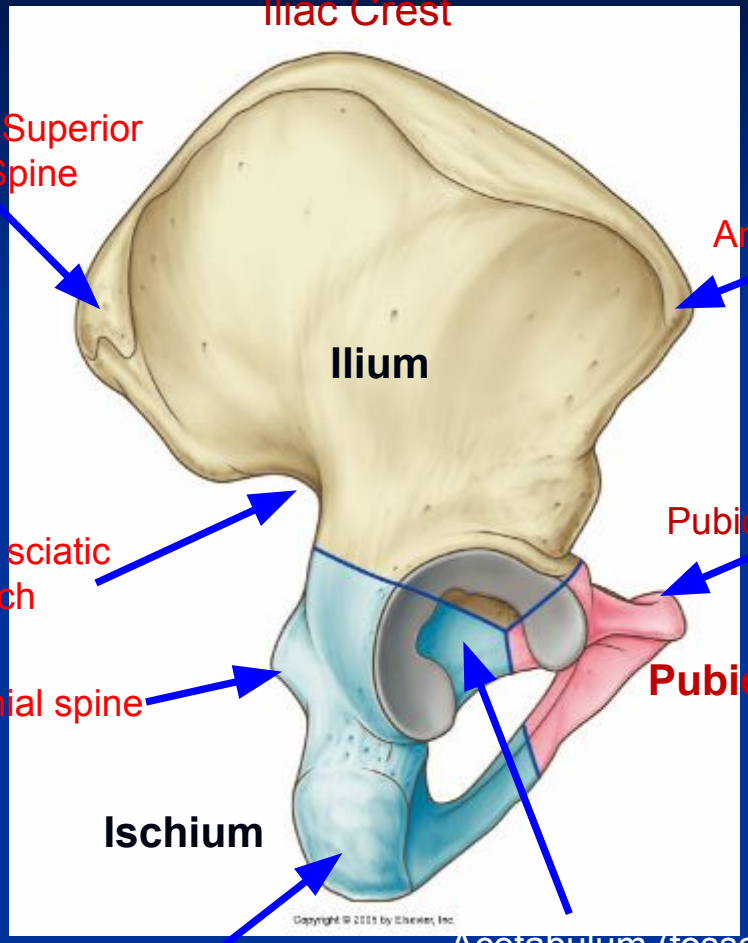
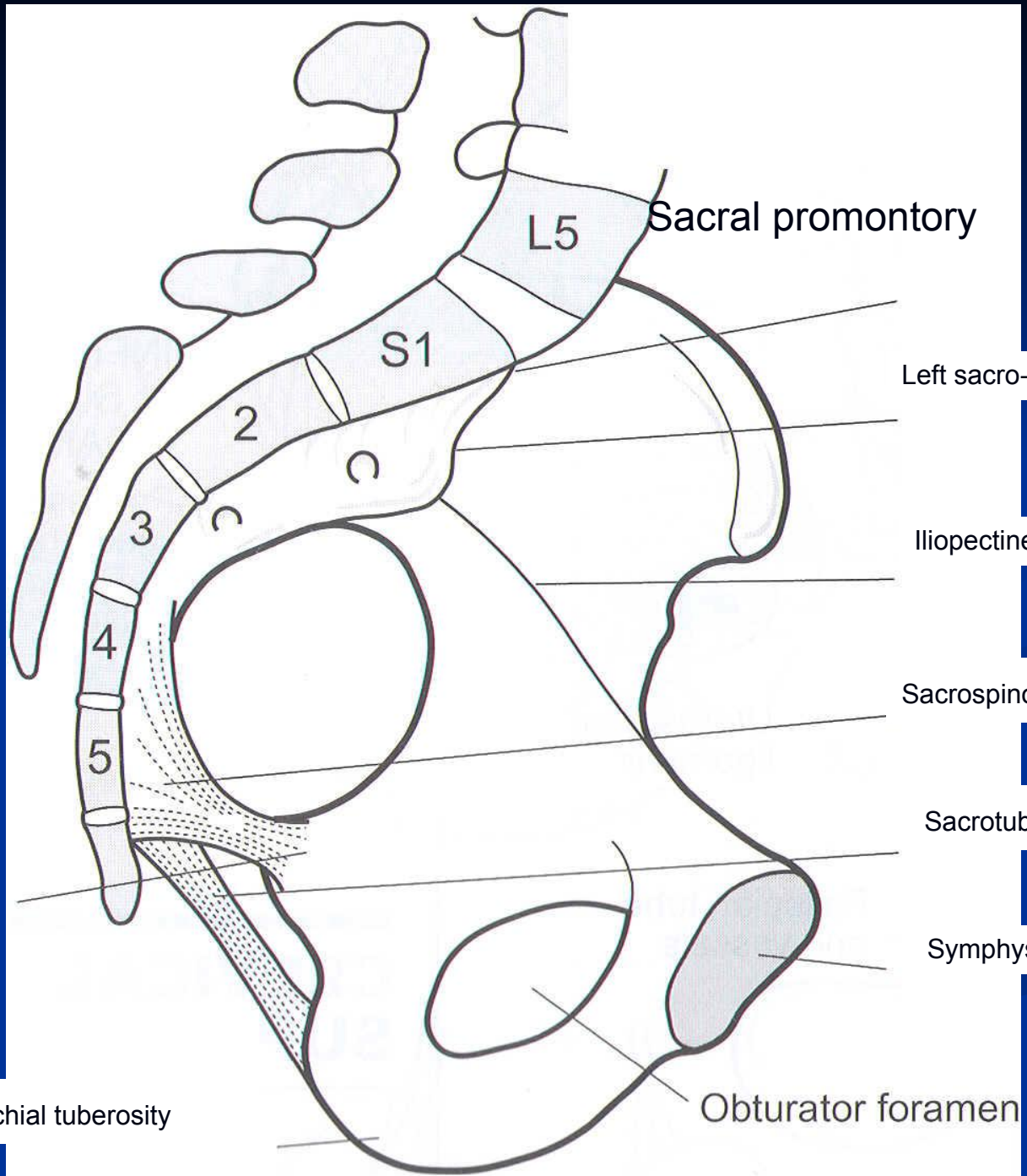
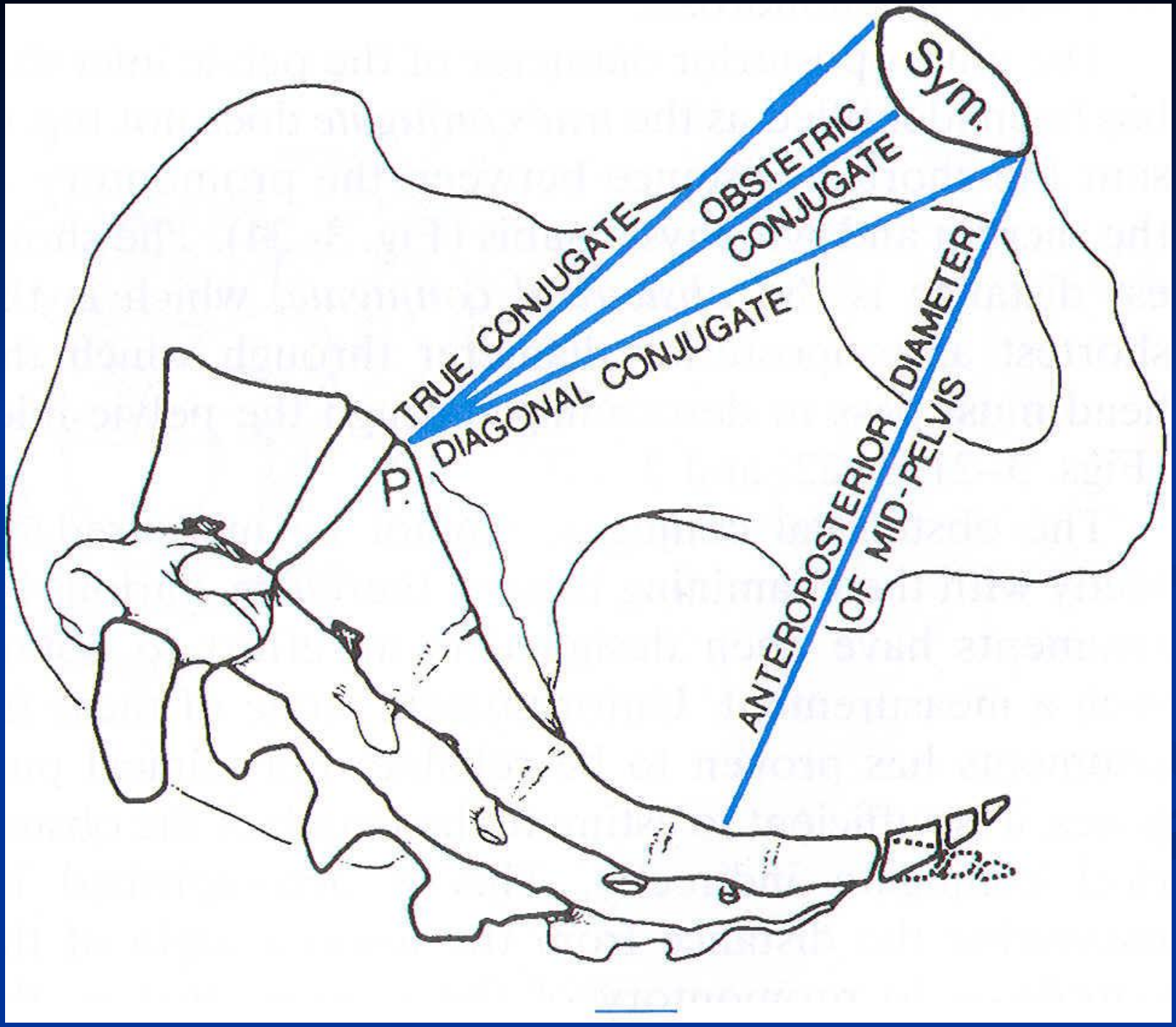
Pelvic Anatomy

Pelvis



- Hip bone formed from 3 bones
  - Ilium
  - Pubic
  - Ischium
- Fuse in late puberty
- Bones fuse at acetabulum

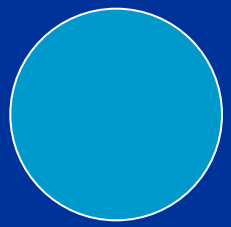

L5
S1
2
3
4
5
Sacral promontory
Left sacro-iliac joint
Iliopectineal line
Sacrospinous ligament
Sacrotuberous ligament
Symphysis pubis
Ischial spine
Ischial tuberosity
Obturator foramen


Sym.
TRUE CONJUGATE
OBSTETRIC CONJUGATE
DIAGONAL CONJUGATE
ANTEROPOSTERIOR DIAMETER OF MID-PELVIS
P.

Pelvis

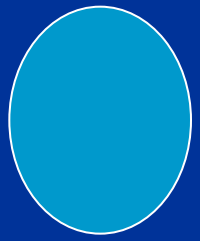
Pelvic Inlet:

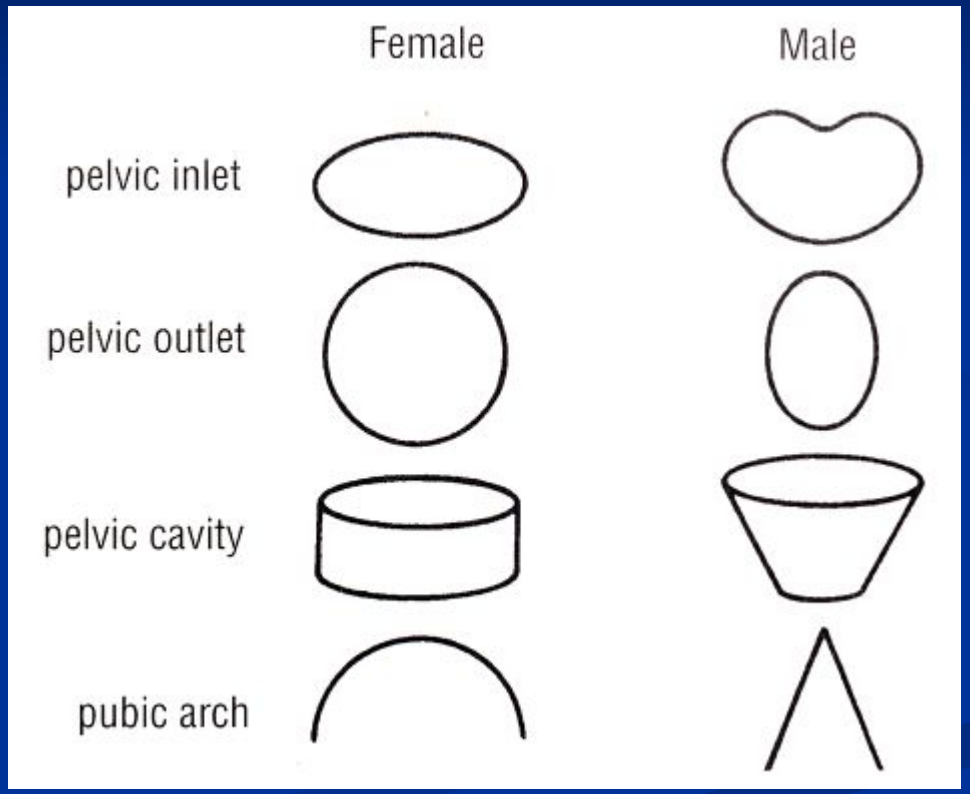
- S1
- Rim of pelvic bone
- Pubic symphysis

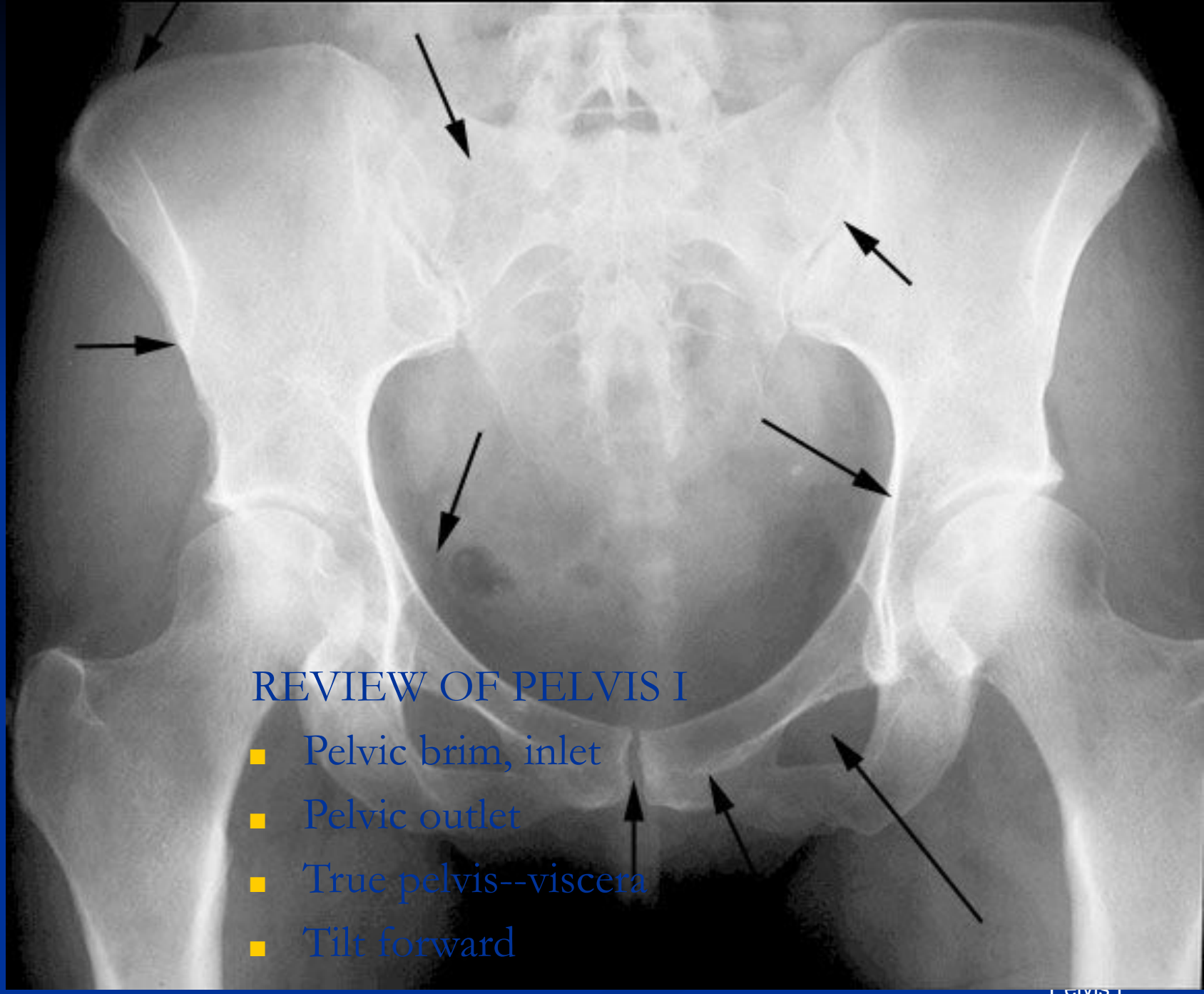


Pelvic Outlet:

- Coccyx and sacrum
- Inferior margin of pelvic bone
- Ischial tuberosity
- Sacrotuberous ligament
- Pubic symphysis



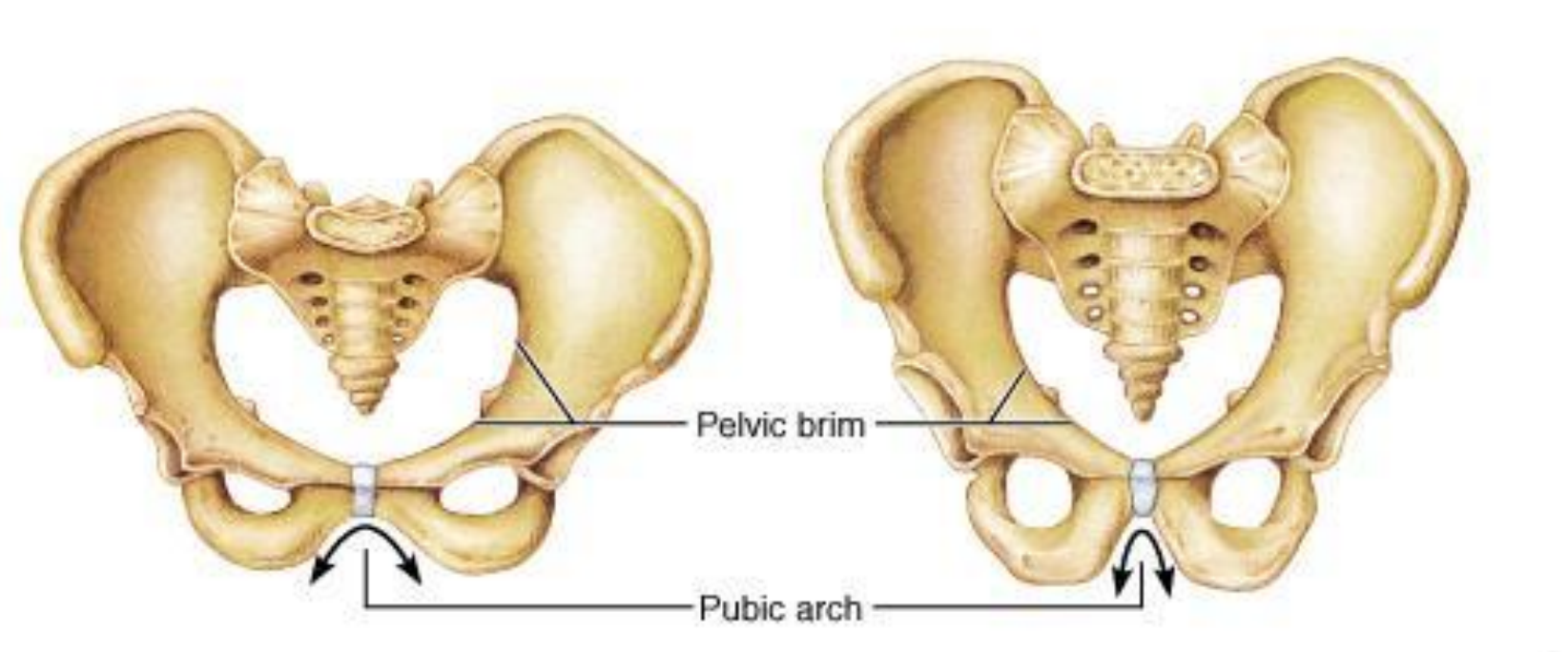




REVIEW OF PELVIS I

- Pelvic brim, inlet
- Pelvic outlet
- True pelvis--viscera
- Tilt forward

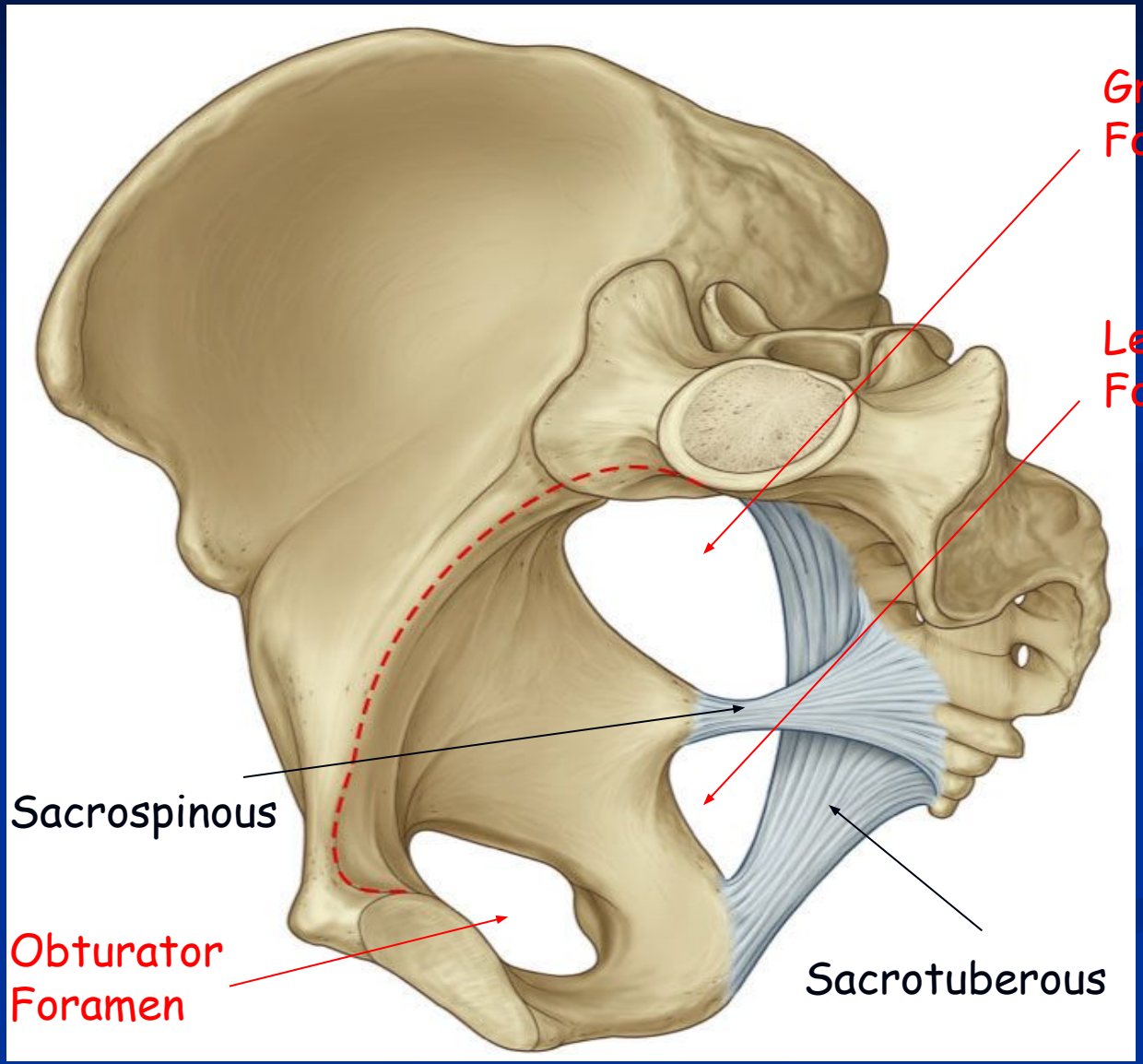
Female Male



- Cavity is broad, shallow
- Pelvic inlet oval + outlet round
- Bones are lighter, thinner
- Pubic angle larger
- Coccyx more flexible, straighter
- Ischial tuberosities shorter, more everted

- Cavity is narrow, deep
- Smaller inlet + outlet
- Bones heavier, thicker
- Pubic angle more acute
- Coccyx less flexible, more curved
- Ischial tuberosities longer, face more medially

Pelvis



Sacrospinous

Apex: ischial spine

Base: sacrum and coccyx

Sacrotuberous

Apex: medial ischial tuberosity

Base: PSIS to sacrum to coccyx to

Pelvic Foramen

Obturator Canal:

- Obturator nerve and vessels.

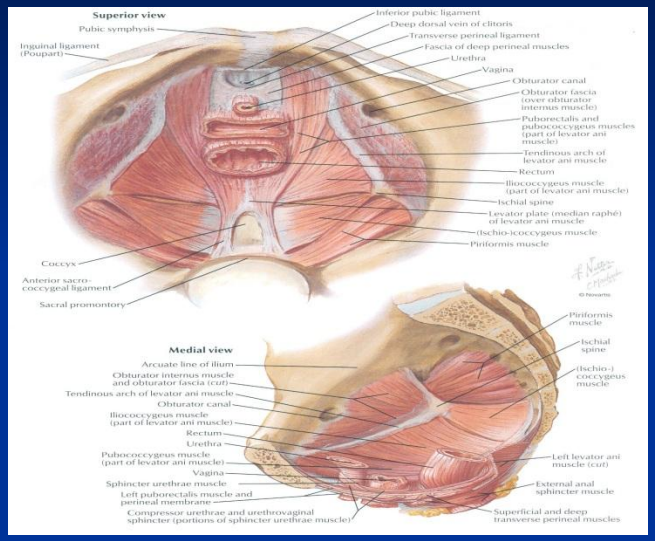
Greater Sciatic Foramen:

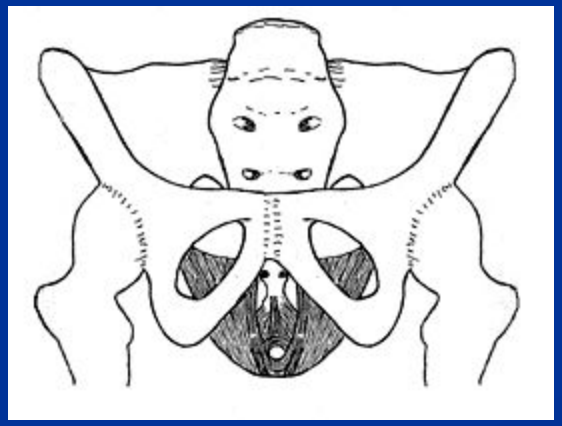
- Above piriformis: - superior gluteal nerves and vessels
- Below piriformis: - inferior gluteal nerve and vessels
  - sciatic nerve
  - pudendal nerve and vessels
  - nerve to obturator internus, post. femoral cutaneous nerves, nerve to quadratous femoris

Lesser Sciatic Foramen:

- Pudendal nerve and vessels enter perineum
- Tendon of obturator internus muscle

The Pelvic Floor





- Musculotendinous hammock or sling
- Termination of the pelvic outlet
- Muscles of the pelvis
  - Anal sphincter complex
  - Levator ani muscles
- Support the abdominal and pelvic organs
- Connect the pelvis to the vertebral column
- Maintain continence

The Function of Pelvic Floor

- Support pelvic and abdominal organs during stress of increased abdominal pressure
- Allow for opening of the pelvic floor to accommodate excretory functions and parturition
- Endopelvic fascia and visceral ligaments contains smooth muscles

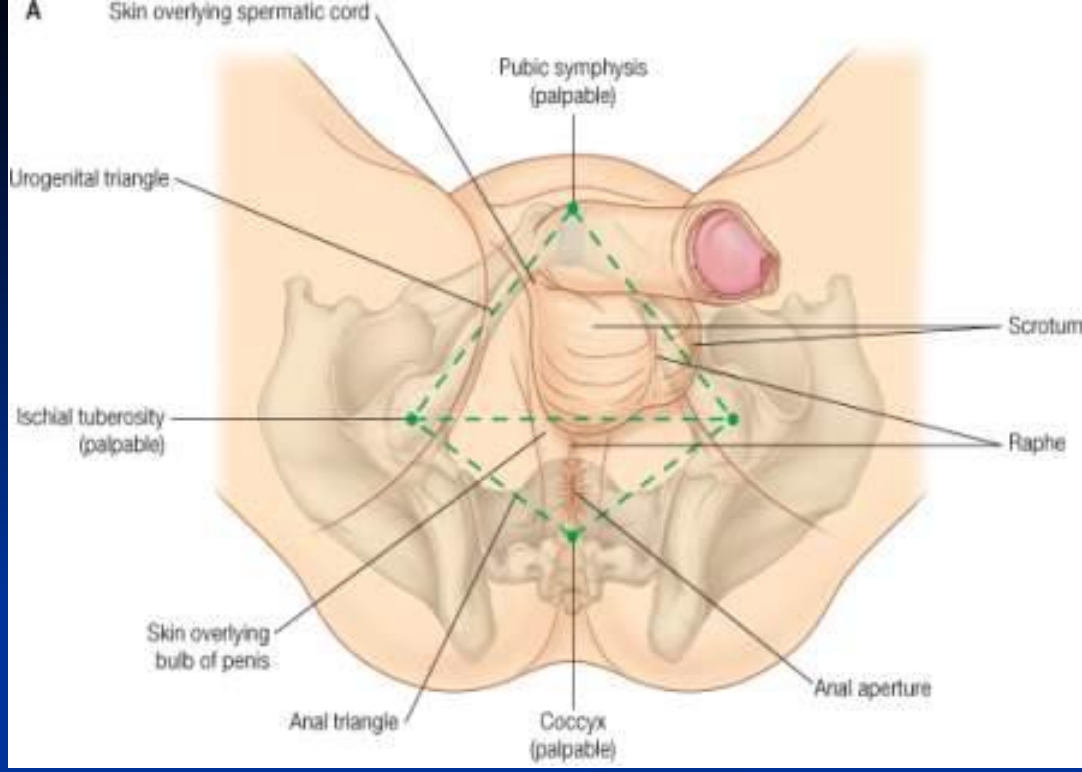
PERINEUM

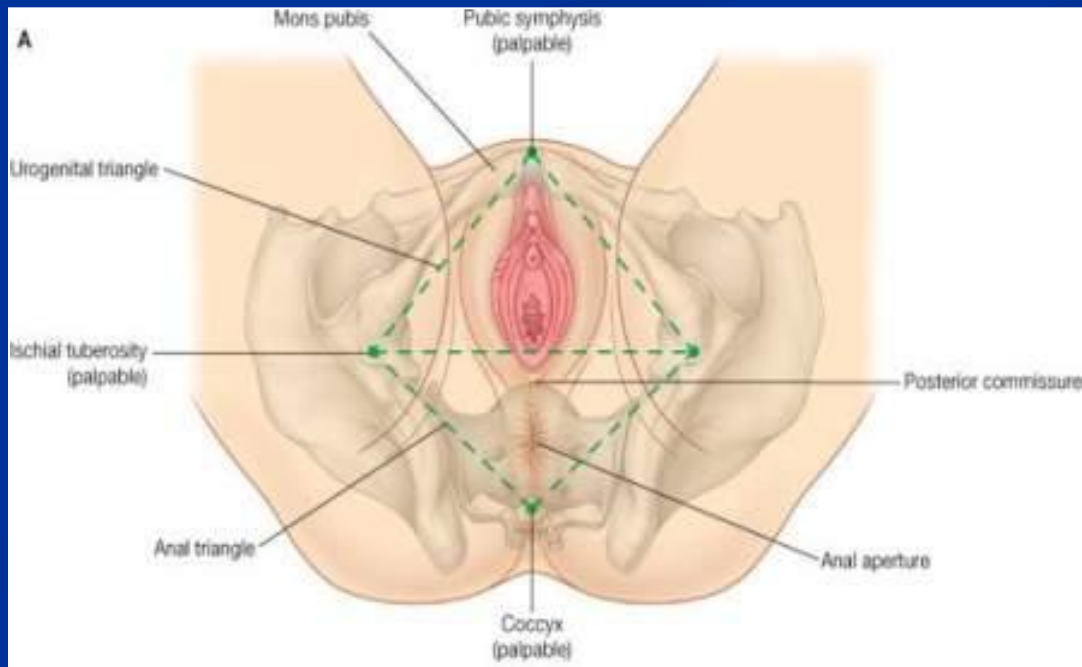
Diamond shape area
It is bouded:
Anteriorly: lower edge of **symphysis pubis**
Posteriorly: **coccyx**
Lateraly: **ischial tuberosity**

Anterior (one on each side) sides formed by **ischiopubic rami.**
Posterior sides formed by **sacrotuberous ligaments.**

Imaginary horizontal line between 2 ischial tuberosities divides perineum into 2 triangles:
Anterior- **UROGENITAL TRIANGLE**
Posterior- **ANAL TRIANGLE**

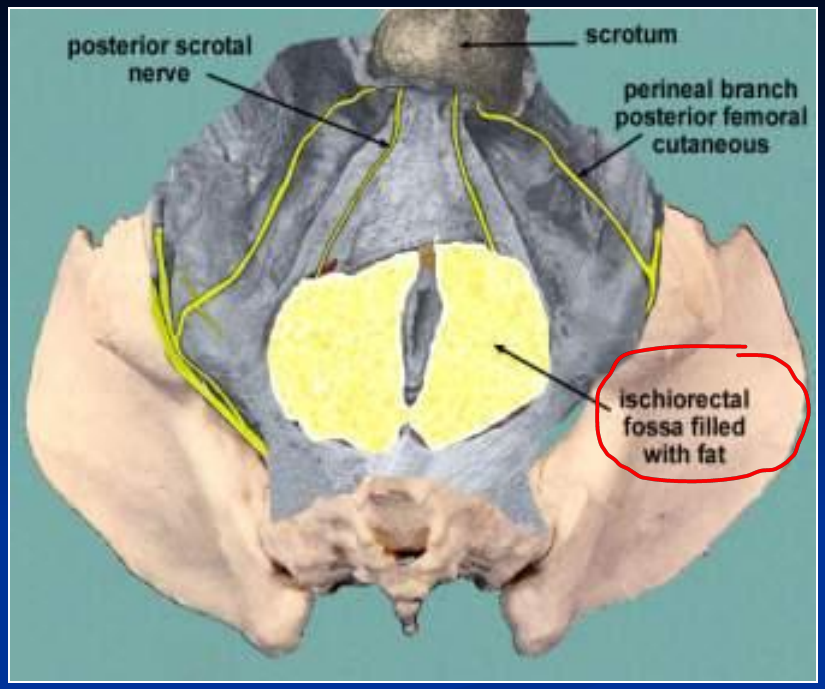
Internal Pudendal Artery (branch of internal iliac artery) enters perineum through pudendal canal and gives branches:
1. **INFERIOR RECTAL ARTERY**
2. **PERINEAL ARTERY gives branches**
3. **DEEP ARTERIES OF PENIS (CLITORIS)**
4. **DORSAL ARTERY OF PENIS (CLITORIS)**





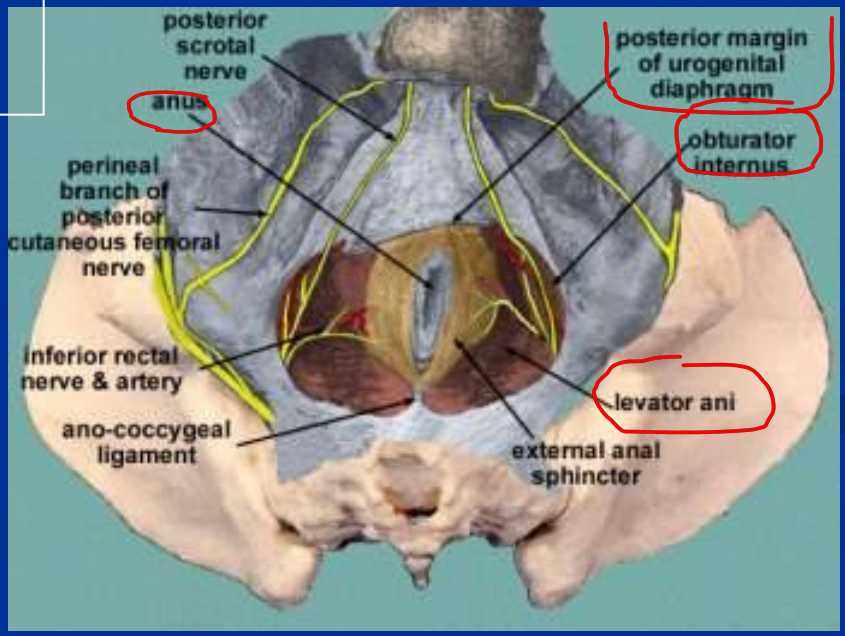
Both the male and female **anal triangles** are similar so we will just describe one.

Starting by removing the skin and superficial fascia, we can identify the anus in the midline and **two fat filled areas adjacent to the anus** represented by the yellow. This **fat fills a space** known as the **ischiorectal fossa.**

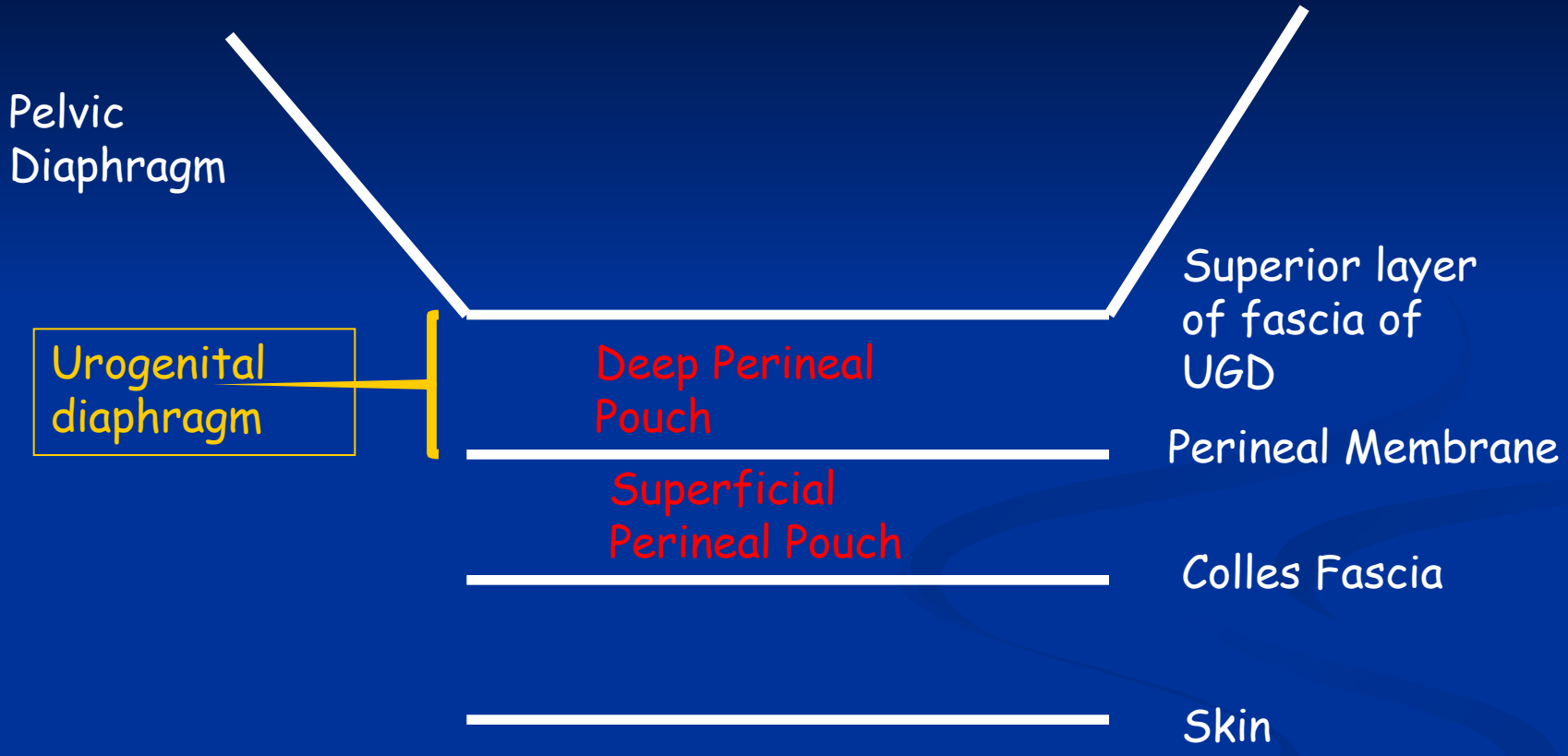


Boudaries:
The base(superficial): skin
Medial border: levator ani muscle and anus
Lateral border: obturator internus muscle
Floor: anteriorly: UGD
posteriorly : fat

CONTENT:
1. FAT
2. PUDENDAL NERVE and
   INTERNAL PUDENDAL VESSELS
3. INFERIOR RECTAL VESSELS and
   INFERIOR RECTAL NERVE

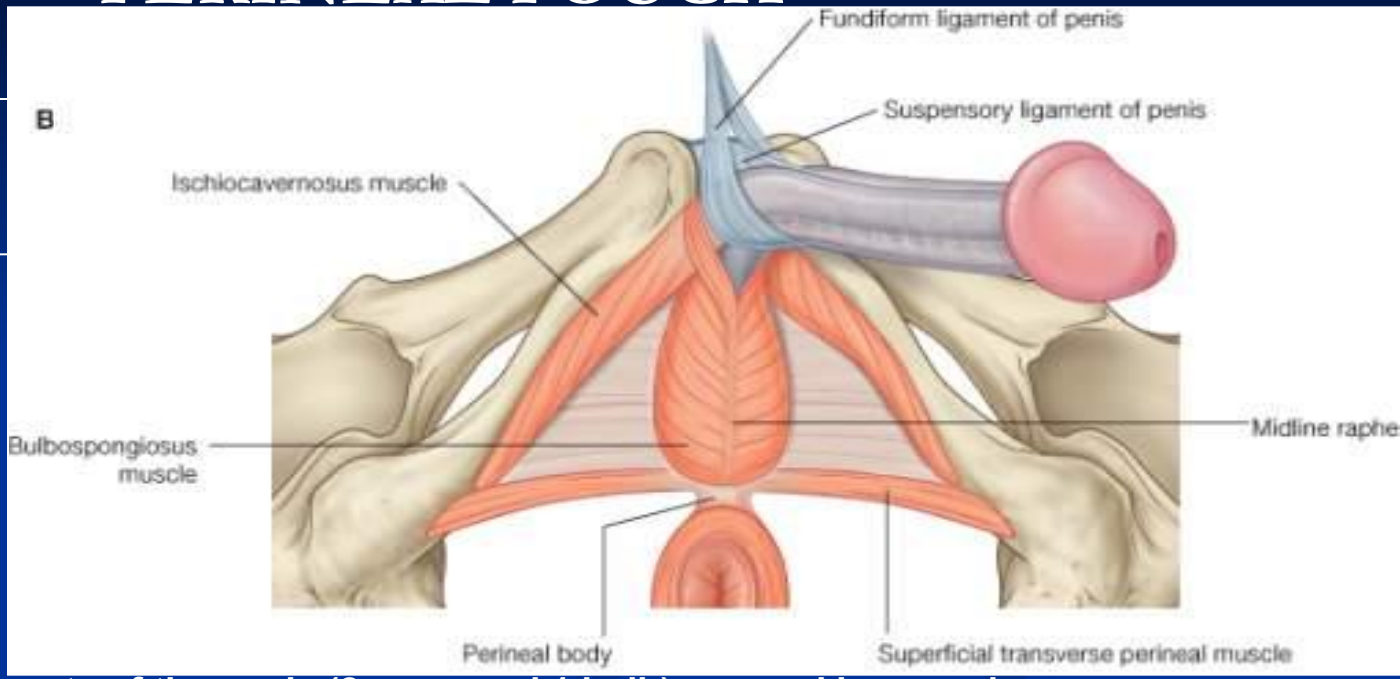


Compartments of the urogenital traingle



CONTENTS OF MALE SUPERFICIAL PERINEAL POUCH

Roof- perineal membrane
Floor-Colle's fascia (covers urogenital triangle)



1. **Structures forming the 3 roots of the penis (2 crura and 1 bulb) covered by muscles:**
- **BULBOSPONGIOSUS MUSCLE (covering bulb of penis – become corpus spongiosum of penis)**
- **ISCHIOCAVERNOSUS MUSCLE (covering 2 crura of penis- become corpora cavernosa of penis)**

2. SUPERFICIAL TRANSVERSAE PERINEAL MUSCLE

3. PERINEAL BODY –serves as site of attachment of:
a) muscles of external anal sphincter
b) bulbospongiosus muscle
c) superficial transversae perineal muscle

CONTENTS OF FEMALE SUPERFICIAL PERINEAL POUCH

Roof- perineal membrane
Floor-Colle's fascia (covers urogenital triangle)

Structures forming the roots of clitoris:

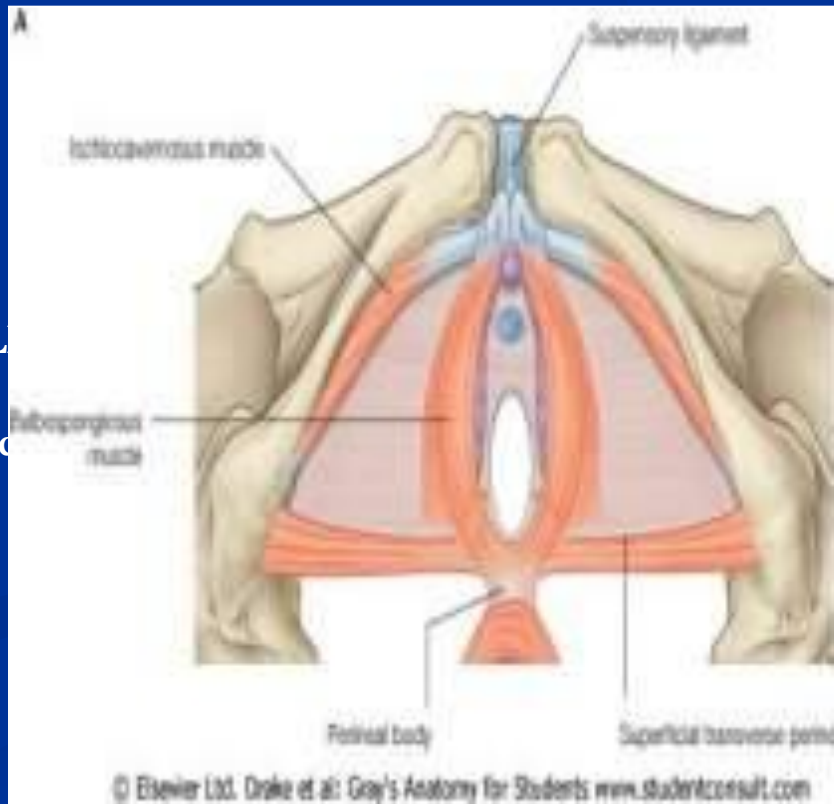
- Two crura of the clitoris, two vestibular bulbs, and their muscles:
- ISCHIOCAVERNOSUS MUSCLE

(on each side covers crura of clitoris)

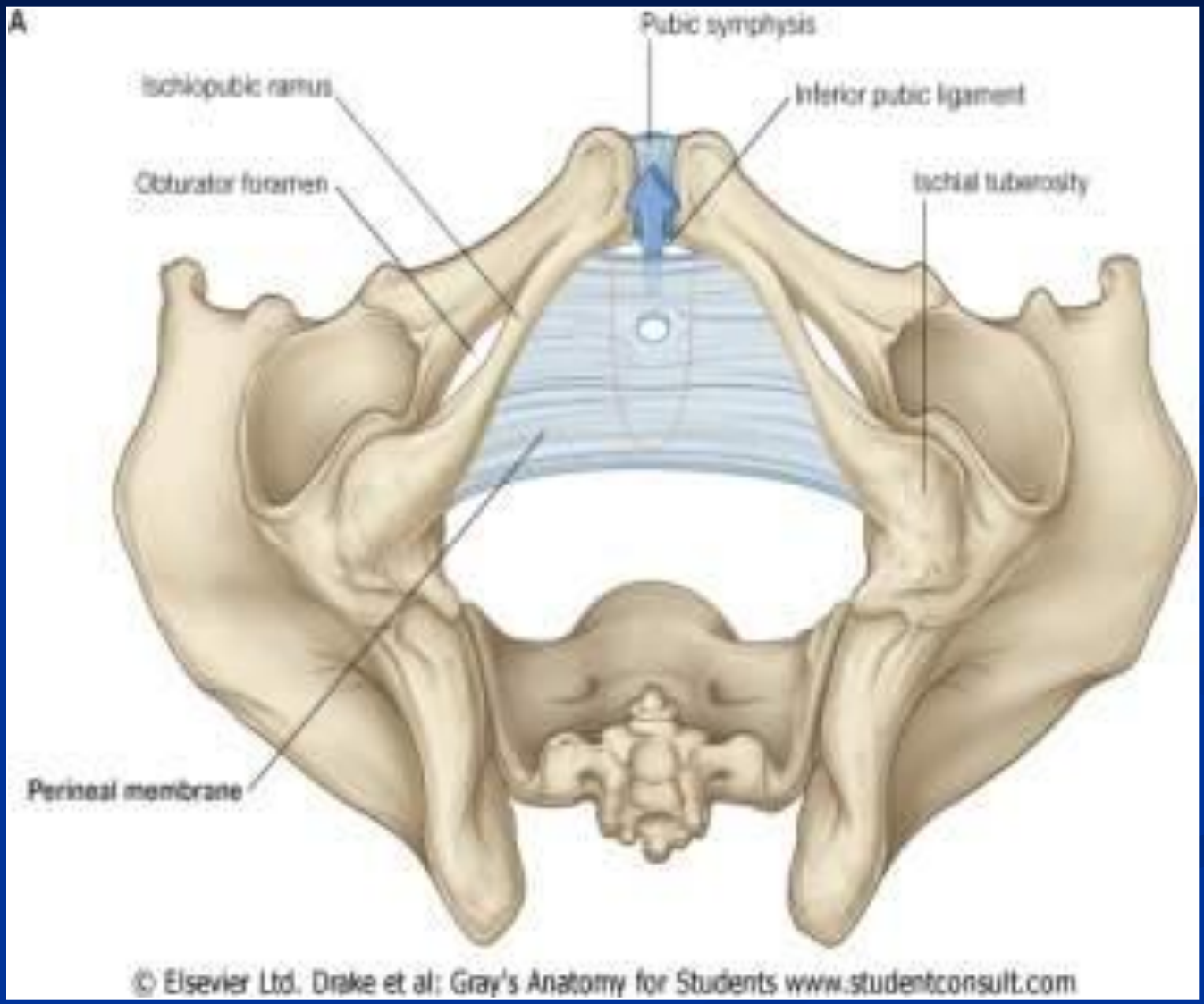
- BULBOSPONGIOSUS MUSCLE

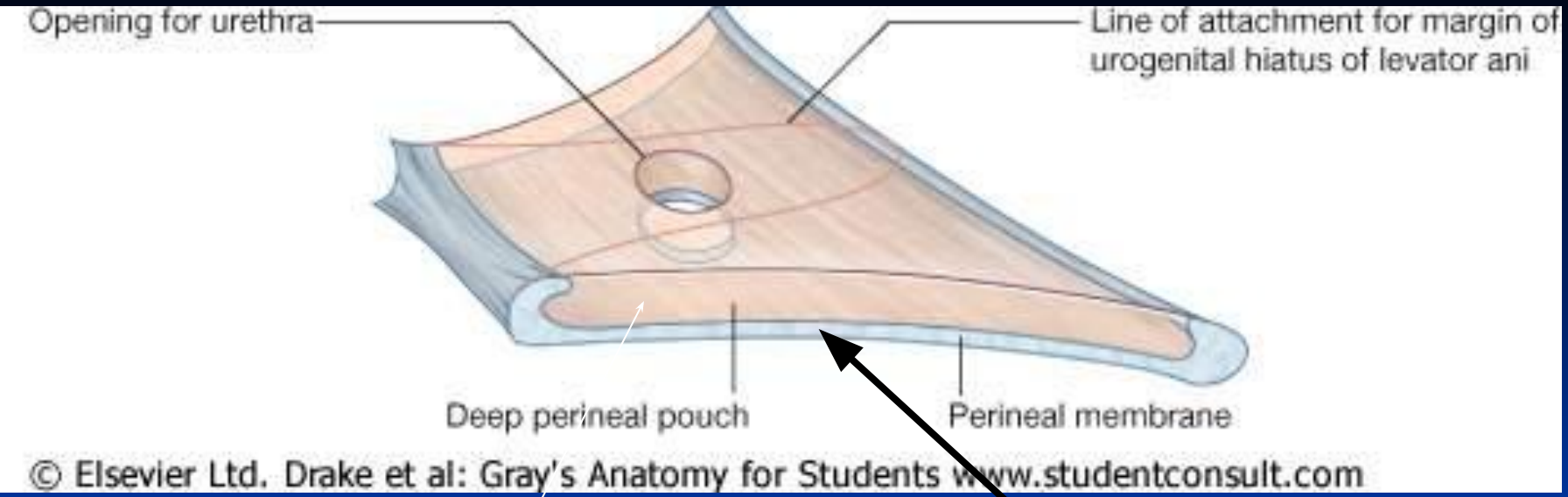
(covers vestibular bulbs, surrounds the opening of vagina)

- Female external genitals
- SUPERFICIAL TRANSVERSAE PERINEAL MUSCL
- Bartholin's glands (great vestibular glands) Perineal boc
- Perineal branches of the pudendal nerve
- Branches of the internal pudendal vessels



Perineal Membrane



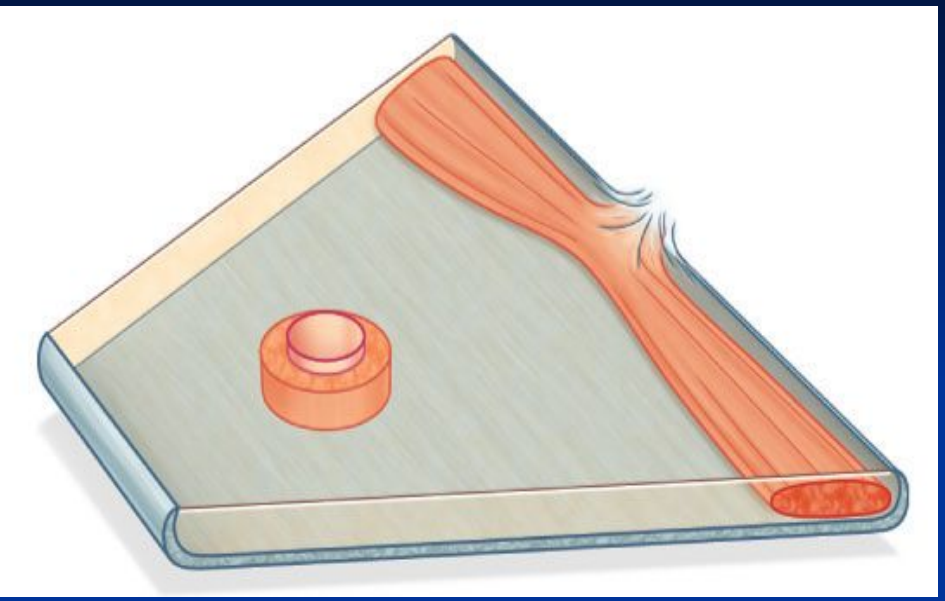


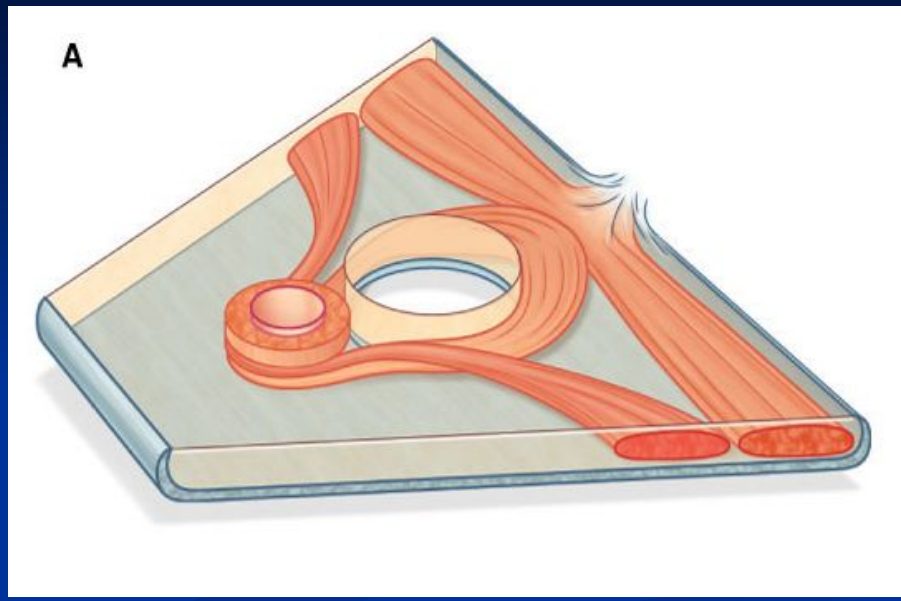
2. INFERIOR LAYER of fascia of UGD= called also perineal membrane

The closed space between 2 layers known as DEEP PERINEAL COMPARTMENT

UG diaphragm is musculomembranous sheet stretched across urogenital triangle . It is formed by muscles -deep transversae perineal muscle and urethra sphincter muscle) .These muscles are enclosed between 2 layers of the fascia (fascia of UGD)inferior layer of fascia of UGD (perineal membrane) superior layer of fascia of UGD (is really continuation of fascia covering pelvic diaphragm (levator ani muscle). Space between these 2 layers known as *deep perineal compartment*

Deep Perineal Pouch





Male contents:

The membranous urethra

Sphincter urethrae muscle

Deep transverse perineal muscles

Bulbourethral glands (Cowper's glands)

The internal pudendal artery and branches

Dorsal nerve of the penis

Female contents:

The same as those of the male but with the following differences:

Absence of the Cowper's glands.

Presence of the vagina.

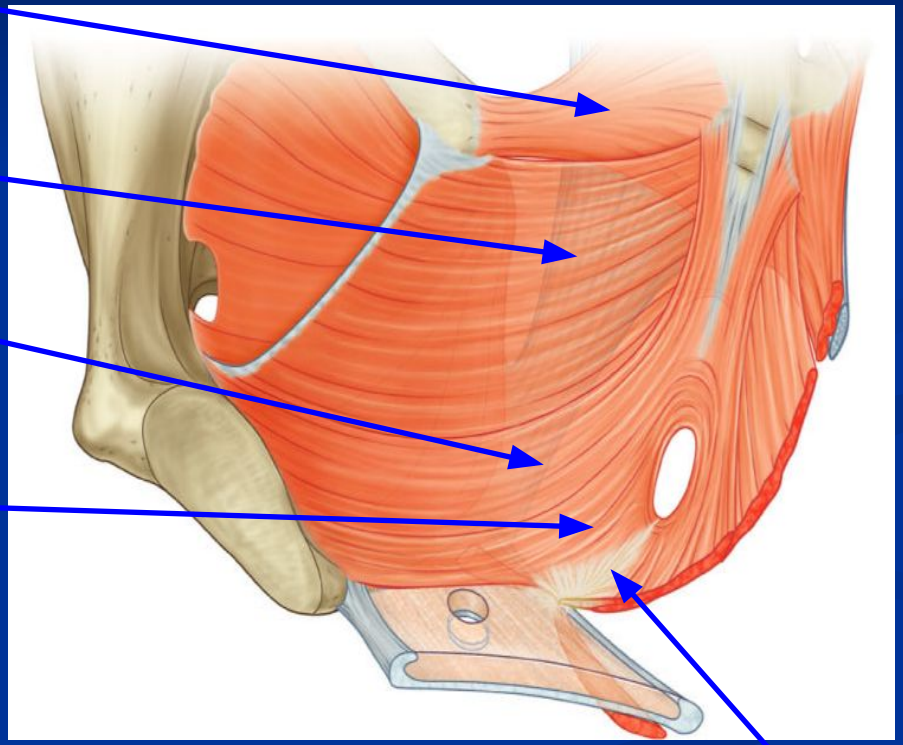
The sphincter urethrae muscle is pierced by the urethra and vagina.

Pelvic diaphragm = levator ani and coccygeus muscles.

Pelvic floor= pelvic diaphragm, perineal membrane and muscles in the deep perineal pouch

Levator Ani

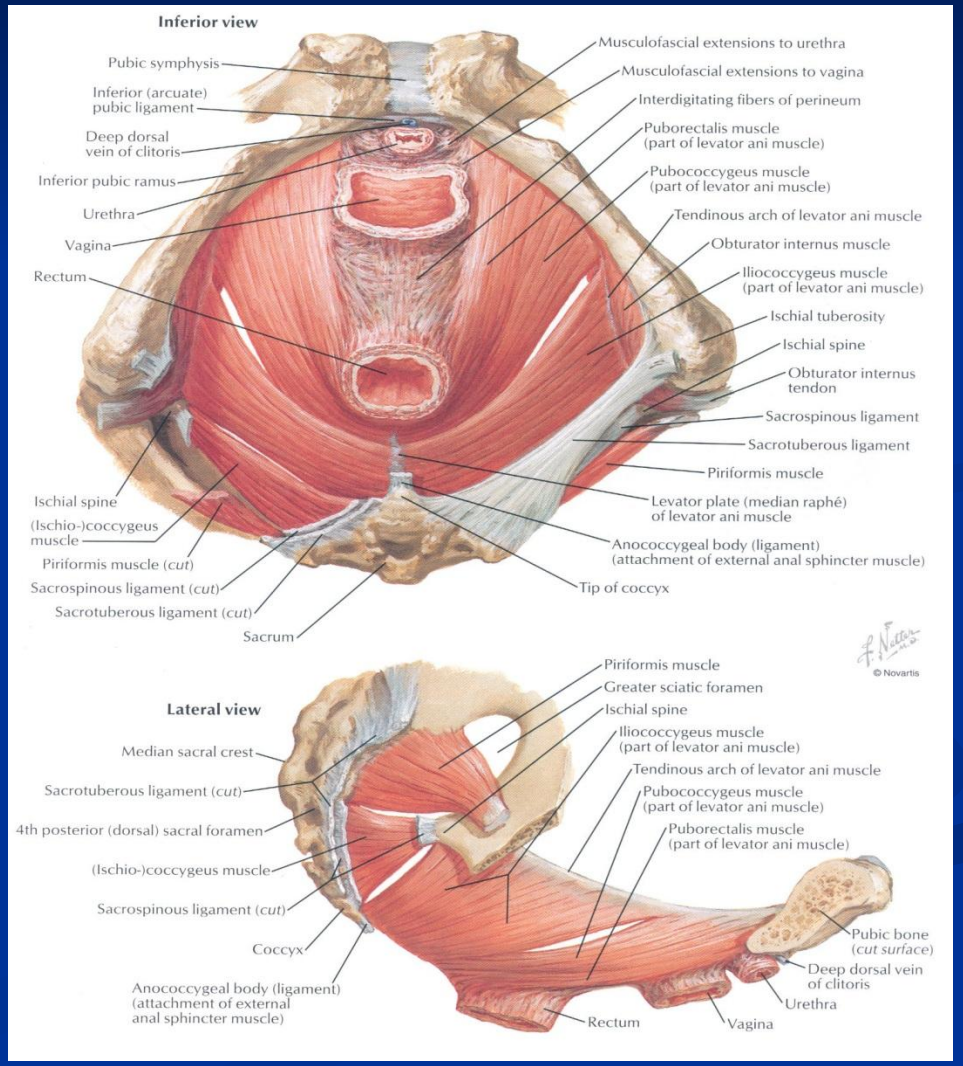
- Ischiococcygeus
- Iliococcygeus
- Pubococcygeus
- Puborectalis



Perineal body
(Only point of union between pelvic floor and perineal membrane)

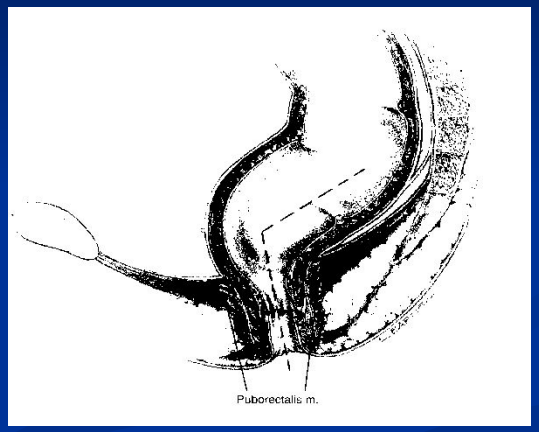
Levator Ani Muscles

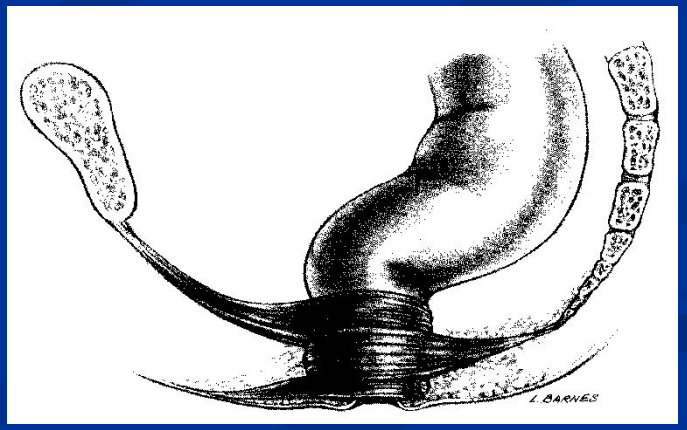
- Pubococcygeus
- Iliococcygeus
- Puborectalis
- Ischiococcygeus



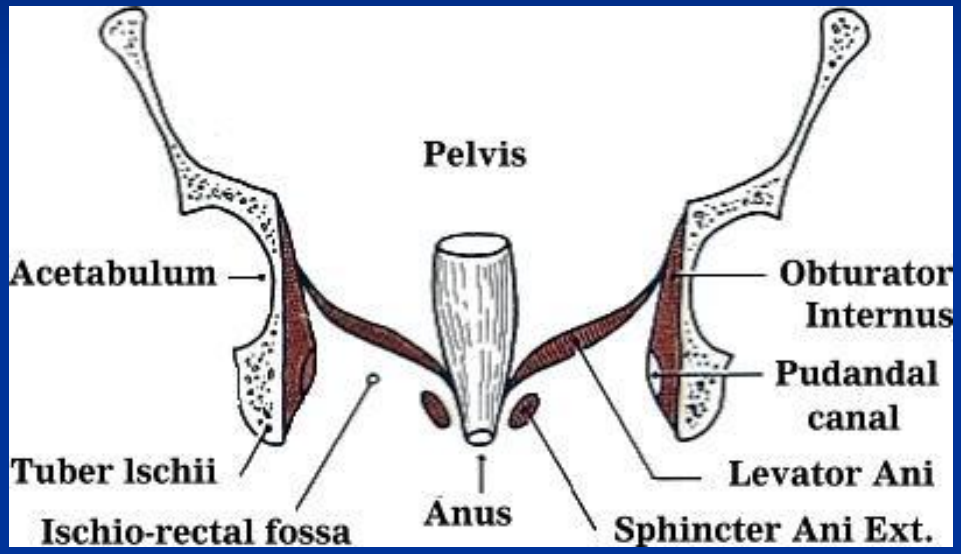
Puborectalis

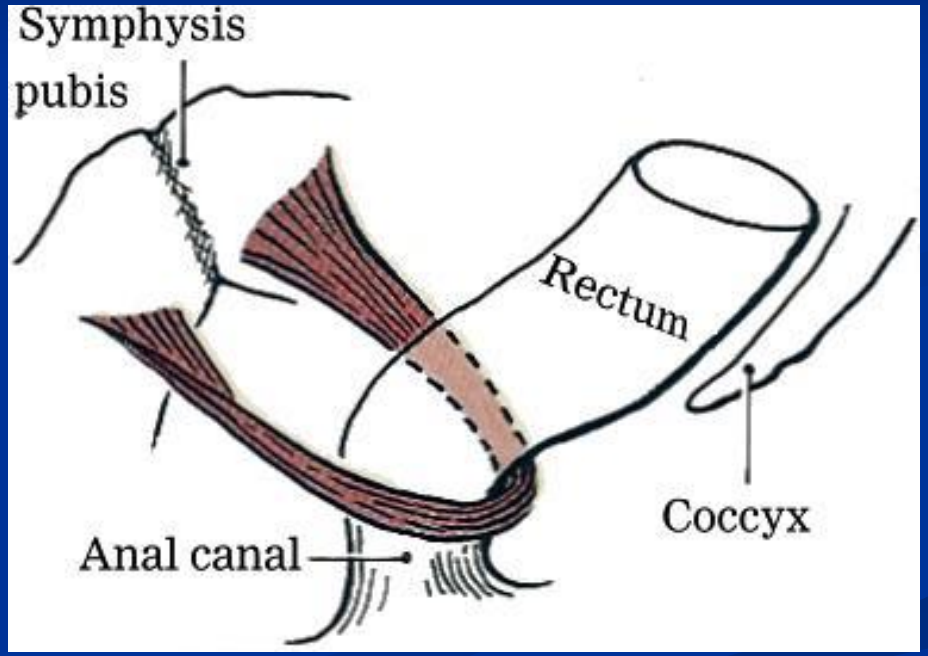
- U-shaped, medial most located levator ani muscle
- Pulls the anorectal junction anteriorly, forming the anorectal angle
- Pelvic floor muscle vs. sphincter muscle?





The puborectalis muscle (Inferior fibers of pubococcygeus)





Functional Anatomy

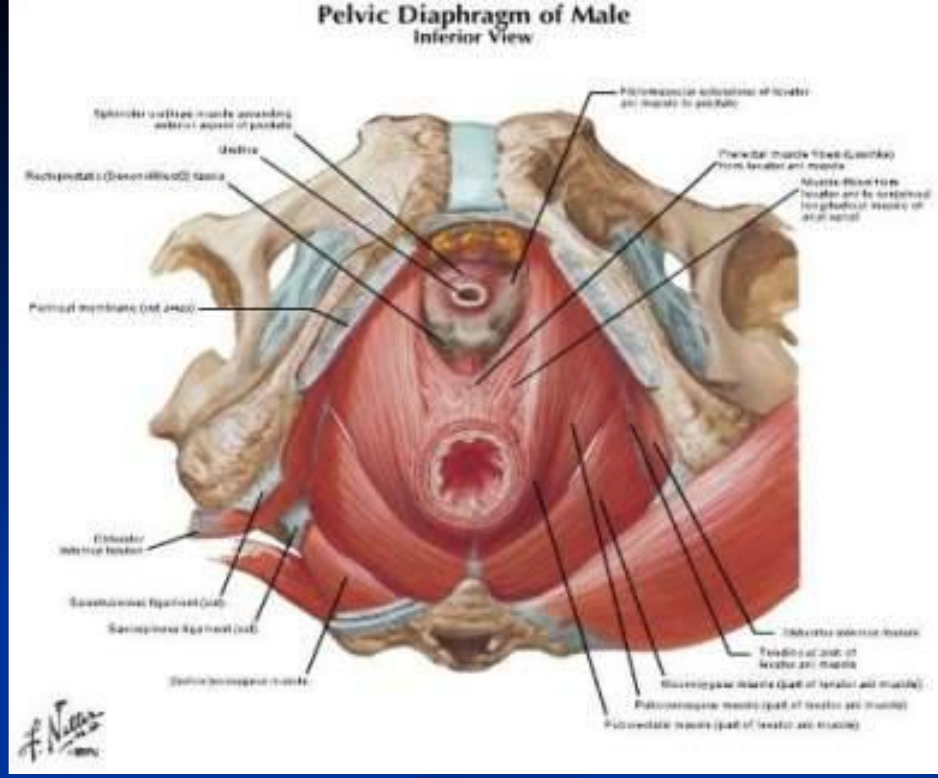
- Puborectalis and the anorectal angle allow for gross fecal continence
- Relieves pressure from the sphincter process
- The sphinter complex is responsible for gas and liquid continence
- Defecation
  - Relaxation of the puborectalis
  - Contraction of the other levator muscles

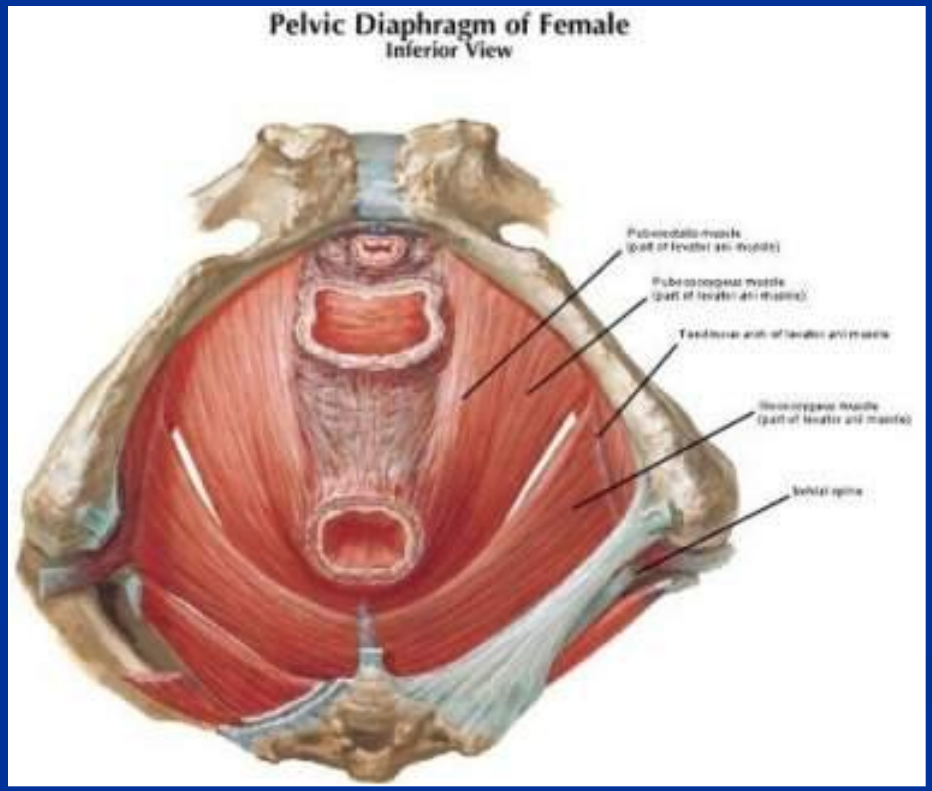
PERFORATIONS OF PELVIC DIAPHRAGM

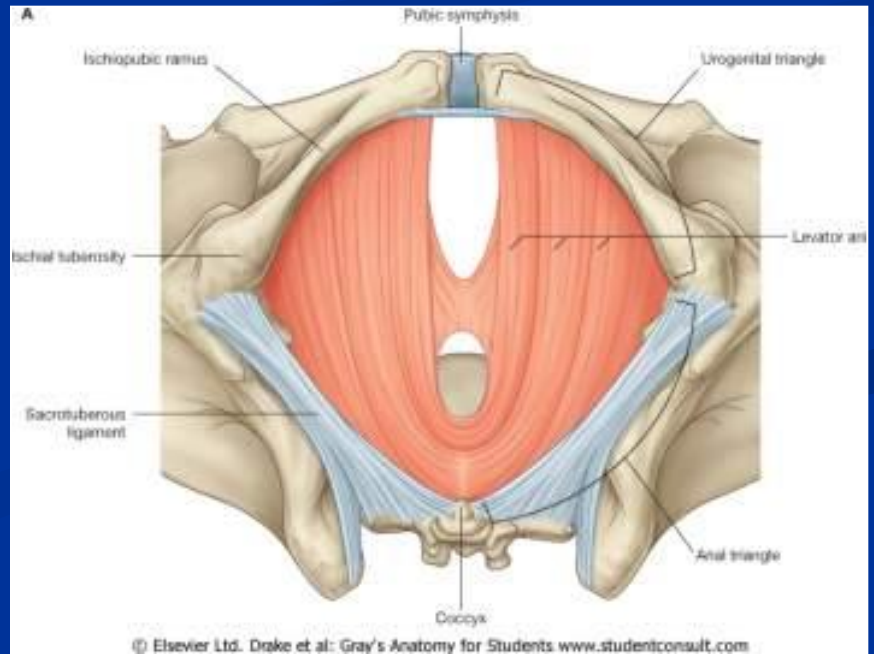
1. Anteriorly: urethral and vaginal opening (the bulb of the penis in males).
2. Posteriorly: anal opening

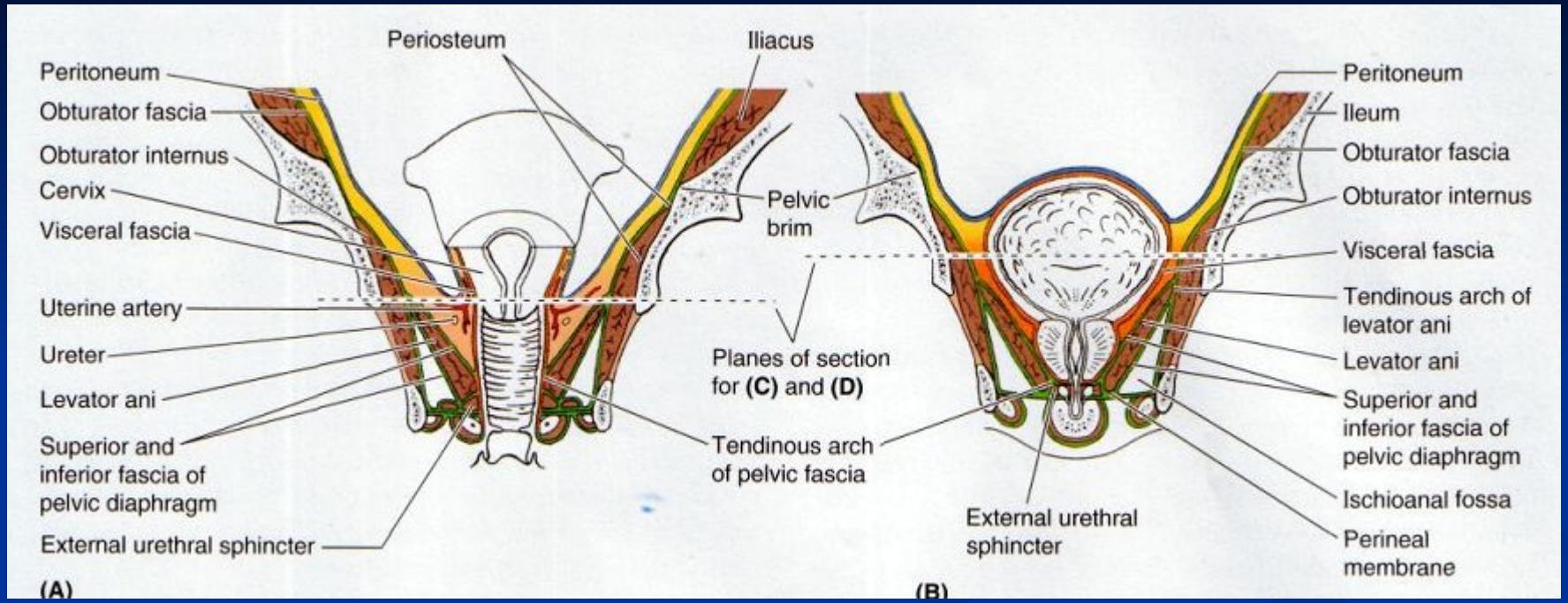
In between : perineal body

Anal opening and coccyx are joined by anococcygeal ligament (body)

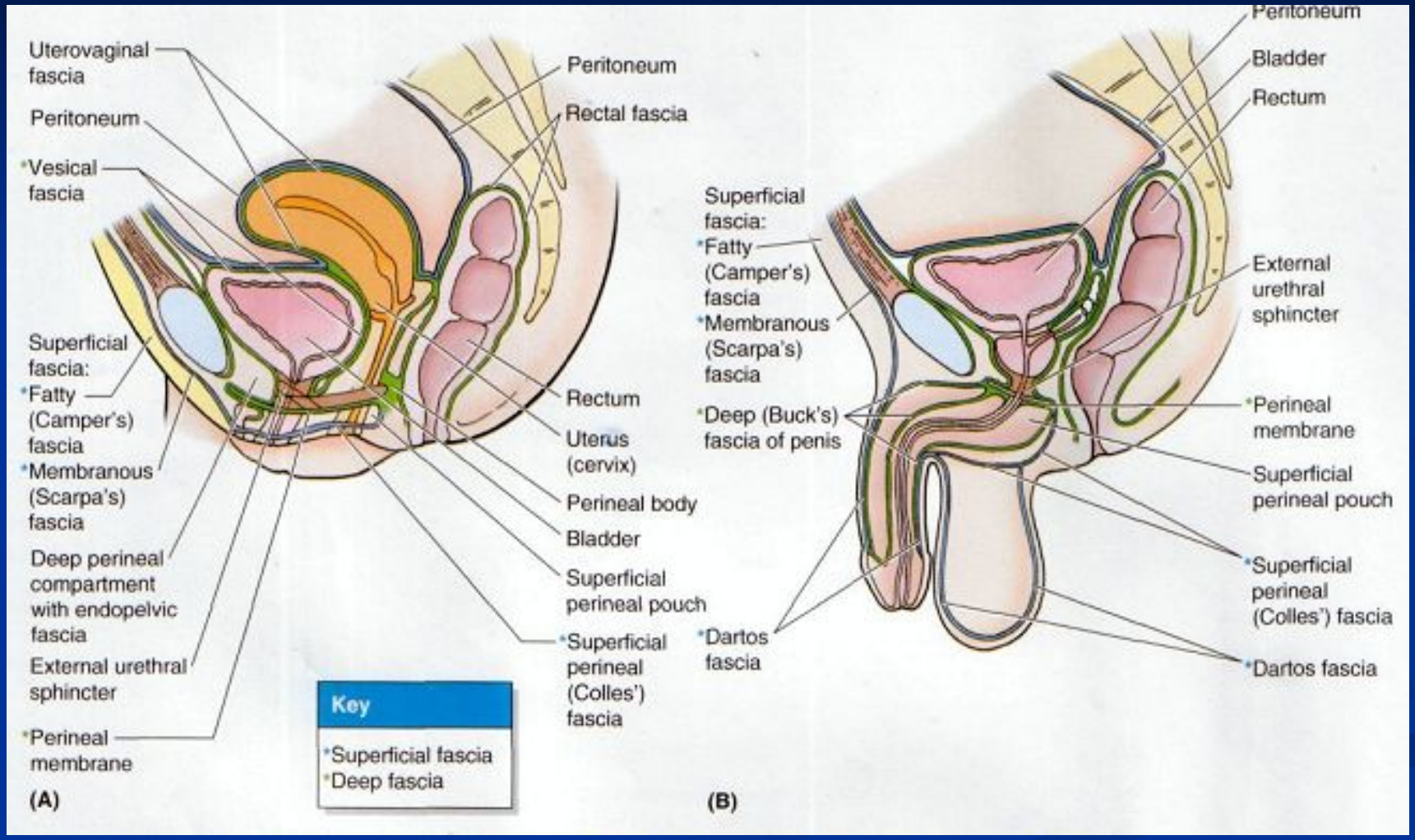




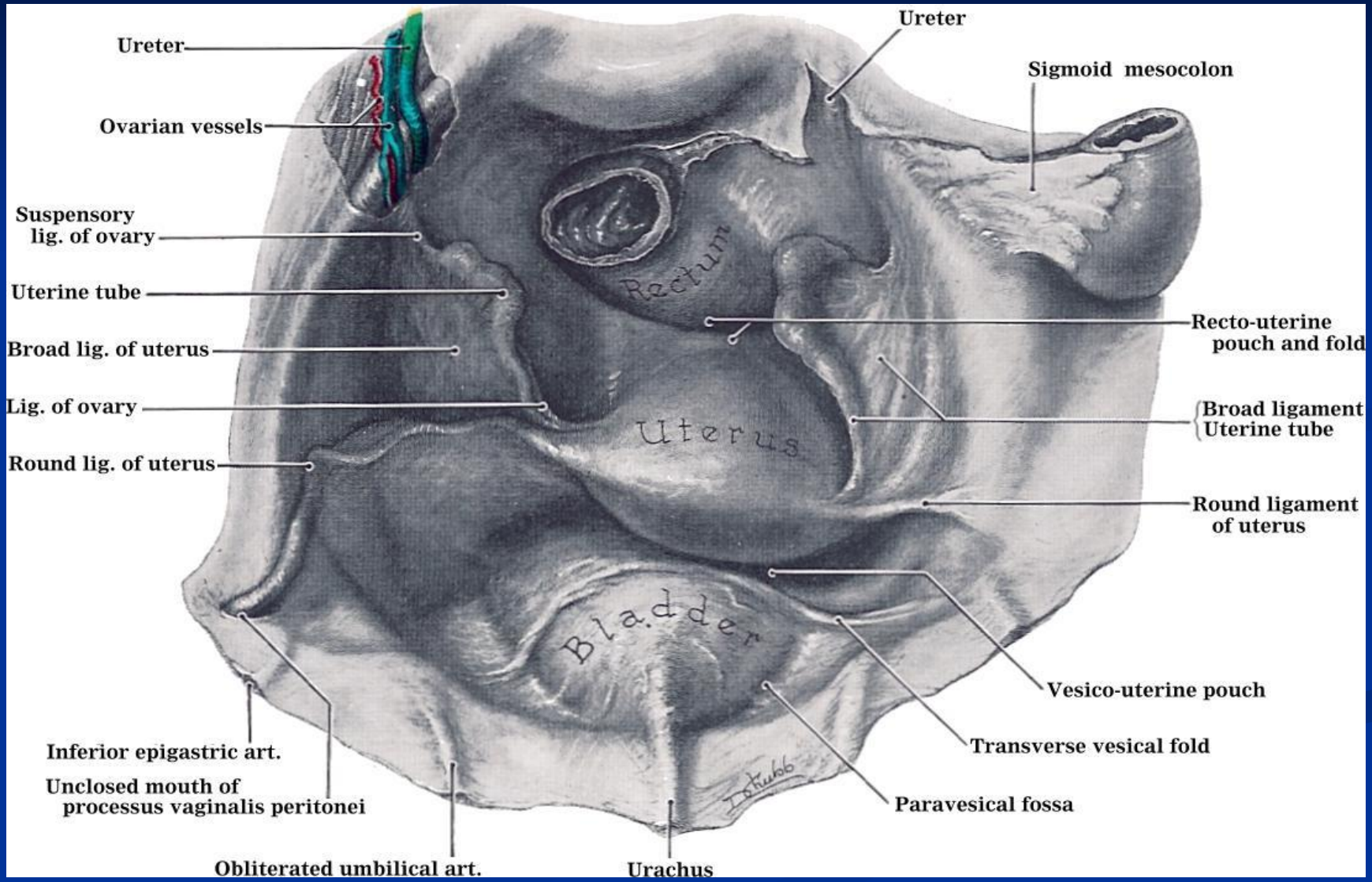




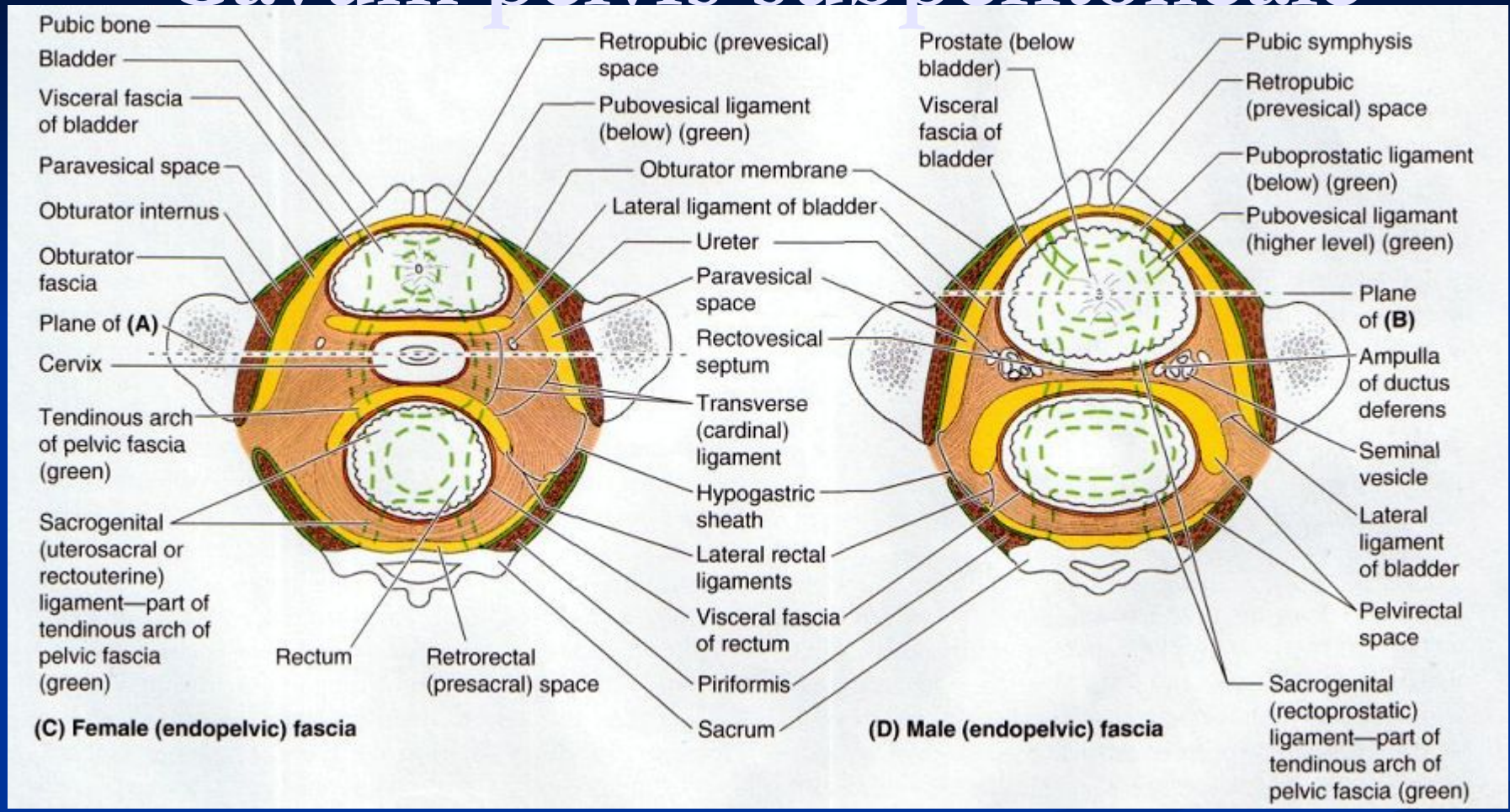
- 1 – cavum pelvis peritoneale
- 2 – cavum pelvis subperitoneale
- 3 –cavum pelvis subcutaneum


Uterovaginal fascia
Peritoneum
*Vesical fascia
Superficial fascia:
*Fatty (Camper's) fascia
*Membranous (Scarpa's) fascia
Deep perineal compartment with endopelvic fascia
External urethral sphincter
*Perineal membrane
Peritoneum
Rectal fascia
Rectum
Uterus (cervix)
Perineal body
Bladder
Superficial perineal pouch
*Superficial perineal (Colles') fascia
Key
*Superficial fascia
*Deep fascia
(A)
Peritoneum
Bladder
Rectum
Superficial fascia:
*Fatty (Camper's) fascia
*Membranous (Scarpa's) fascia
*Deep (Buck's) fascia of penis
*Dartos fascia
External urethral sphincter
*Perineal membrane
Superficial perineal pouch
*Superficial perineal (Colles') fascia
*Dartos fascia
(B)

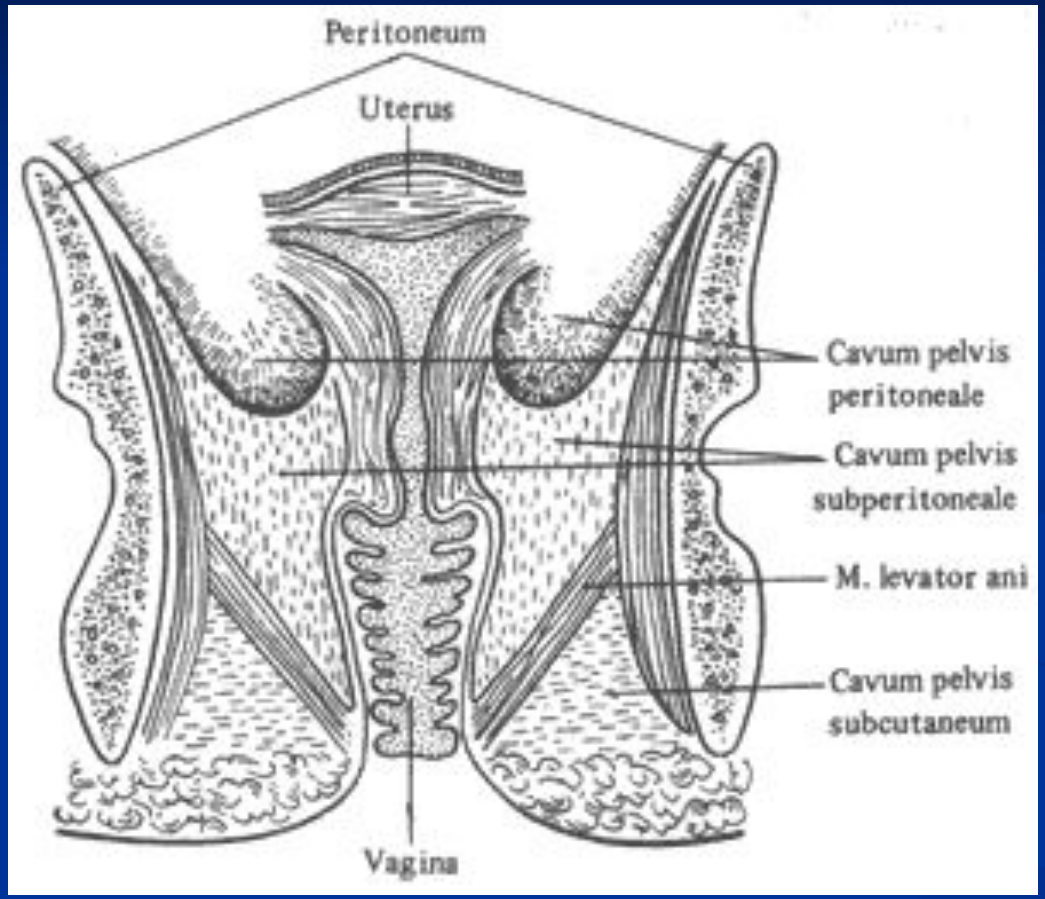
Female reproductive anatomy



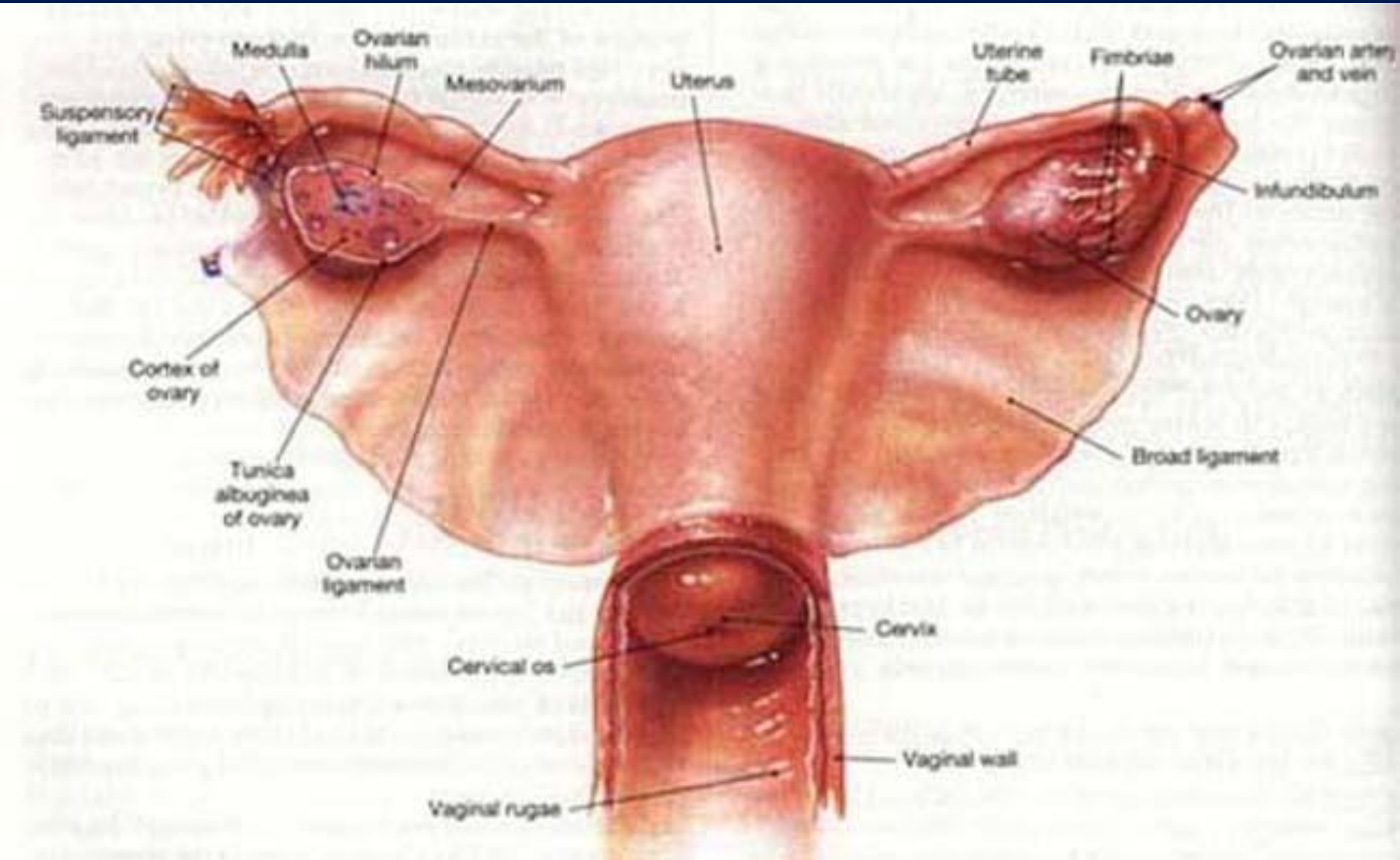
Cavum pelvis subperitoneale



cavum pelvis subcutaneum



Female reproductive anatomy



Uterine Support

Uterine support thought to be by:

Ligaments: - from the uterus to the pelvic walls

- Pubocervical
- Transverse cervical (cardinal ligament)
- Uterosacral

Perineal membrane

Pelvic floor (especially levator ani)

Perineal body

Ligaments

Broad Ligament:

- Double fold of peritoneum extending laterally from the uterus towards the pelvic side wall and encloses the uterine tube.
- Between the fold the uterine and ovarian arteries anastomose

Ovarian Ligament:

- Forms a ridge on the posterior leaf of the broad ligament. It is developmentally part of the gubernaculum and in continuity with the round ligament.

Round ligament:

- Curves anteriorly to pass through the inguinal canal

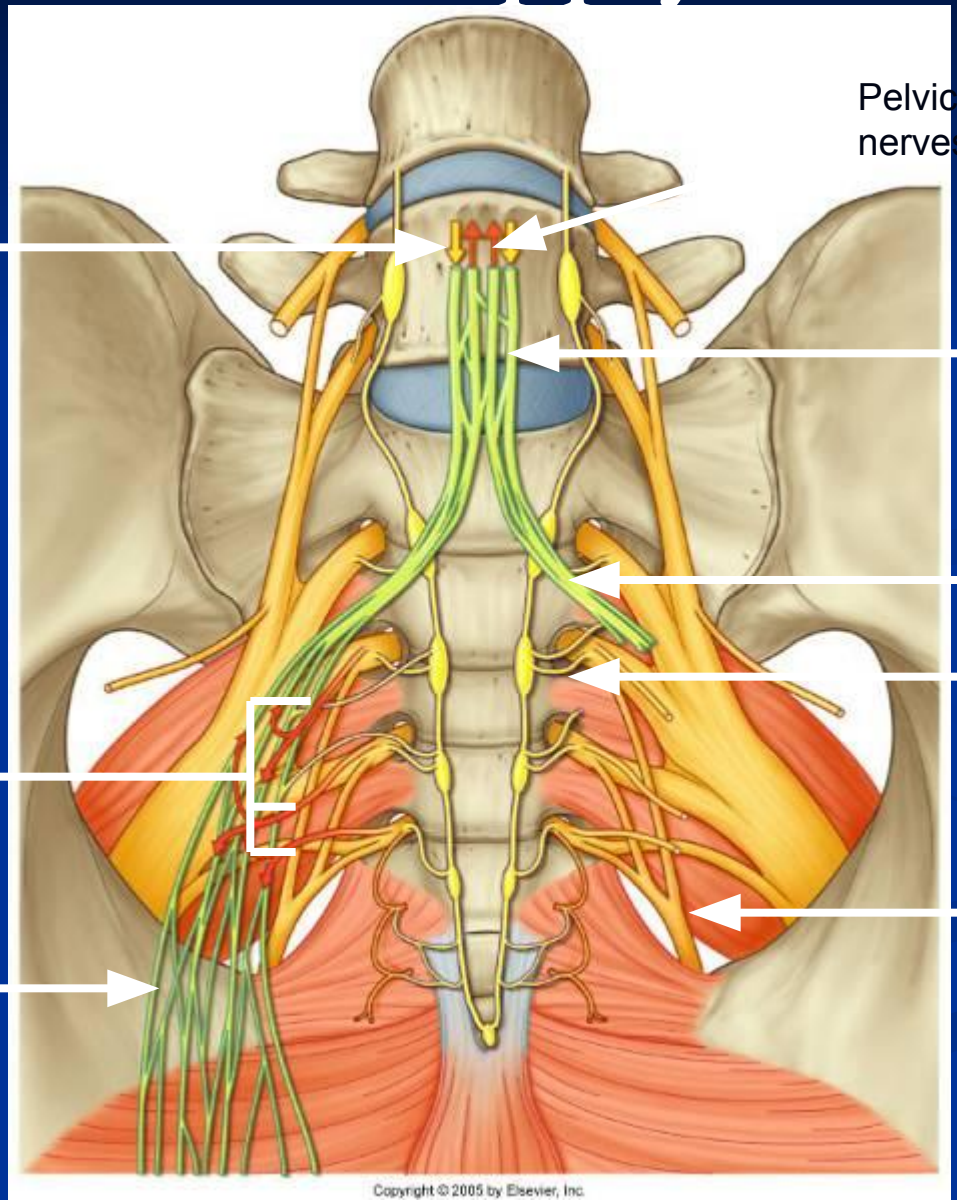
Suspensory ligament of the ovary:

- Part of the broad ligament between the mesovarium and the lateral wall of the pelvis.

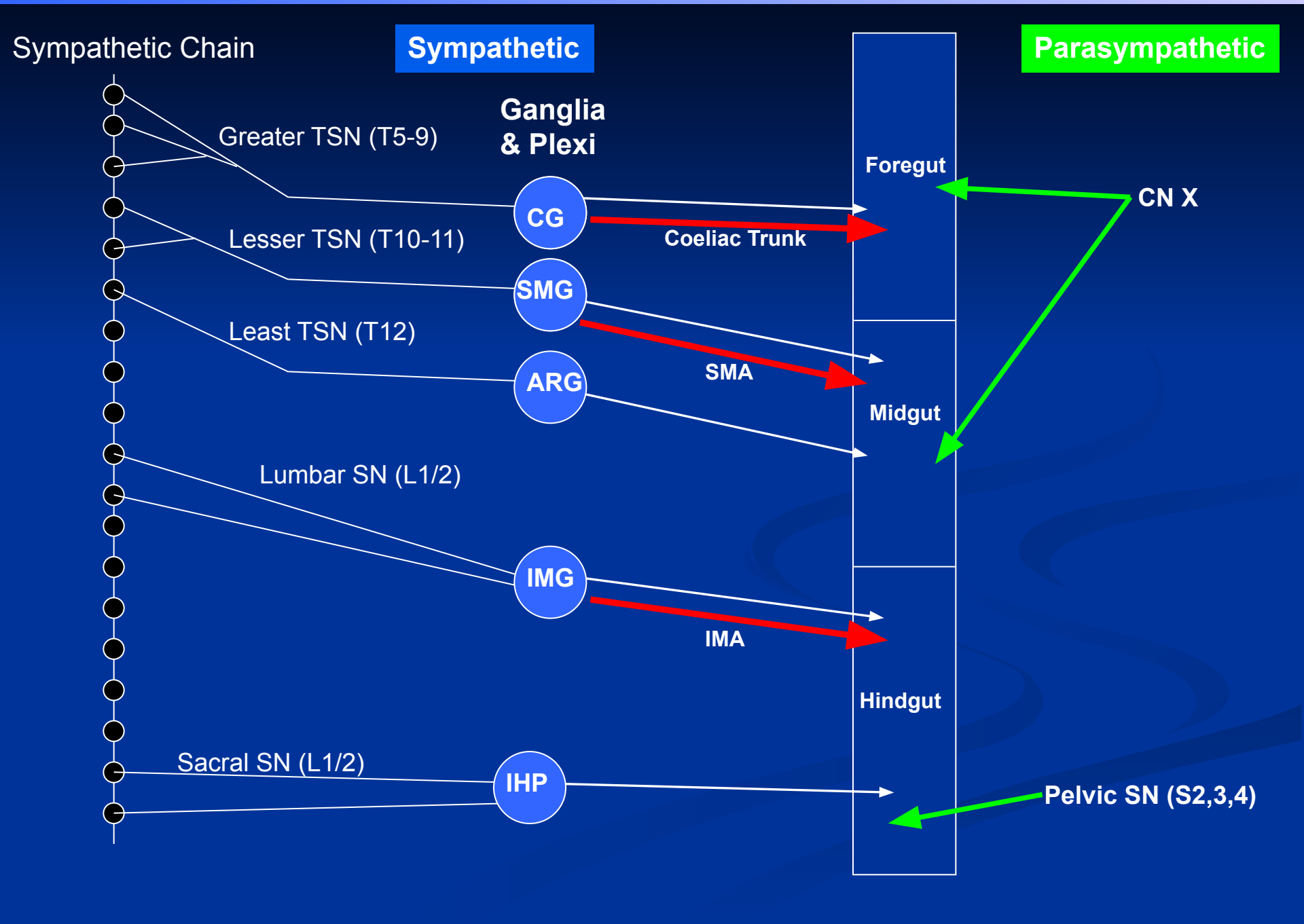
Mesovarium: posterior portion of broad ligament that suspends the ovaries.

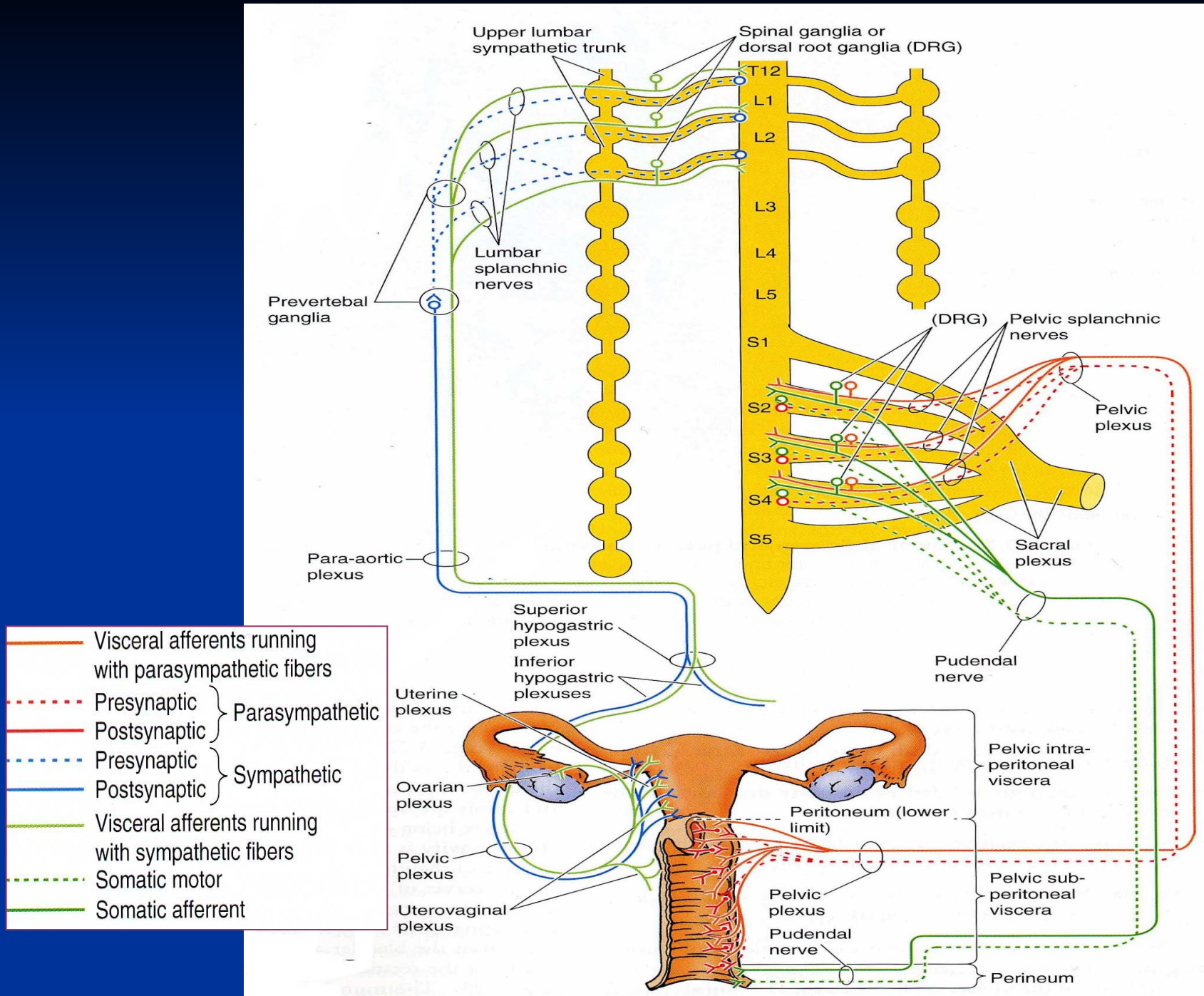
Mesosalpinx: portion of broad ligament between the mesovarium and the uterine tube.

Nerve supply

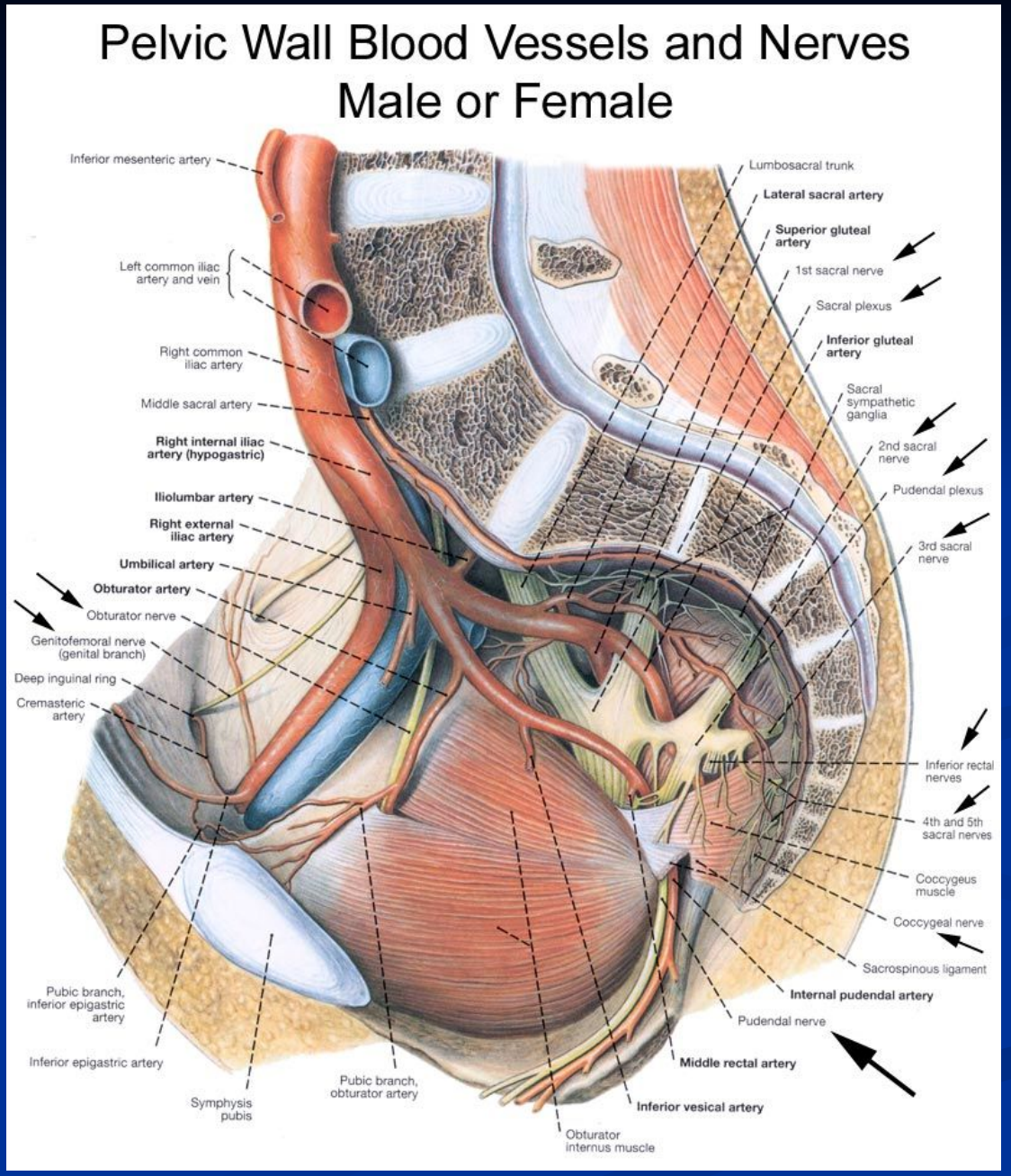


GI Tract: Autonomic Nerve Supply




Upper lumbar sympathetic trunk
Spinal ganglia or dorsal root ganglia (DRG)
T12
L1
L2
L3
L4
L5
S1
S2
S3
S4
S5
Lumbar splanchnic nerves
Prevertebal ganglia
(DRG)
Pelvic splanchnic nerves
Pelvic plexus
Sacral plexus
Para-aortic plexus
Superior hypogastric plexus
Inferior hypogastric plexuses
Pudendal nerve
Uterine plexus
Ovarian plexus
Pelvic plexus
Uterovaginal plexus
Peritoneum (lower limit)
Pelvic intra-peritoneal viscera
Pelvic sub-peritoneal viscera
Perineum
Visceral afferents running with parasympathetic fibers
Presynaptic
Postsynaptic
Parasympathetic
Presynaptic
Postsynaptic
Sympathetic
Visceral afferents running with sympathetic fibers
Somatic motor
Somatic afferent

Pelvic Wall Blood Vessels and Nerves
Male or Female

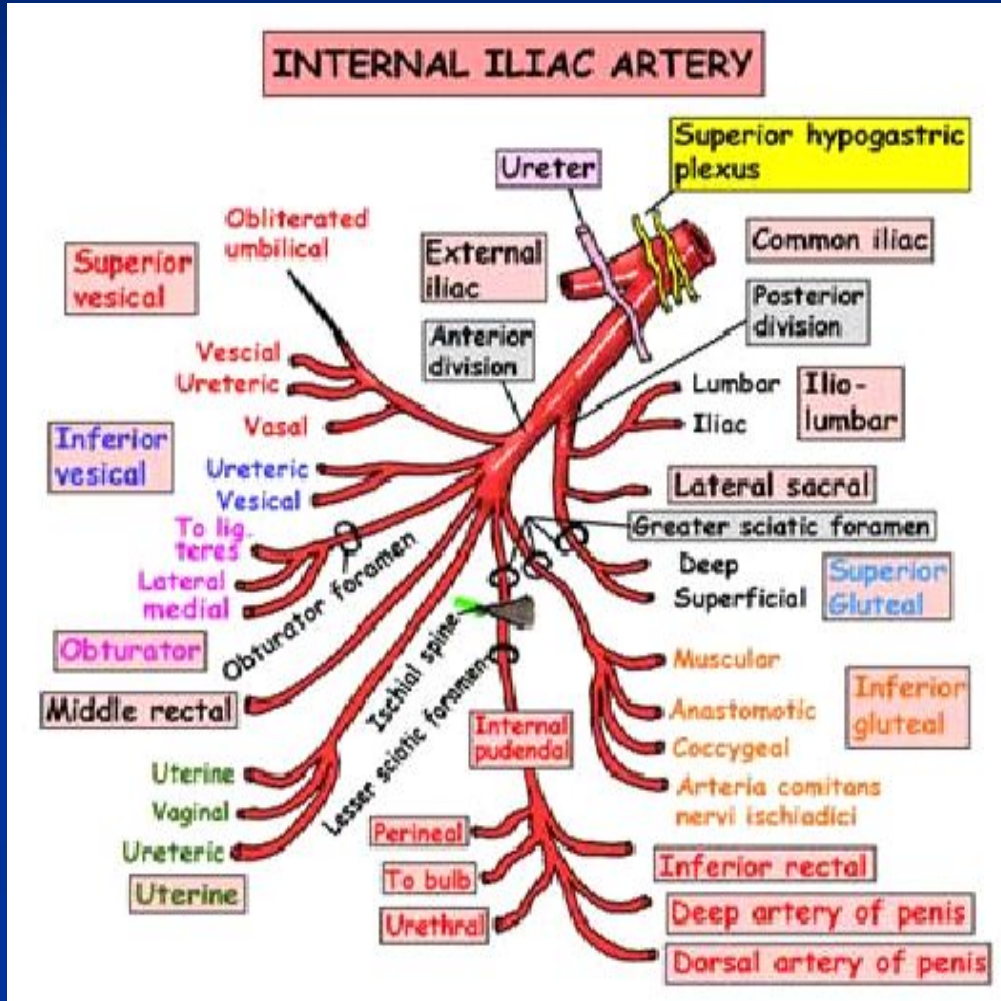


Frolich, Human Anatomy, Pelvis I

Vascular Supply

I Love Going Places In My Very Own Underwear:

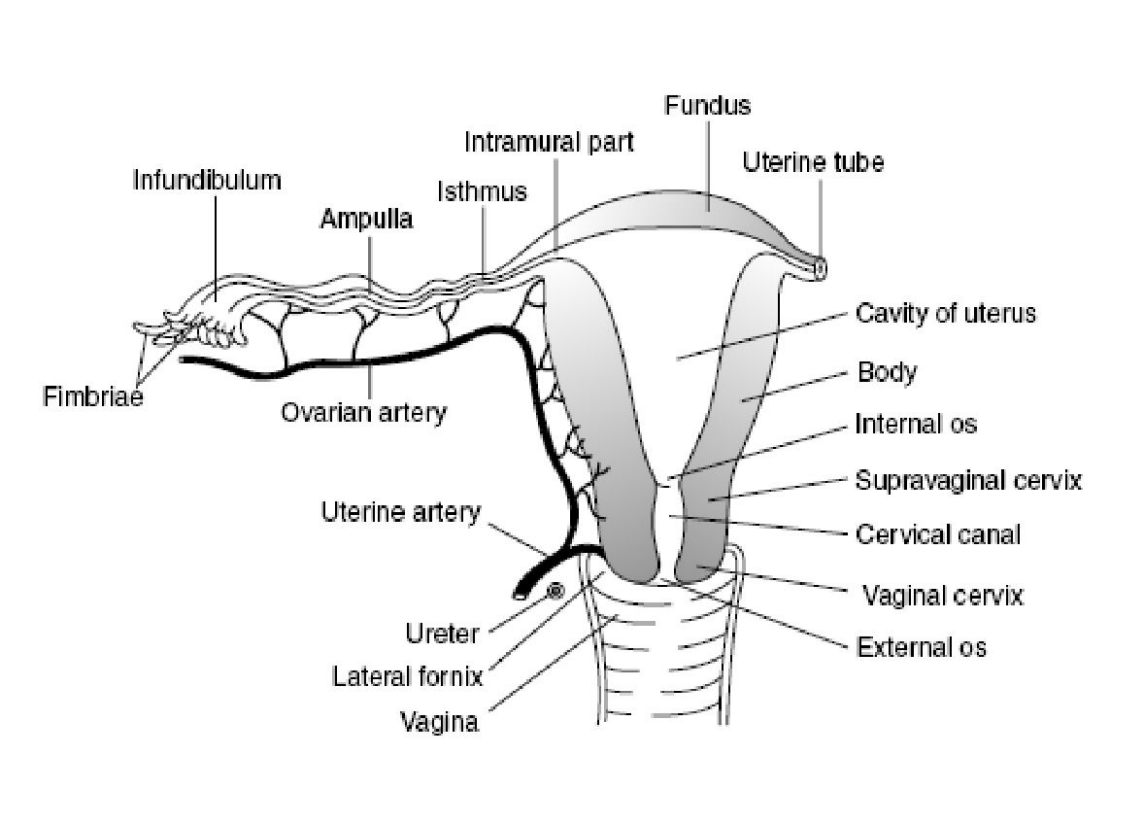
- **I**leolumbar (post. branch)
- **L**ateral sacral (post. branch)
- **G**luteal (superior (post.) and inferior)
- **P**udendal (internal)
- **I**nferior vesicle (uterine in females)
- **M**iddle rectal
- **V**aginal
- **O**bturator
- **U**mbilical



Vascular Supply

Ovarian artery / testicular artery:

-originates from L2 as a branch of the abdominal aorta.



Lymphatic drainage mainly follows the arterial supply and venous drainage by passing backwards through the nodes around the branches of the iliac arteries and abdominal aorta.

Lymph from the scrotum and penile skin or labia and the distal part of the vagina drain into the **superficial inguinal** nodes.

Pudendal Nerve S2-S4

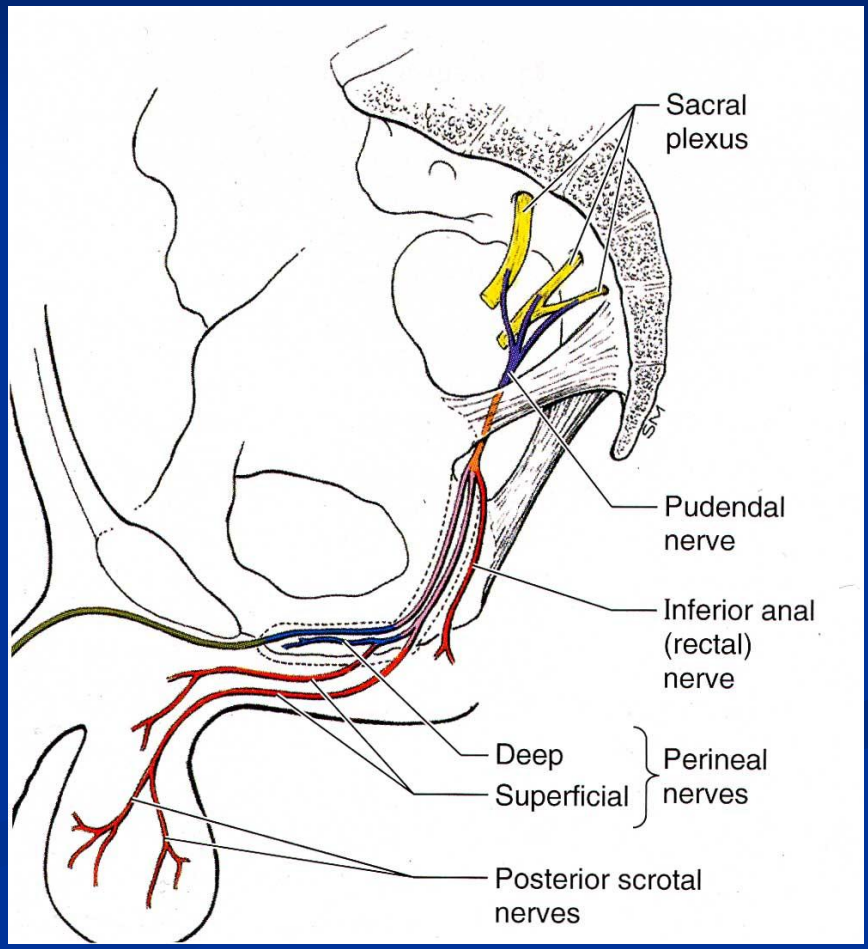
- Supplies skin, organs and muscles of perineum
- Distribution similar in males and females

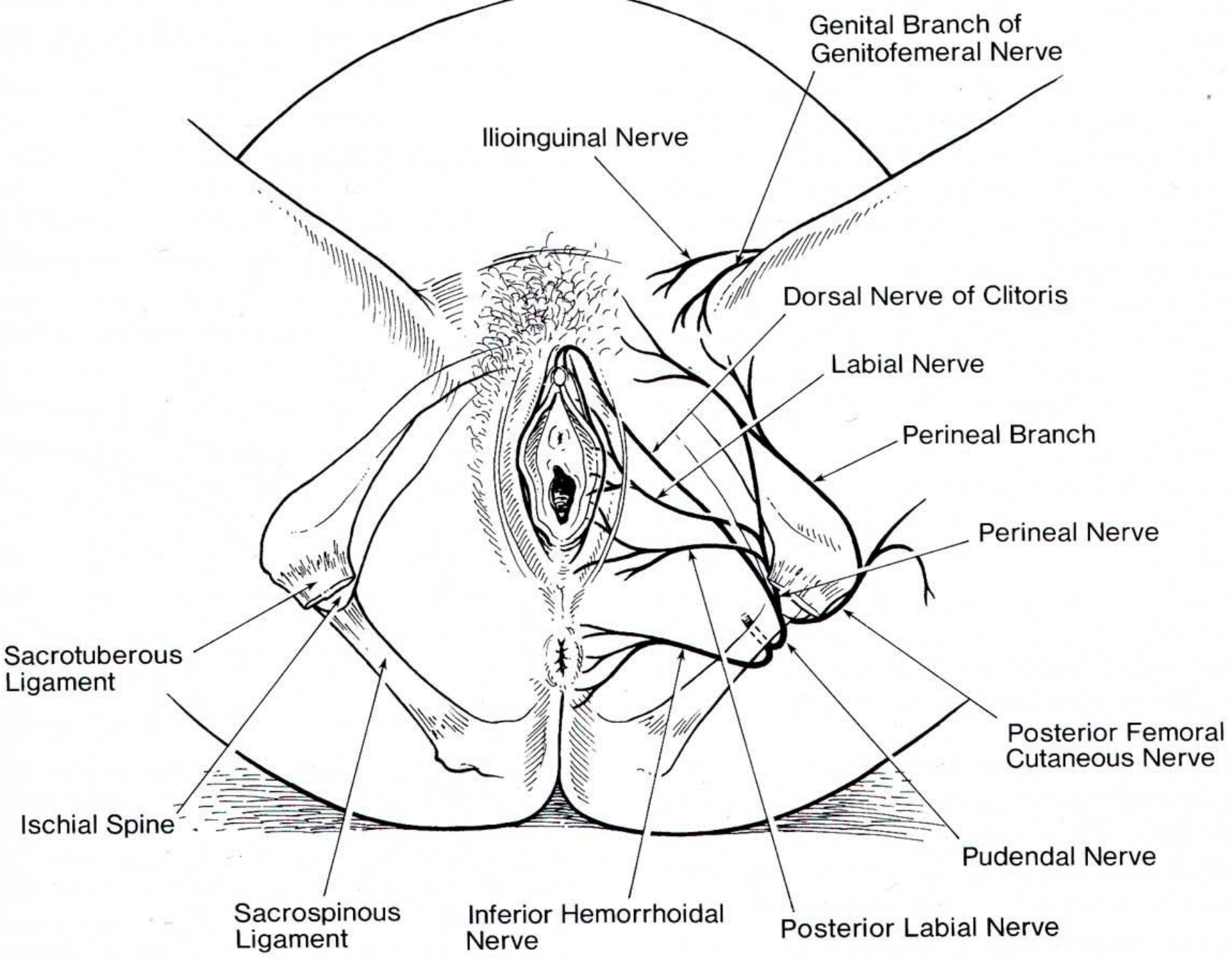
Route: (travels with internal pudendal vessels)

- Passes through GSF inferior to piriformis
- Enters the perineum by passing around the ischial spine and sacrospinous ligament
- Passes through LSF

Functions:

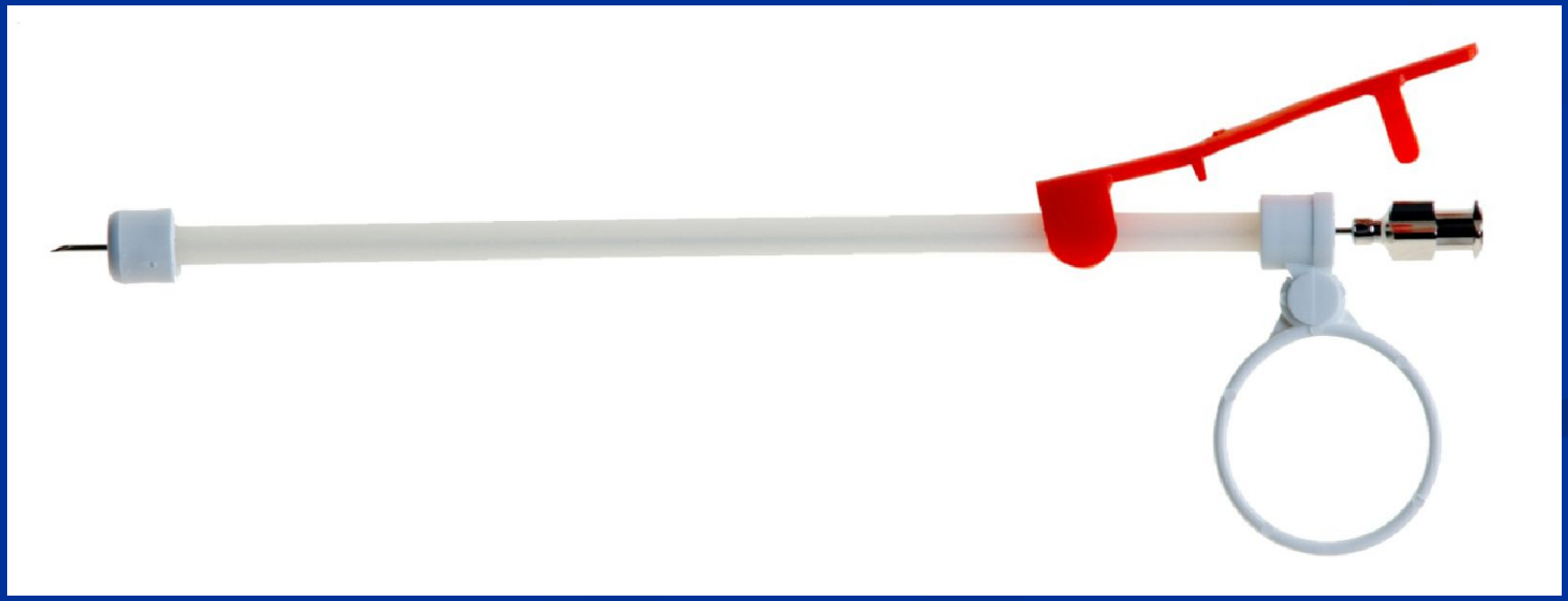
- Micturition
- Defecation
- Erection
- Ejaculation
- Parturition




Genital Branch of
Genitofemeral Nerve
Ilioinguinal Nerve
Dorsal Nerve of Clitoris
Labial Nerve
Perineal Branch
Perineal Nerve
Sacrotuberous
Ligament
Posterior Femoral
Cutaneous Nerve
Ischial Spine
Pudendal Nerve
Sacrospinous
Ligament
Inferior Hemorrhoidal
Nerve
Posterior Labial Nerve

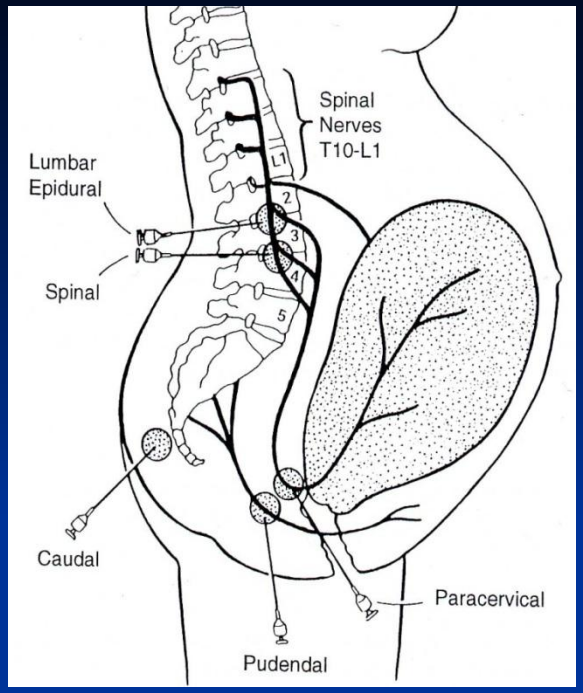
Pudendal Nerve Blockade

- Medial to ishial tuberosity at sacrospinous ligament
- Transvaginal



Spinal:

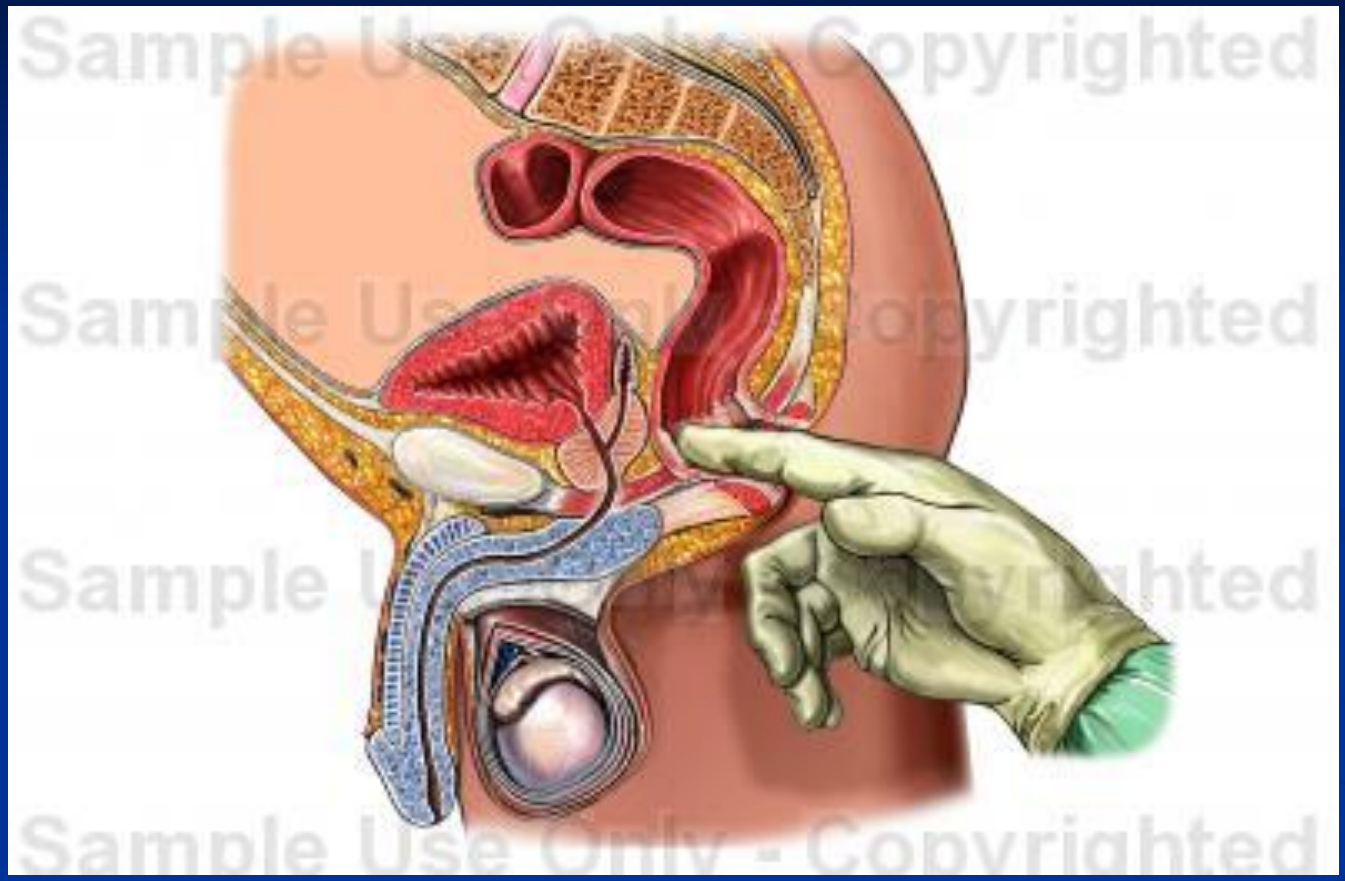
- Into subarachnoid space
- Dense block for 2-4 hours
- Can cause hypotension
- Needle goes through:
  - The skin.
  - Subcutaneous fat.
  - Supraspinous ligament
  - Interspinous ligament
  - ligamentum flavum
  - epidural space
  - The dura
  - The subarachnoid space



Epidural:
-mainly on request but are also obstetric indications

- Patchy analgesia
- Can cause hypotension
- Needle goes through:
  - Skin
  - Supraspinous ligament
  - Interspinous ligament
  - Ligamenta flava

- PR exam



- Bimanual Vaginal exam