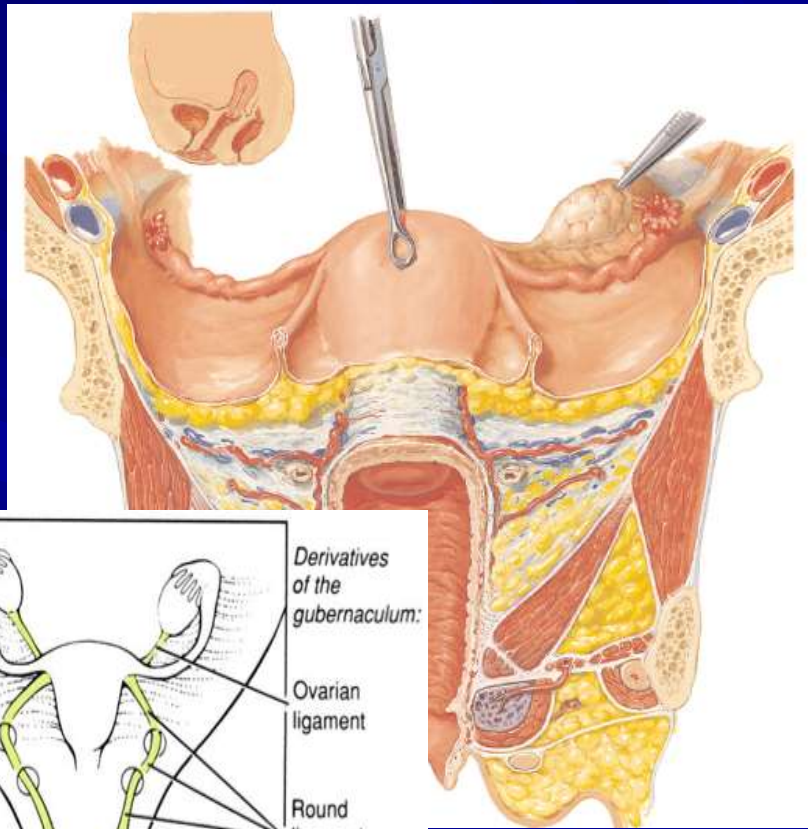
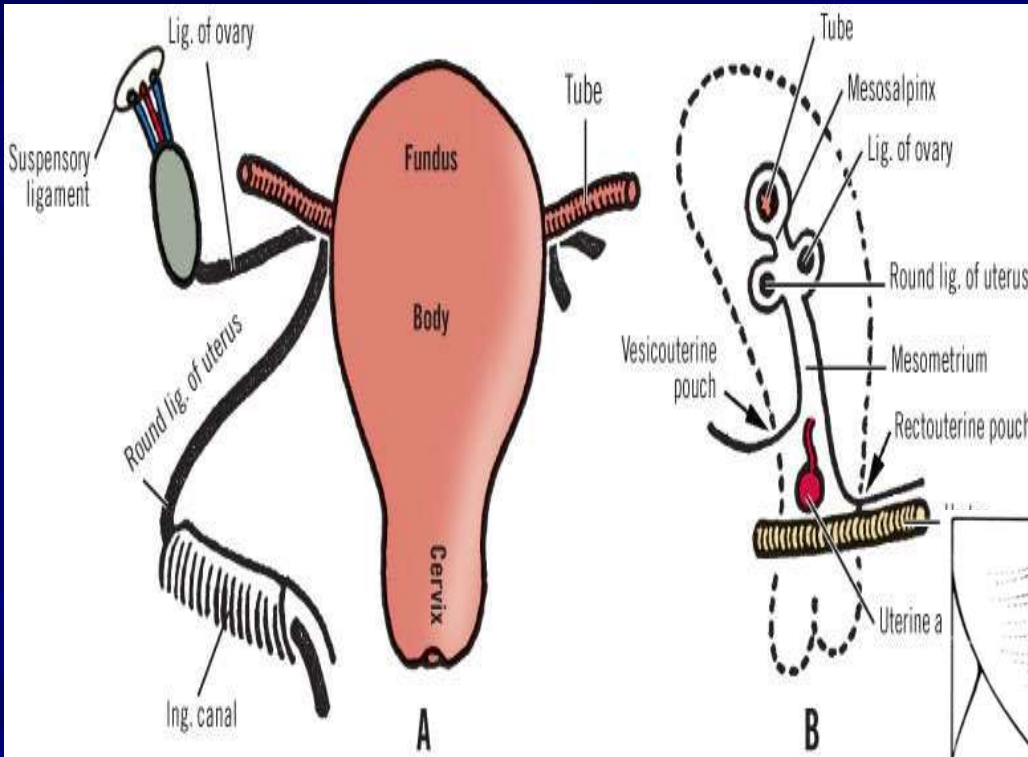
The broad ligament of the uterus – the parts

- Mesovarium - suspends the ovary
- Mesosalpinx - forms the mesentery of the uterine tube
- Mesometrium – the mesentery of the uterus, the major part of the broad ligament, below the mesosalpinx and mesovarium



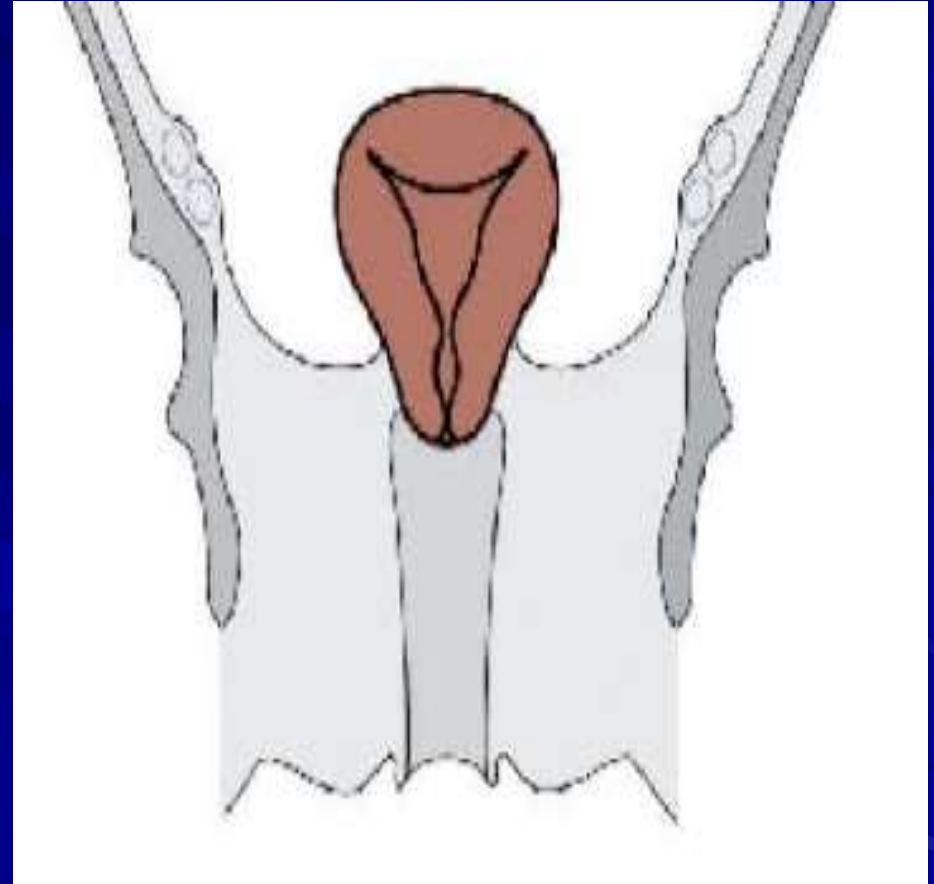
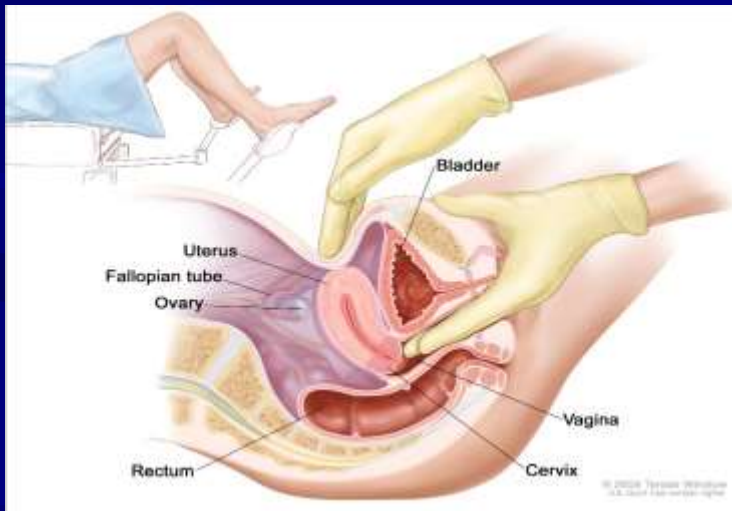
The round ligament of the uterus

- Lies anteroinferiorly between the layers of the broad ligament of uterus
- In front and below the attachment of the uterine tube



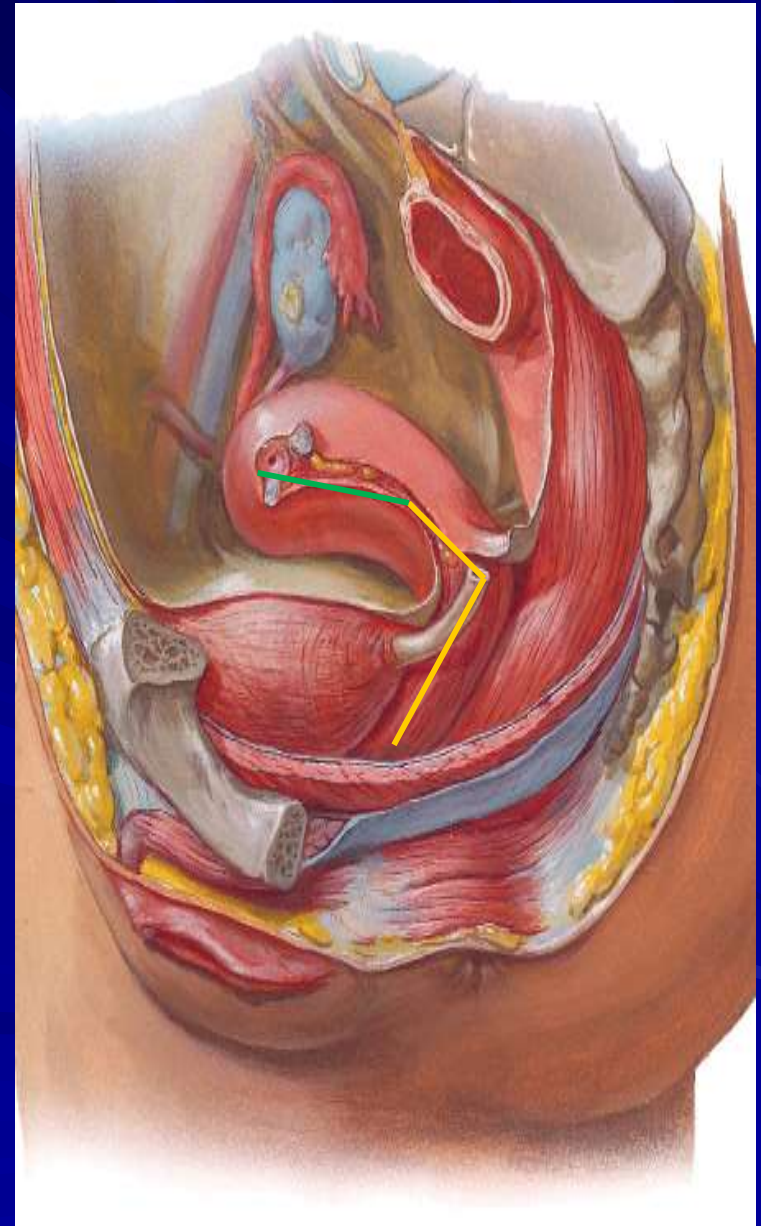
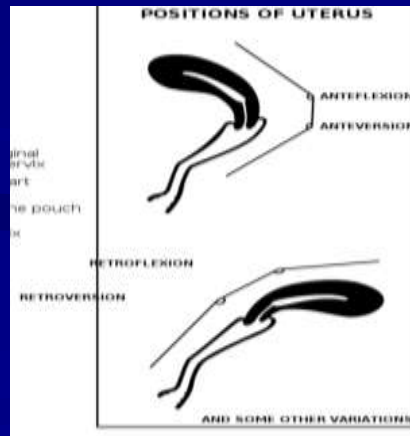
Uterine position

- The position in the median plane (at the center of pelvis) with vaginal part of uterus level with a line connecting the two ischial spines



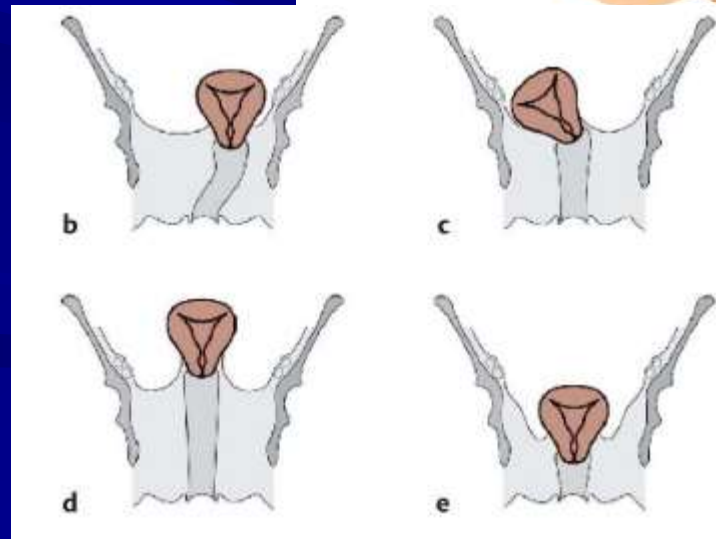
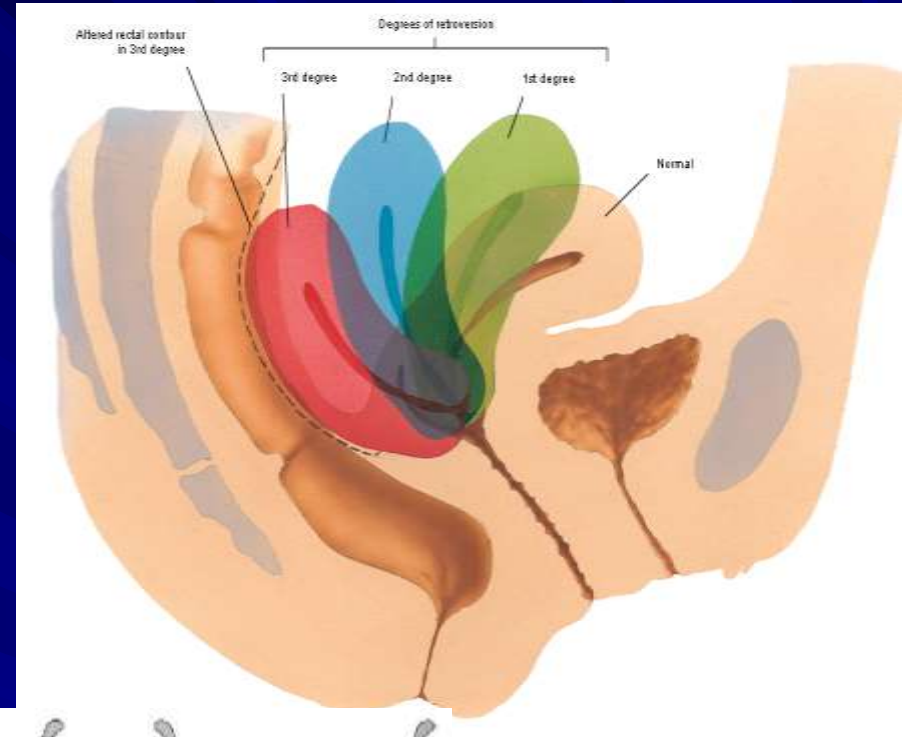
Curvature of the uterus

- **Anteverted** – version- inclination of the cervix in the pelvic cavity; defined by the angle between the cervical axis and the vagina
- **Anteflexed**- flexion- inclination of the uterine body relative to the cervix; defined by the angle between the longitudinal axes of the cervix and uterine body



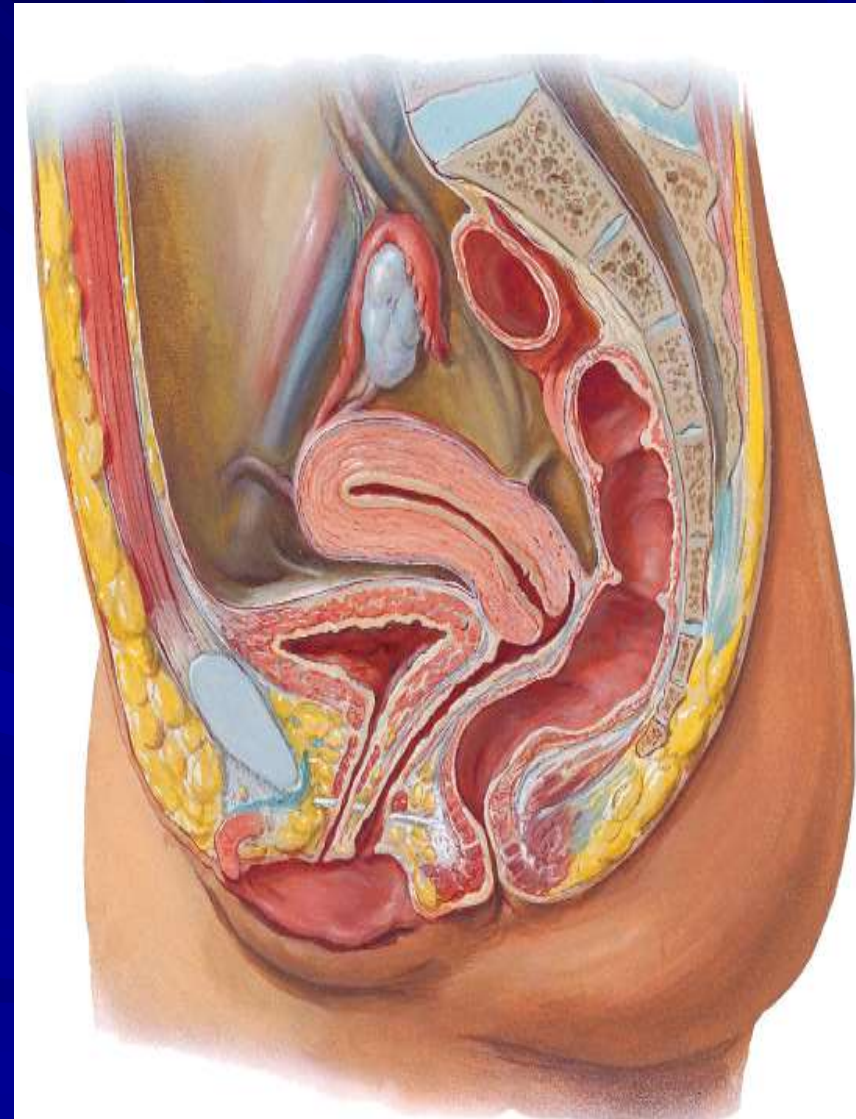
The principal supports of the uterus

- Keep the uterus centered in the pelvic cavity and resist the tendency of its to fall or be pushed through the hollow tube formed the vagina



The principal supports of the uterus

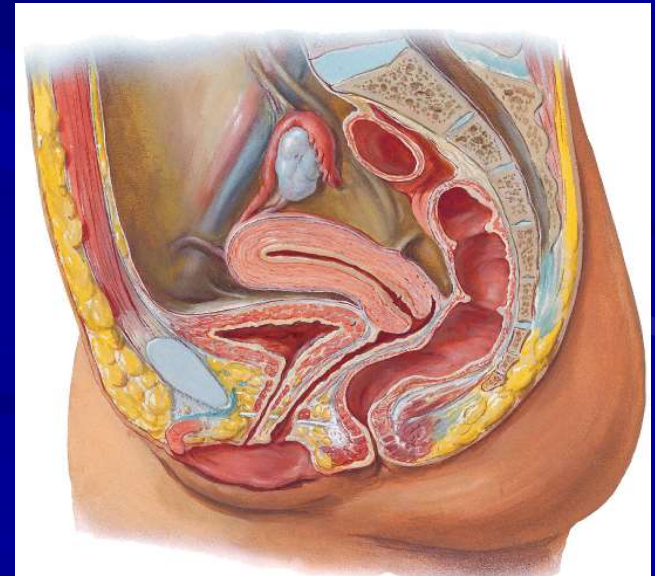
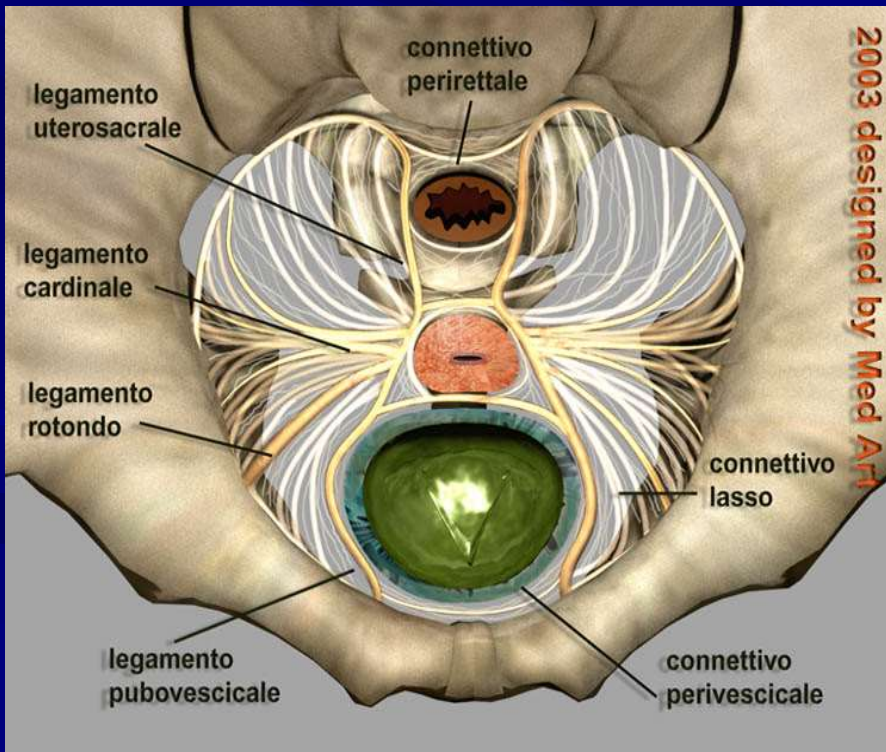
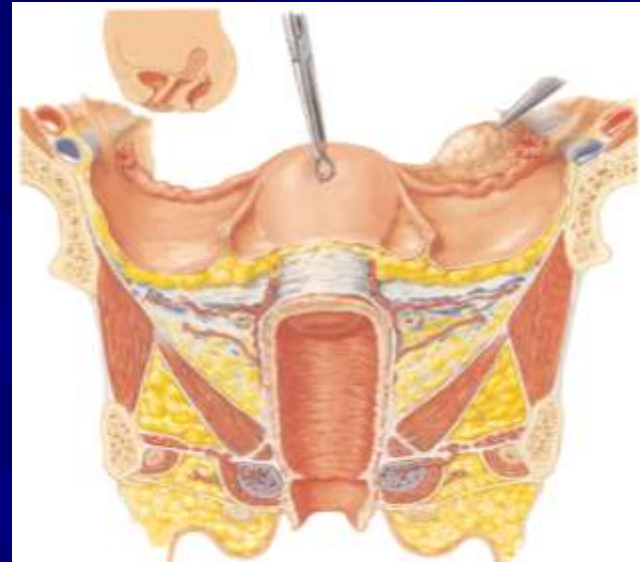
- Dynamic- provided by the pelvic diaphragm
 - the tonus during sitting and standing
 - active contraction during periods of increased intra-abdominal pressure which is transmitted to the uterus through the surrounding pelvic organs and the endopelvic fascia
- Passive- provided by the position of the uterus, the way in which the normally anteflexed and anteverted uterus „rests” on top of the bladder



Passive supports of the cervix

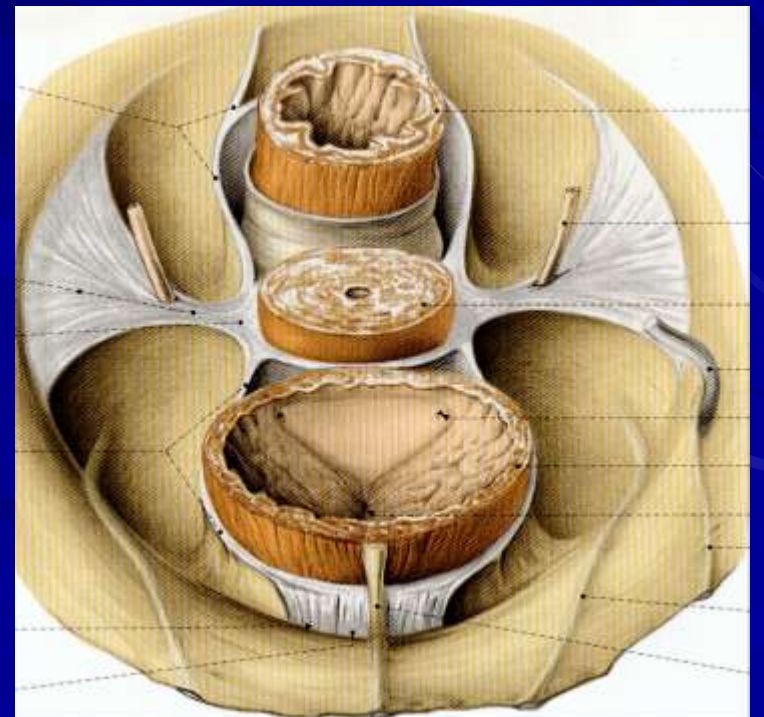
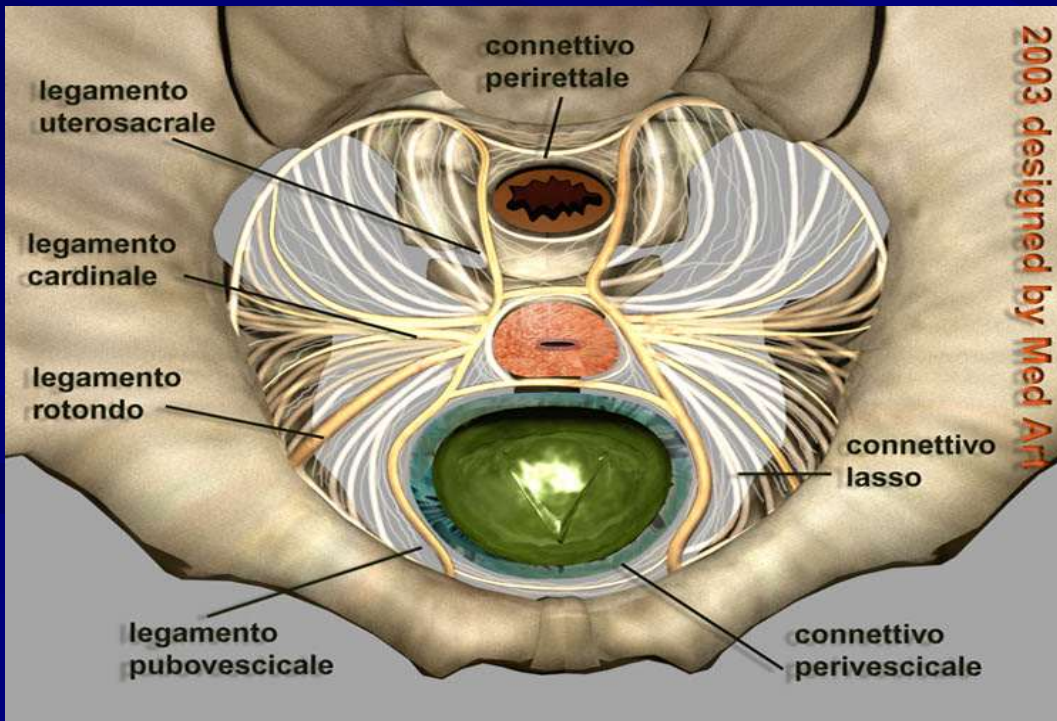
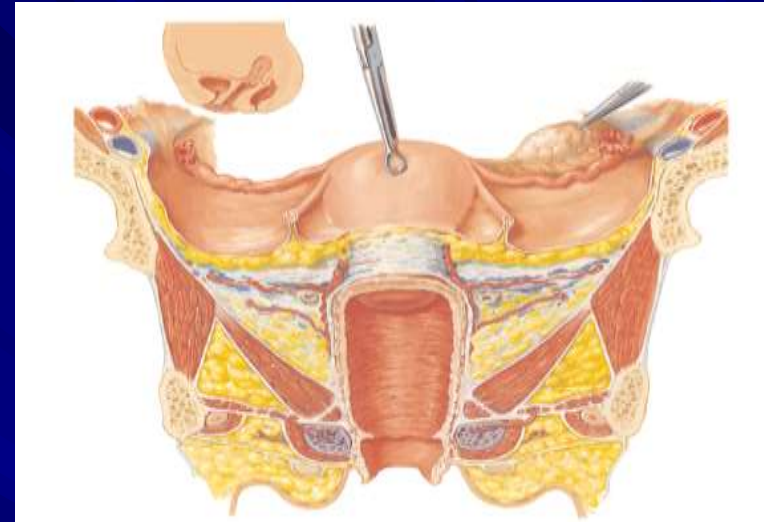
Condensations of endopelvic fascia (ligaments):

- Transverse cervical (cardinal) ligaments
- Uterosacral ligaments



Passive supports of the cervix

- Transverse cervical (cardinal ligaments)- extend from the cervix and lateral parts of the fornix of the vagina to the lateral walls of the pelvis

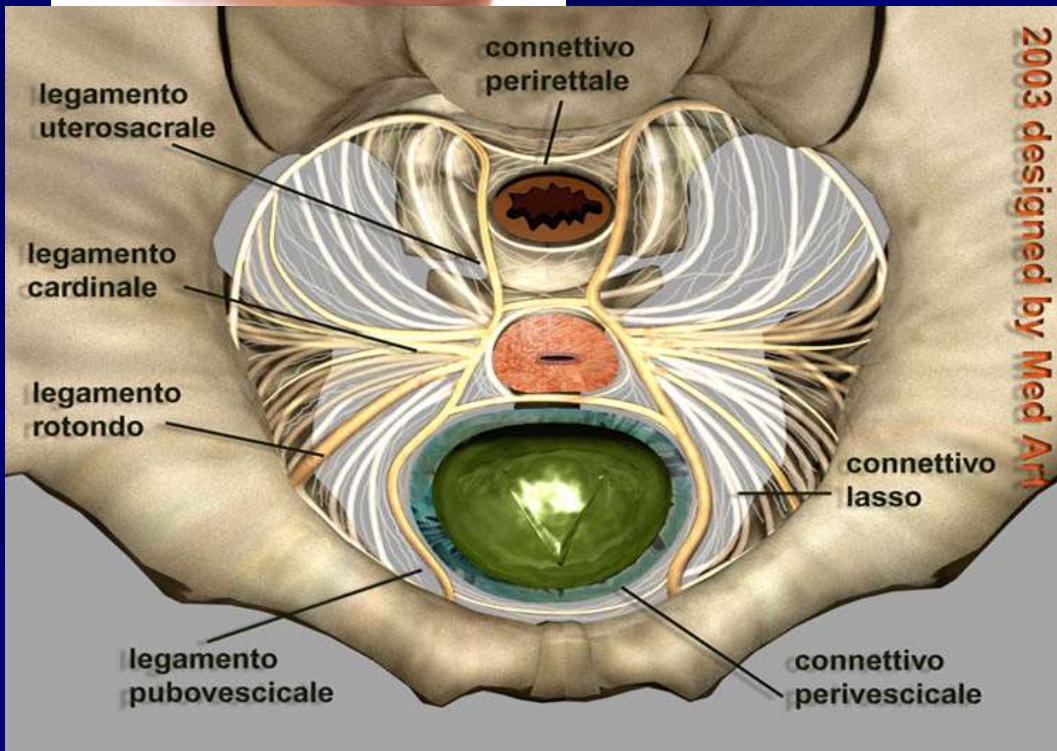


Passive supports of the cervix



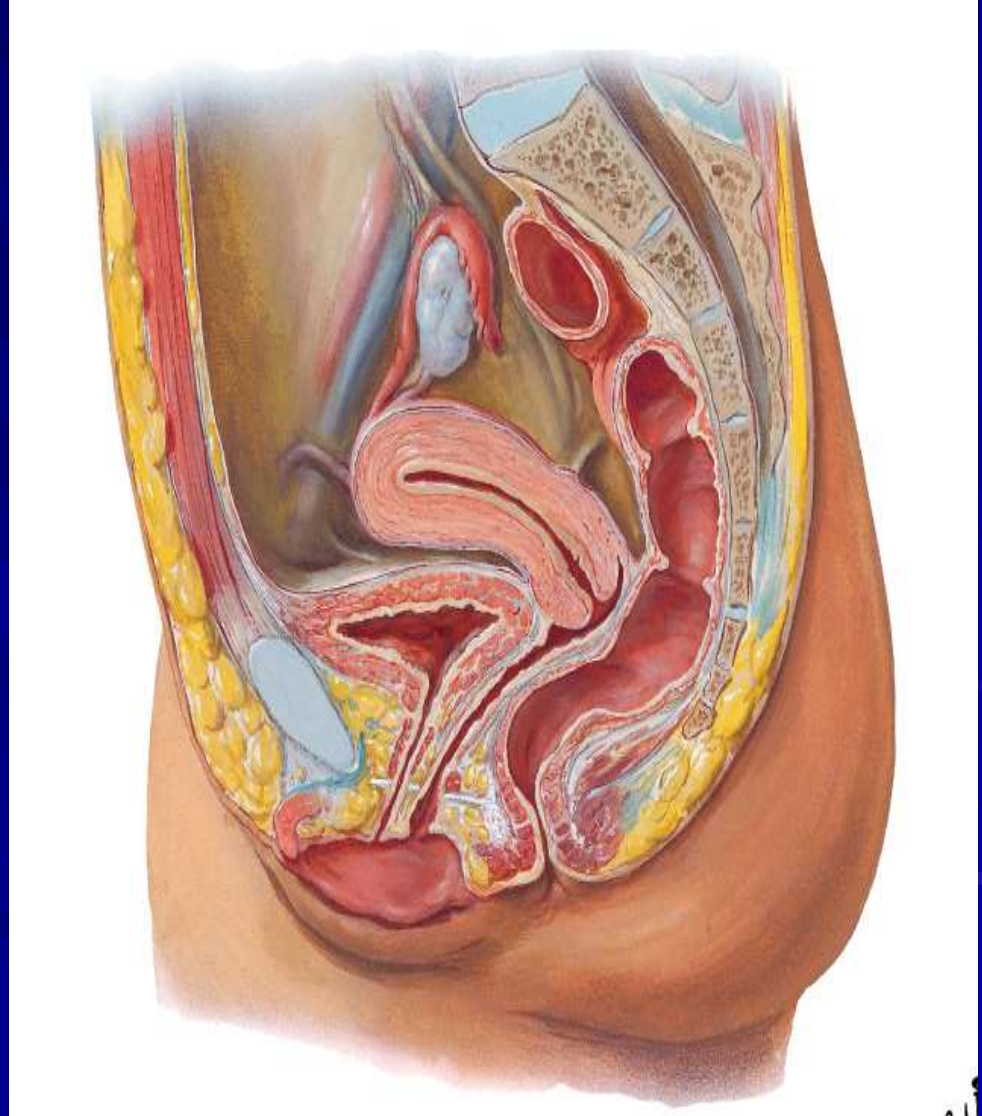
■ Uterosacral ligaments-

pass superiorly and slightly posteriorly from the sides of the cervix to the middle of the sacrum; they are palpable during the rectal examination



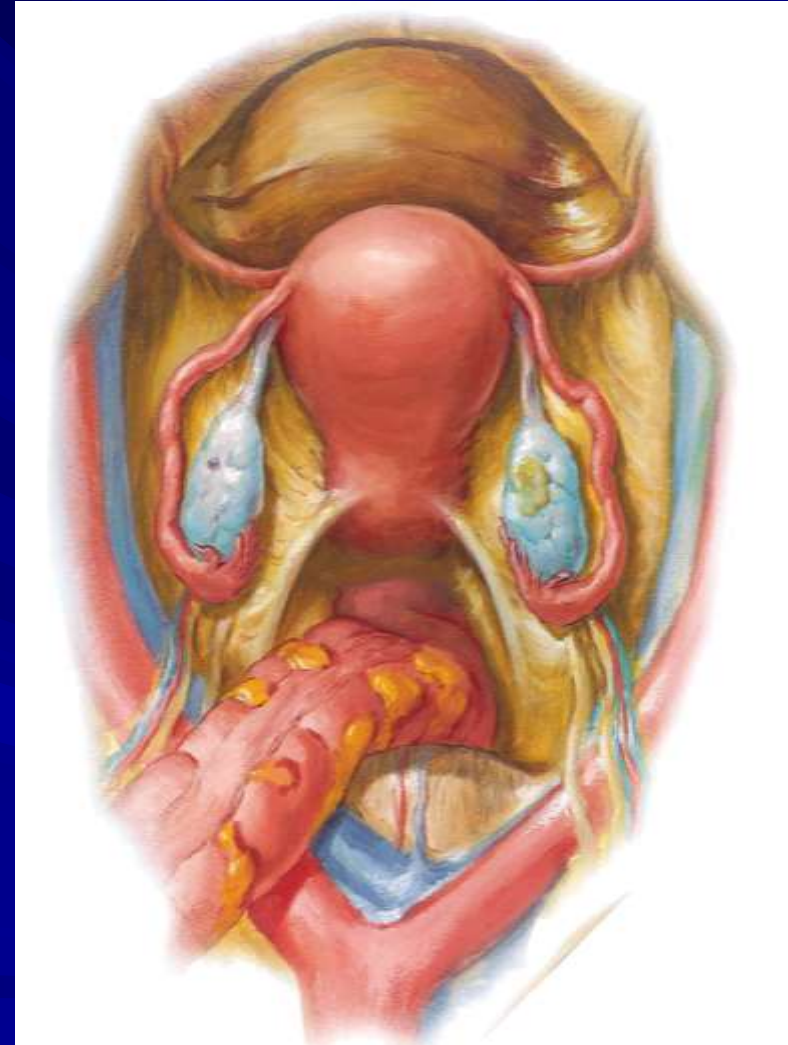
Relations of the uterus to the peritoneum

- Anteriorly and superiorly except vaginal part of the cervix
- Posteriorly- reflected over the posterior part of the fornix of the vagina to the rectum



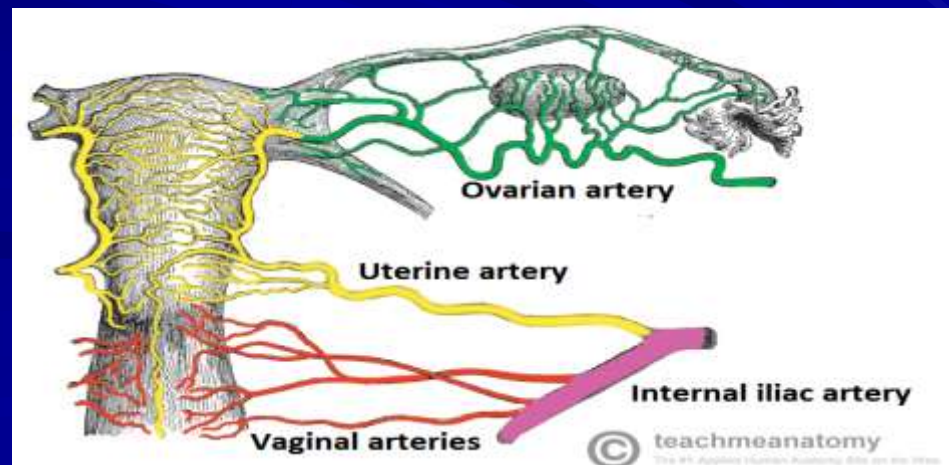
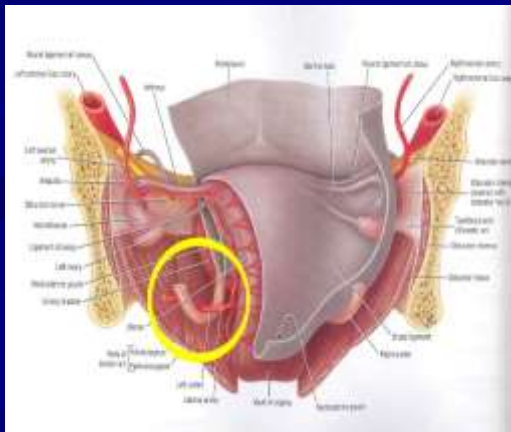
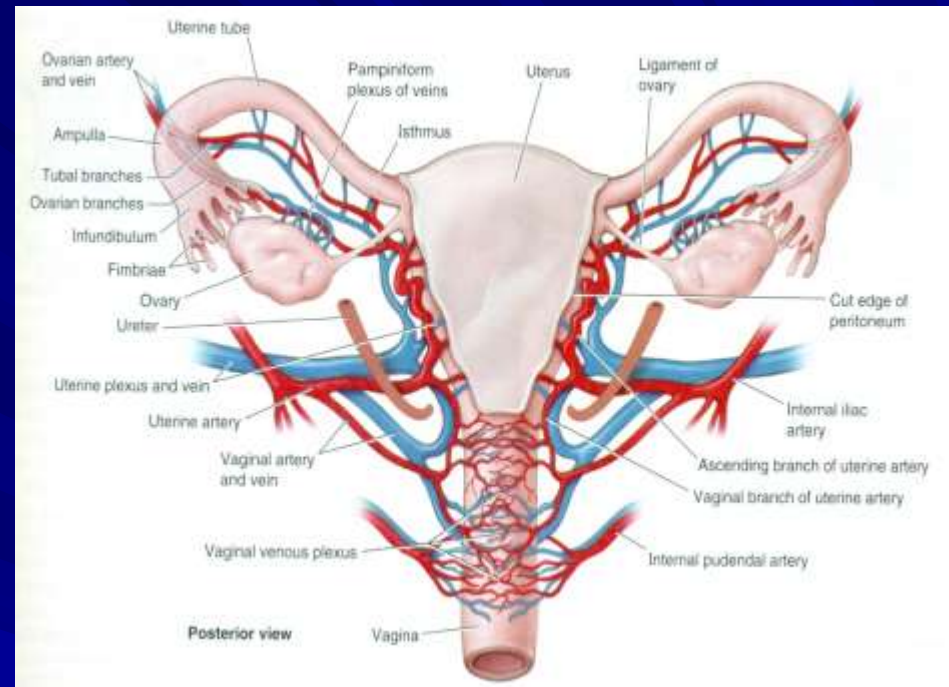
Relations of the uterus

- Anteriorly
 - the vesicouterine pouch
 - the superior surface of the bladder
- Posteriorly
 - the rectouterine pouch (Douglas) containing loops of intestine
 - the anterior surface of the rectum
- Laterally
 - the peritoneal broad ligament
 - the fascial transverse cervical (cardinal) ligaments
 - the ureters
 - the uterine arteries



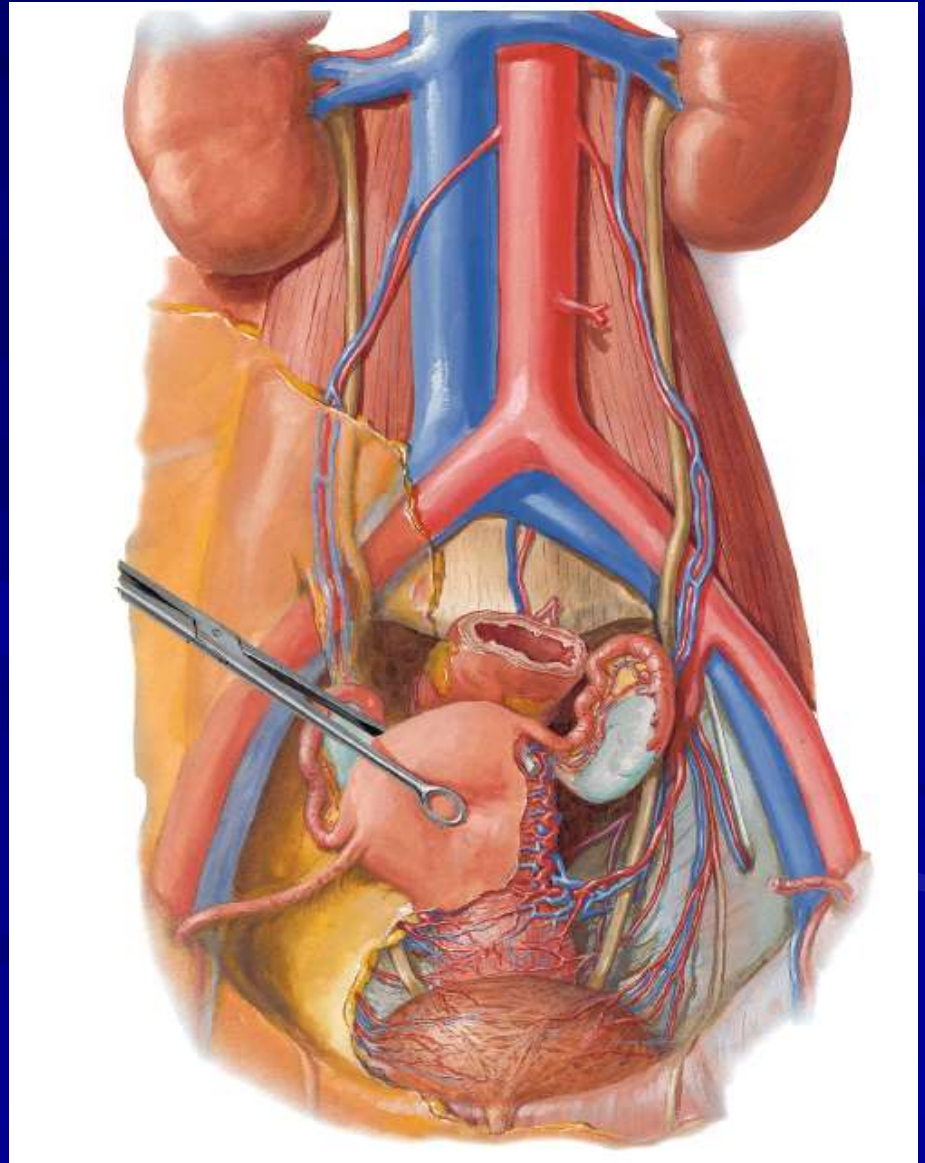
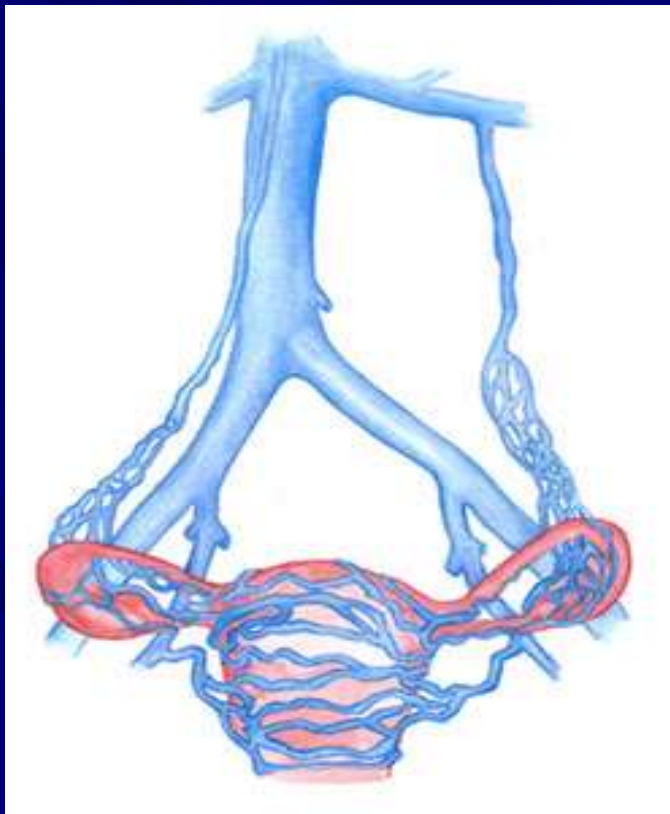
Arterial supply of the uterus

- Uterine arteries - anterior division of the internal iliac arteries, run medially in base of broad ligaments, superior to cardinal ligaments, crossing superior to ureters („water-ureter-runs under the bridge-uterine artery”)
- The ovarian arteries- an additional supply



Venous drainage of the uterus

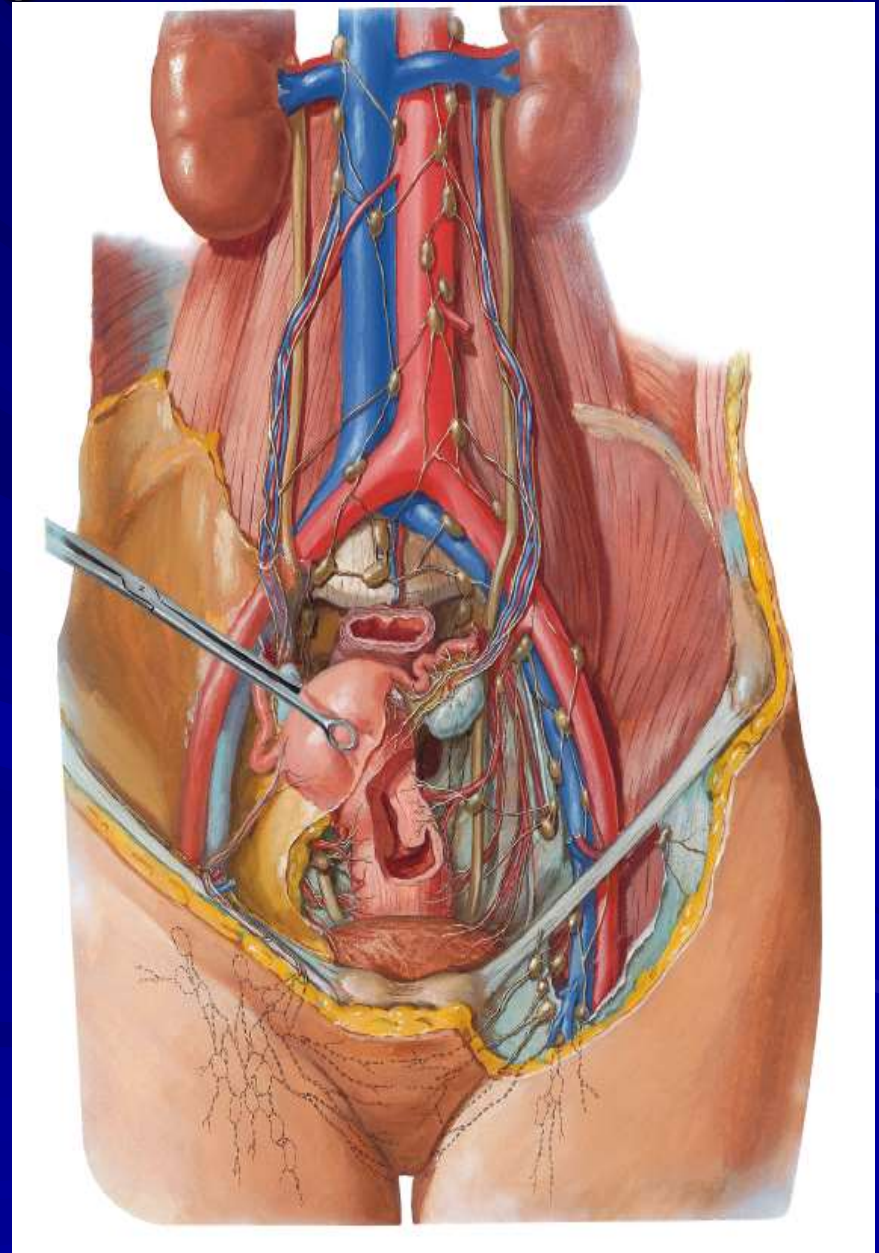
- Uterine plexus on each side of the cervix
- Into the internal iliac vein through uterine vein



Lymphatic drainage of the uterus

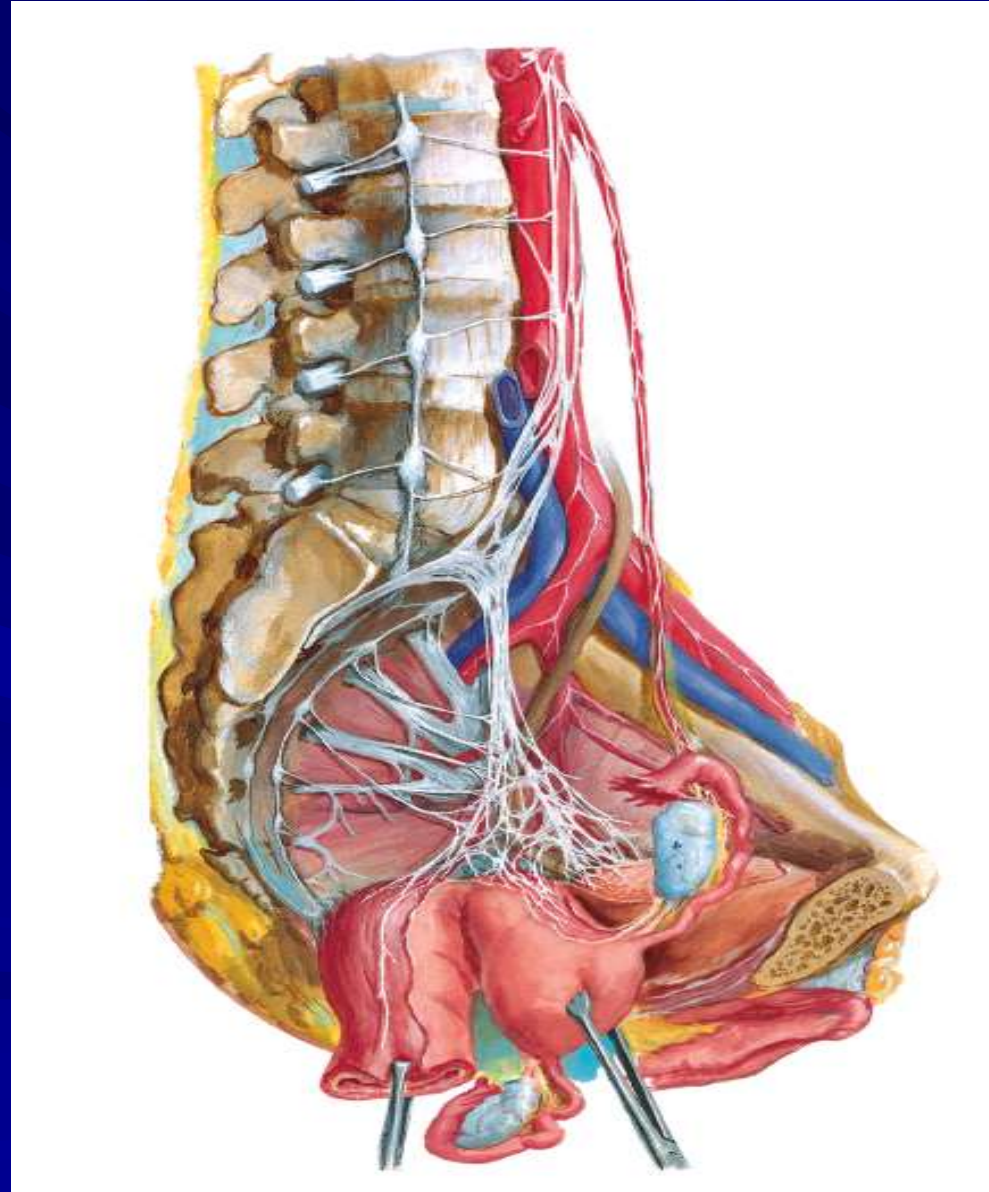
Three main routes:

- From the fundus to the *lumbar lymph nodes*
 - some vessels to the *external iliac lymph nodes* or along the round ligament of the uterus to the *superficial inguinal nodes*
- From the uterine body to the *external iliac lymph nodes*
- From the uterine cervix to the *internal iliac and sacral lymph nodes*



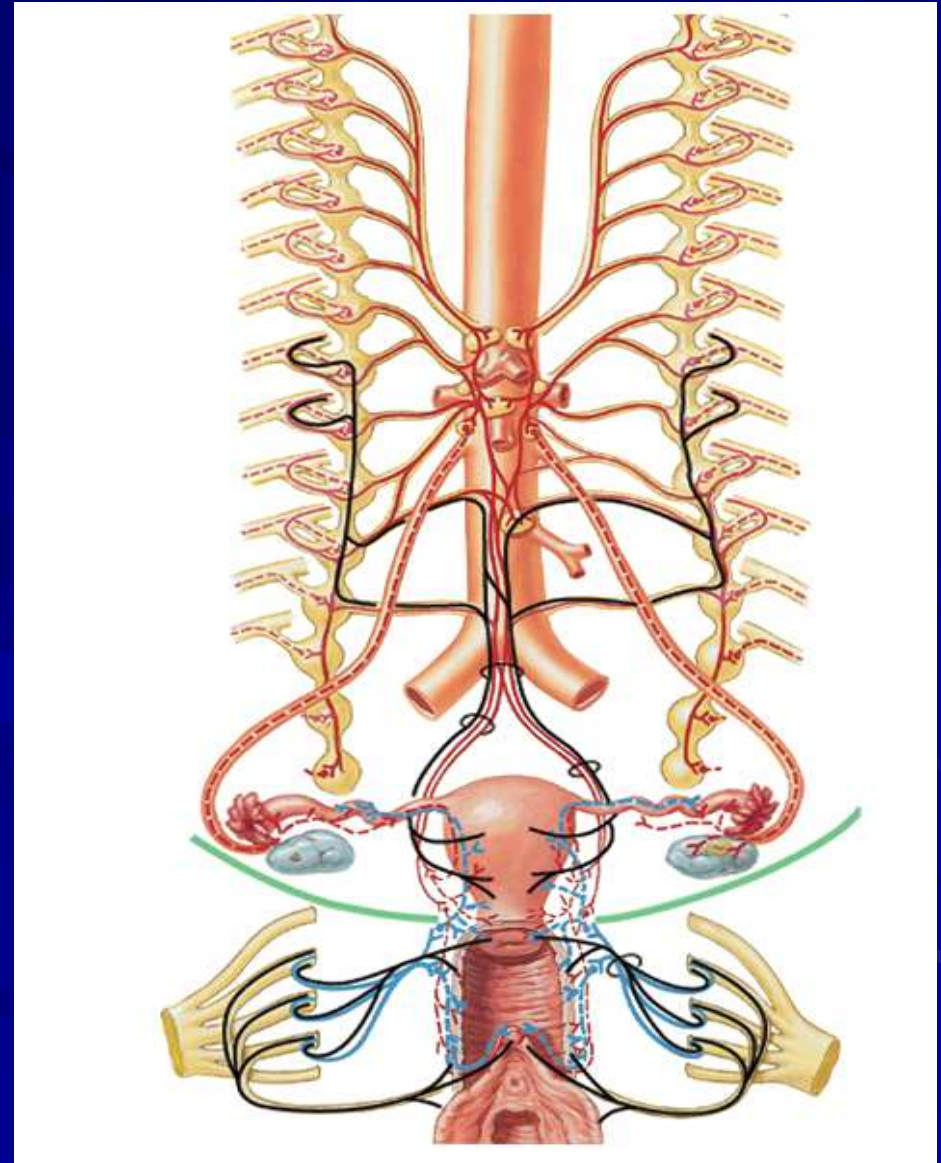
The uterovaginal plexus of the uterus

- Extends to the pelvic viscera from the inferior hypogastric plexus
- Contains:
 - Sympathetic fibers
 - Parasympathetic fibers
 - Visceral afferent fibers
- The nerves travel with the uterine artery at the junction of the base of the peritoneal broad ligament and the superior part of the cardinal ligament



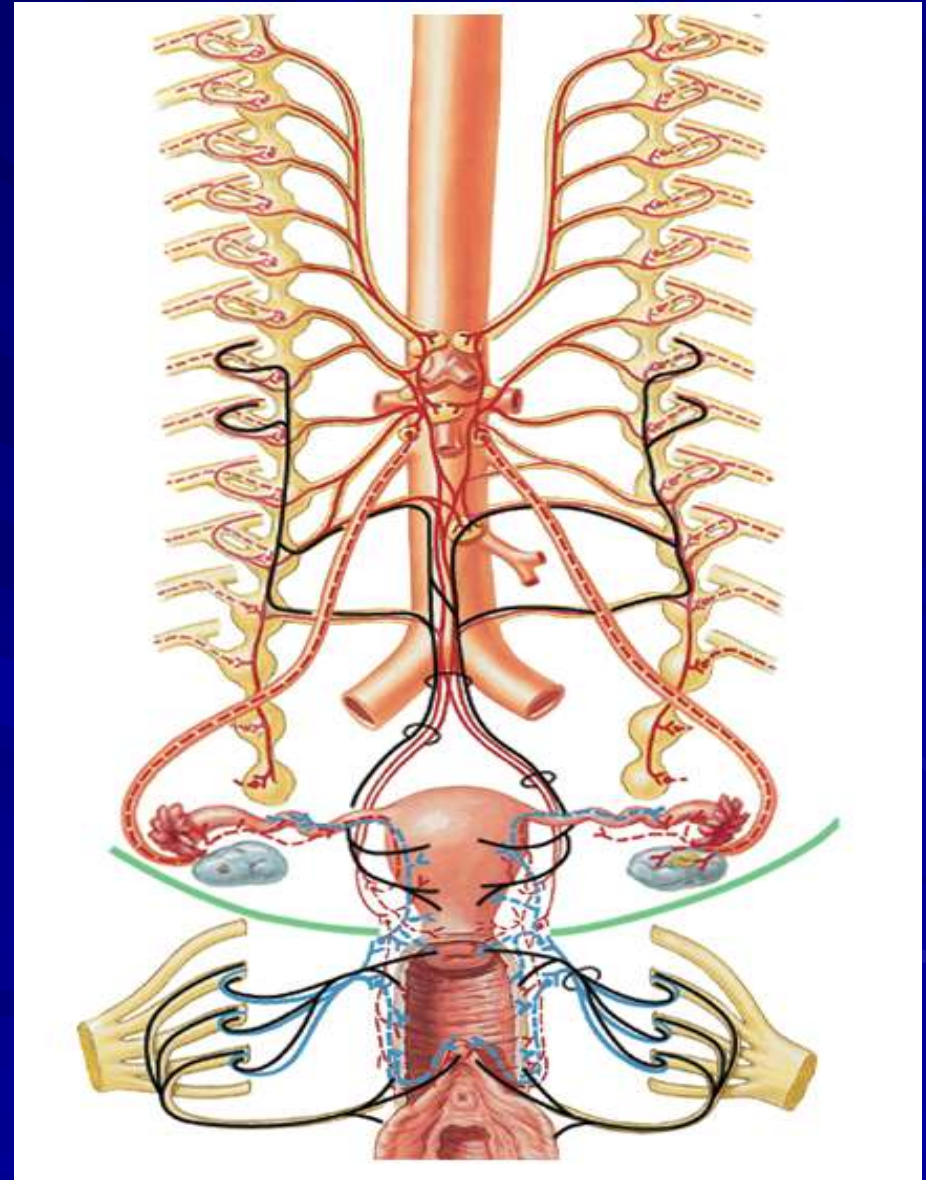
Sympathetic innervation of the uterus

- Originates in the lower thoracic spinal cord segments and passes through lumbar splanchnic nerves and the intermesenteric/hypogastric plexuses



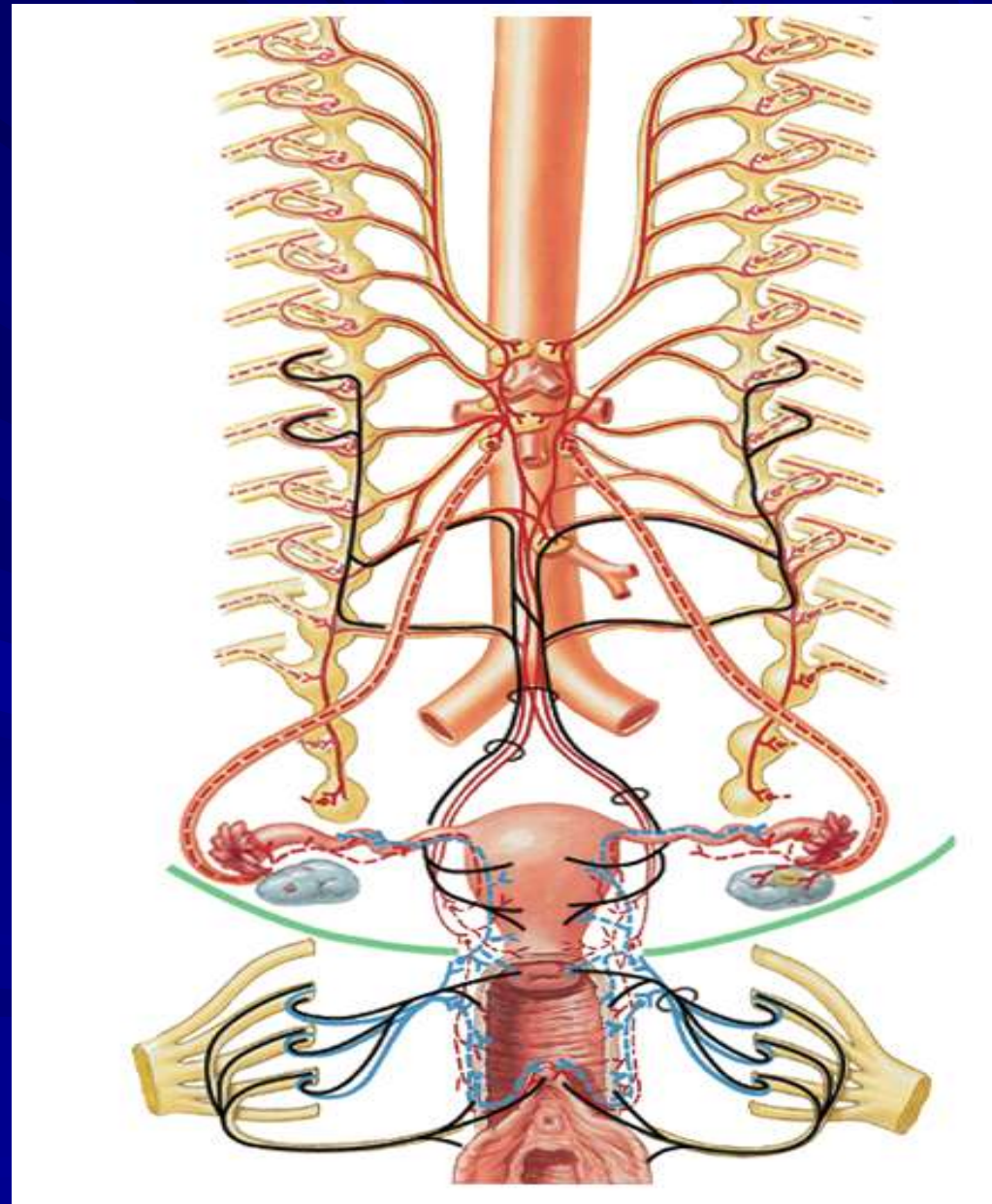
Parasympathetic innervation of the uterus

- Parasympathetic innervation originates in the S2 through S4 spinal cord segments and passes through pelvic splanchnic to the inferior hypogastric/uterovaginal plexus



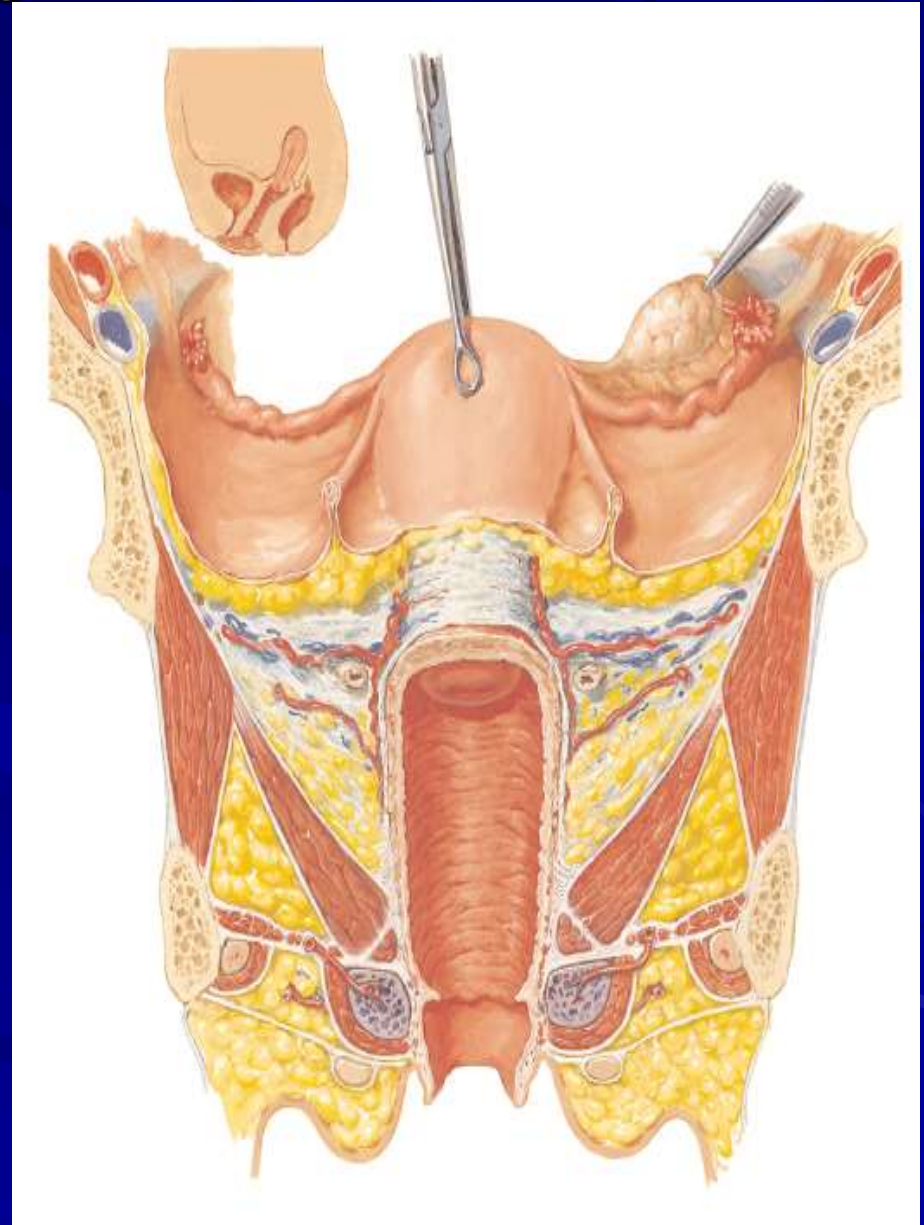
The visceral afferent fibers of the uterus

- Conduct pain impulses
- From the intraperitoneal uterine fundus and body follow the sympathetic innervation to reach cell bodies in the lower thoracic/upper lumbar spinal ganglia
- From the subperitoneal uterine cervix follow the parasympathetic fibers to reach cell bodies in the spinal ganglia of S2 through S4



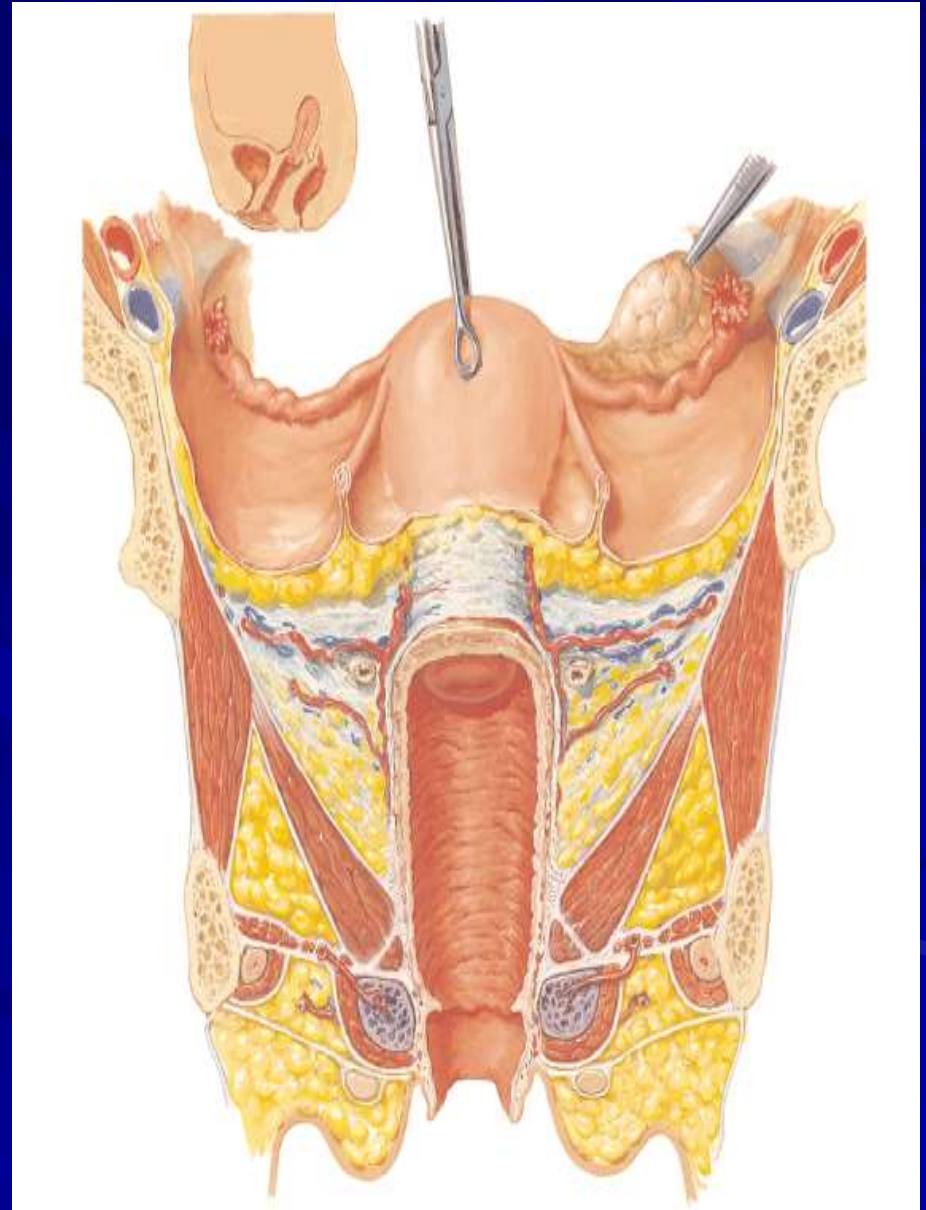
Vagina

- Organ of copulation and parturition
- A musculomembranous tube, 7-9 cm long
- Extends from cervix to the vestibule of the vagina- the cleft between the labia minora
- The superior end surrounds the cervix
- The lower end passes anteroinferiorly through the pelvic floor to open in the vestibule



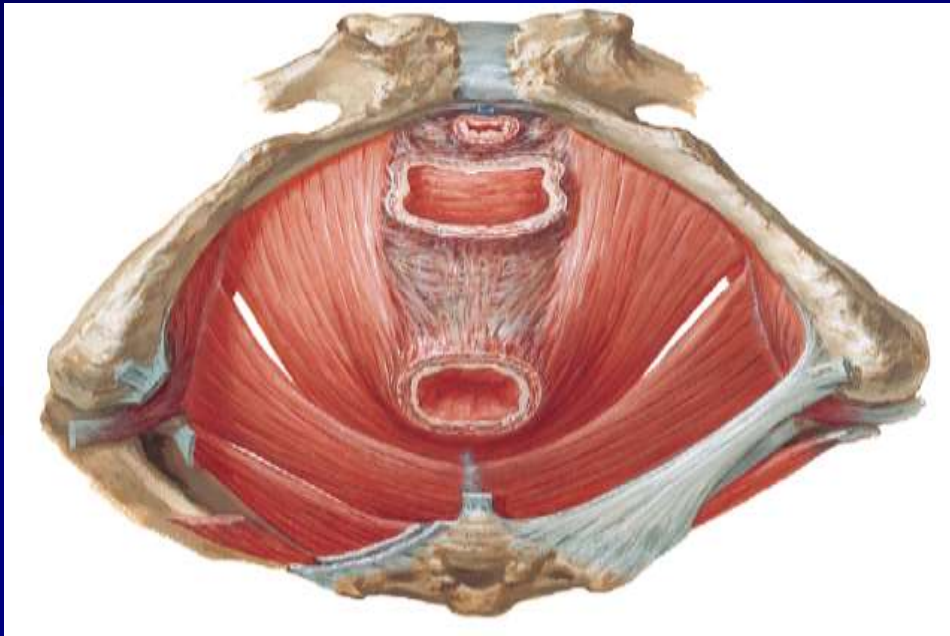
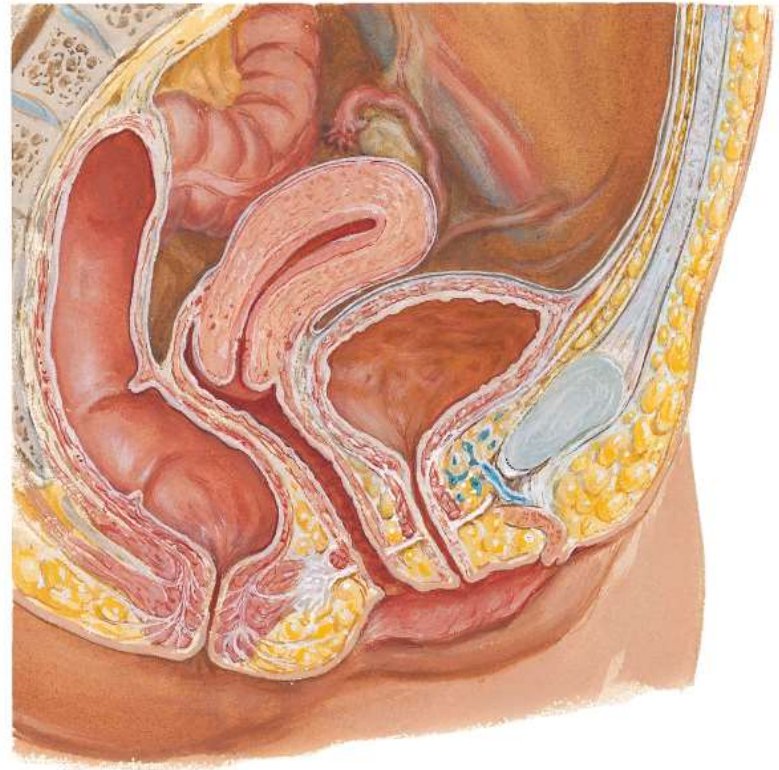
Vagina

- Serves as the excretory duct for menstrual fluid
- Forms the inferior part of the pelvic (birth) canal
- Receives the penis and ejaculate during sexual intercourse
- Communicates superiorly with the cervical canal and inferiorly with the vestibule of the vagina



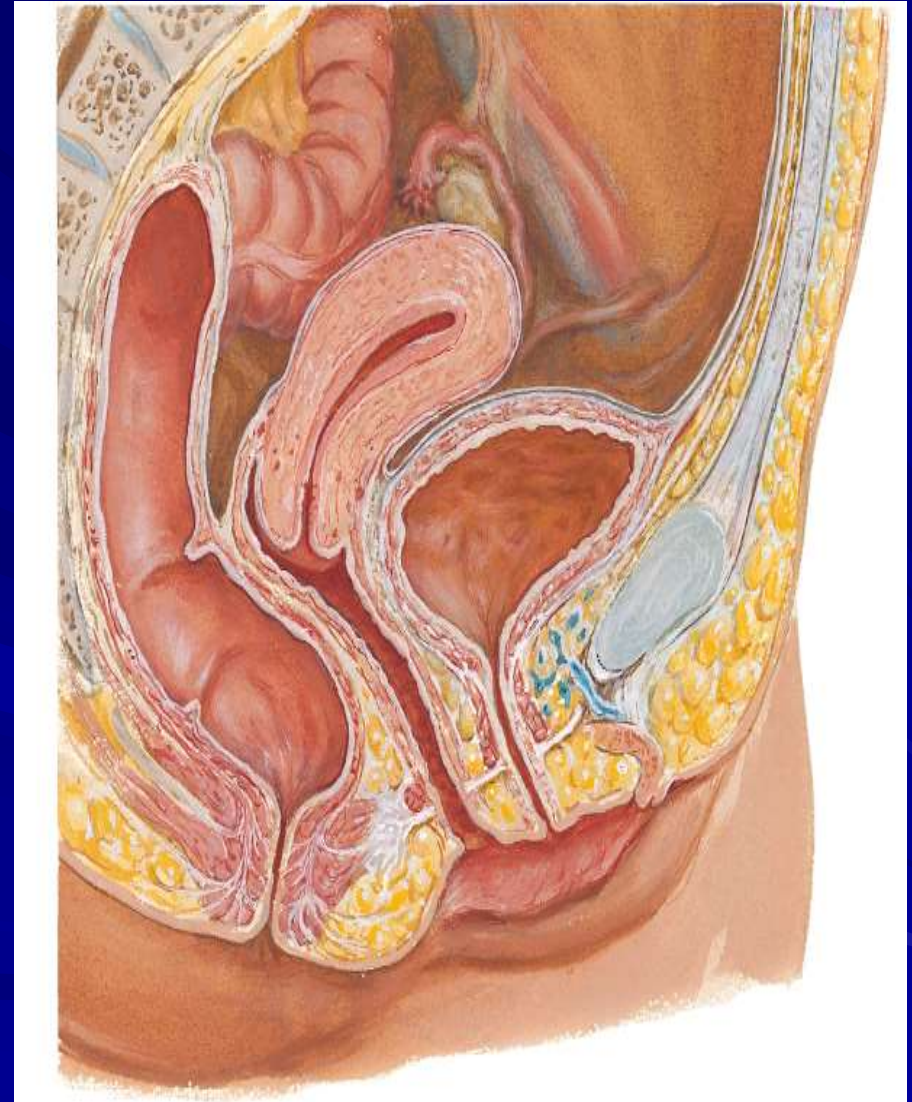
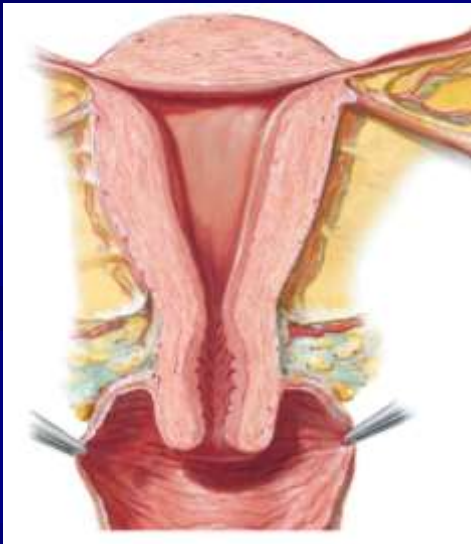
Vagina

- Posterior to the urethra and urinary bladder
- Anterior to the rectum, the anal canal and rectouterine pouch
- Between the medial margins of the levator ani muscles, visceral pelvic fascia and ureters



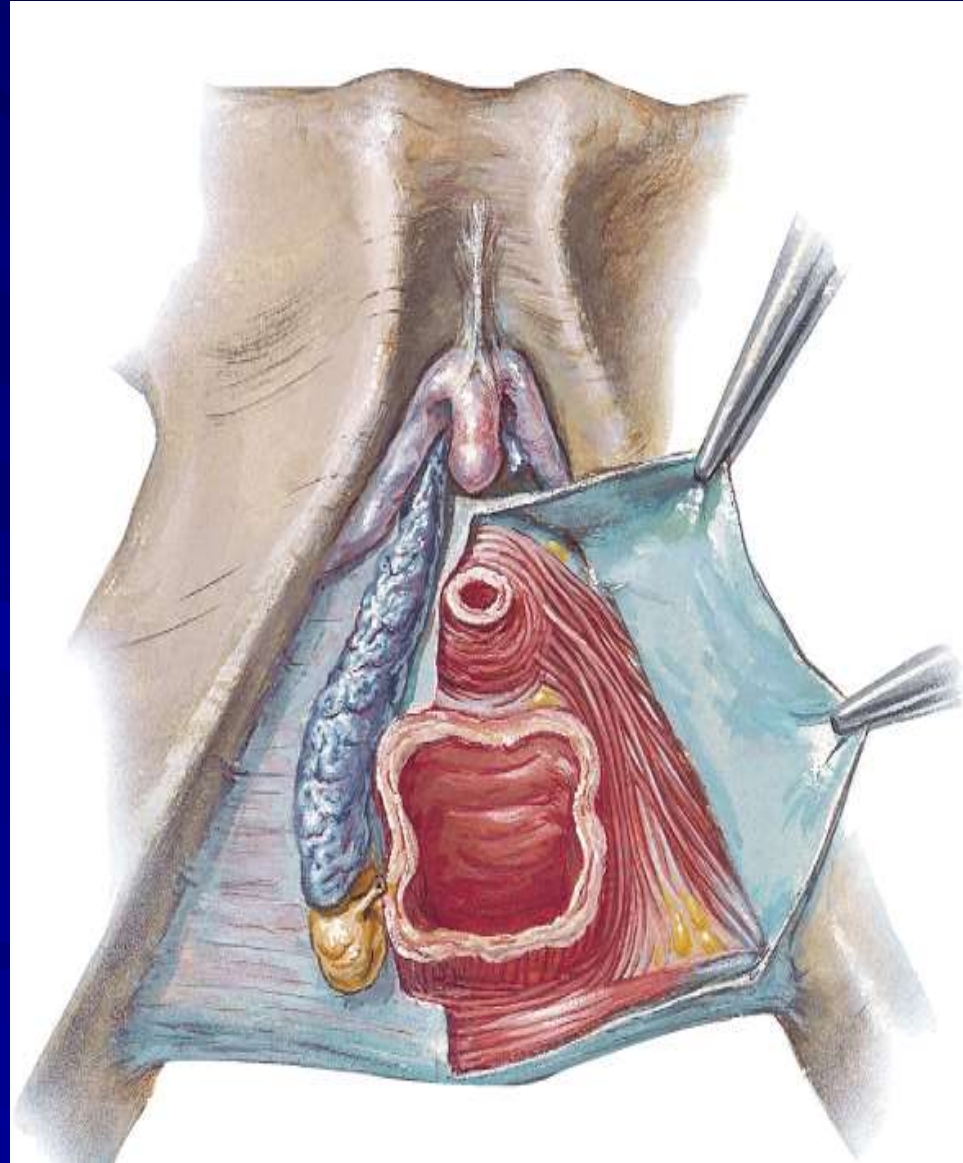
The vaginal fornix

- The recess around the cervix
- Anterior, posterior and lateral parts
- The posterior fornix- the deepest part, closely related to the rectouterine pouch



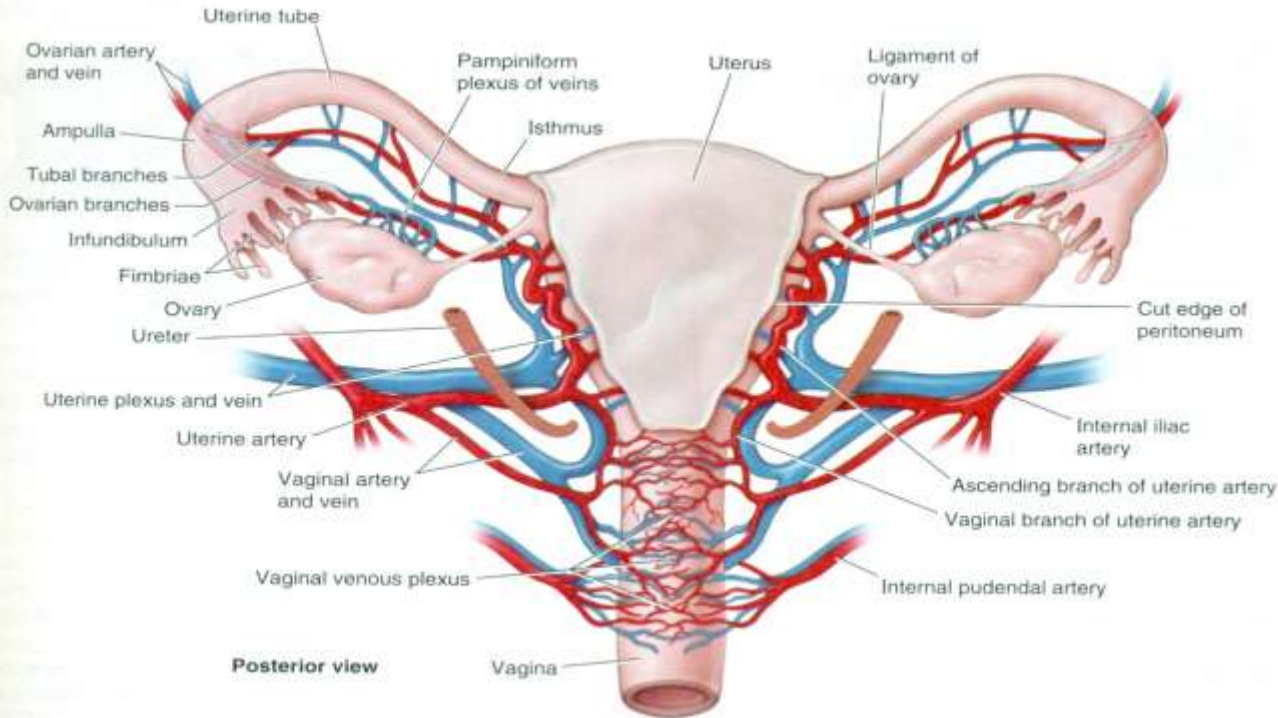
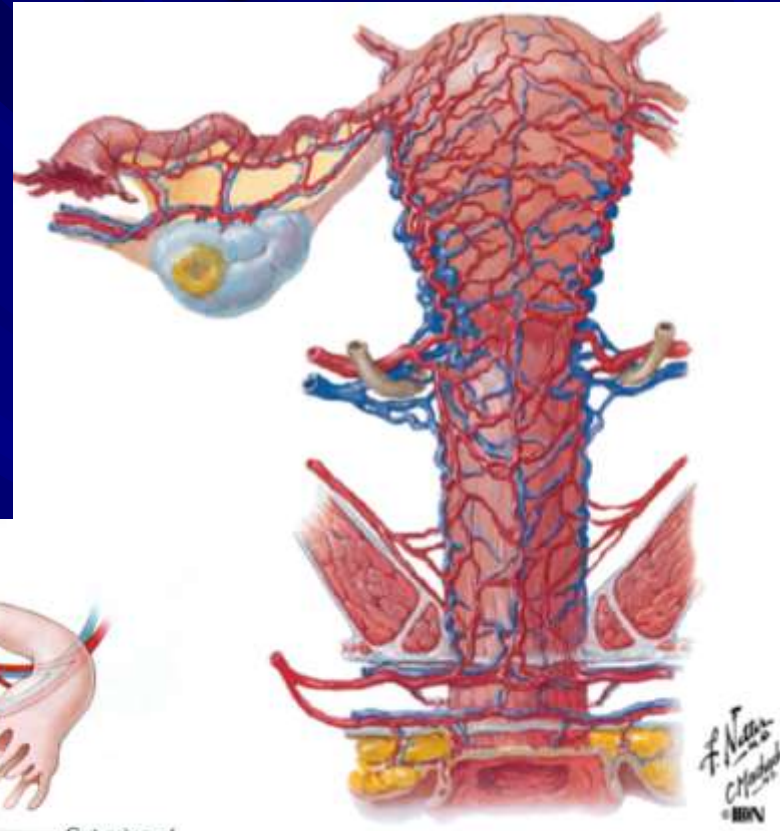
Muscles compressing the vagina

- Act like sphincters
- Four muscles:
 - Pubovaginalis
 - External urethral sphincter
 - Urethrovaginal sphincter
 - Bulbospongiosus



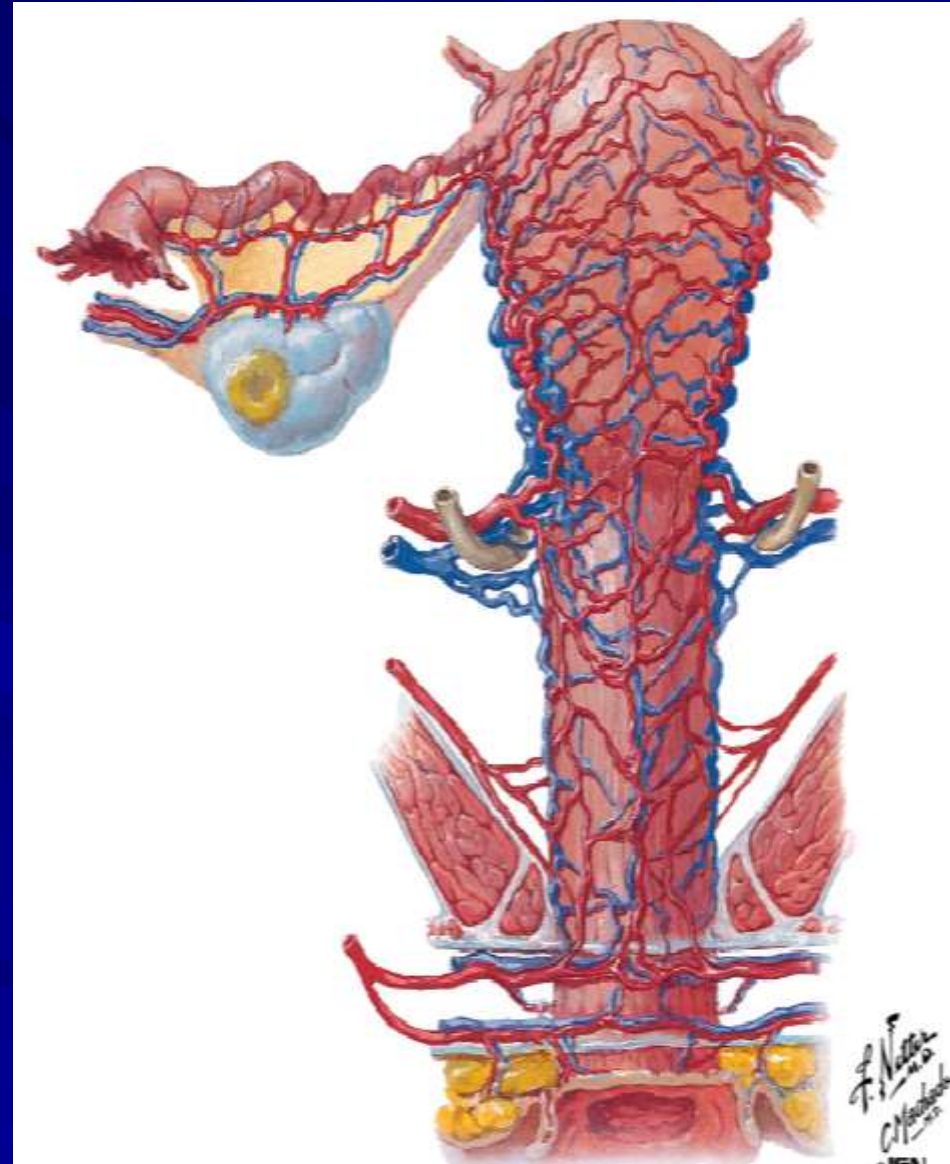
Arterial supply of the vagina

- To the superior part derive from the uterine arteries
- To the middle and inferior parts derive from the middle rectal artery and the internal pudendal artery



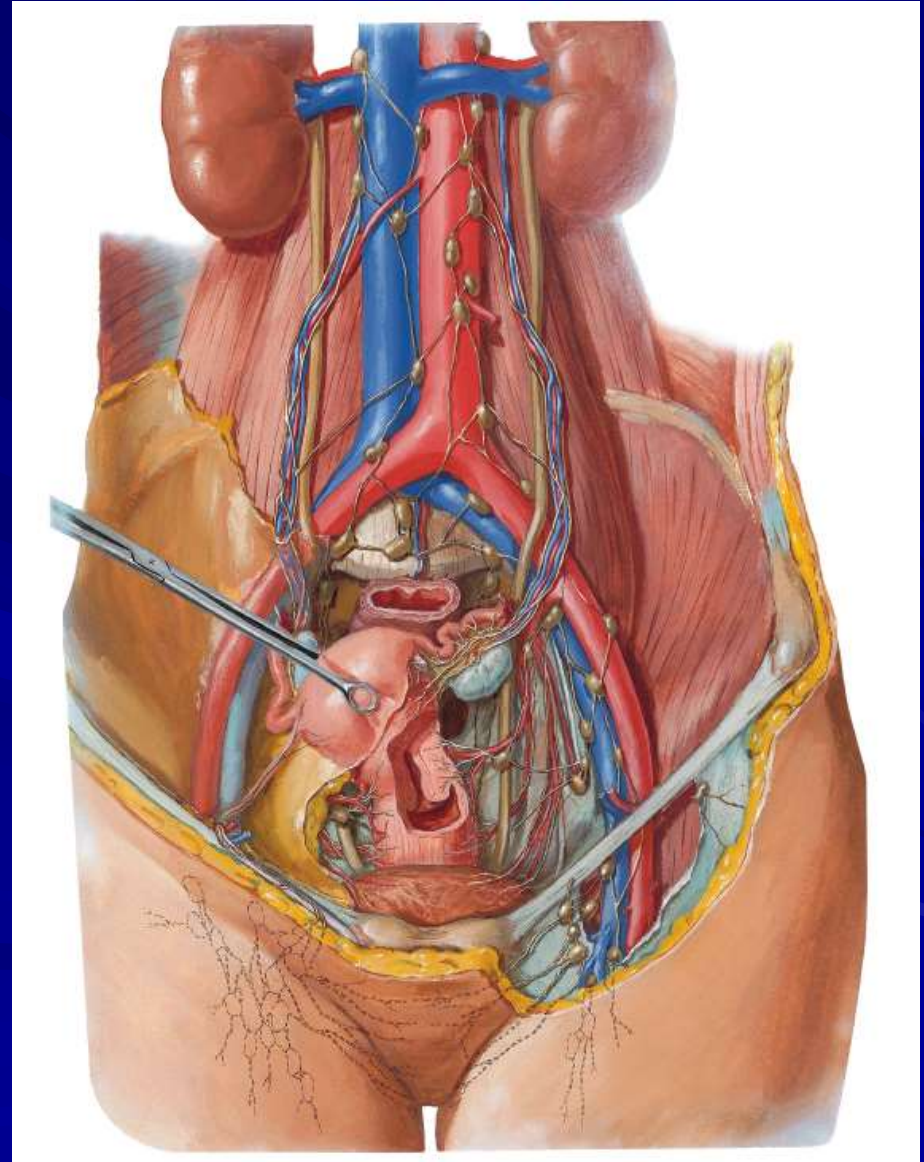
Vaginal venous plexuses

- Along the sides of the vagina and within the vaginal mucosa
- Continuous with the uterine venous plexus as the uterovaginal venous plexus
- Drain into the internal iliac veins through the uterine vein
- Communicates with the vesical and rectal venous plexuses



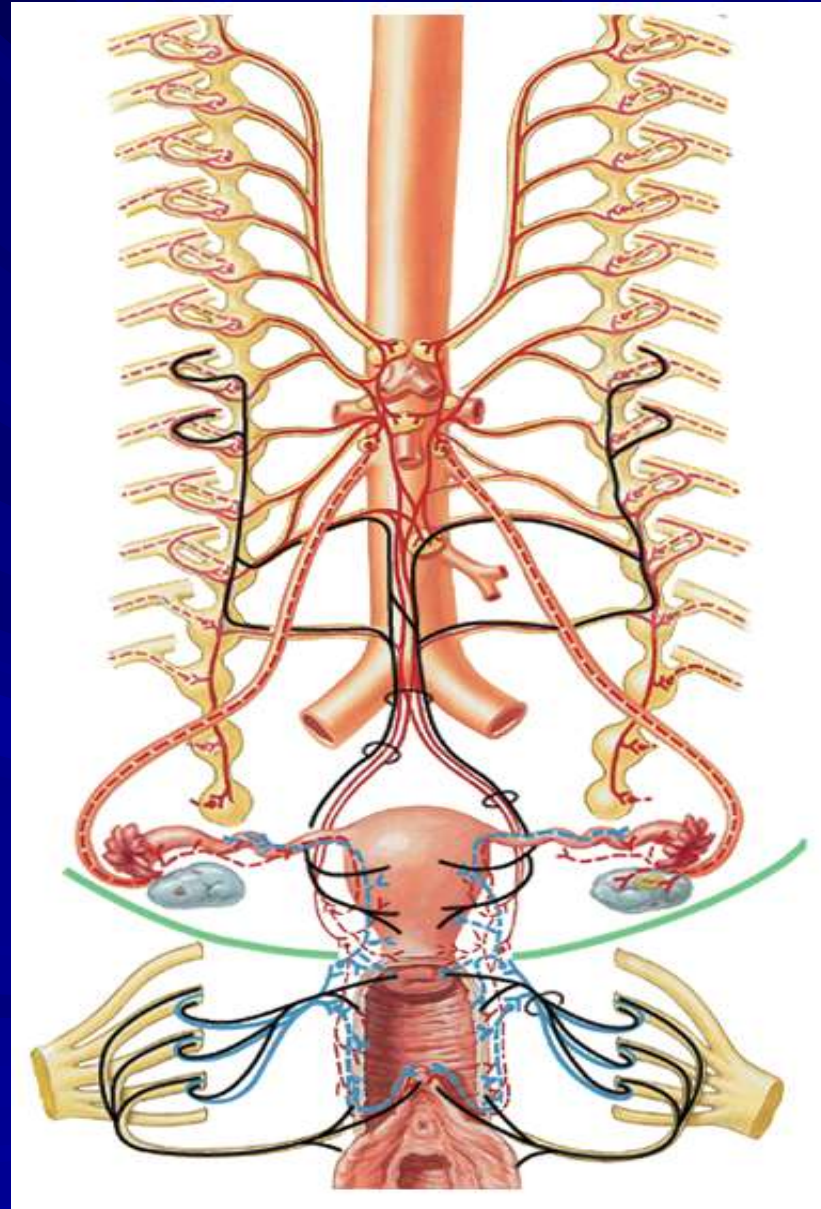
The vaginal lymphatic vessels

- From superior part drain into the internal and external iliac lymph nodes
- From the middle part into the internal iliac lymph nodes
- From the inferior part into the sacral and common iliac nodes, as well as into the superficial inguinal lymph nodes



The nerves of the vagina

- From the the uterovaginal plexus to the upper three-fourths to four- fifths
- From the pudendal nerve by the deep perineal branch (conveys sympathetic and afferent fibers but no parasympathetic fibers) to the lower one-fifth to one-fourth



Female external genitalia

- Mons pubis
- Labia majora
- Labia minora
- Clitoris
- Vestibule of vagina
- Bulbs of vestibule
- Greater vestibular glands



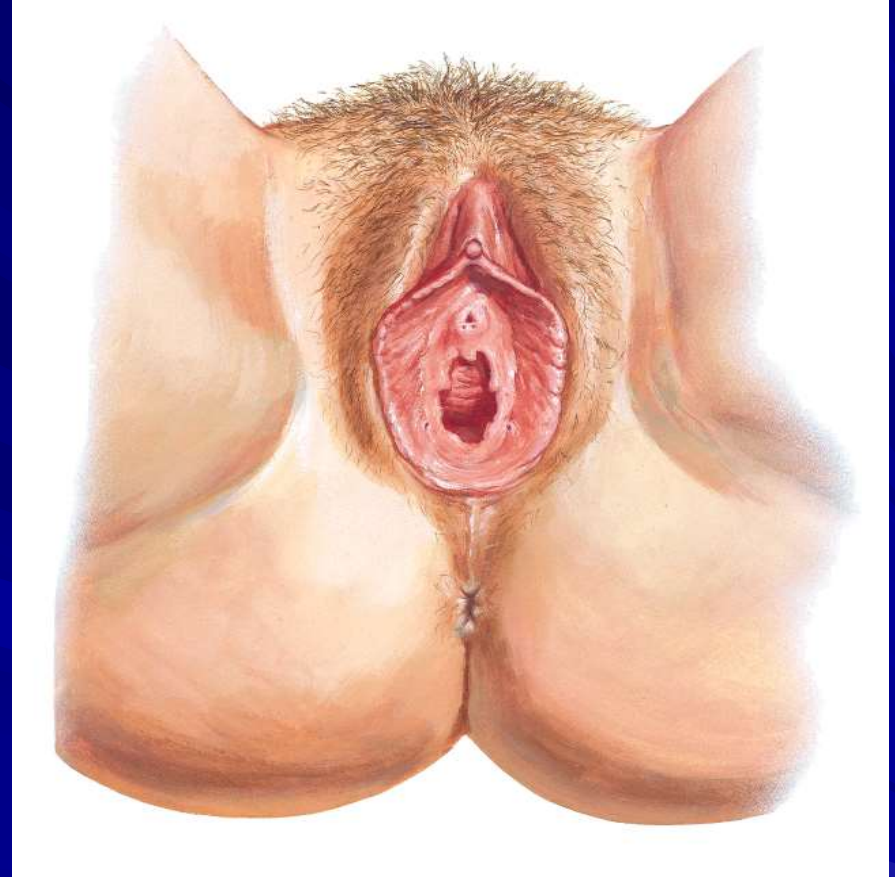
Mons pubis

- Rounded, fatty prominence anterior to the pubic symphysis, pubic tubercles and superior pubic rami



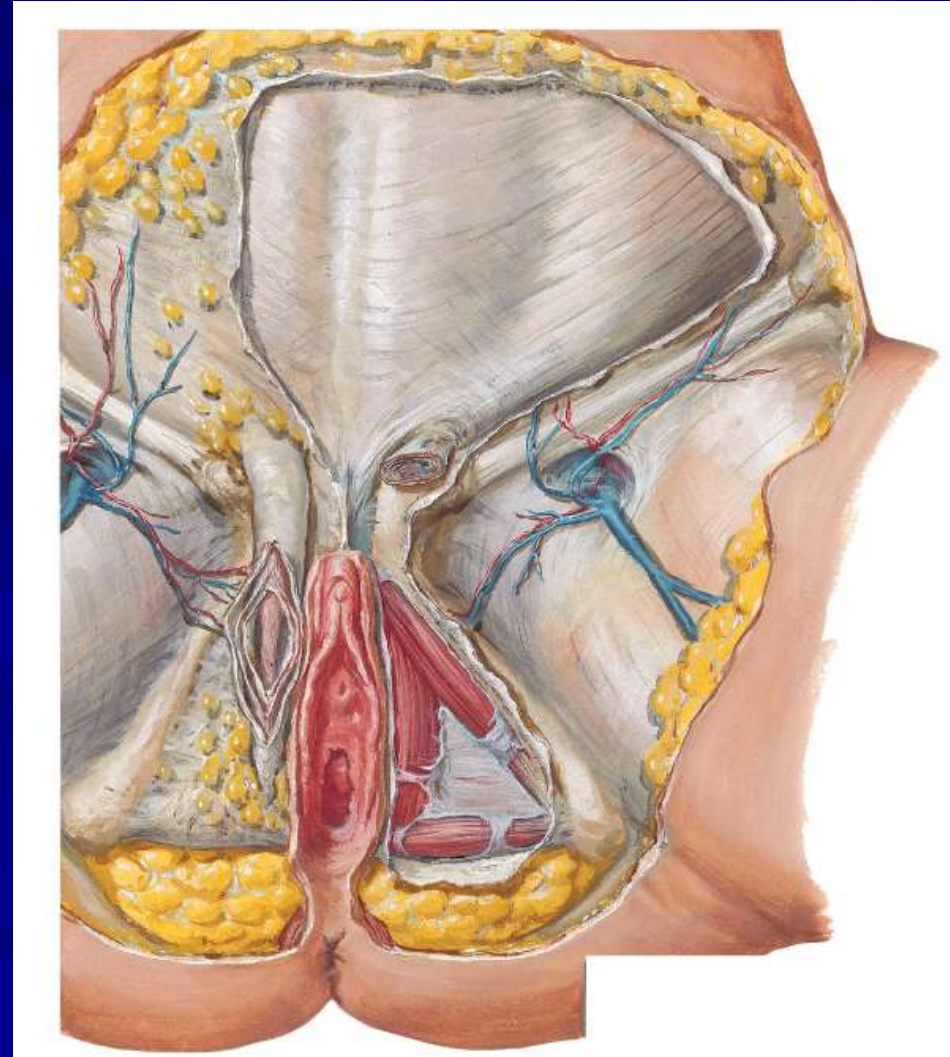
Labia majora

- Copulatory organ
- Longitudinal folds of skin
- Bound the pudendal cleft and indirectly provide protection for the urethral and vaginal orifices
- Pass inferoposteriorly from the mons pubis toward the anus
- Join to form the anterior labial commissure
- Contain smooth muscles and fat
- Homologous to the scrotum of the male



Labia majora

- The termination of the round ligaments of the uterus



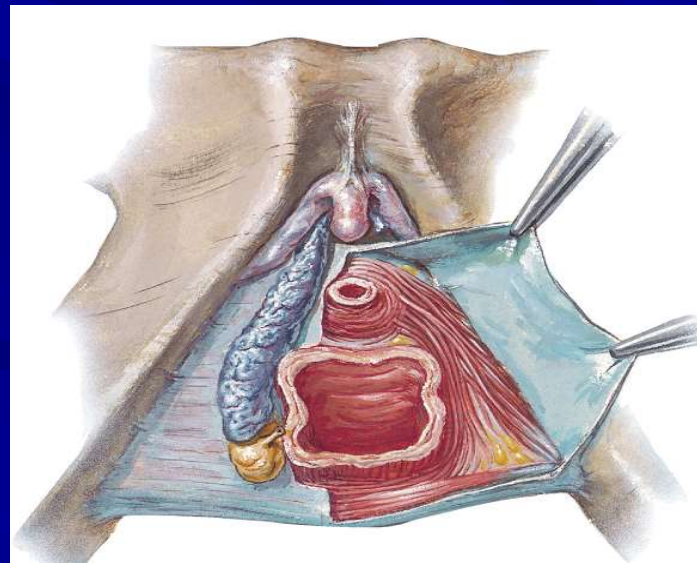
Labia minora

- Copulatory organ
- Folds of fat-free, hairless skin
- Enclosed in the pudendal cleft within the labia majora
- Surround the vestibule of the vagina
- Fuse to form the prepuce of the clitoris
- Extend from the clitoris posterolaterally around the external urethral orifice and the orifice of the vagina



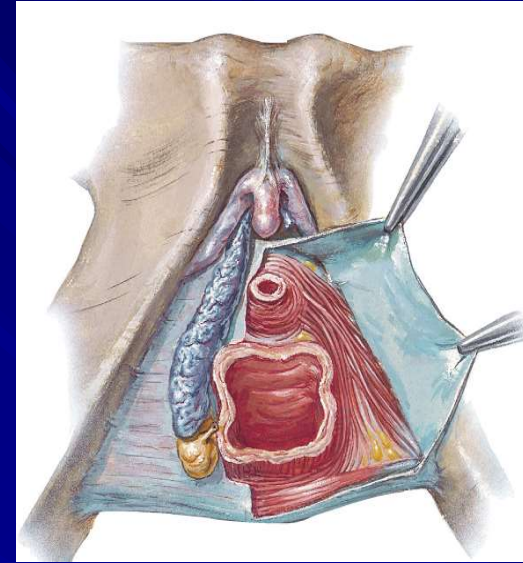
Clitoris

- An erectile organ located where the labia minora meet anteriorly
- Consists of a root, a body, composed of two crura, two corpora cavernosa and a glans clitoridis that is covered by a prepuce
- Highly sensitive
- Homologous to the penis in the male



Vestibule of the vagina

- Space between the labia minora
- Contains the openings of the urethra, vagina and ducts of the greater and lesser vestibular glands (product secretion)
- On each side of the external urethral orifice are openings of the ducts of the paraurethral glands
- The hymen- a thin fold of mucous membrane surrounding the vaginal orifice (after childbirth- a few remanants- hymenal caruncles)



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Vulva: Virginal, Nulliparous, Parous



Virginal



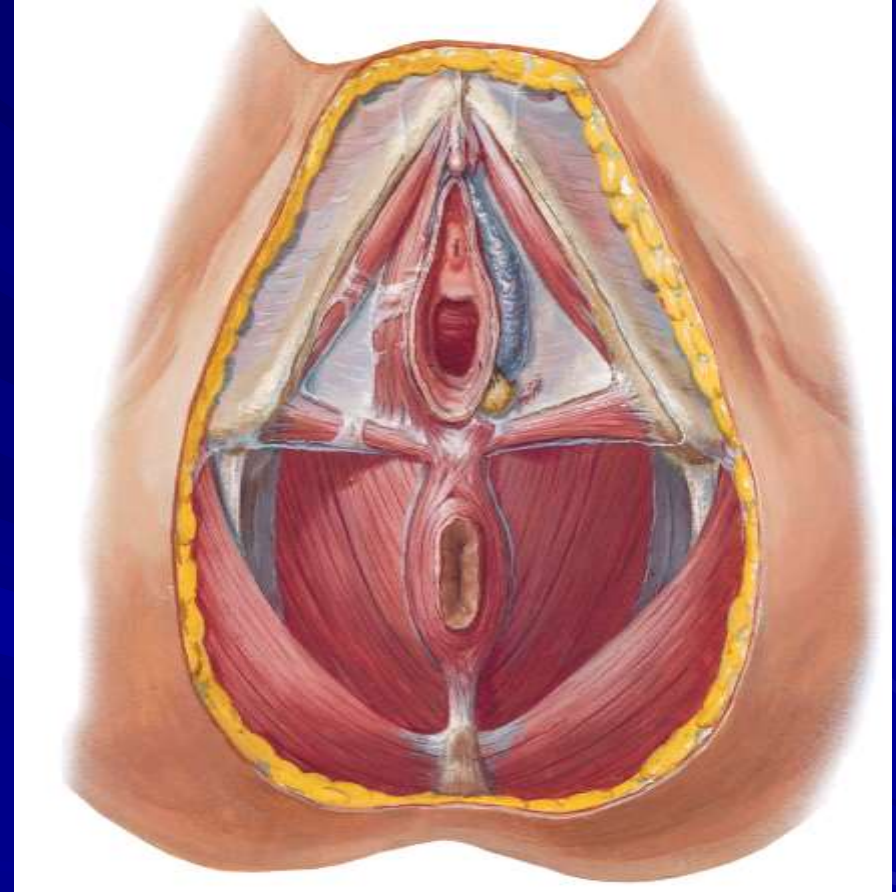
In the woman
who has had
intercourse



In the woman
who has had a baby

Bulbs of the vestibule

- Paired masses of elongated erectile tissue
- Lie along the sides of the vaginal orifice under cover of the bulbospongiosus muscles
- Homologous with the bulb of the penis and corpus spongiosum



Female urethra

- Approximately 4 cm long and 6 mm in diameter
- Passes anteroinferiorly from the internal urethral orifice of the urinary bladder, posterior and then inferior to the pubic symphysis
- The external urethral orifice - in the vestibule of the vagina, directly anterior to the orifice of the vagina
- Passes with the vagina through the pelvic diaphragm, external urethral sphincter and perineal membrane



THANK YOU!