

# **Clinical topographic anatomy**

**2017/2018**

## **Pelvis, perineal region**

**Miloš Grim**

**Institute of Anatomy, First Faculty of Medicine,  
Charles University**

# PELVIS

Bony pelvis, external measurements

Pelvic planes and their measurements

Pelvic floor muscles in relation to childbirth

Uterine tubes and ovaries

Female endopelvic fascias, ligaments supporting uterus, uterine prolapse

Nerve blocks of the perineum (pudendal and ilioinguinal)

Mechanisms of urinary continence

Peritoneum and the female pelvis

Peritoneum and the male pelvis

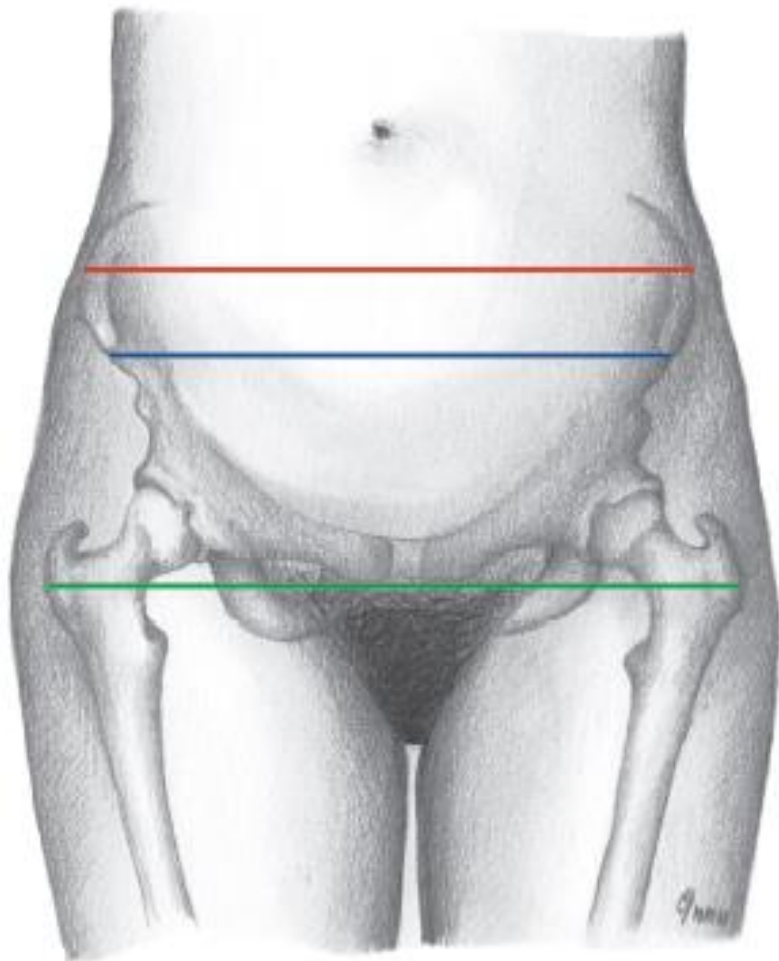
Syntopy of the prostate, per rectum examination

Syntopy of the rectum, per rectum examination

Blood supply of pelvic viscera

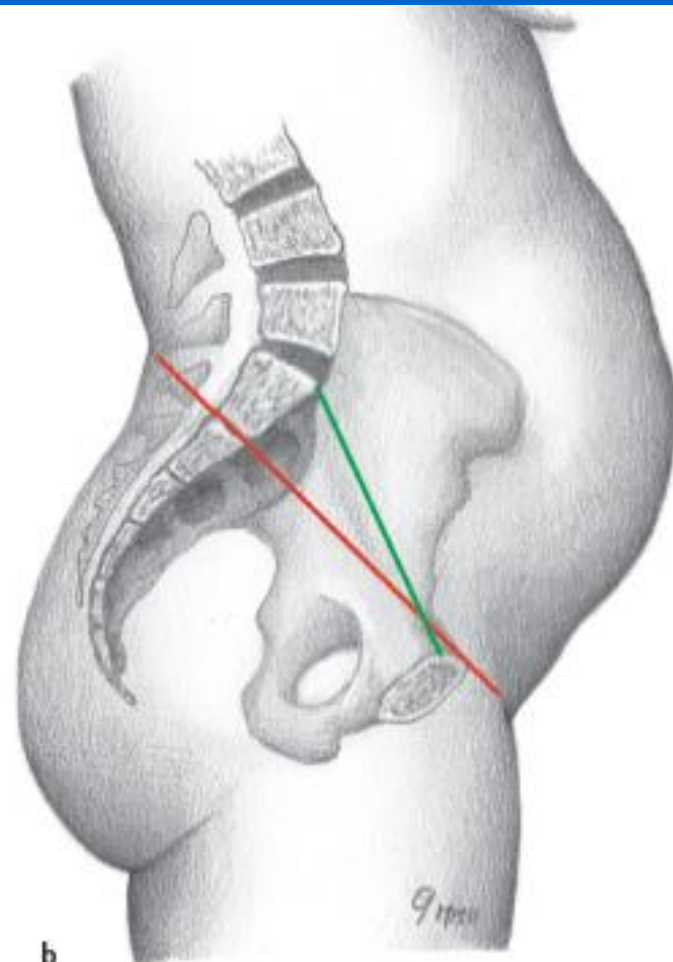
Perineum and episiotomy

Bony pelvis, external measurements  
Pelvic planes and their measurements



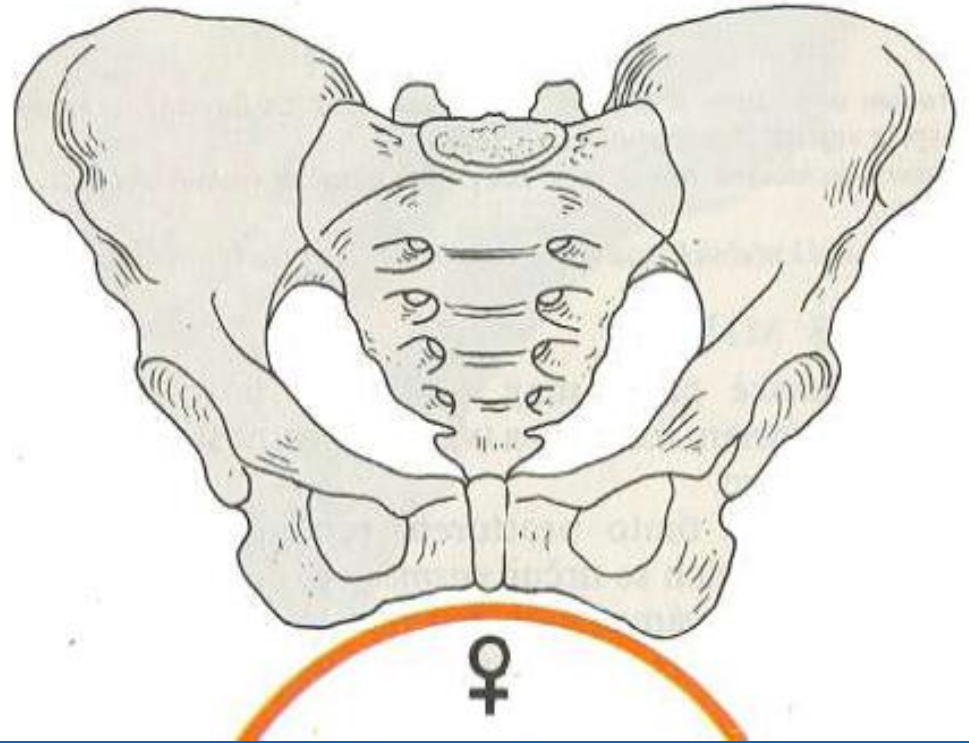
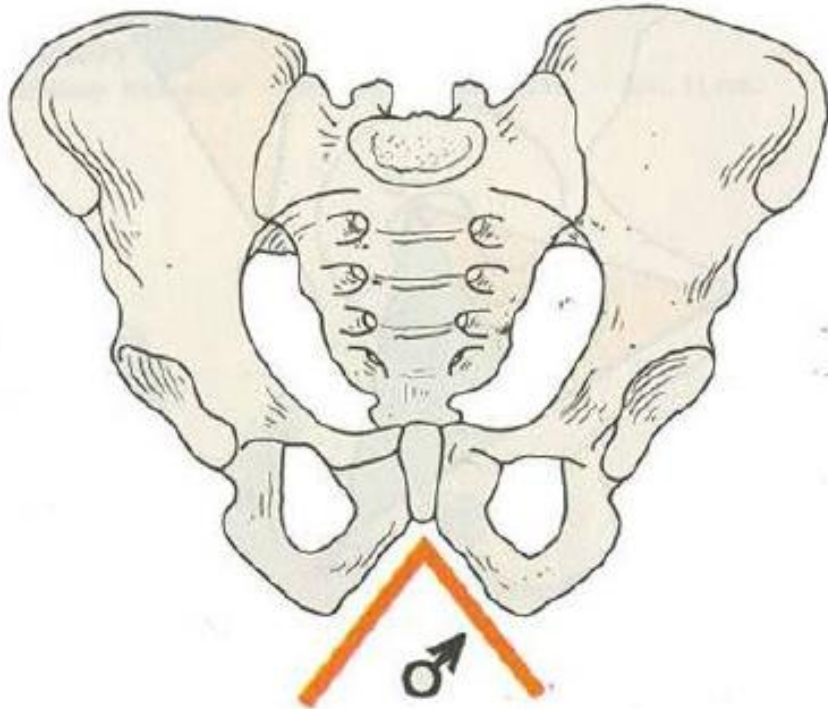
a

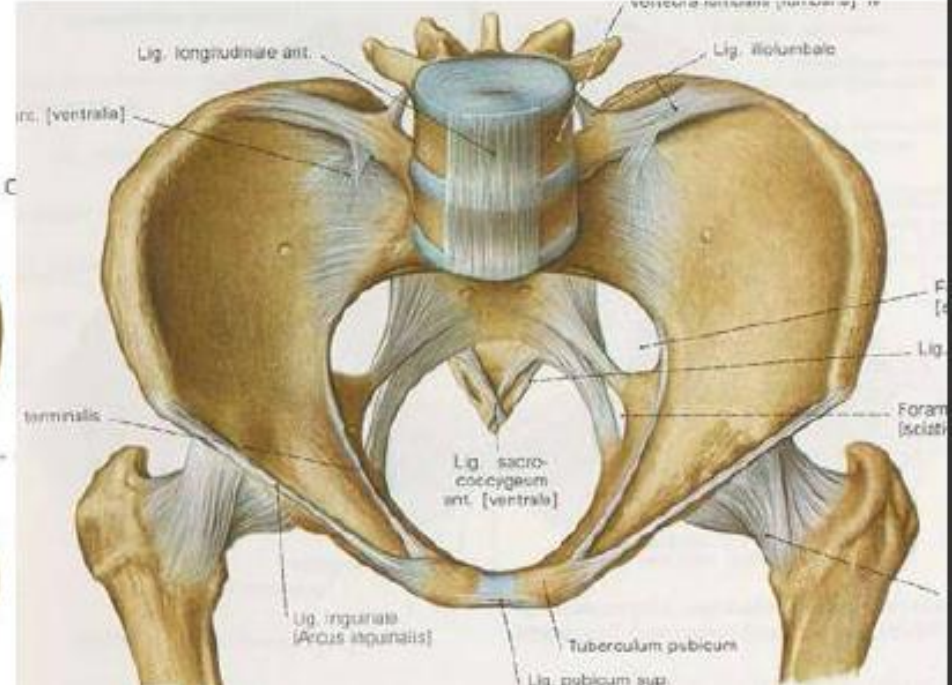
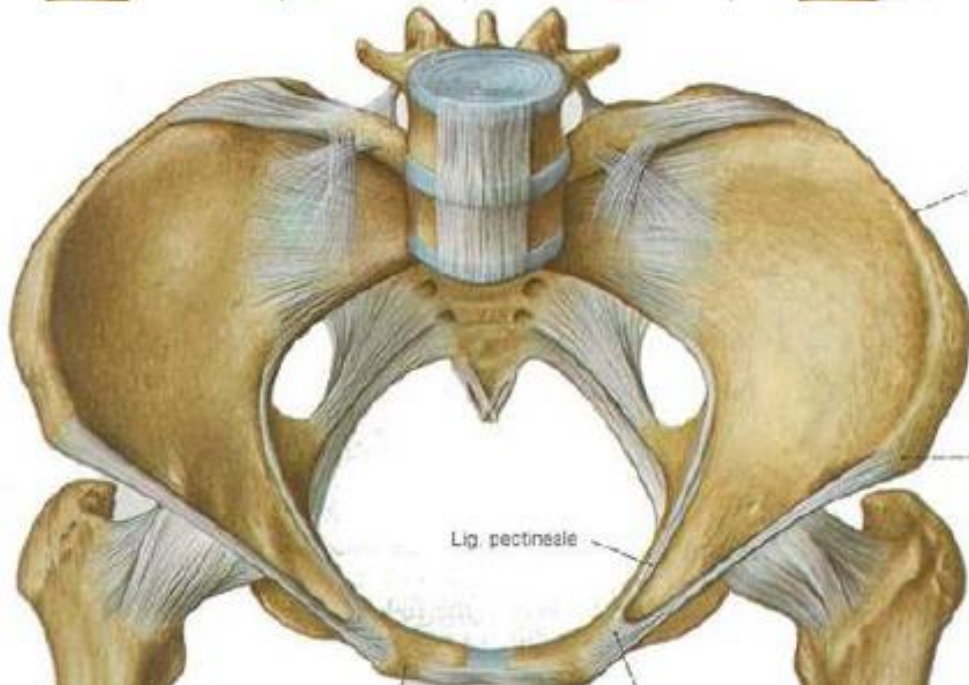
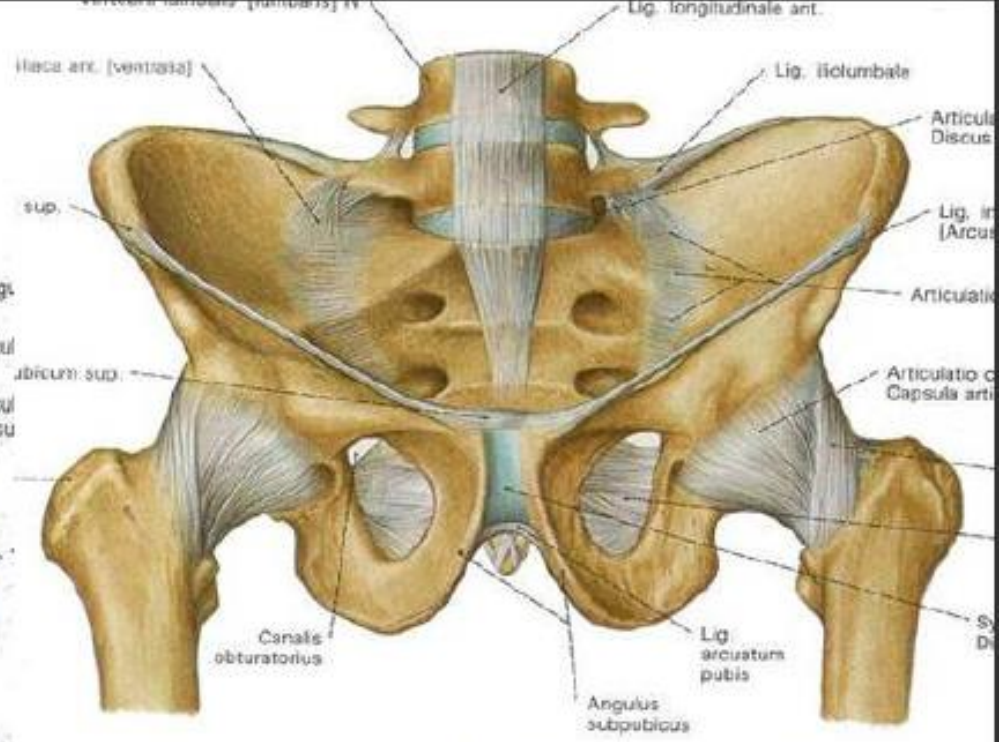
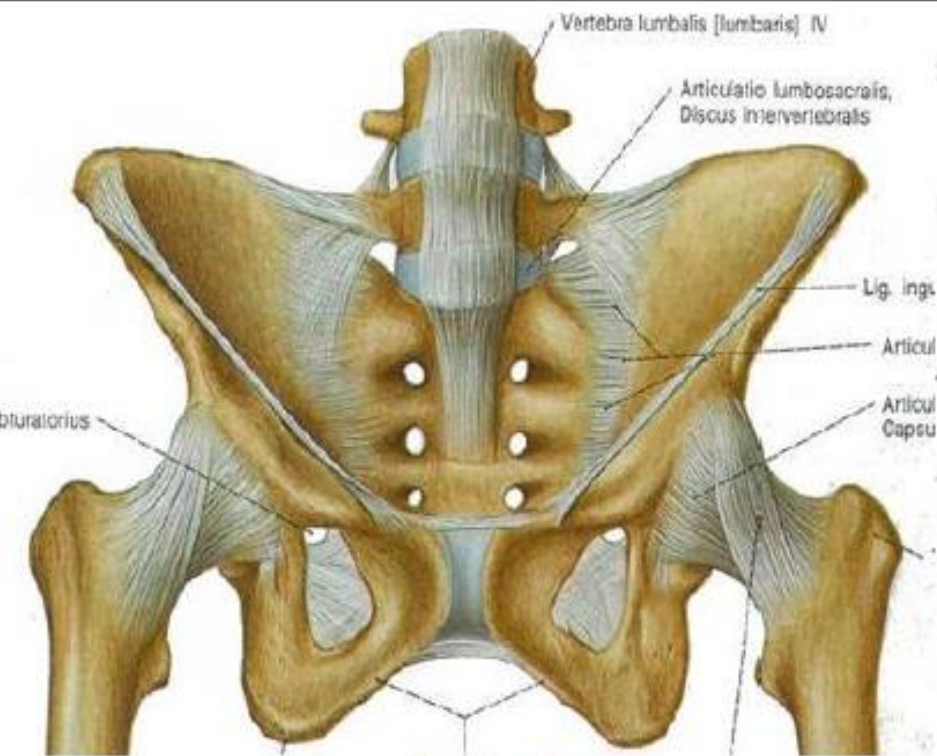
- Distantia cristarum  
(28–29 cm)
- Distantia spinarum  
(25–26 cm)
- Distantia trochanterica  
(31–32 cm)

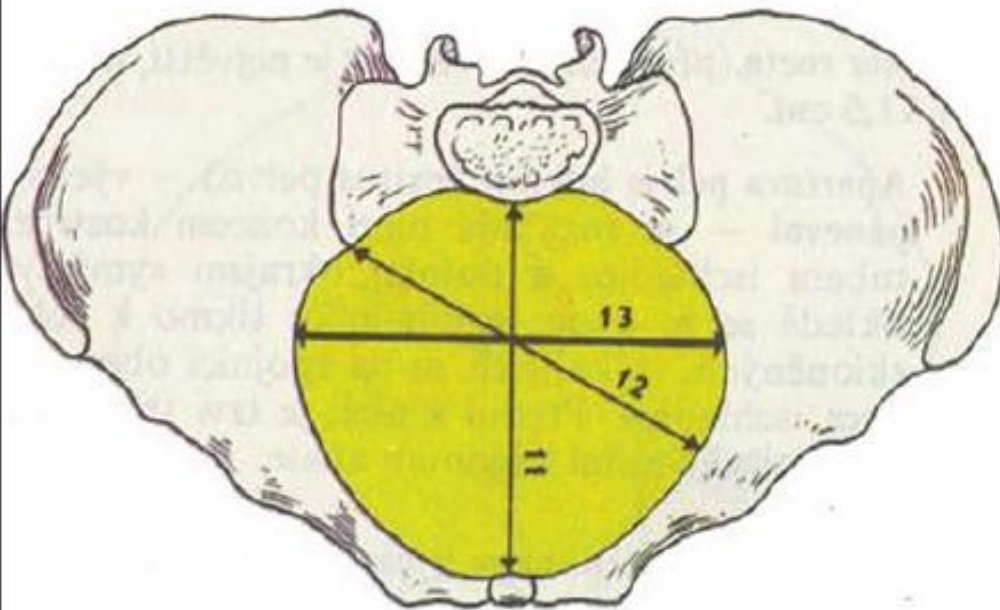


b

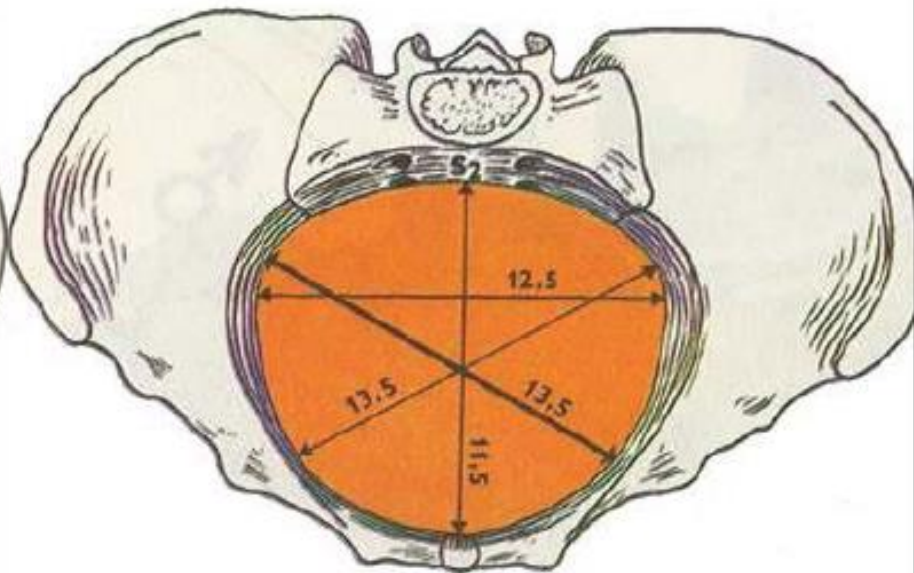
- Conjugata externa = Diameter Baudeloqui  
(ca. 20 cm)
- Conjugata vera = obstetrica  
(ca. 11 cm)



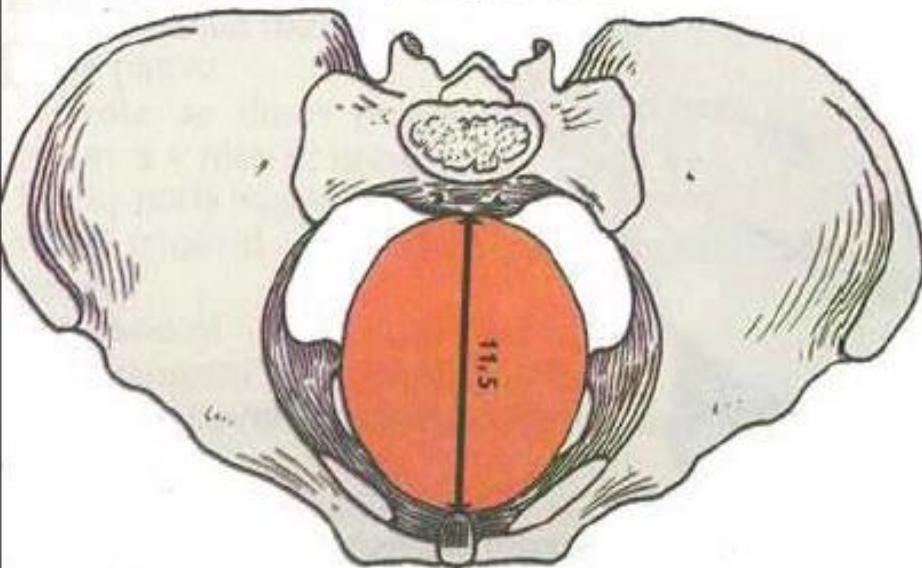




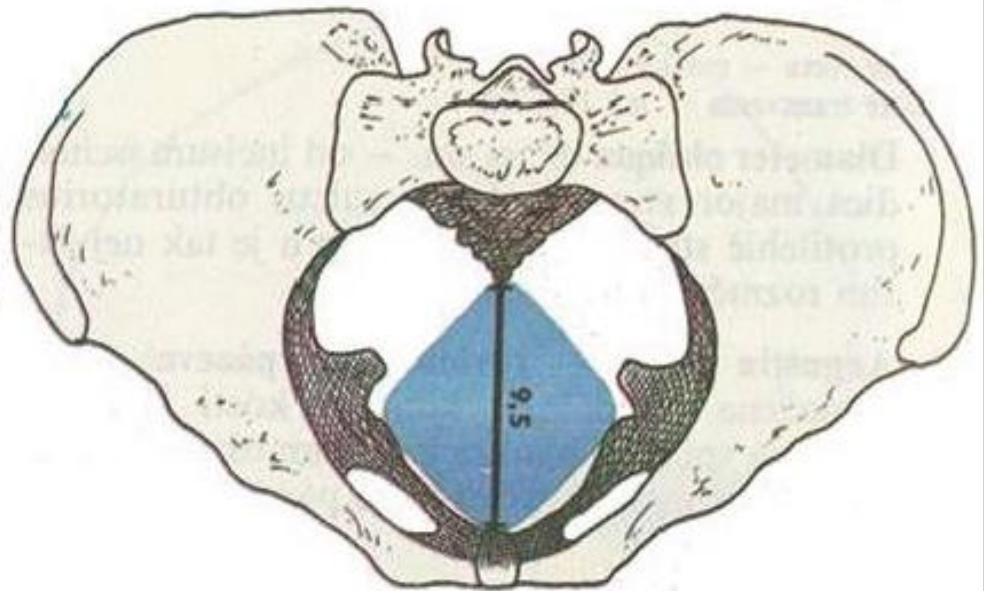
**ADITUS**



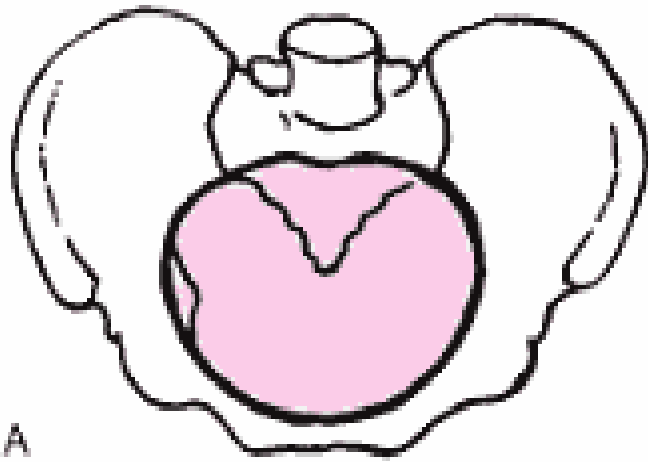
**AMPLITUDO**



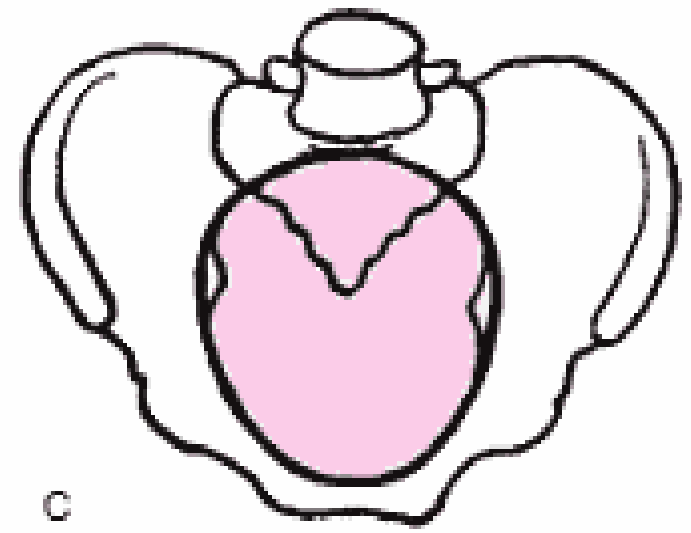
**ANGUSTIA**



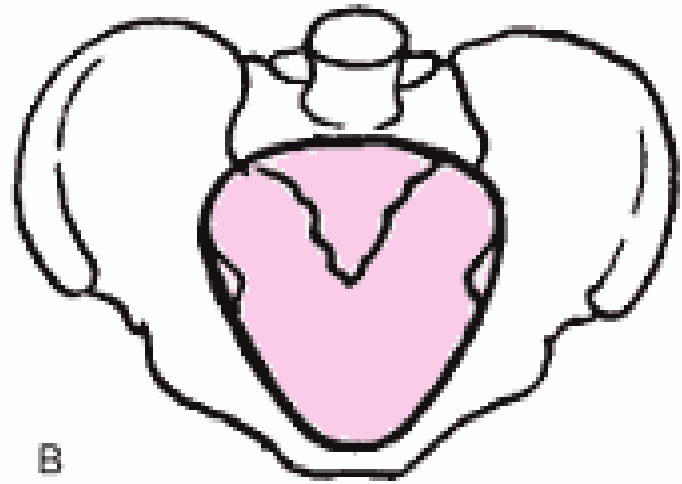
**EXITUS**



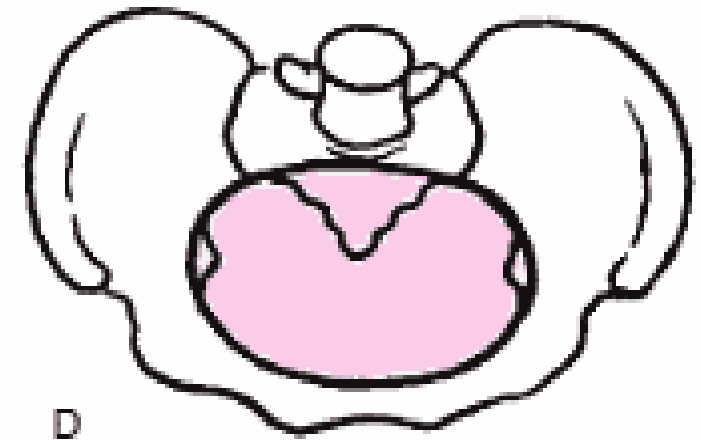
A



C



B

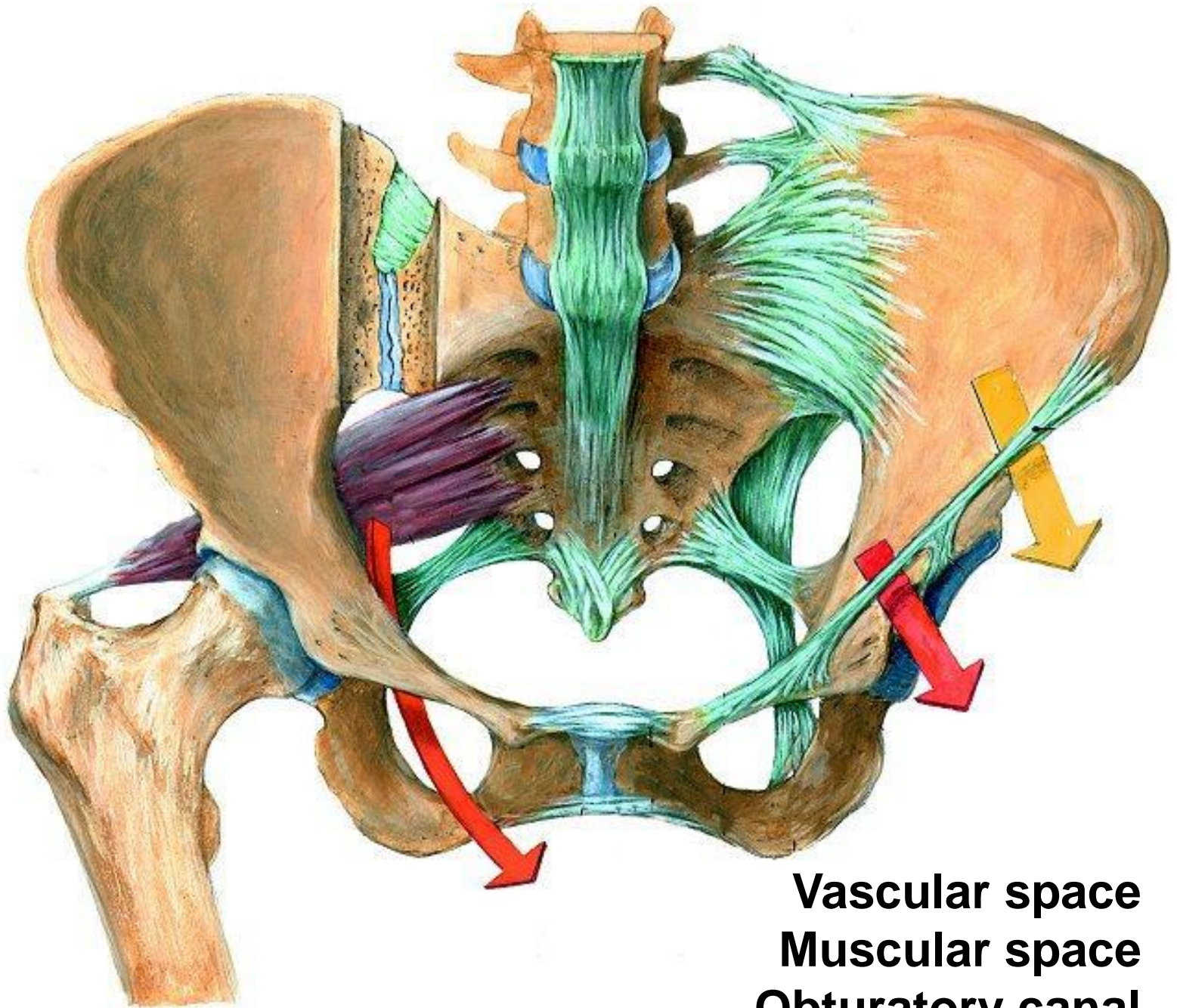


D

Pelvis types in women:

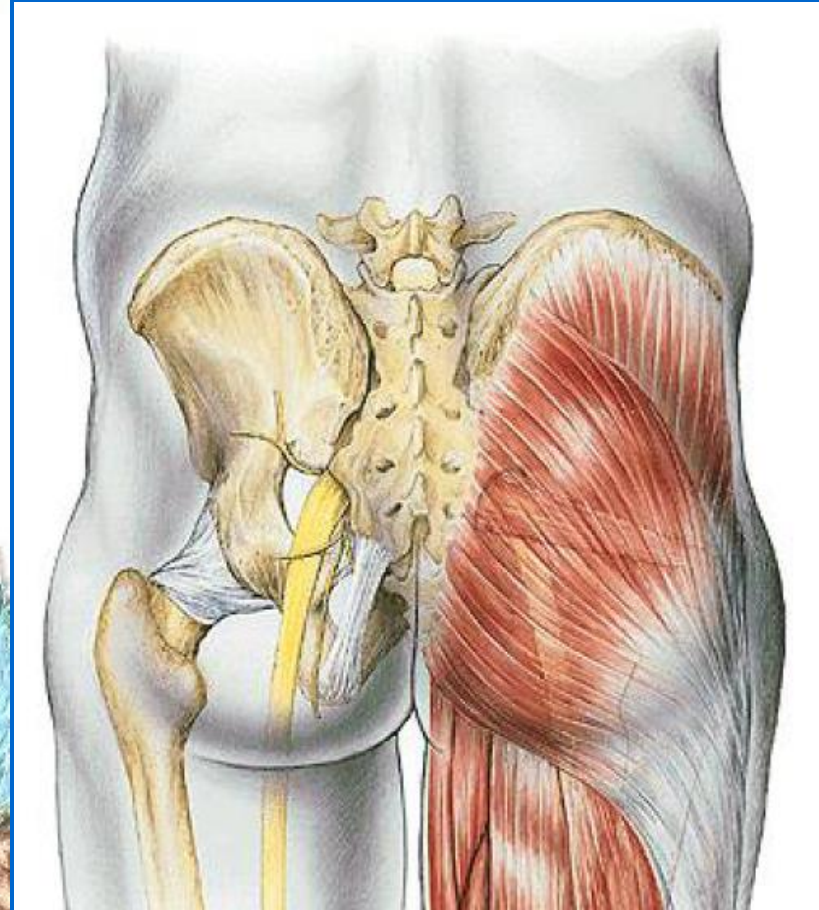
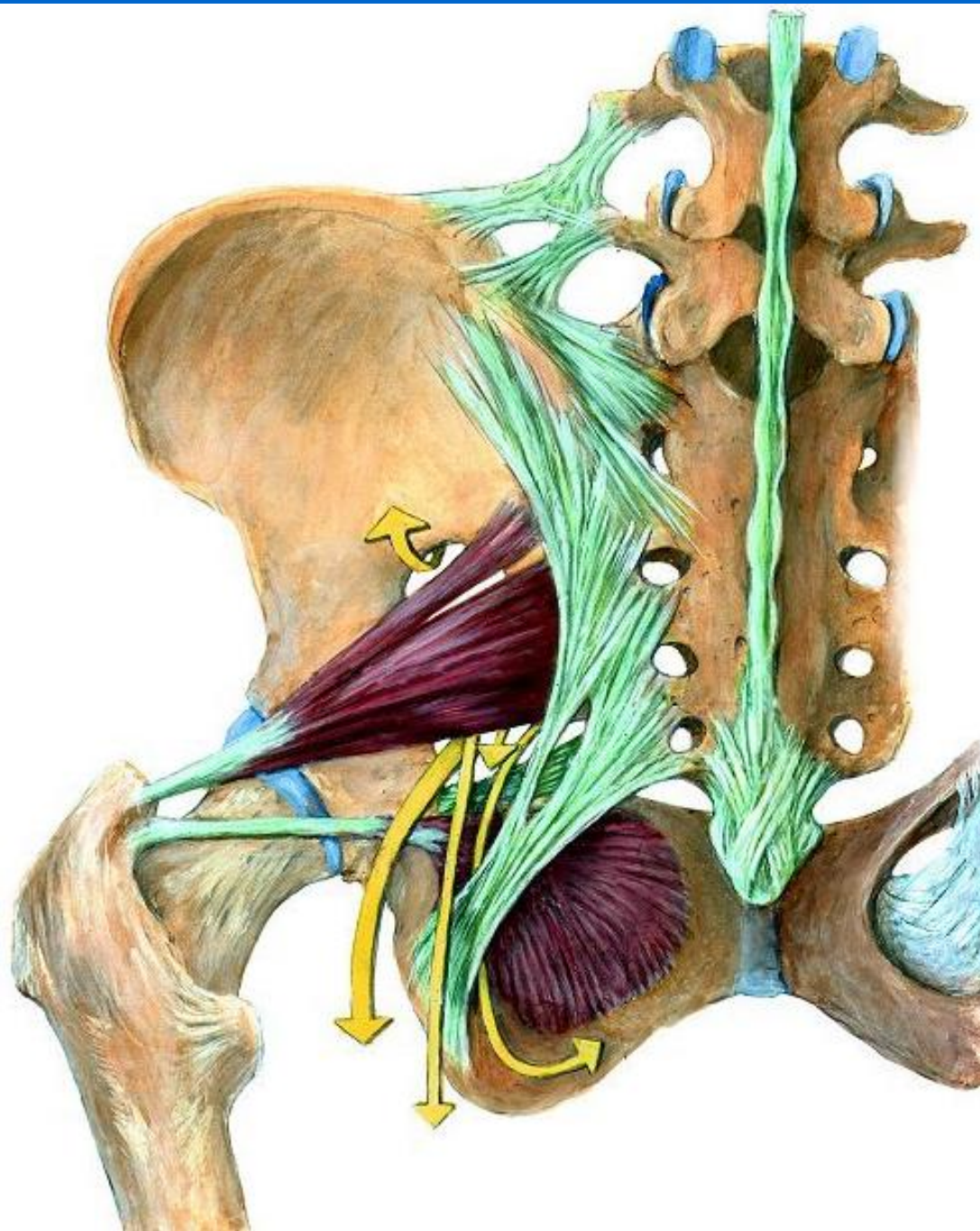
- A. **Gynoid** type (frequency 40%) B. **Android** type (frequency 30%)  
C. **Anthropoid** type (frequency 20%). D. **Platypelloid** type (frequency 3%).





**Vascular space**  
**Muscular space**  
**Obturator canal**

**infrapiriform foramen**  
**suprapiriform foramen**



**Pelvic floor muscles  
in relation to childbirth,  
Female endopelvic fascia,**

# Pelvic diaphragm, pelvic floor

## Levator ani

pubic part – **pubococcygeus** (pubovisceral)

pubovaginal

puboprostatic

puboperineal

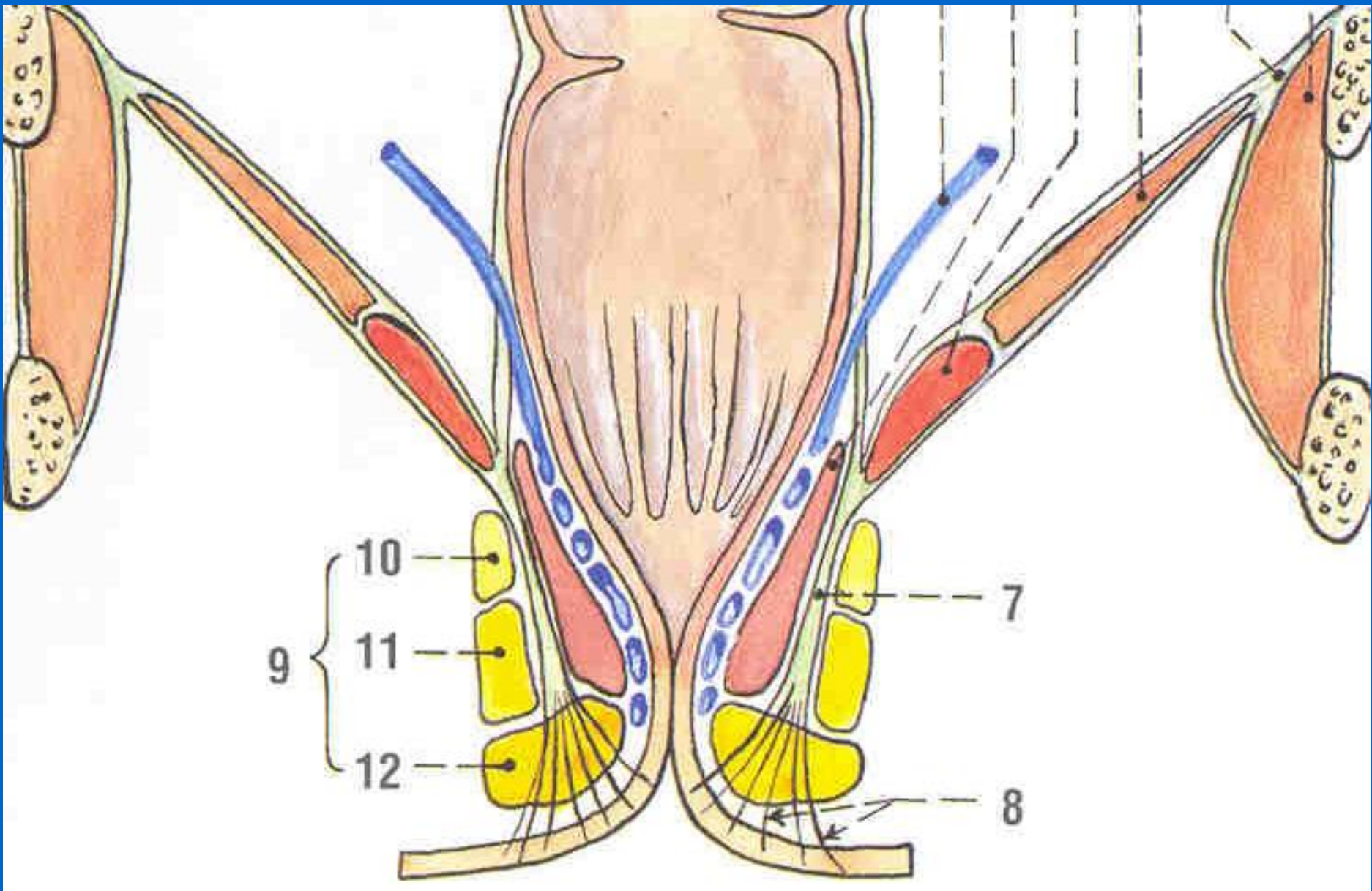
pubo-analis

– **puborectal**

iliac part – **iliococcygeus**

**Coccygeus** – **ischiococcygeus**

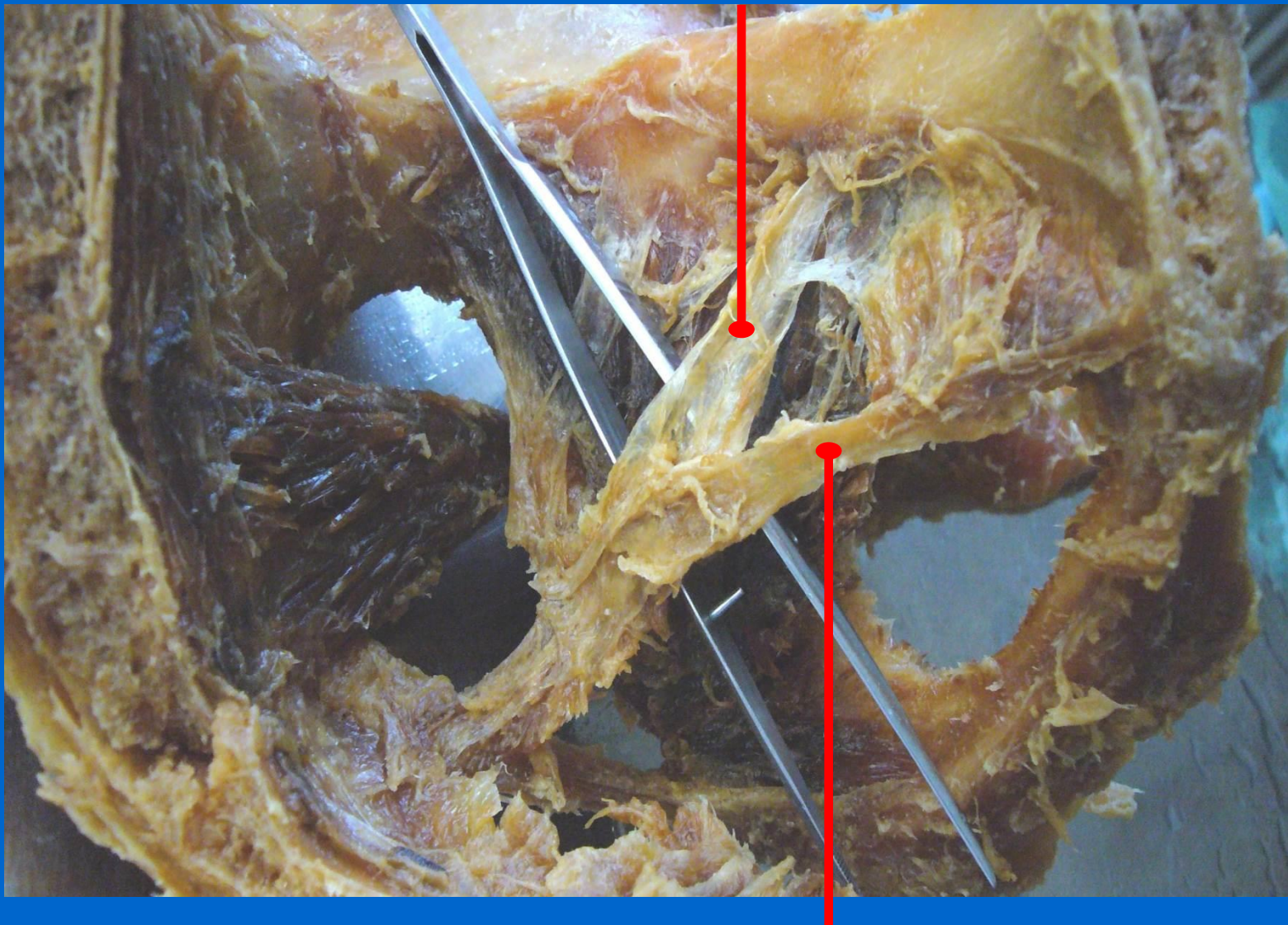
anococcygeal body, tendinous arch of levator ani,  
perineal body, urogenital hiatus, anal hiatus



**Levator ani muscle and parts of external anal sphincter (9):  
deep part (10), superficial part (11), subcutaneous part (12)**



## Tendinous arch of levator ani



Tendinous arch of endopelvic fascia



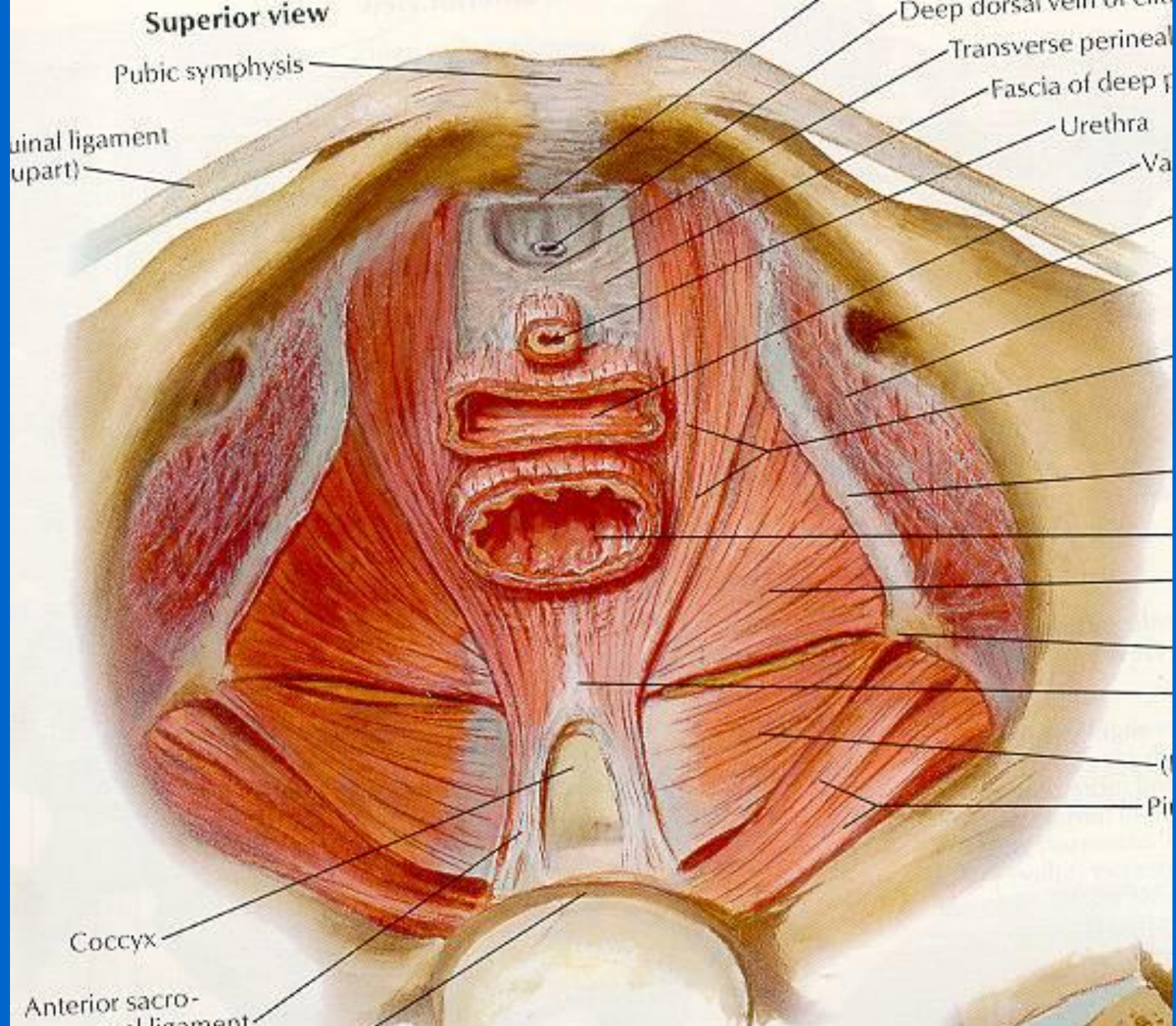
**Tendinous arch of levator ani**

This anatomical diagram illustrates the female pelvis from a medial view. The levator ani muscle is shown as a broad, fan-shaped muscle that forms the floor of the pelvic cavity. It is composed of several parts: the psoas major muscle, the iliacus muscle, and the pubococcygeus muscle. The tendinous arch of the levator ani is a thickened, fibrous band that runs horizontally across the lesser sciatic foramen. The endopelvic fascia is a layer of connective tissue that lines the internal surface of the lesser sciatic foramen. Its tendinous arch is a thickened, fibrous band that runs horizontally across the lesser sciatic foramen, just below the tendinous arch of the levator ani. The diagram shows the relationship between these two structures and the underlying bony structures of the pelvis, including the ilium, ischium, and pubis.

**Tendinous arch of endopelvic fascia**



**Superior view**



Pubic symphysis

Deep dorsal vein of penis

Transverse perineal

Fascia of deep p

Urethra

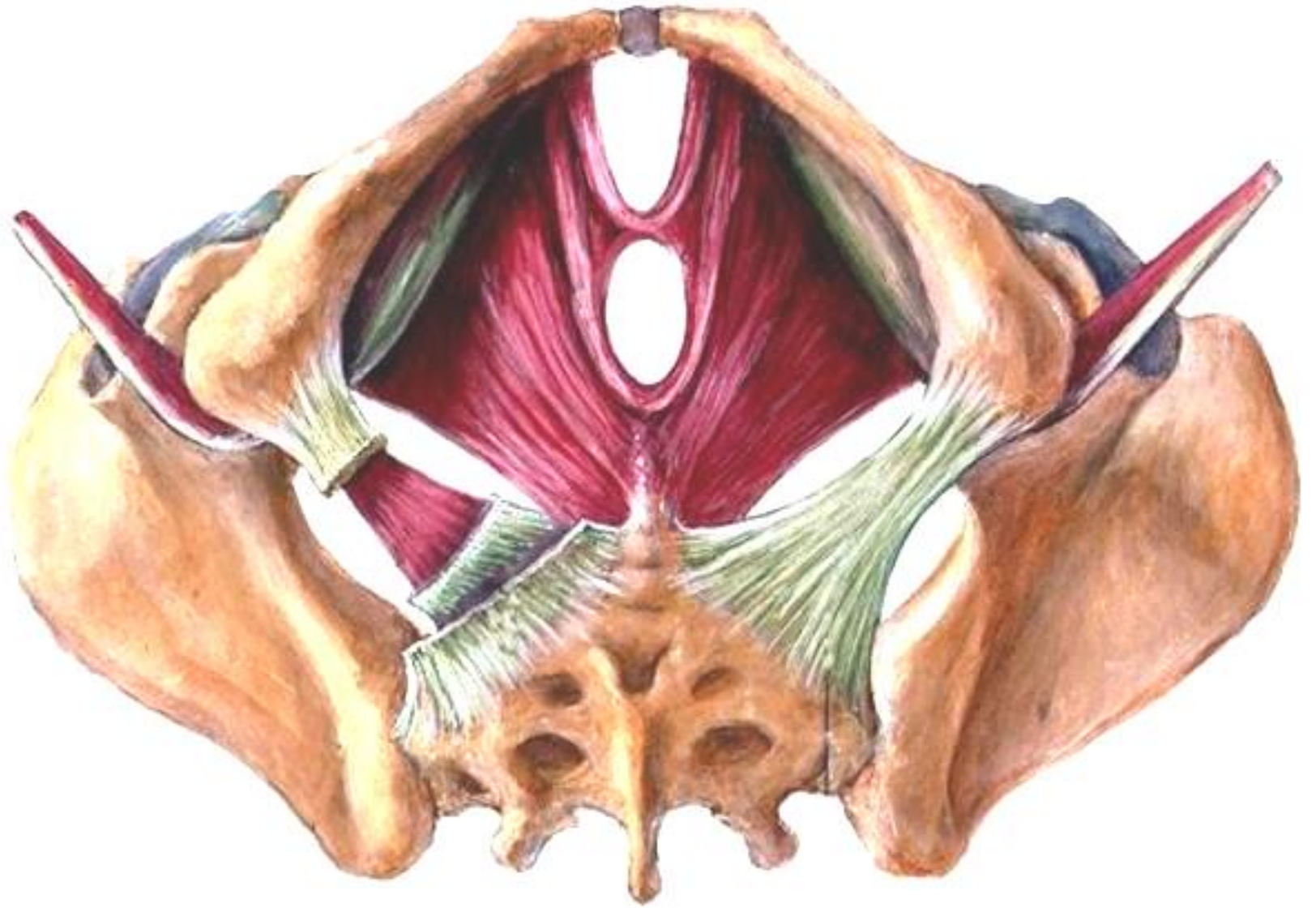
Va

Inguinal ligament (upper part)

Coccyx

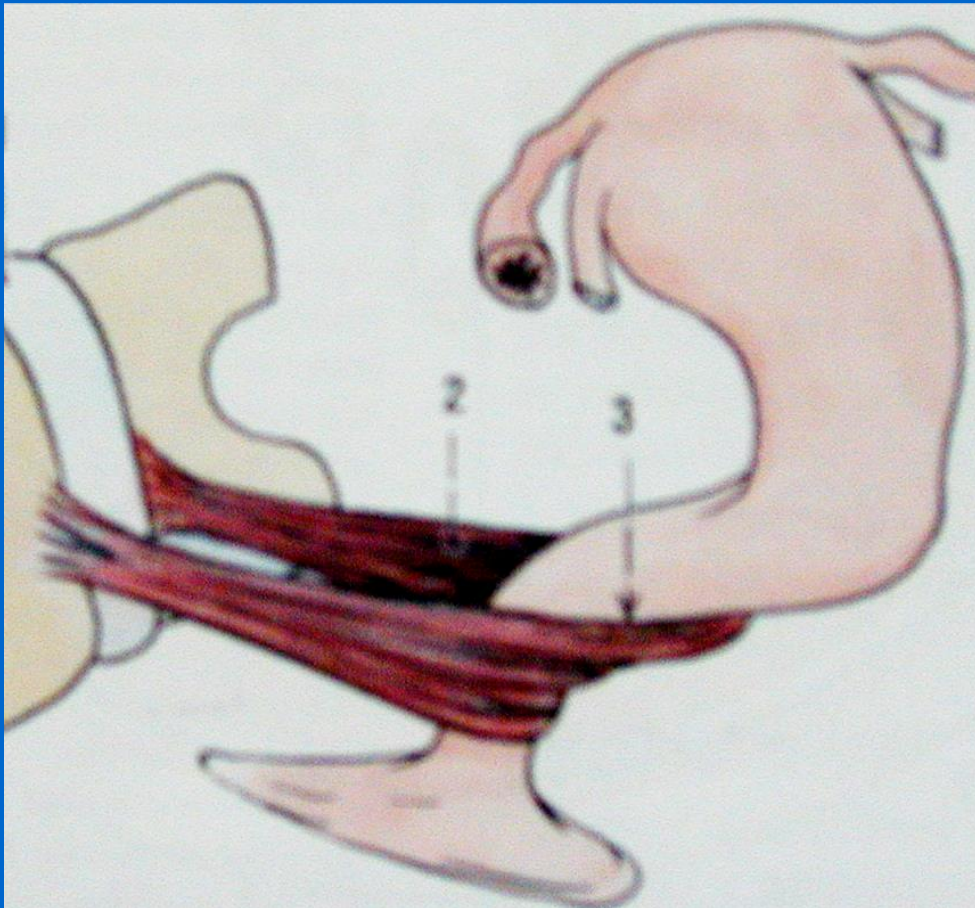
Anterior sacro-spinous ligament

Pi

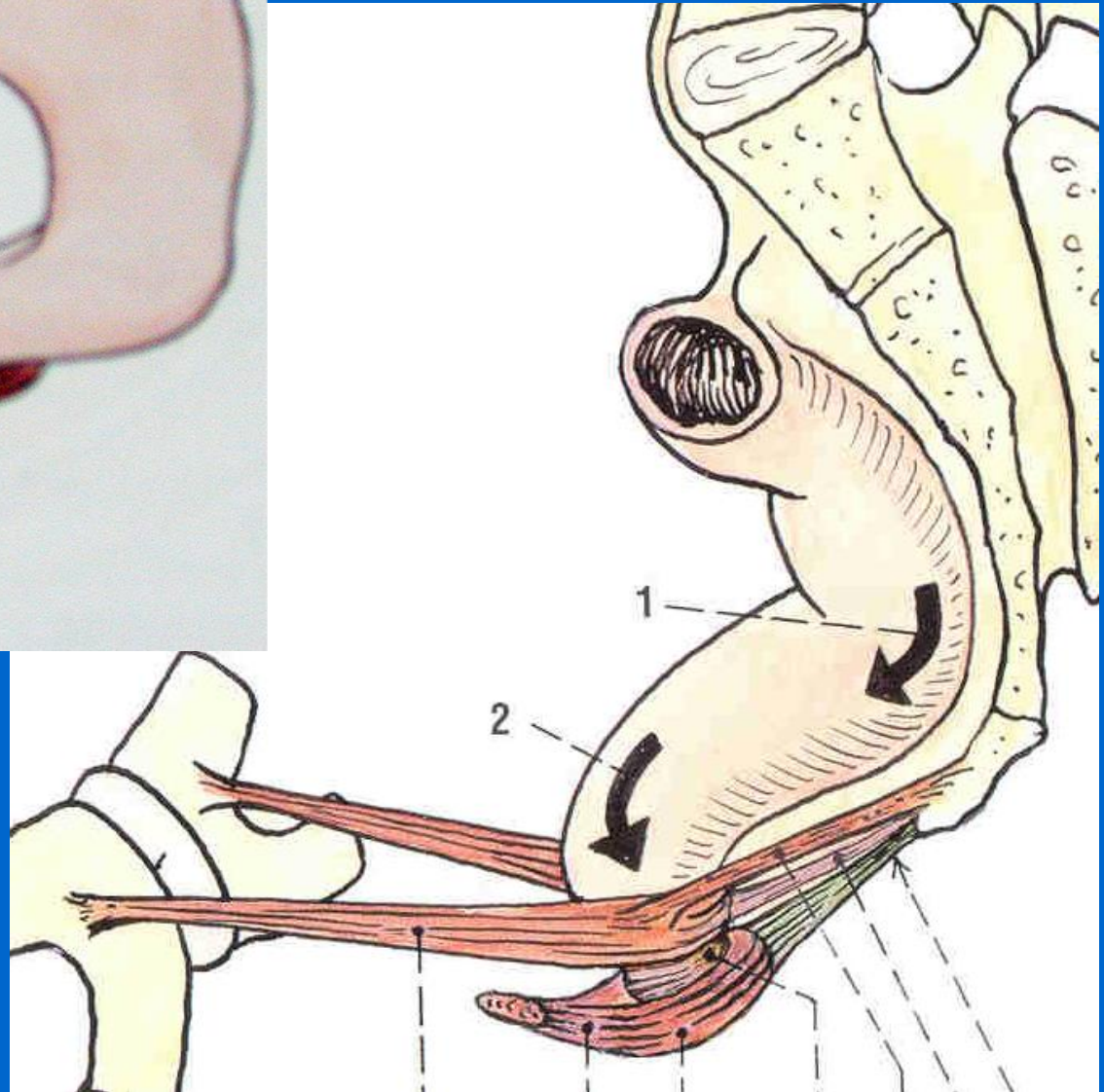


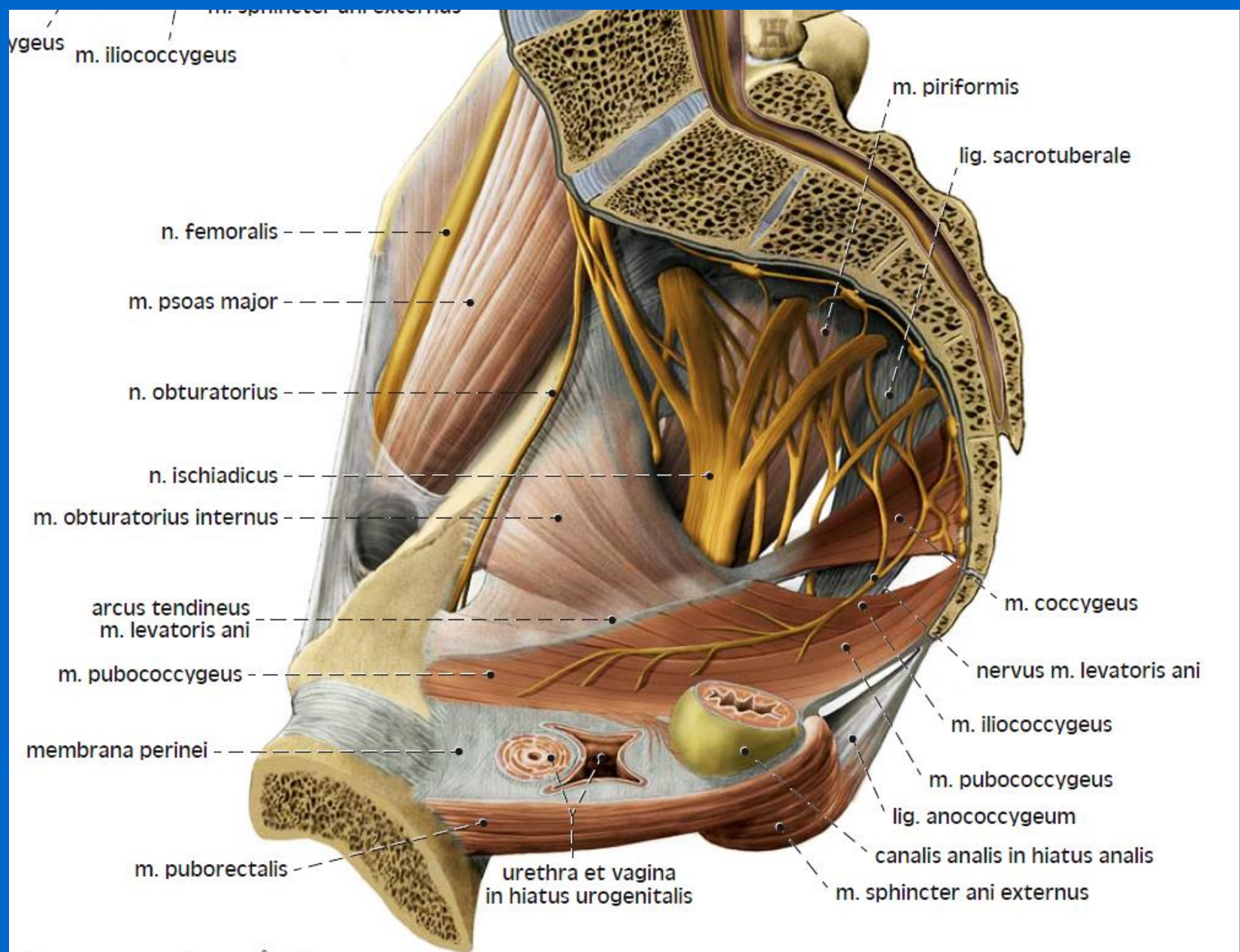
**Pelvic diaphragm**

**Fork formed by  
pubovaginal muscle**



**Fork formed by  
puborectal muscle**







**Pelvic diaphragm**

# **Urogenital diaphragm**

deep transverse perineal muscle (**in man only**)

sphincter urethrovaginalis (**in woman only**)

compressor urethrae (**in woman only**)

## **Fibrous structures**

Perineal body,

Anococcygeal lig., Perineal membrane

## **Ischio-anal fossa**

Fat body of ischio-anal fossa

Pudendal canal (Alcock's canal)

# **Perineal muscles**

## **Muscle of anal triangle**

external anal sphincter

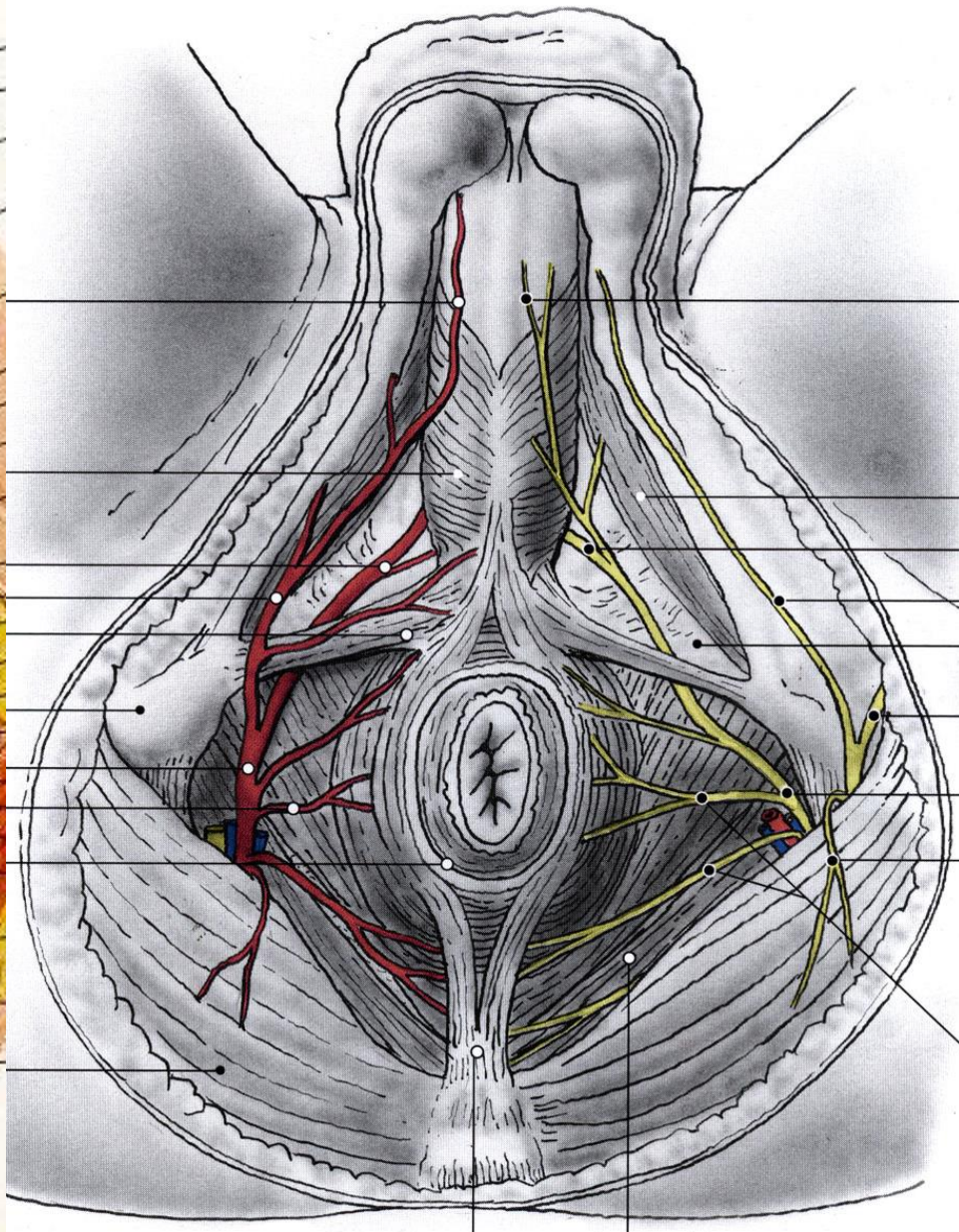
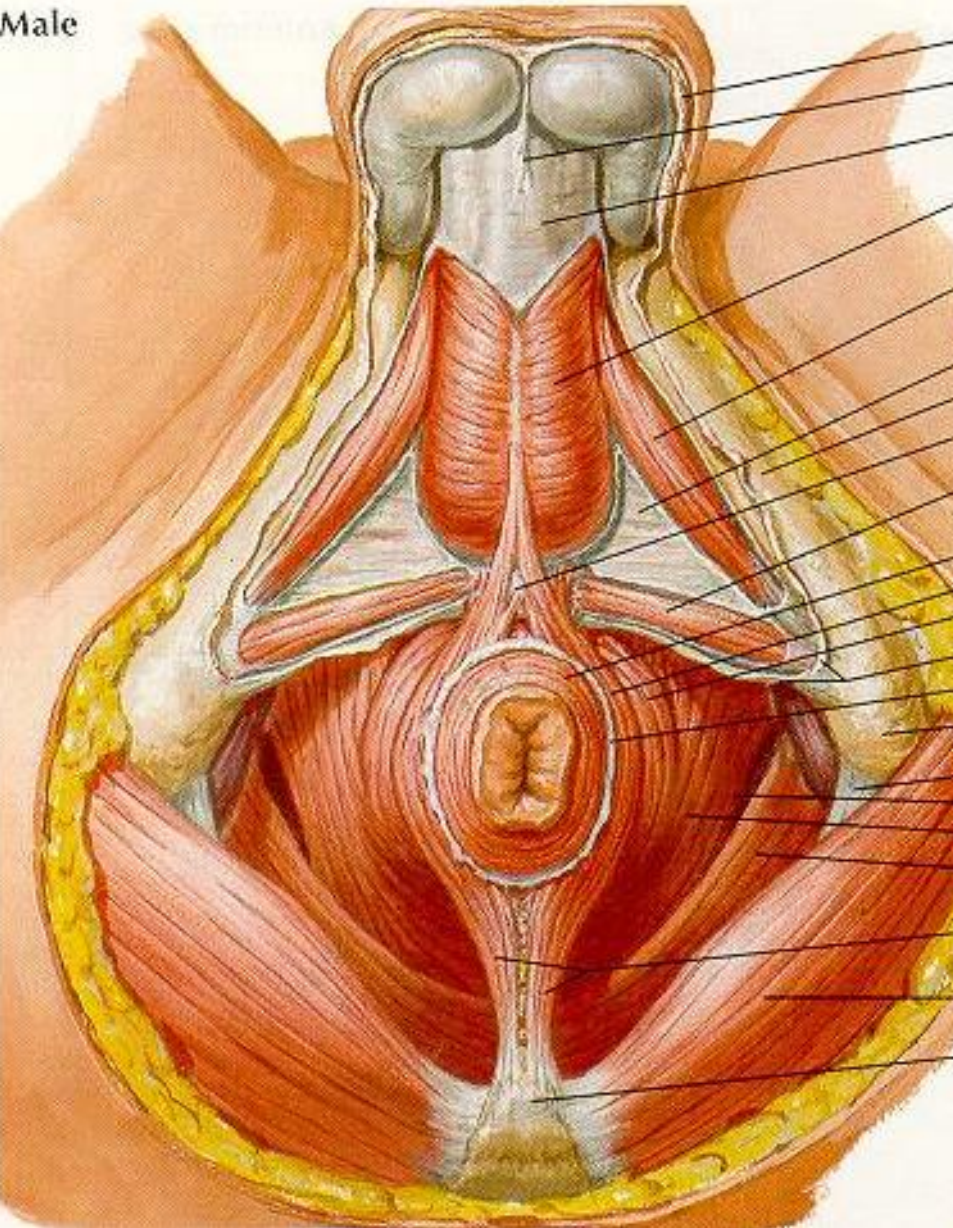
## **Muscles of urogenital triangle**

external urethral sphincter

ischiocavernosus

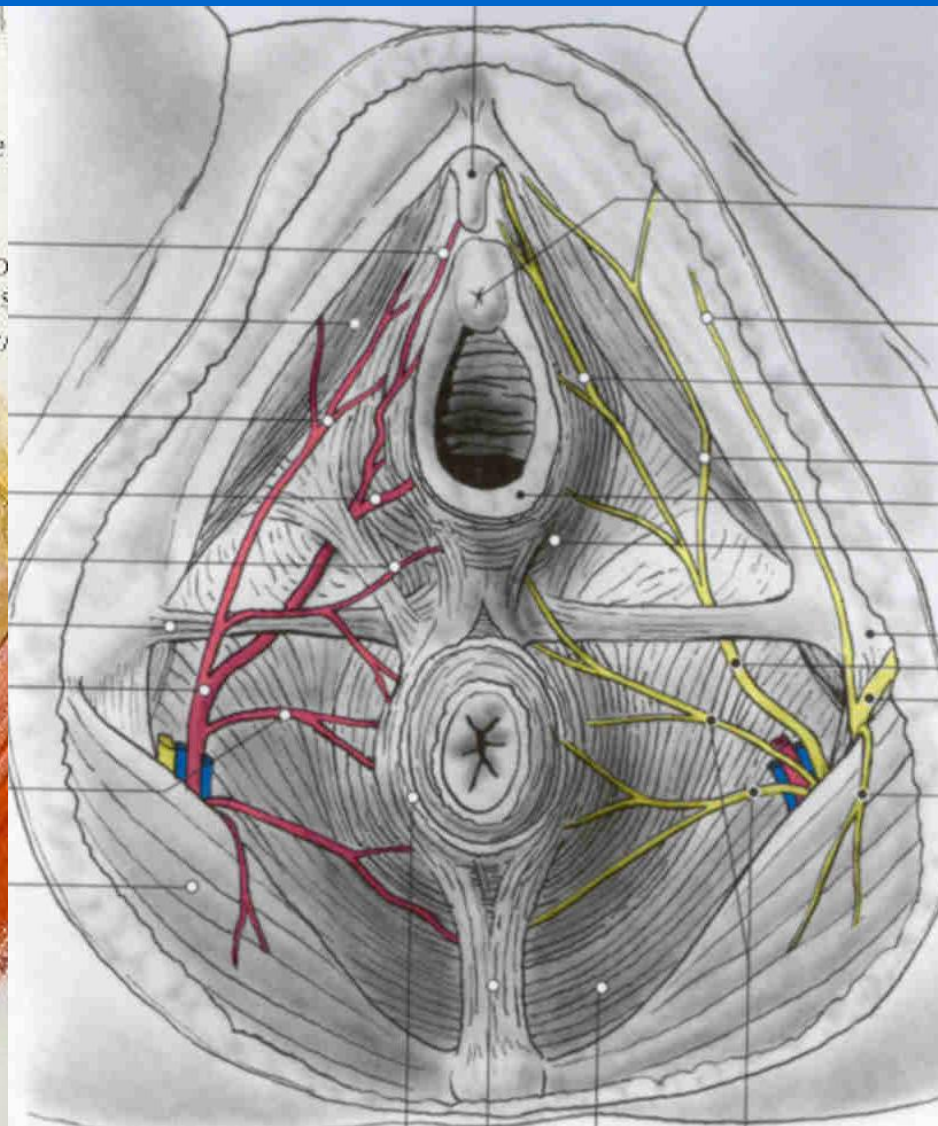
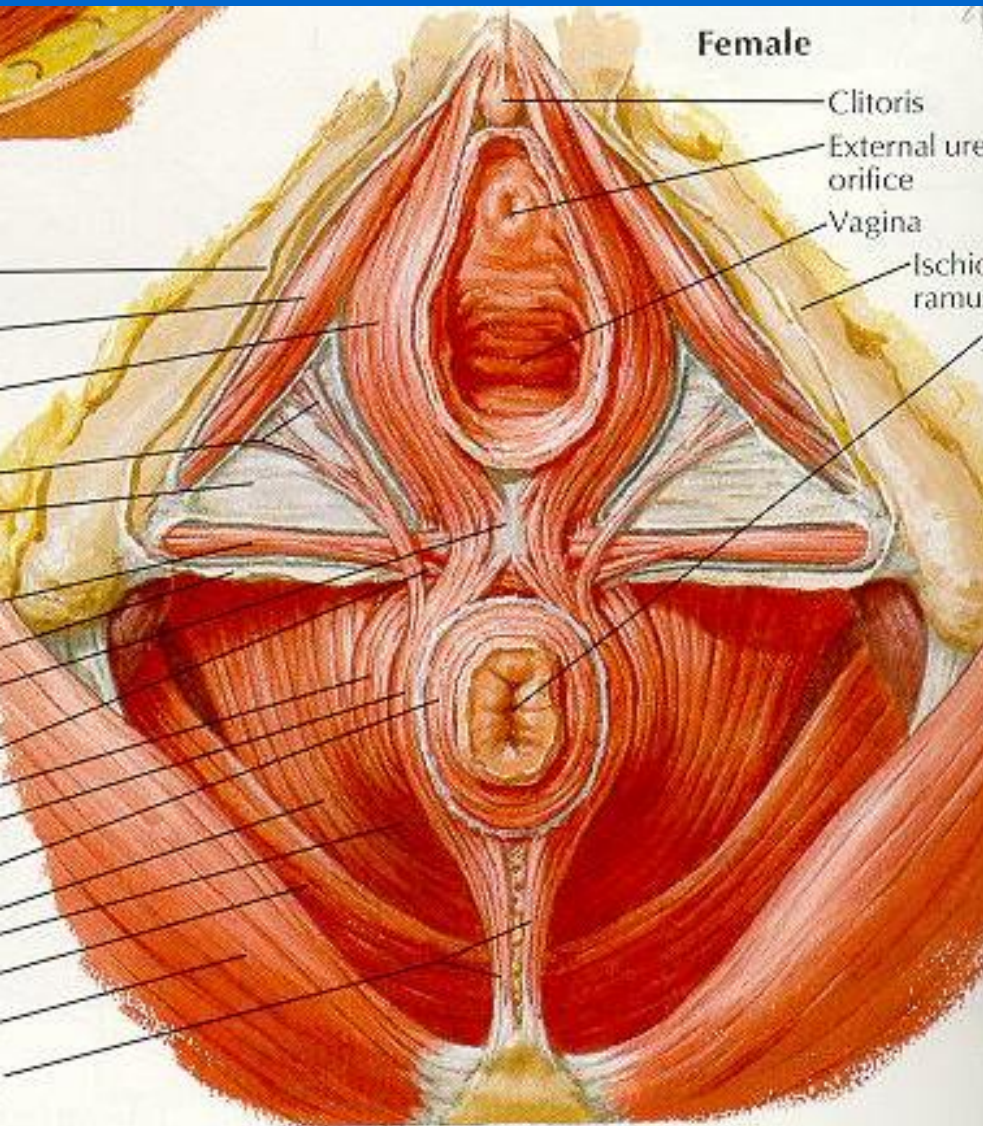
bulbospongiosus

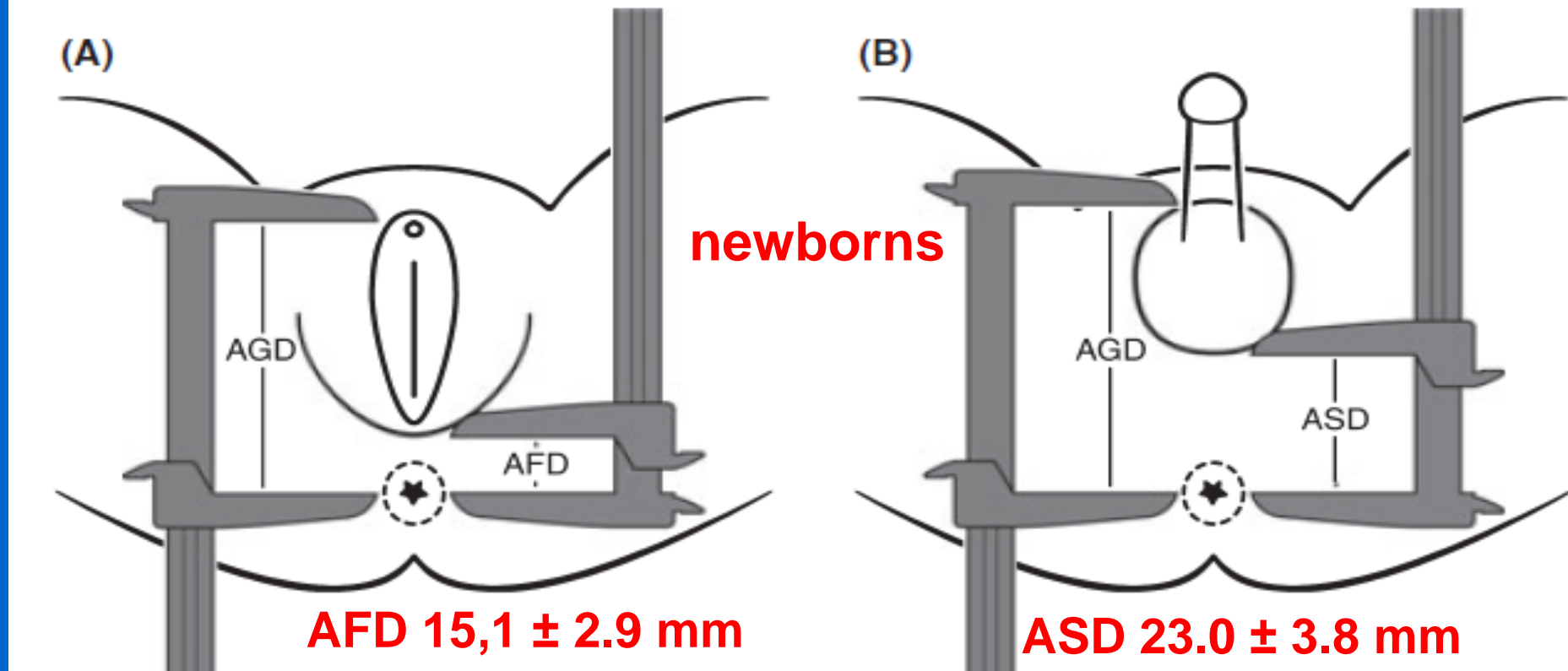
# Perineal muscles in male, blood supply, innervation





# Perineal muscles in female, blood supply, innervation



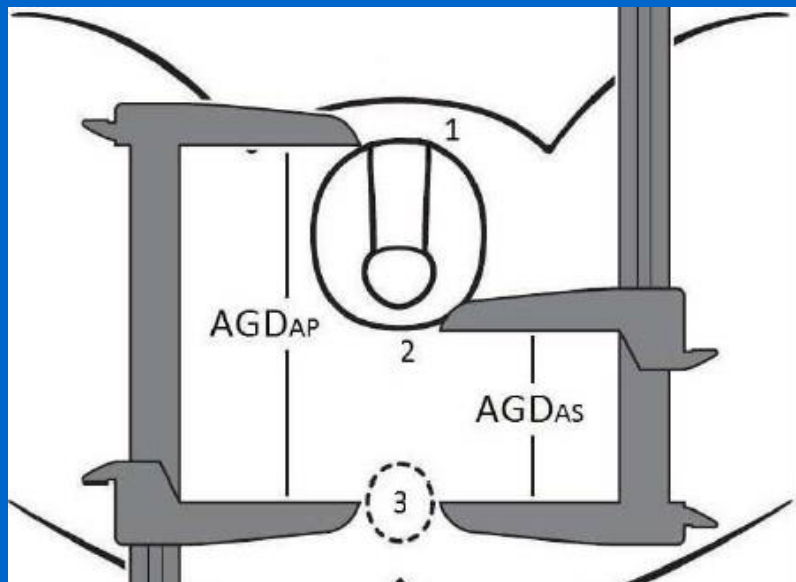


**Ano-genital distance / ano-scrotal distance / ano-fourchette distance diagrams.**

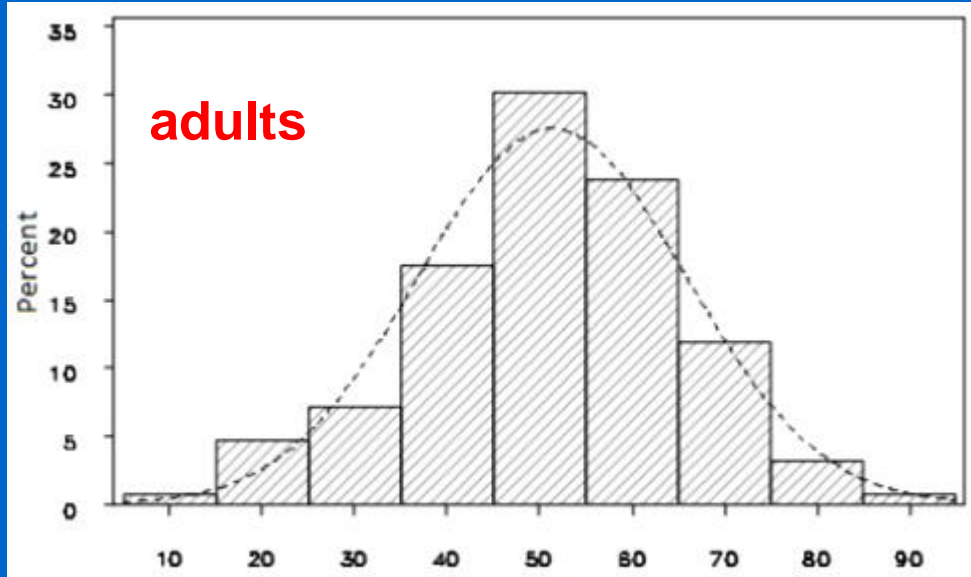
**(A) Center of the anus to the anterior clitoral surface (AGD) and the center of the anus to the posterior fourchette (AFD) measurements made in female subjects.**

**(B) Center on the anus to the anterior base of the penis (AGD) and the center of the anus to the junction of the perineum with the rugated scrotal skin (ASD) measurements made in male subjects.**

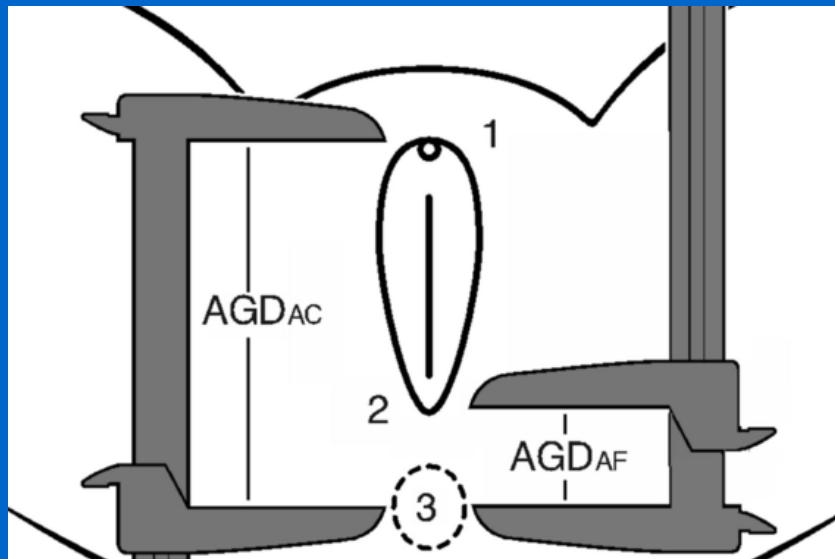
*Sathyannarayana S et al. : Measurement and correlates of ano-genital distance in healthy, newborn infants. Int. J. Androl. 33: 317–323, 2010*



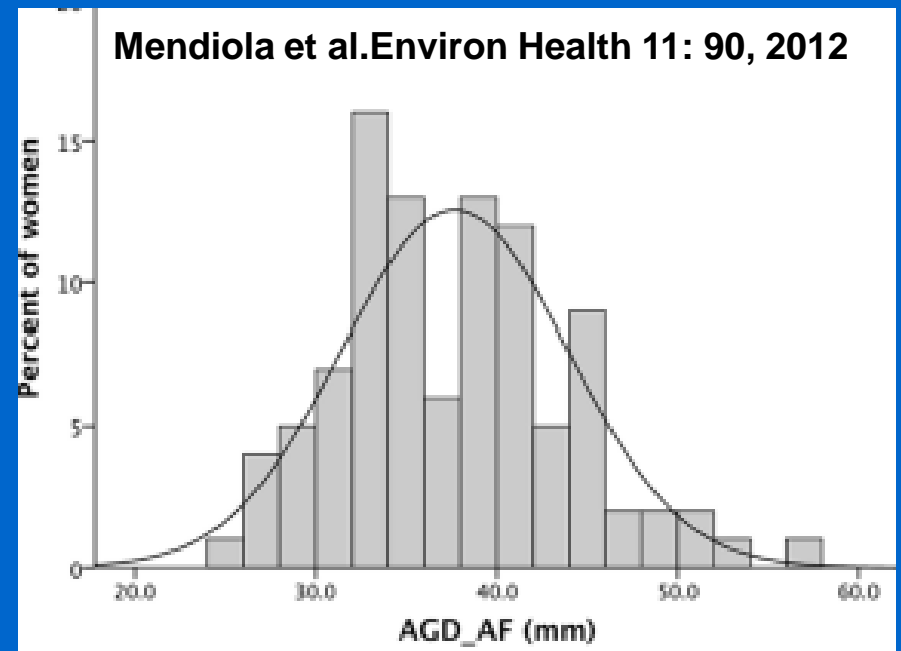
**AGD AS  $51.3 \pm 14.5$  mm**



Mendiola et al.:Environ Health Persp119:958, 2011



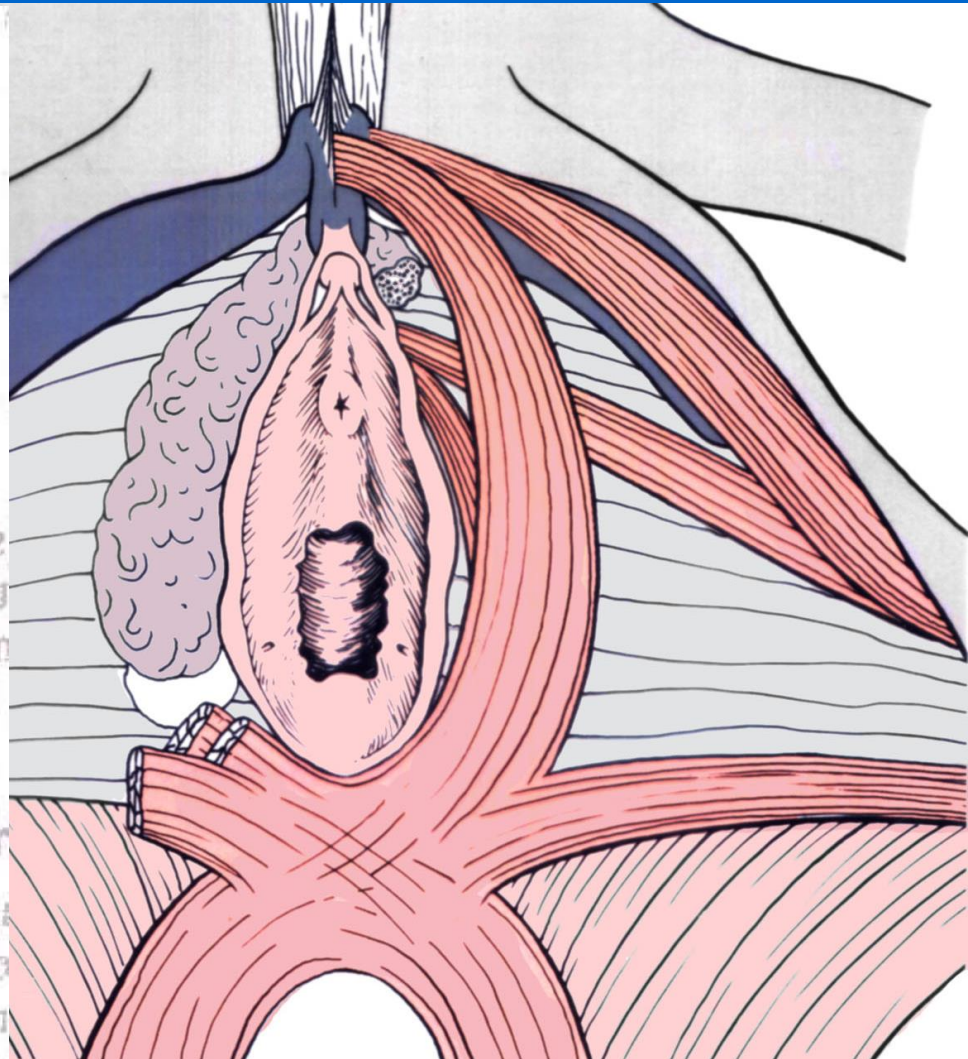
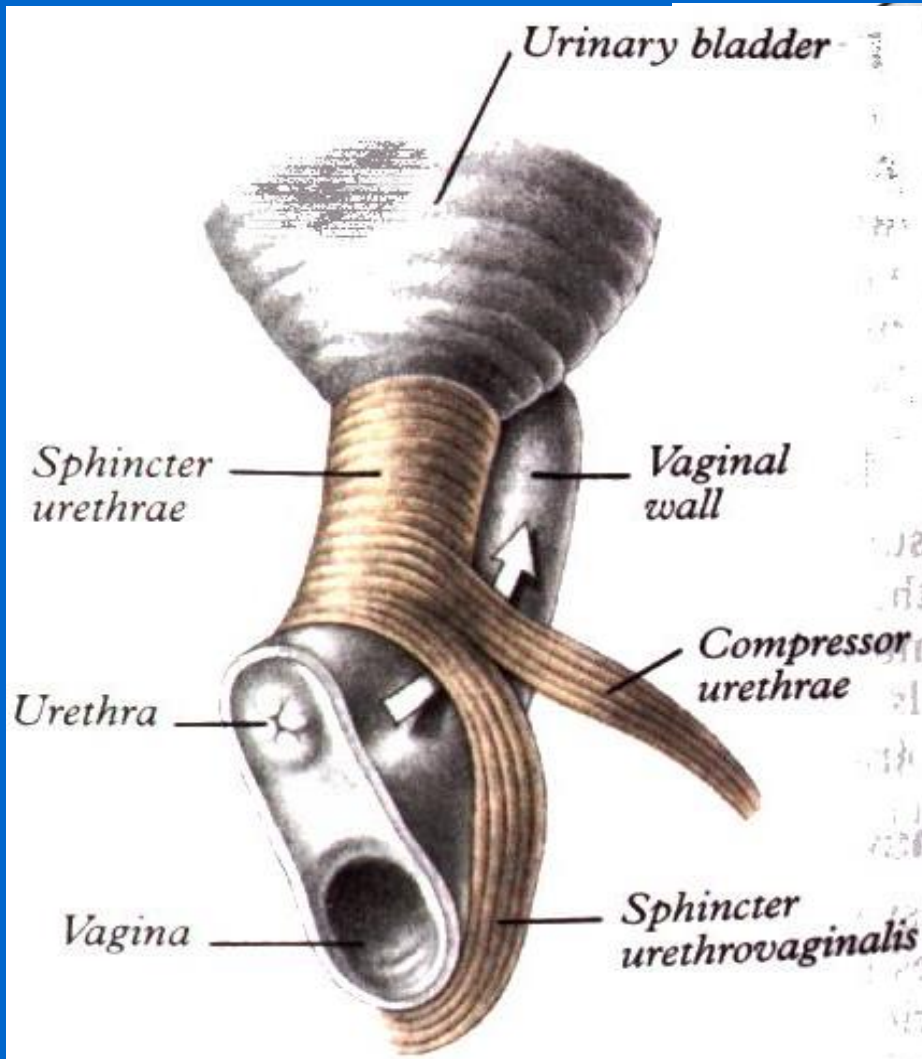
**F AGD AF  $37.7 \pm 6.3$  mm**



Female endopelvic fascias,  
ligaments supporting uterus,  
uterine prolapse

Mechanisms of urinary continence

# Perineal muscles of female



External urethral sphincter,  
Sphincter urethrovaginalis,  
Compressor urethrae

Bulbospongiosus, Ischocavernosus,  
Sphincter urethrovaginalis,  
Compressor urethrae

## Female urethra

Fibromuscular tube (4 cm)

internal orifice,  
(filling, voiding)

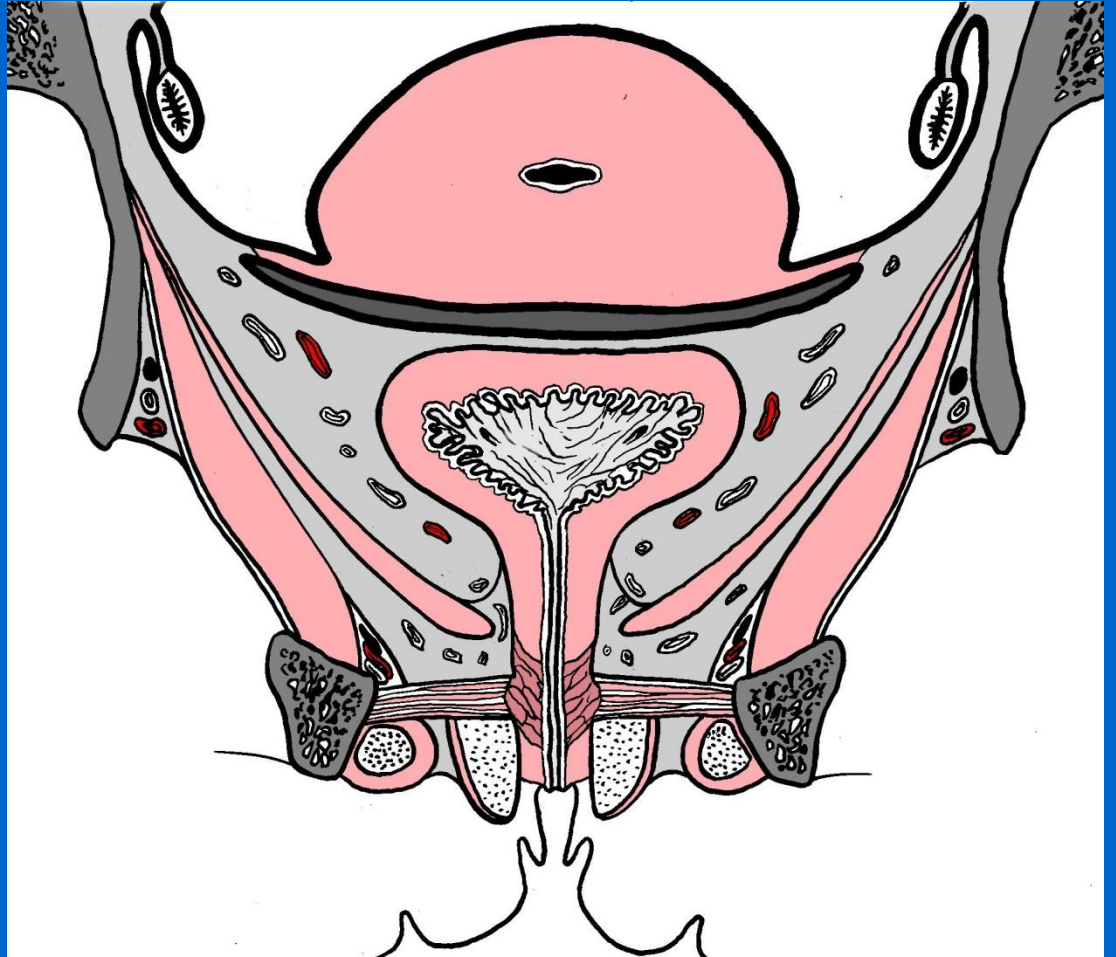
external orifice

Parts: intramural,  
pelvic,

perineal,

external urethral sphincter,

urethral glands,  
(paraurethral ducts)

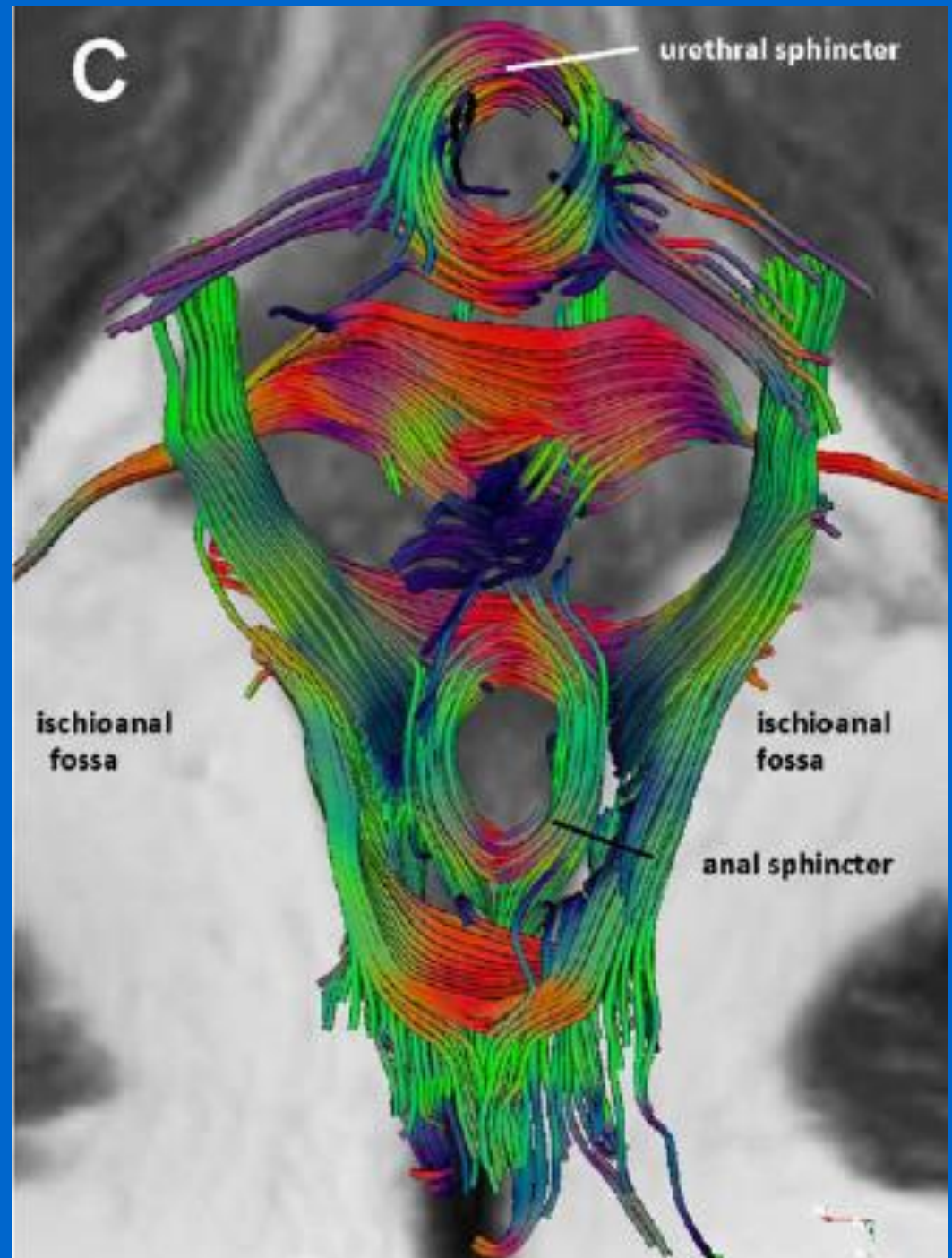


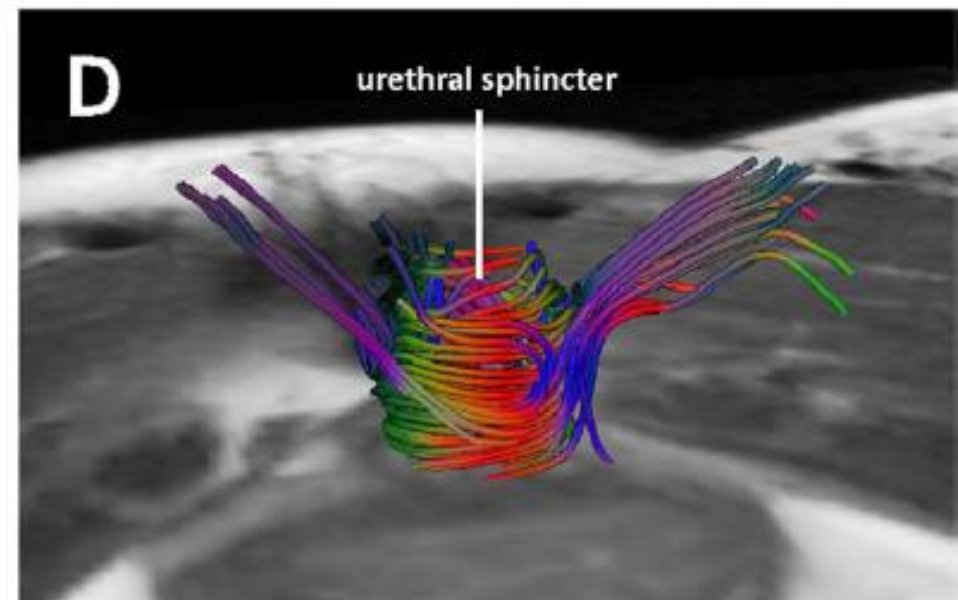
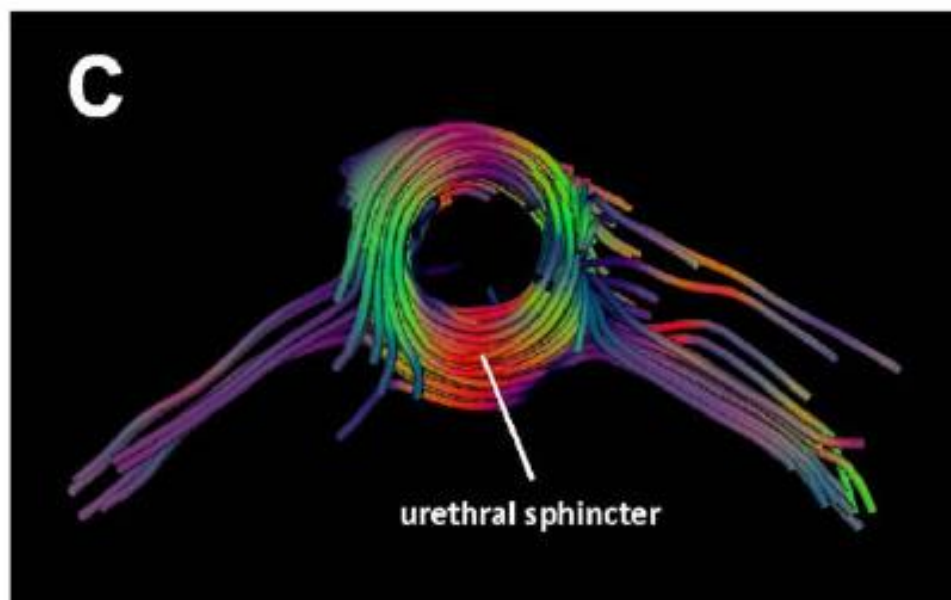
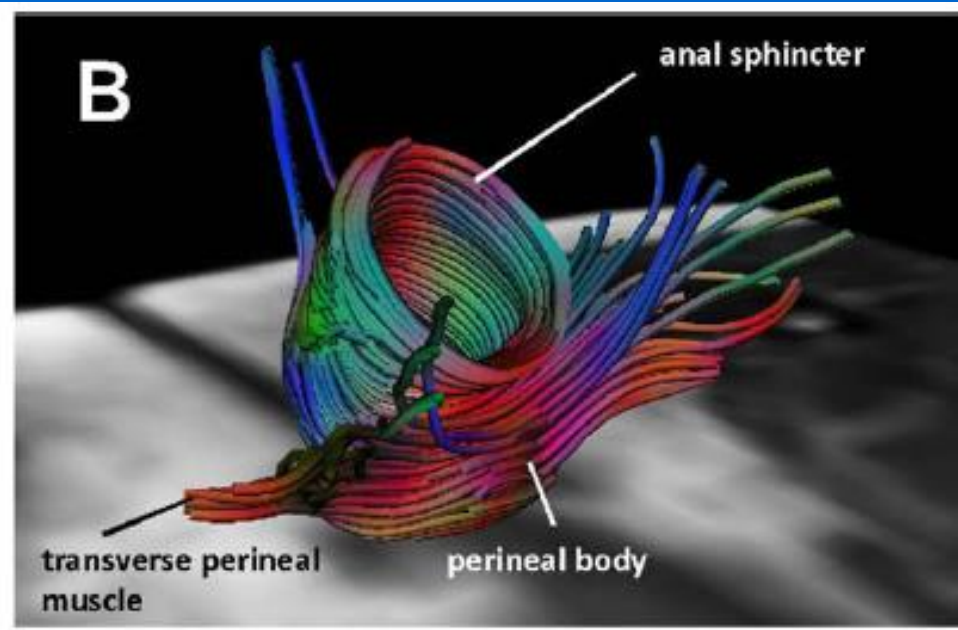
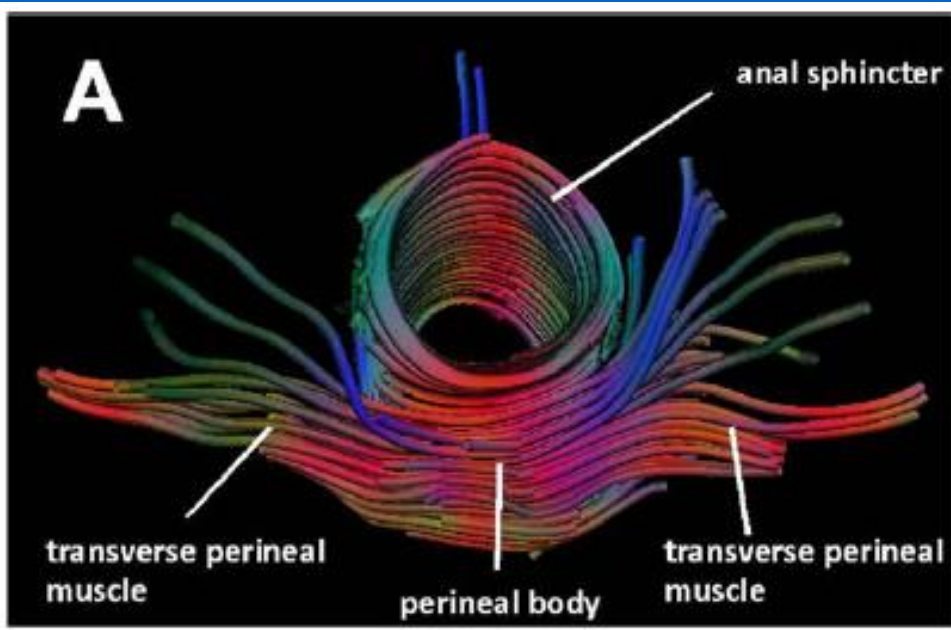
Zijta M et al. *Clin Anat*

26:110–114 (2013)

Axial T2-weighted image  
of a 26-year-old nullipara.

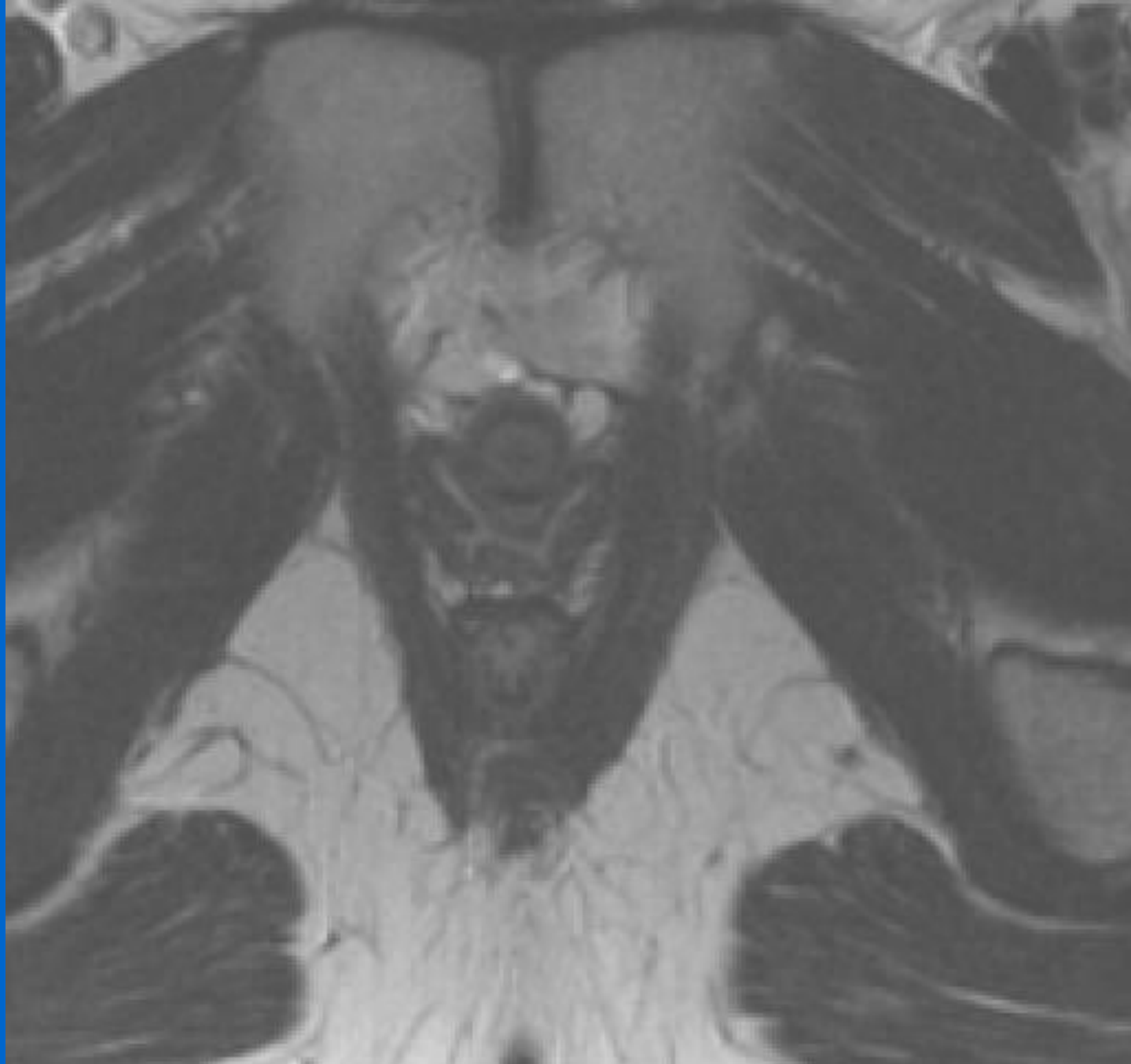
C demonstrates  
the multidirectional  
organization of the  
complex pelvic floor anatomy.  
The per-voxel vector values  
are color coded as follows:  
green (anteroposterior direction),  
blue (craniocaudal direction),  
and red (mediolateral direction).





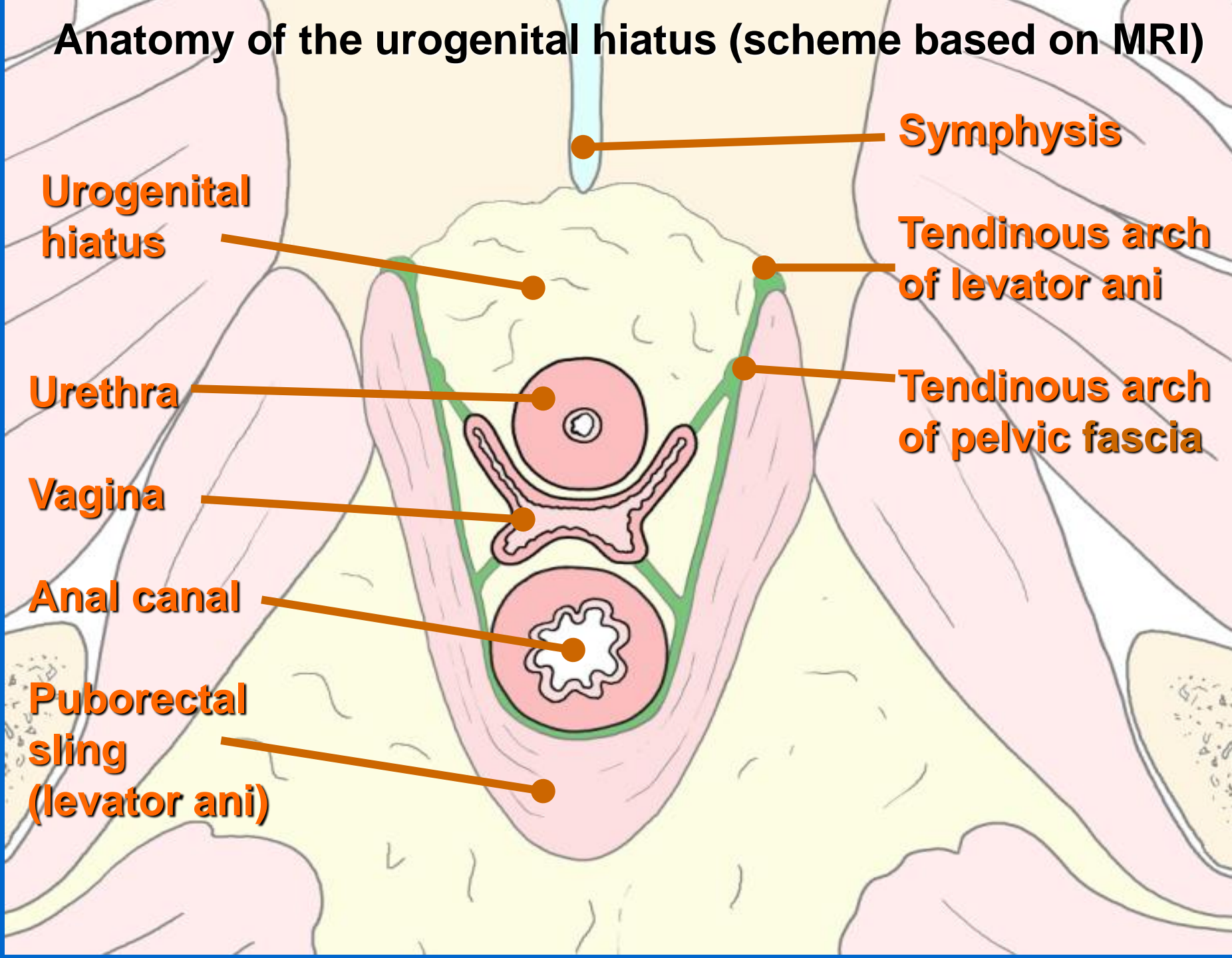
Fiber tractography representing the anal sphincter complex from anterior (A) and right anterolateral view (B) and the urethral sphincter complex from cranial (C) and posterior view (D).





Švábik, Mašata, Martan, Moravai

# Anatomy of the urogenital hiatus (scheme based on MRI)



**Urogenital hiatus**

**Urethra**

**Vagina**

**Anal canal**

**Puborectal sling (levator ani)**

**Symphysis**

**Tendinous arch of levator ani**

**Tendinous arch of pelvic fascia**

Hammock  
endopelvic fascia  
(pubocervical fascia)  
fixation: tendineus arch of endopelvic fascia



Attachments of the cervix and vagina to pelvic walls (uterine corpus and the bladder have been removed)

*Obturator int.*

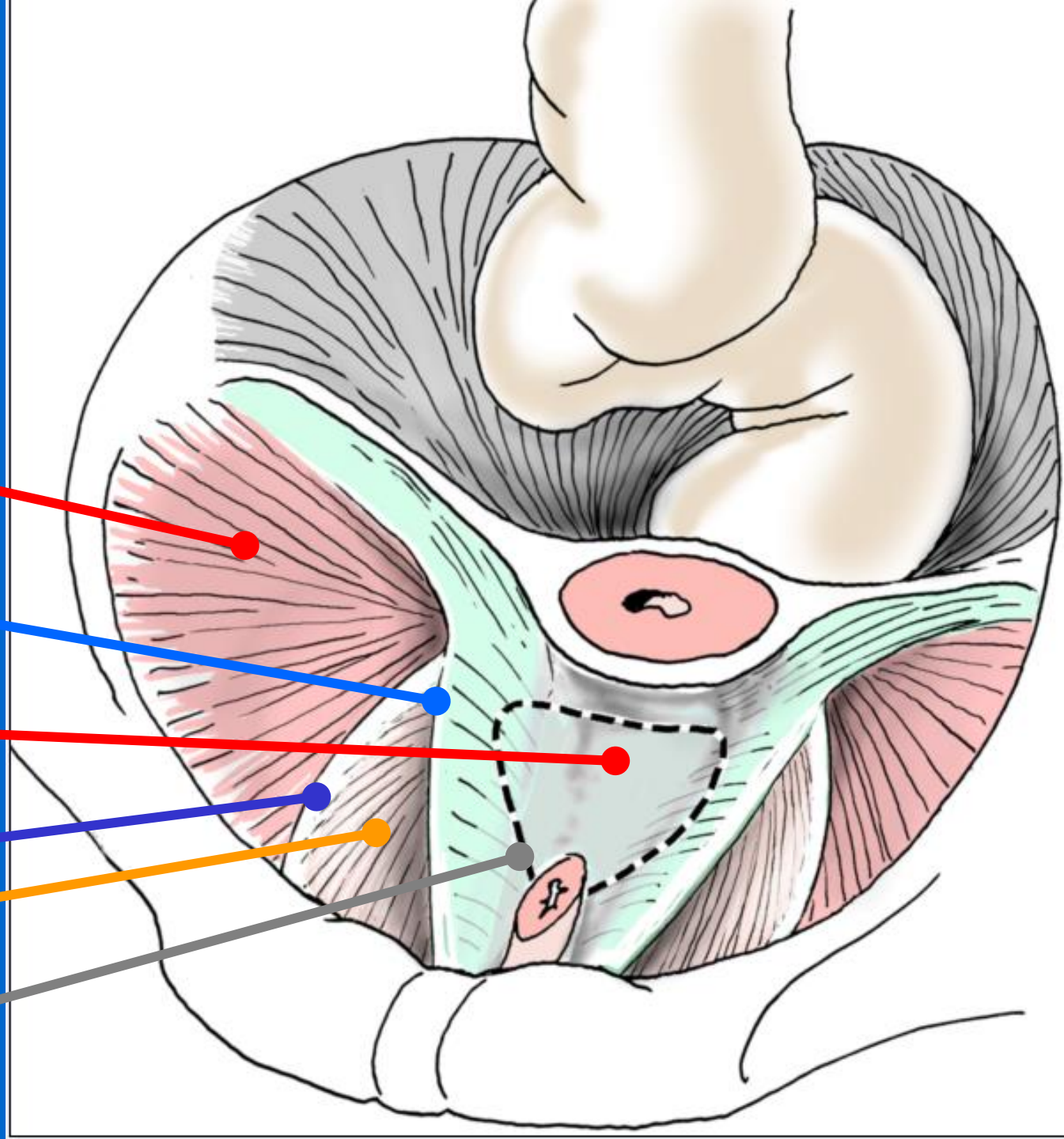
*Tendinous arch of endopelvic fascia*

*Vagina*

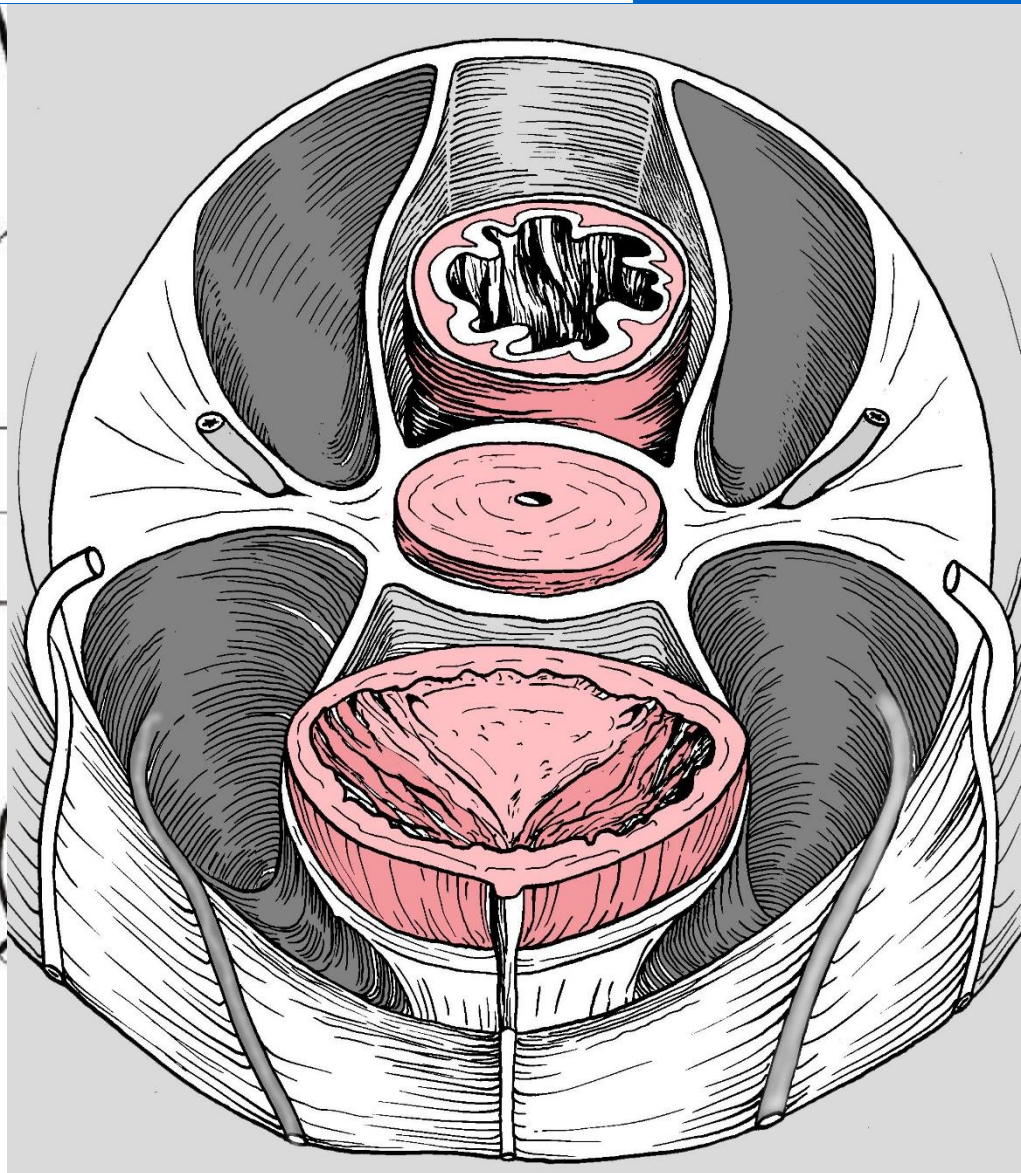
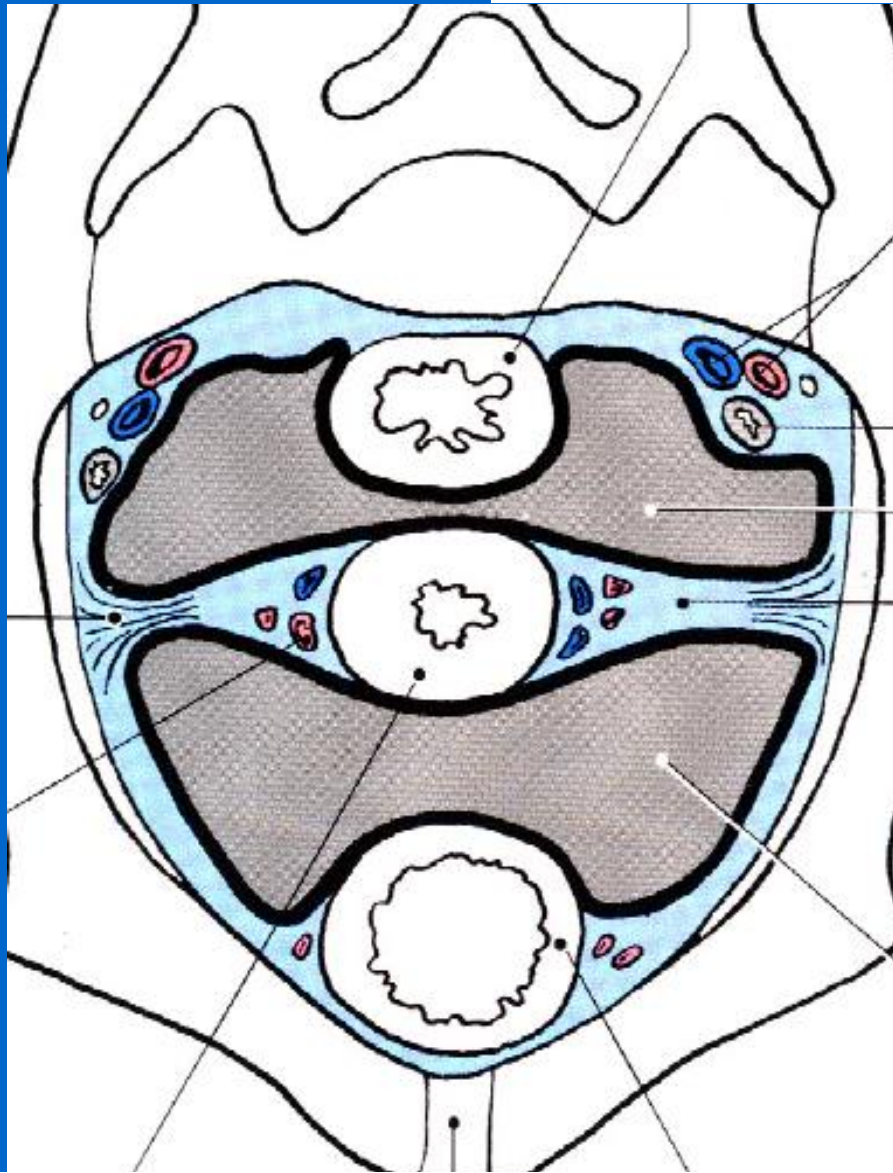
*Tendinous arch of levator ani*

*Levator ani*

*Projection of trigon of the bladder*

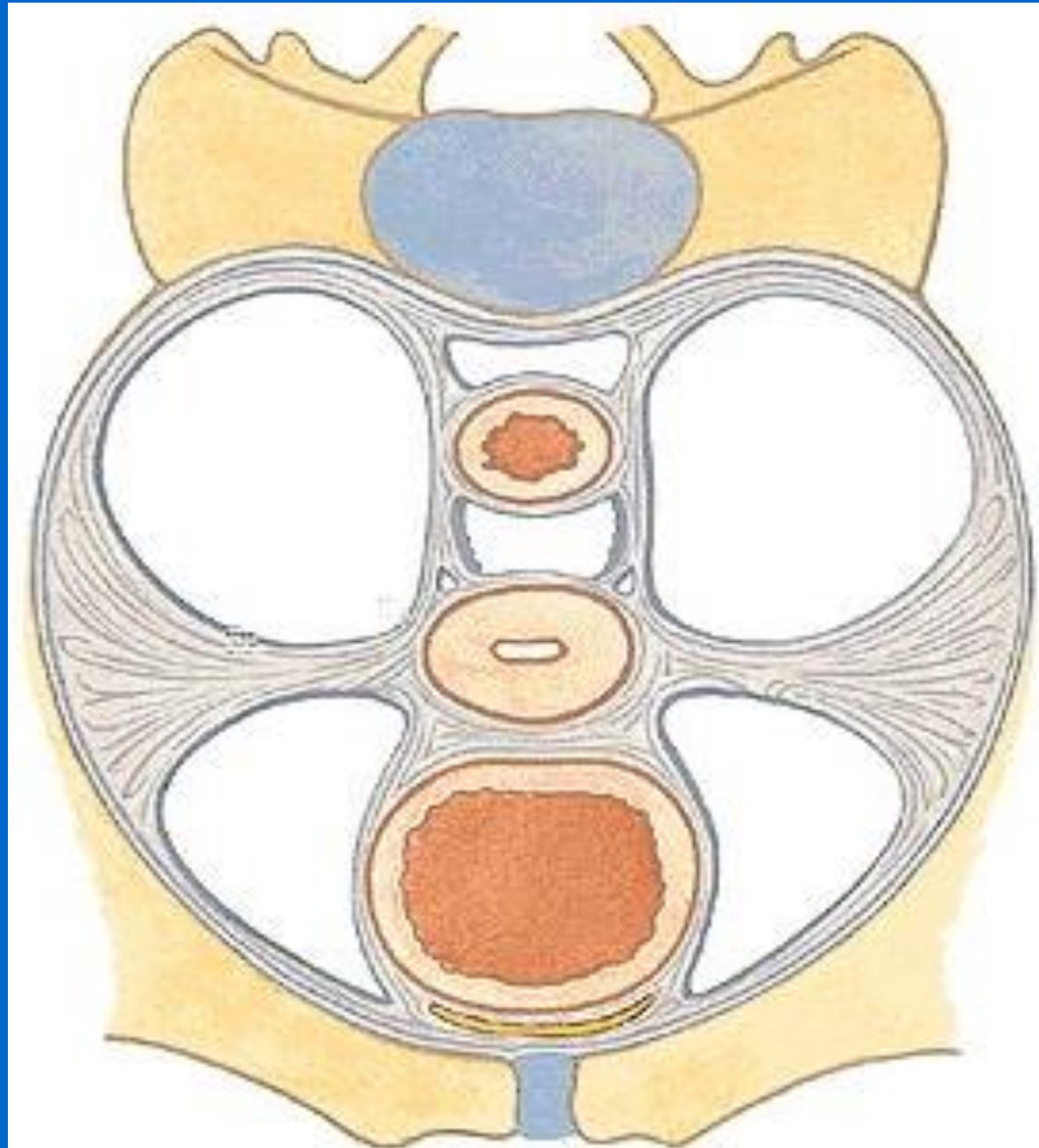


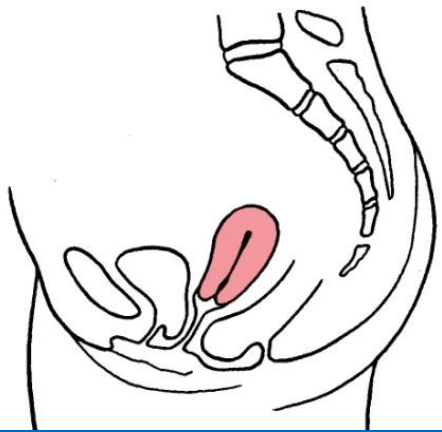
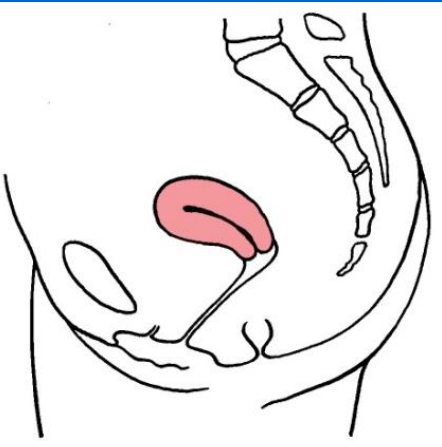
## Transverse section of the female pelvis

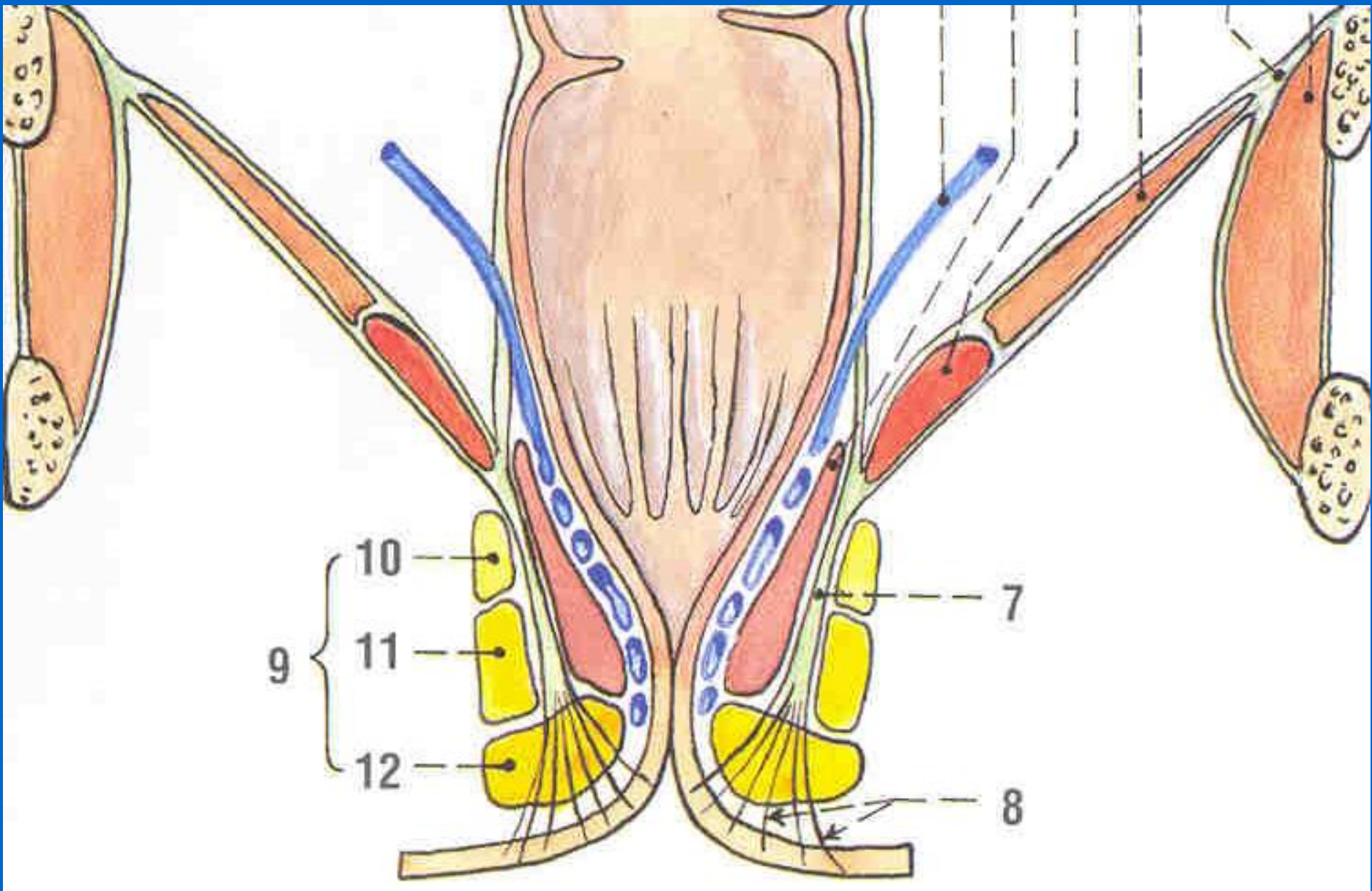


**Parametrium, broad ligament cardinal lig., transverse cervical lig.  
uterosacral lig., recto-uterine lig., pubocervical lig., round lig. of uterus**

**Parametrium**  
Supporting  
apparatus of  
uterus,  
cardinal lig.  
(broad ligament)  
round ligament  
pubocervical lig.  
recto-uterine lig.





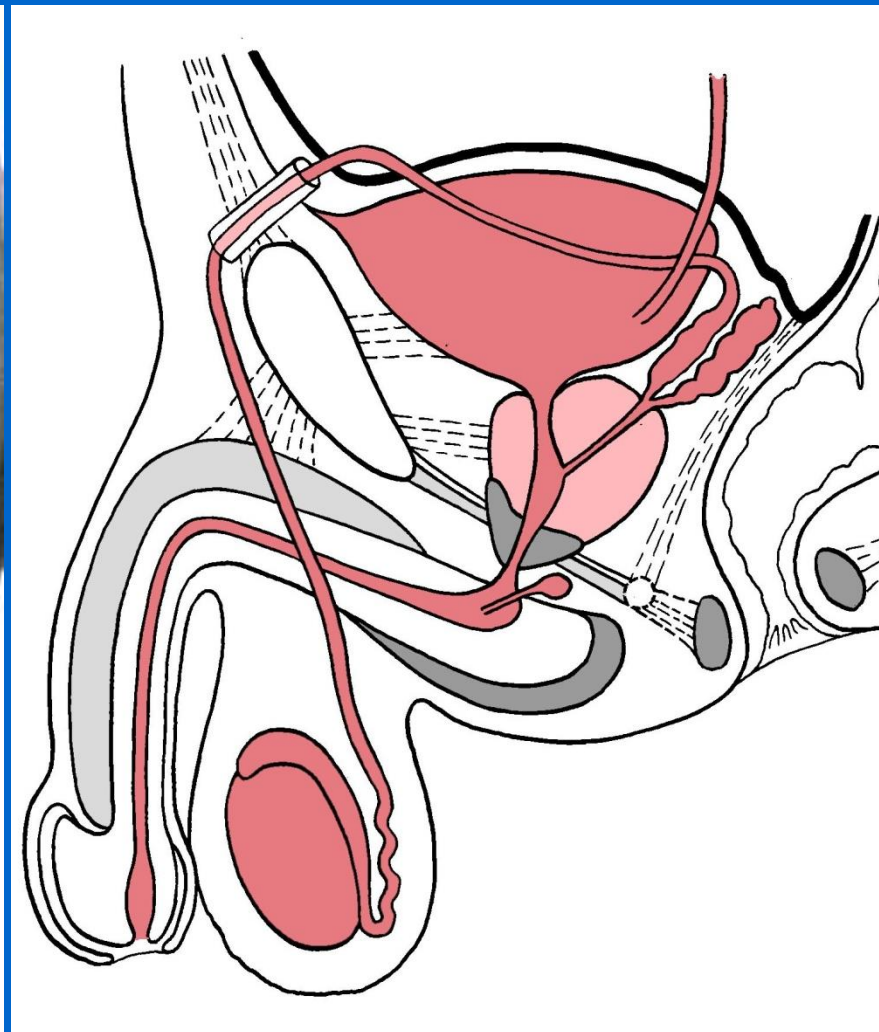
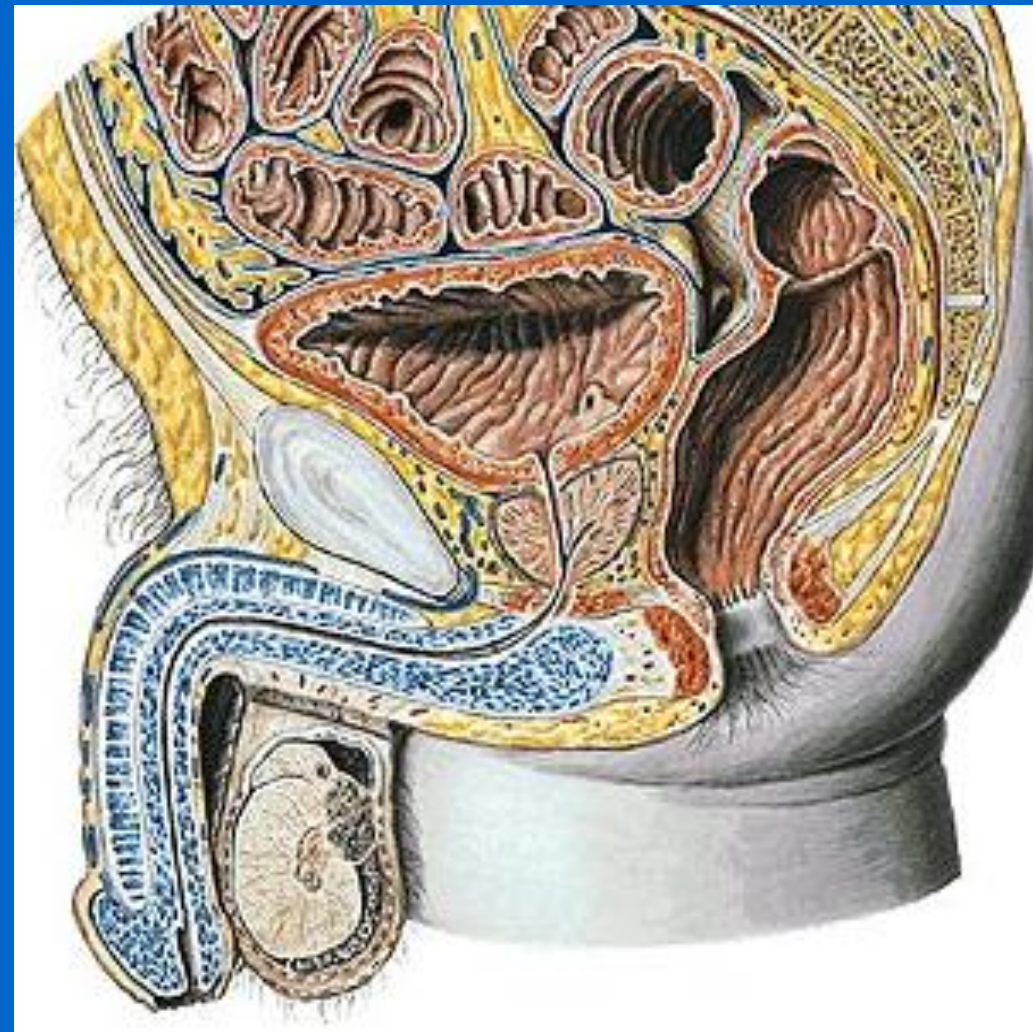


**Levator ani muscle and parts of external anal sphincter (9):  
deep part (10), superficial part (11), subcutaneous part (12)**



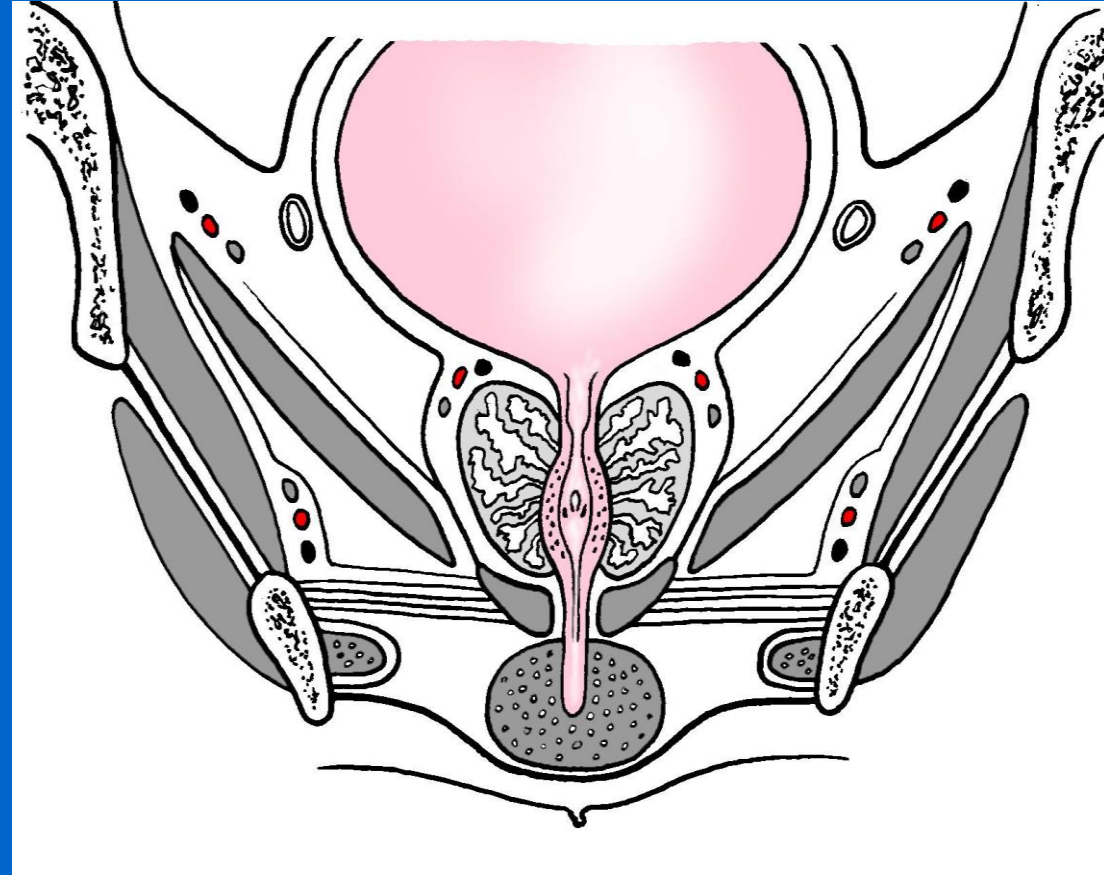
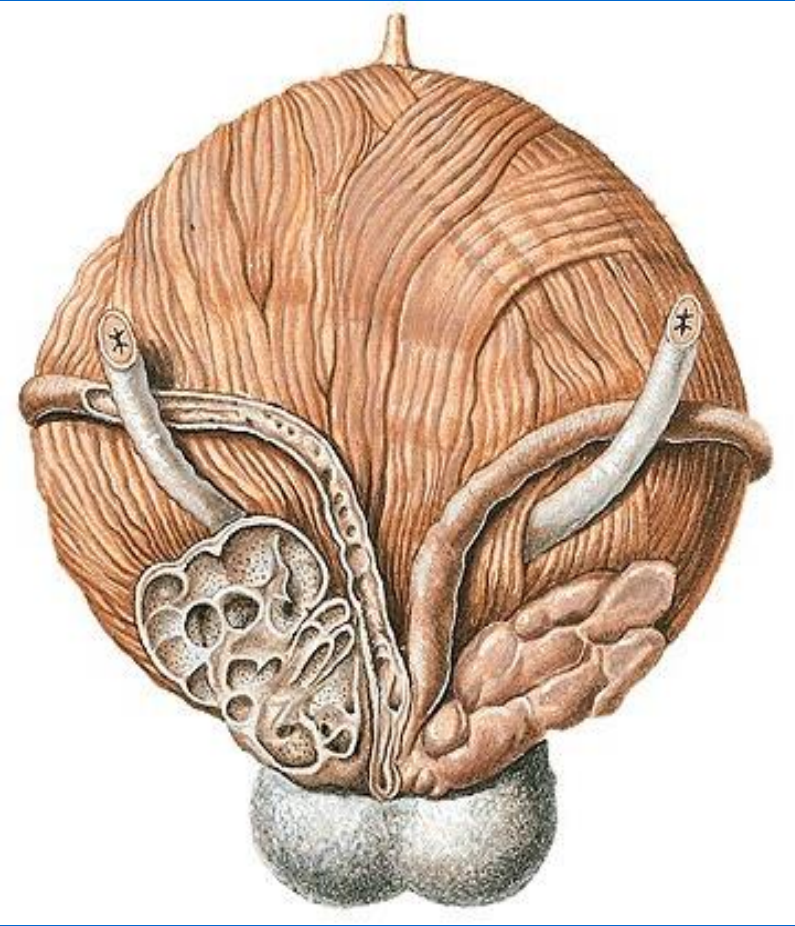
# Peritoneum and the male pelvis

## Syntopy of the urinary bladder in male

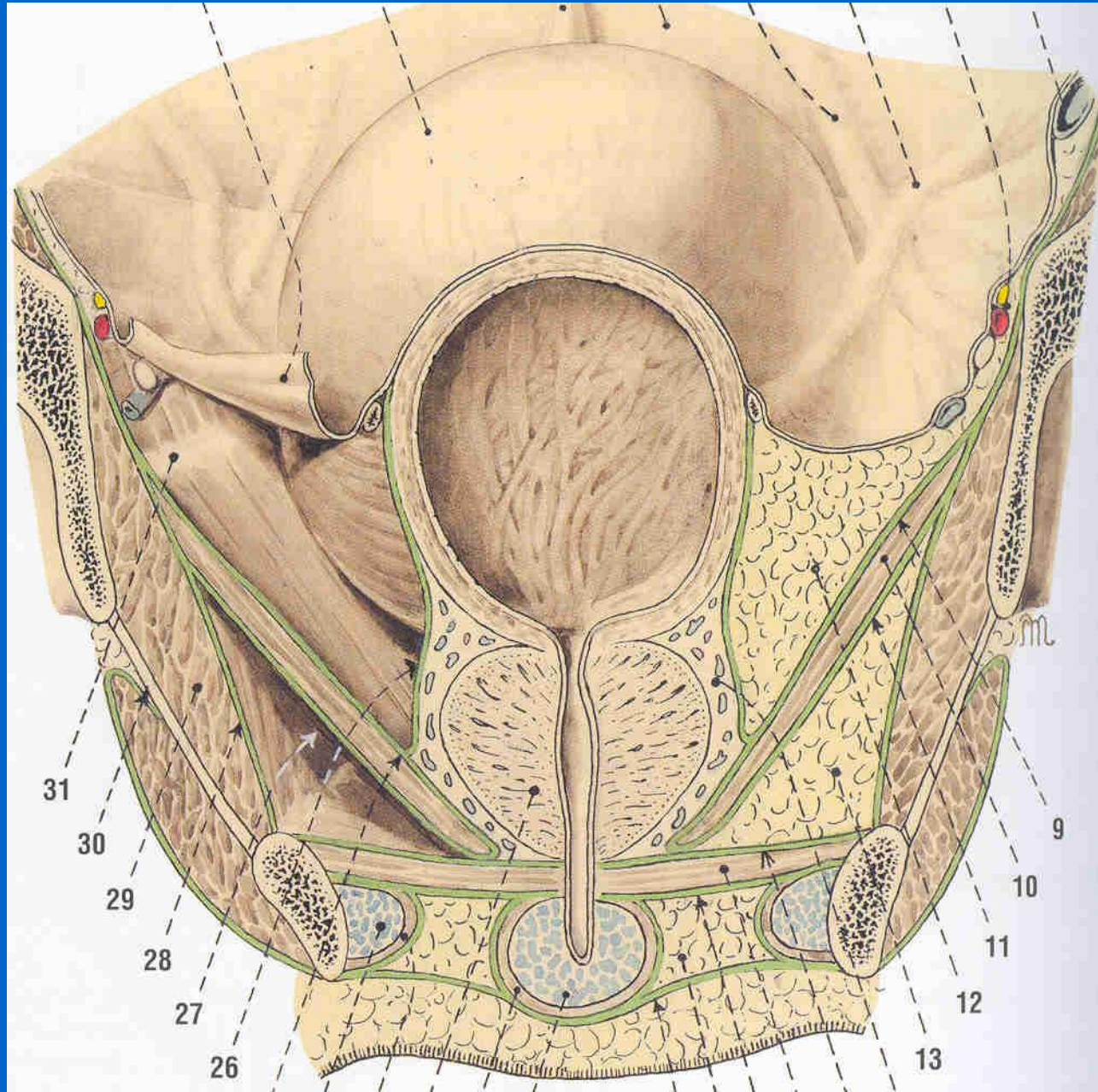


recto-vesical pouch, pubo-vesical lig., pubo-prostatic lig., retropubic space, recto-vesical septum, paracystium

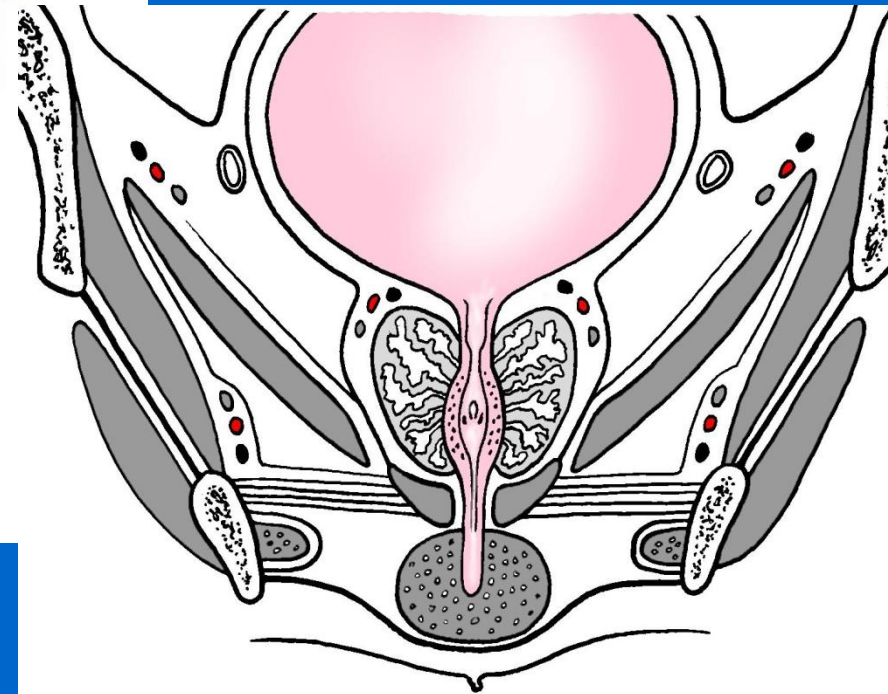
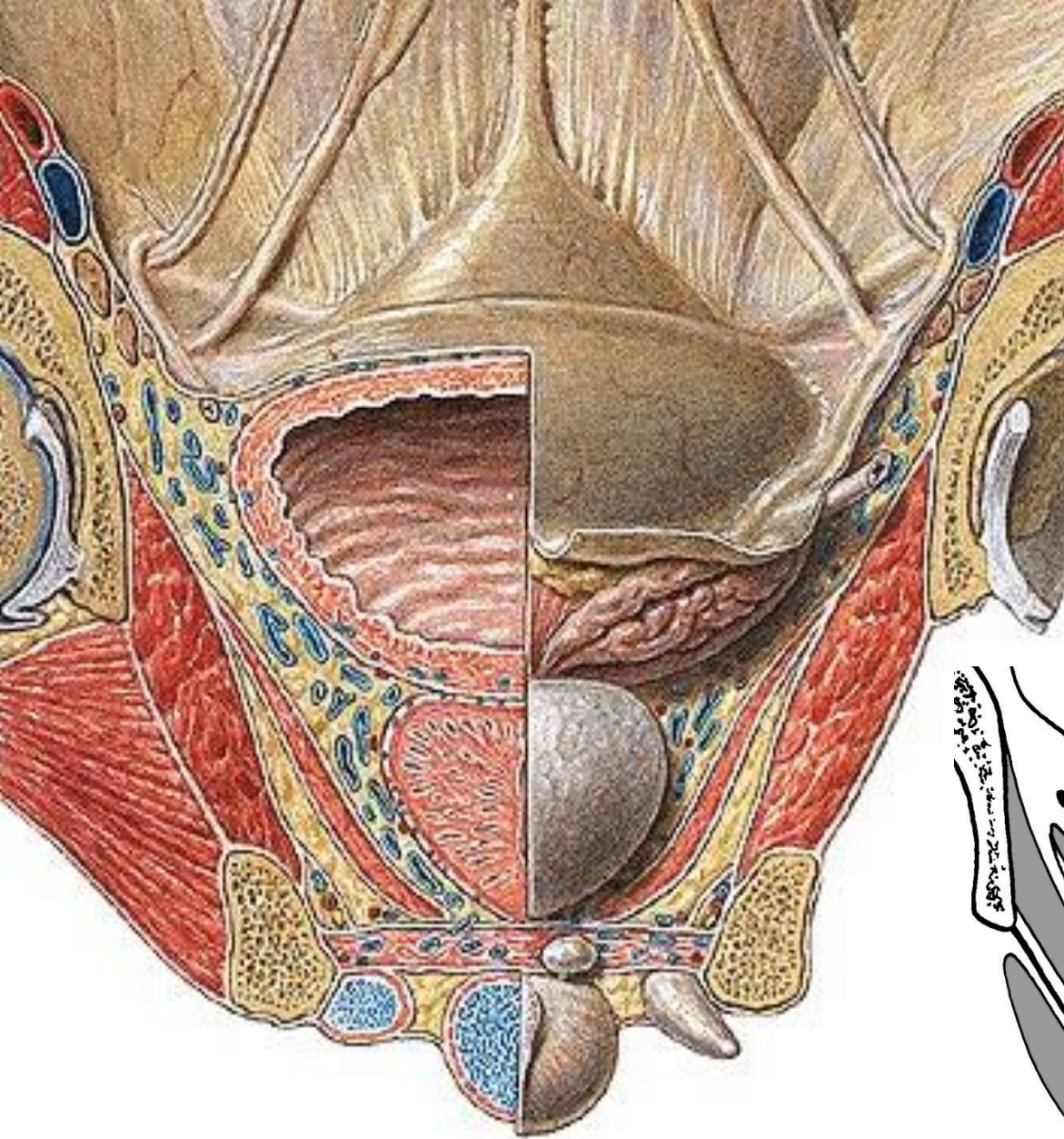
# Interampullar trigon, syntopy of prostate



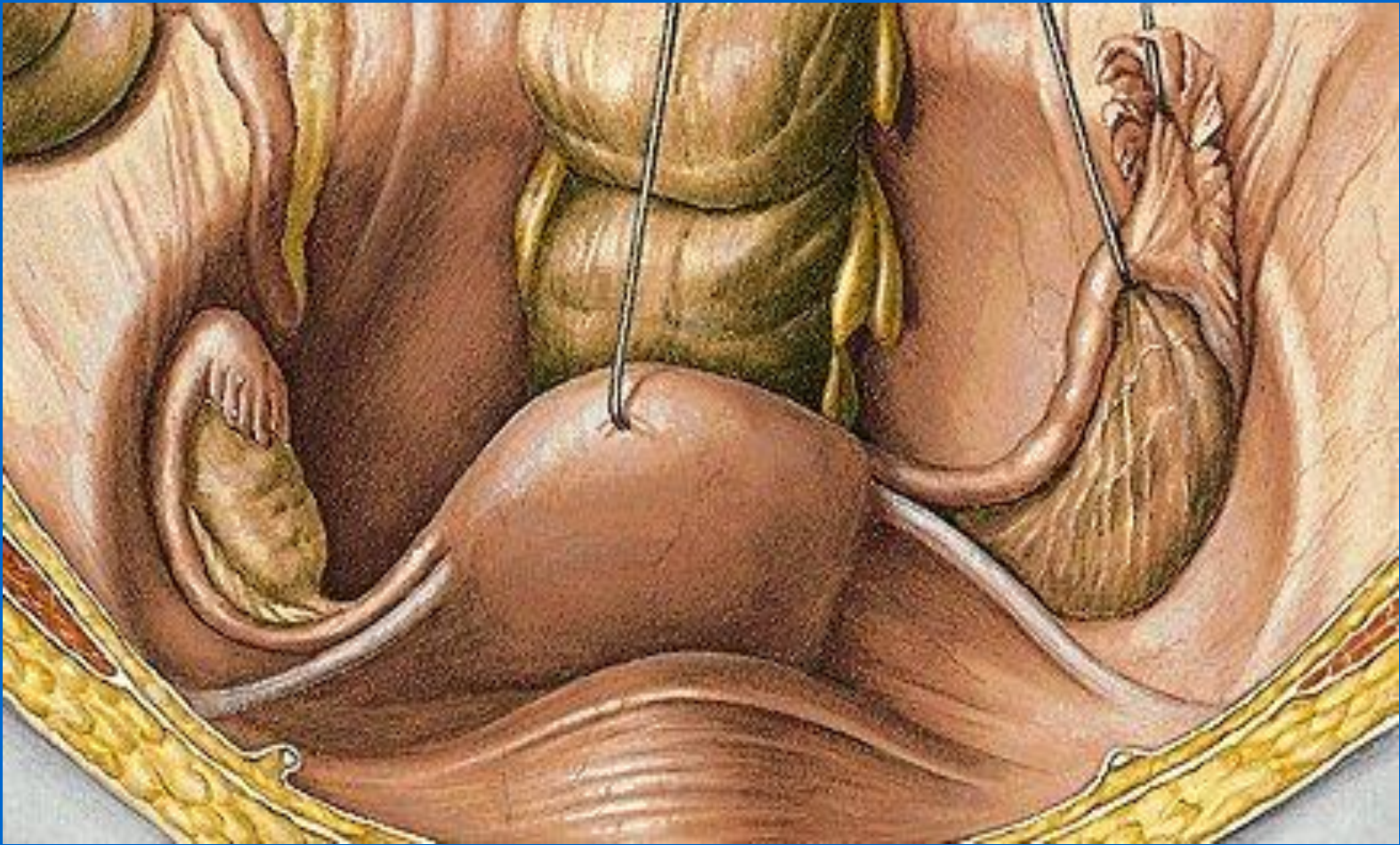
# Ischioanal fossa



**Syntopy of  
urinary bladder in  
male on frontal  
section**



Peritoneum and the female pelvis  
Uterus,  
Uterine tubes,  
Ovaries



**Uterus** - fundus, horns, body, isthmus, cervix, intestinal surface, vesical surface, perimetrium, round ligament  
**Ovary, Uterine tube**

# Female genital organs

## Internal genital organs

Ovary, Uterine tube,  
Uterus, Vagina

## External genital organs

Pudendum (vulva)

Mons pubis

Labium majus

Labium minus

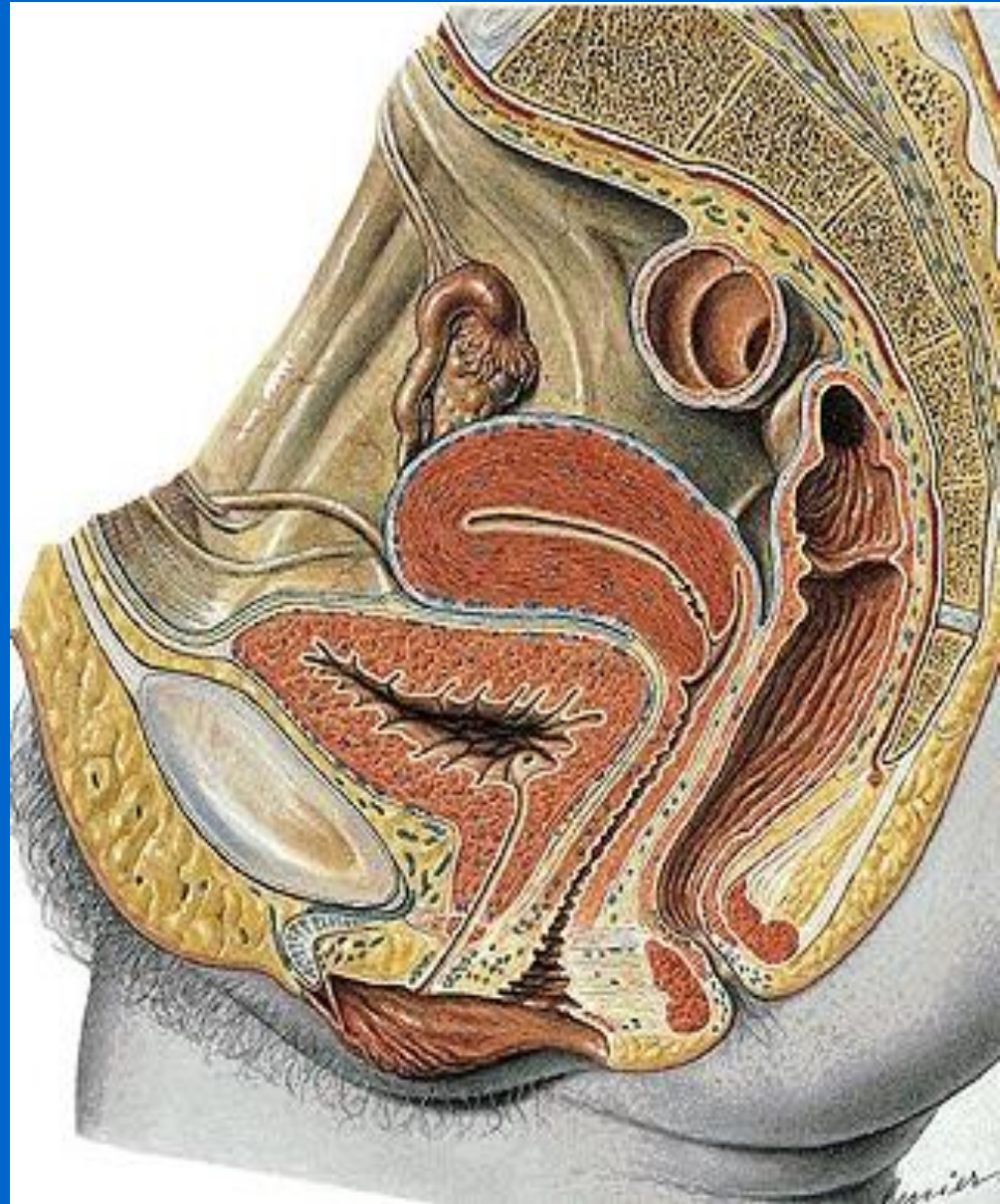
Pudendal cleft

Labium minus

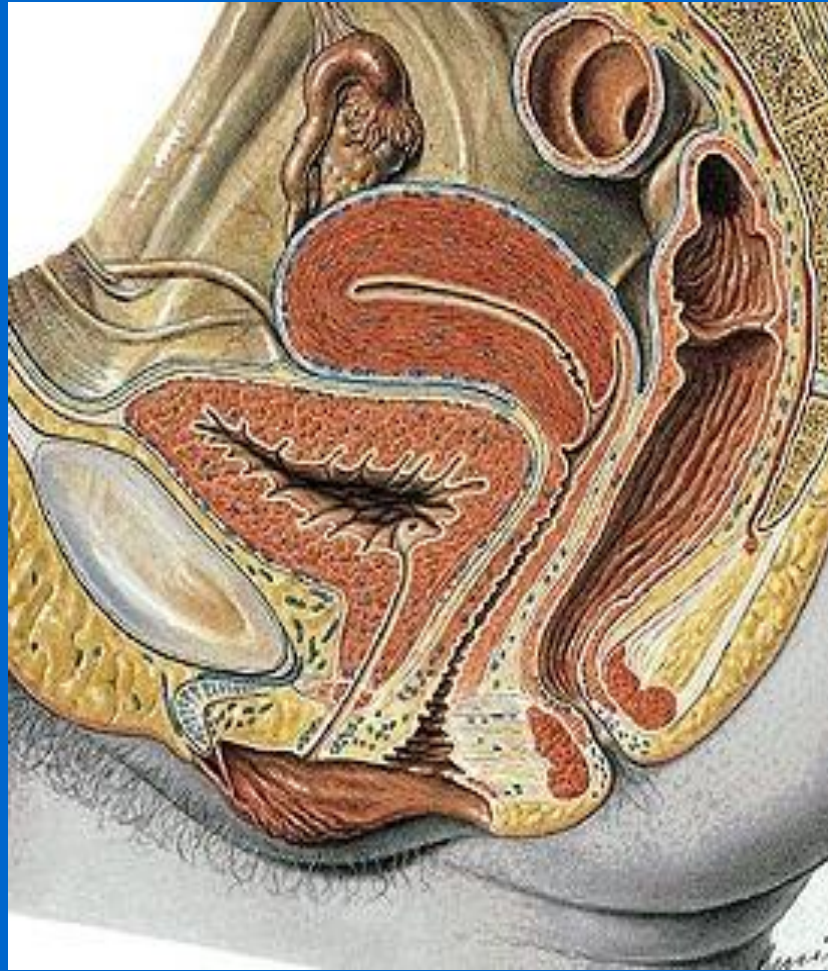
Vestibule

Bulb of vestibule

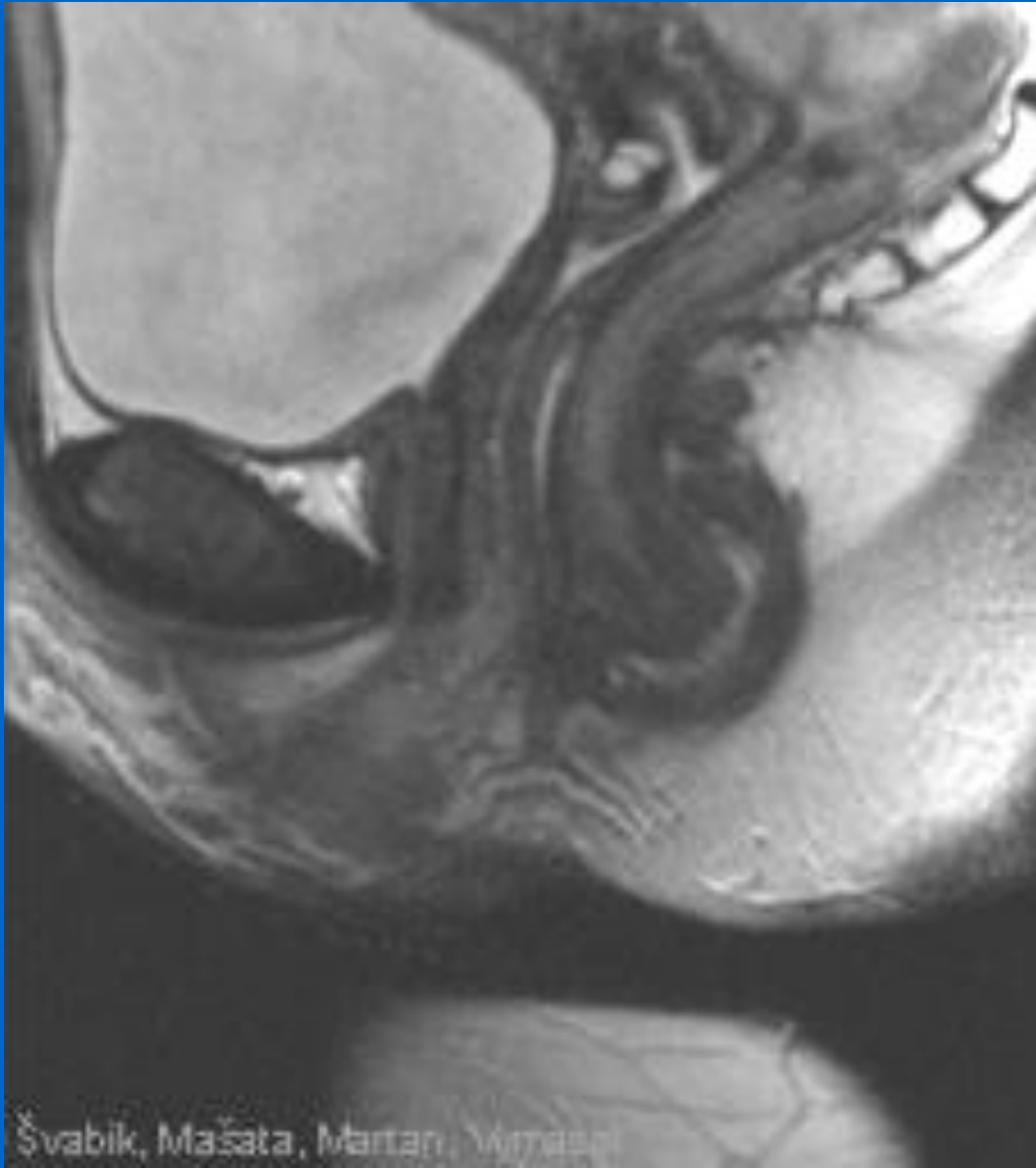
Clitoris





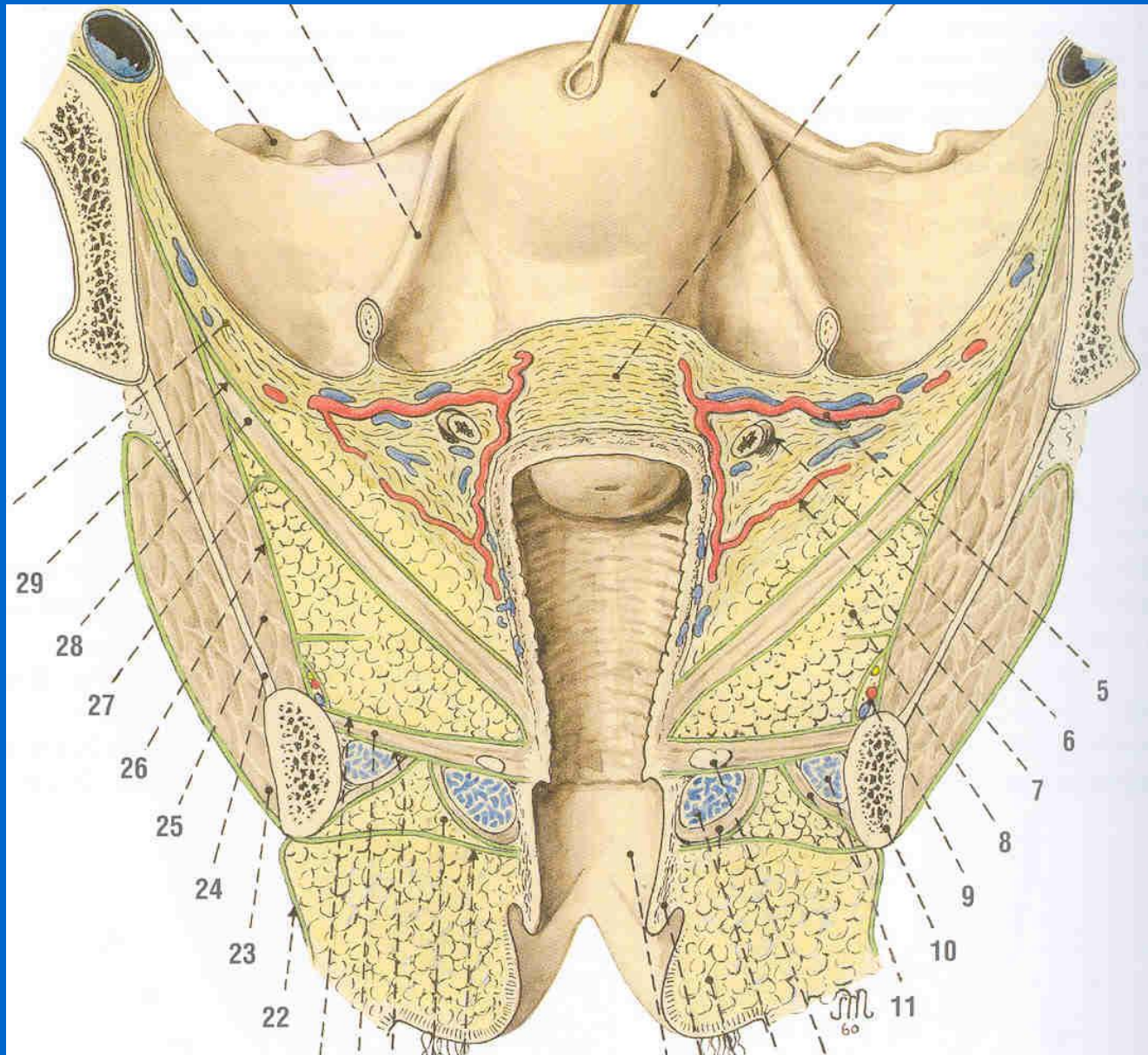


**Sagittal section of the female pelvis**

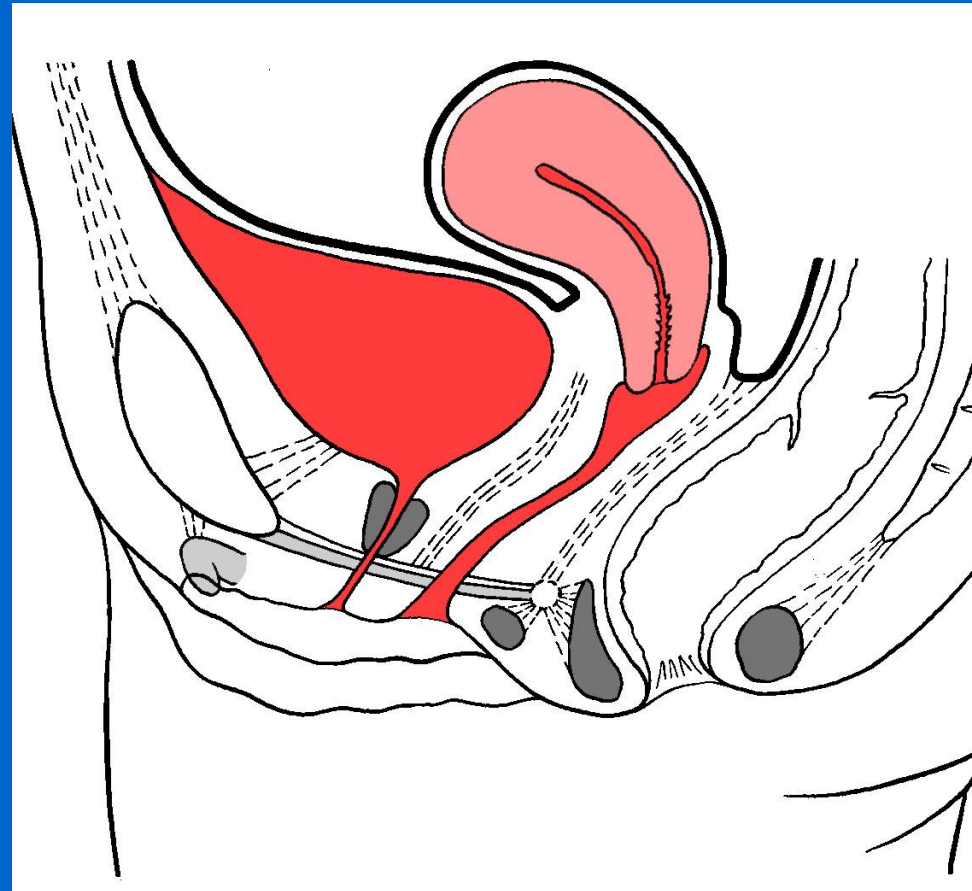
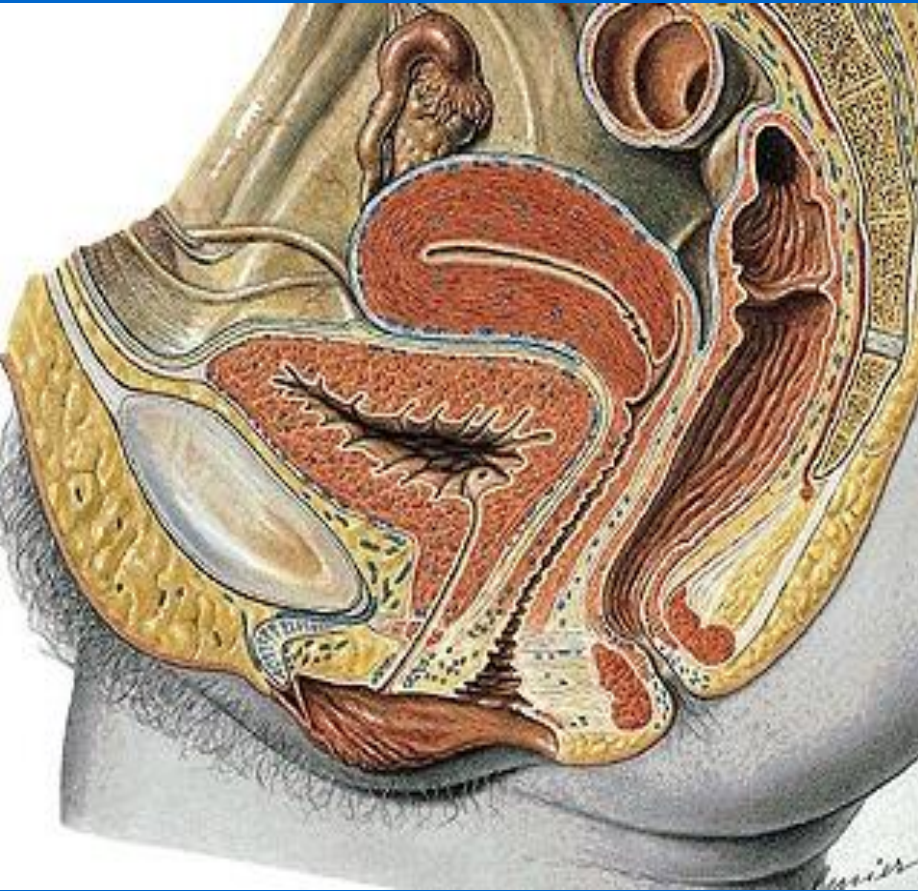


**MRI of female pelvis in sagittal plane**

# Ischioanal fossa, frontal section

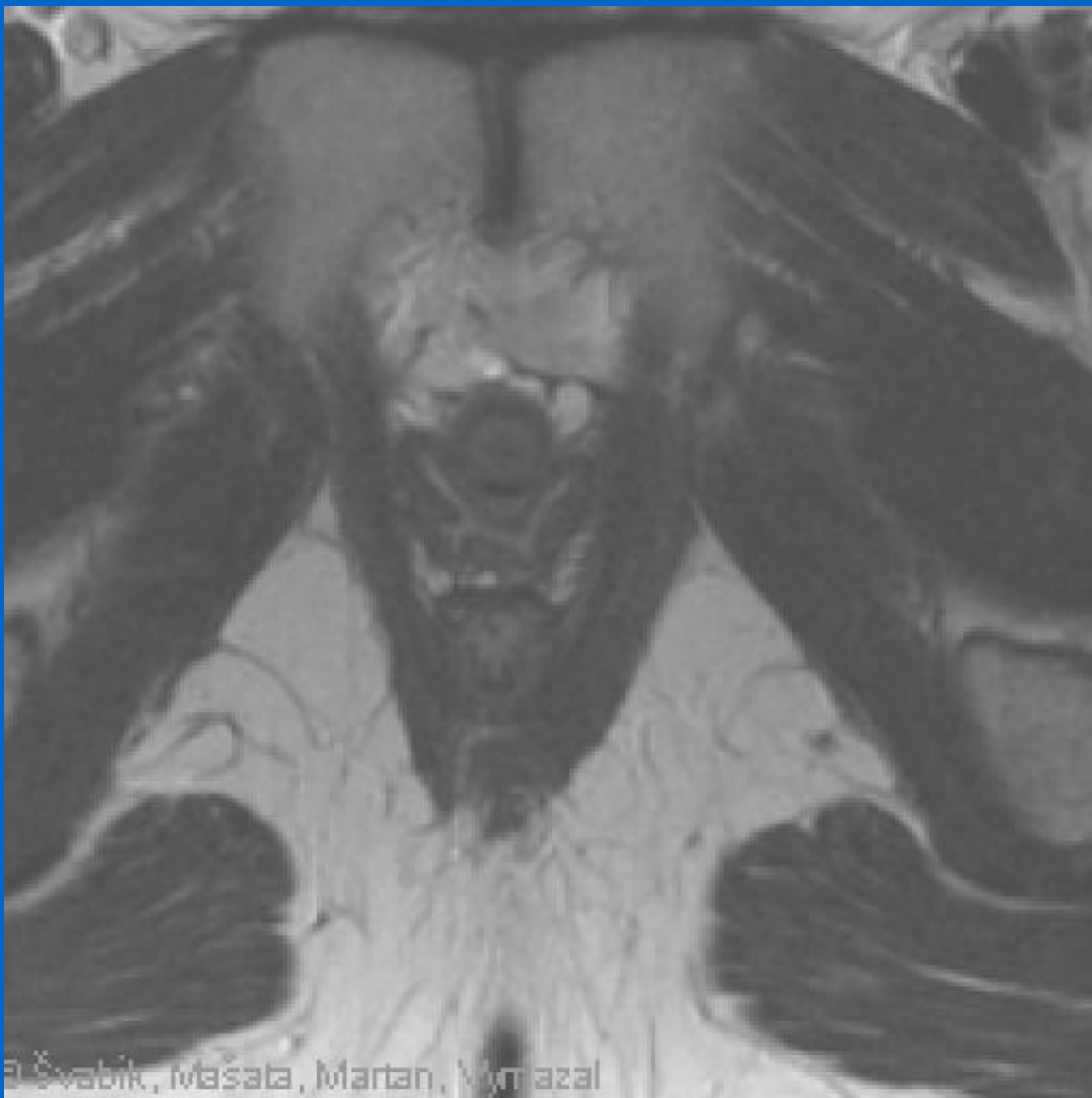


## Syntopy of the urinary bladder in female

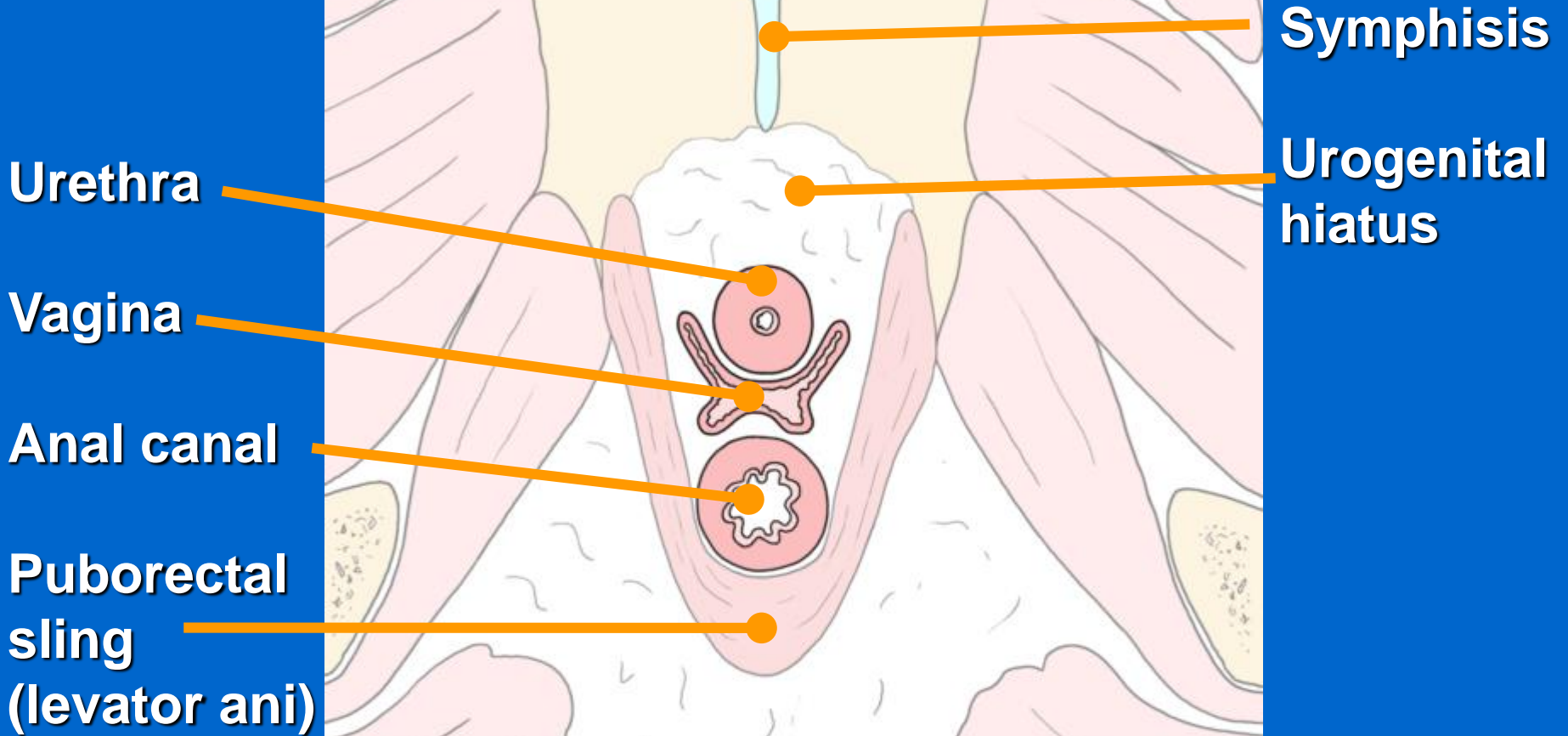


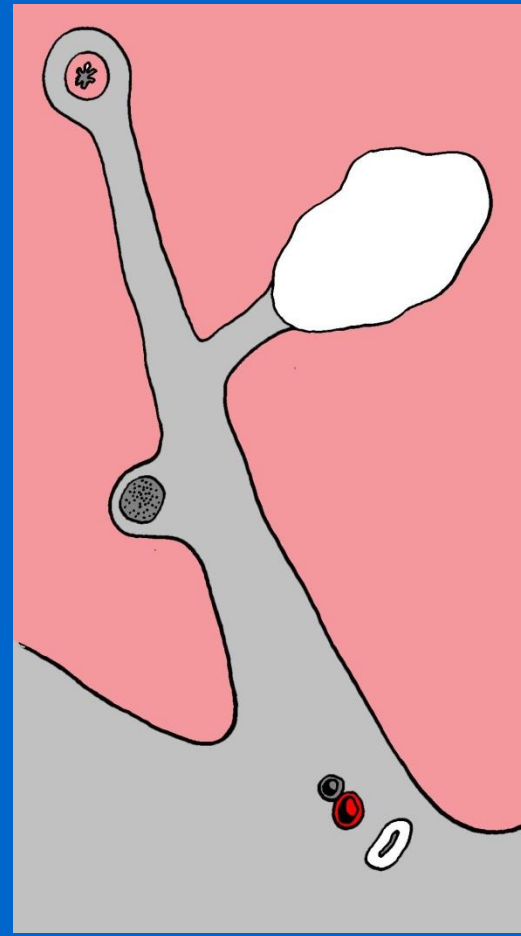
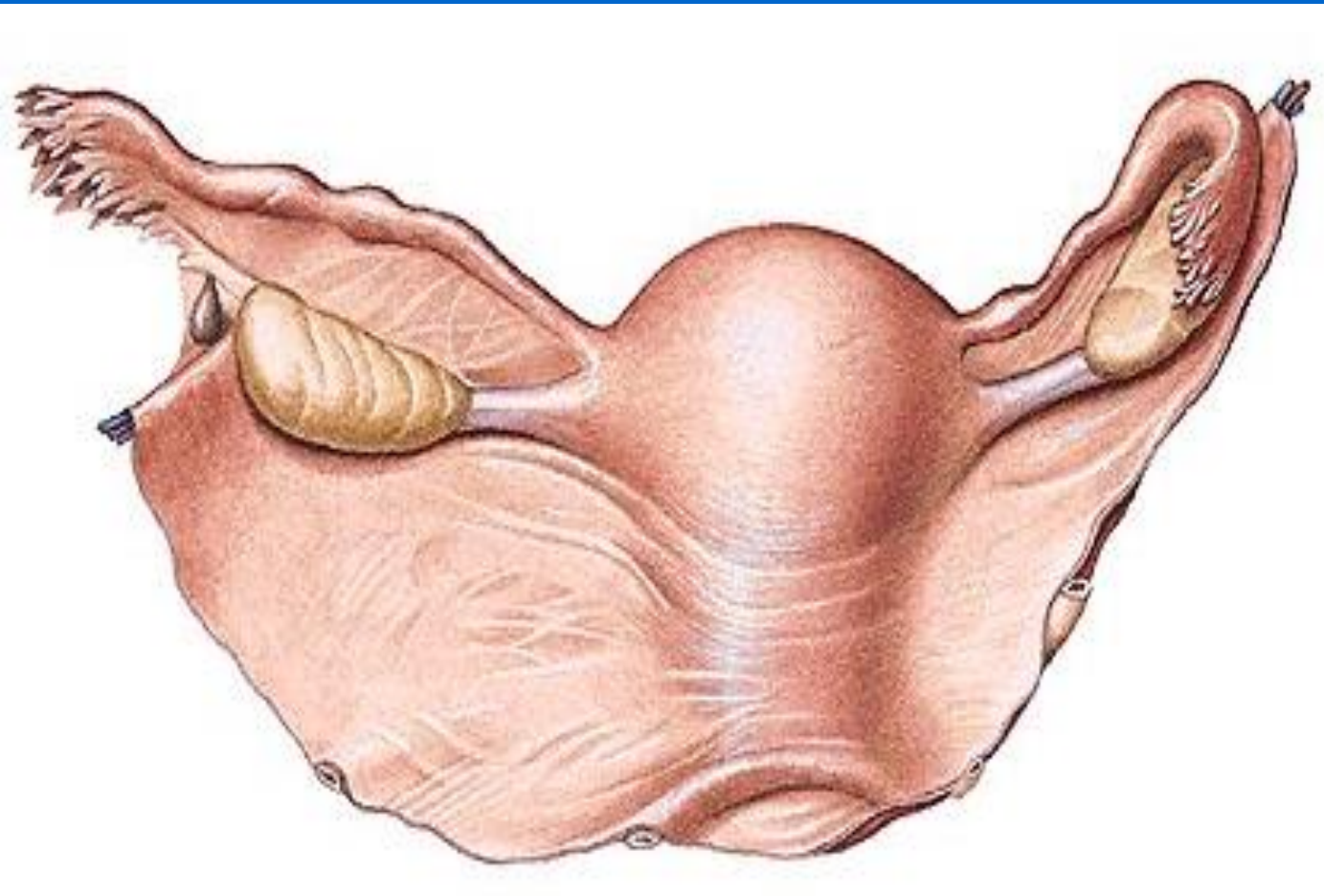
vesicouterine pouch, rectouterine pouch, pubovesical lig., retropubic space, vesicovaginal septum, paracystium, rectovaginal septum

# Urogenital hiatus (MRI)



# Anatomy of the pelvic outlet (scheme based on MRI)

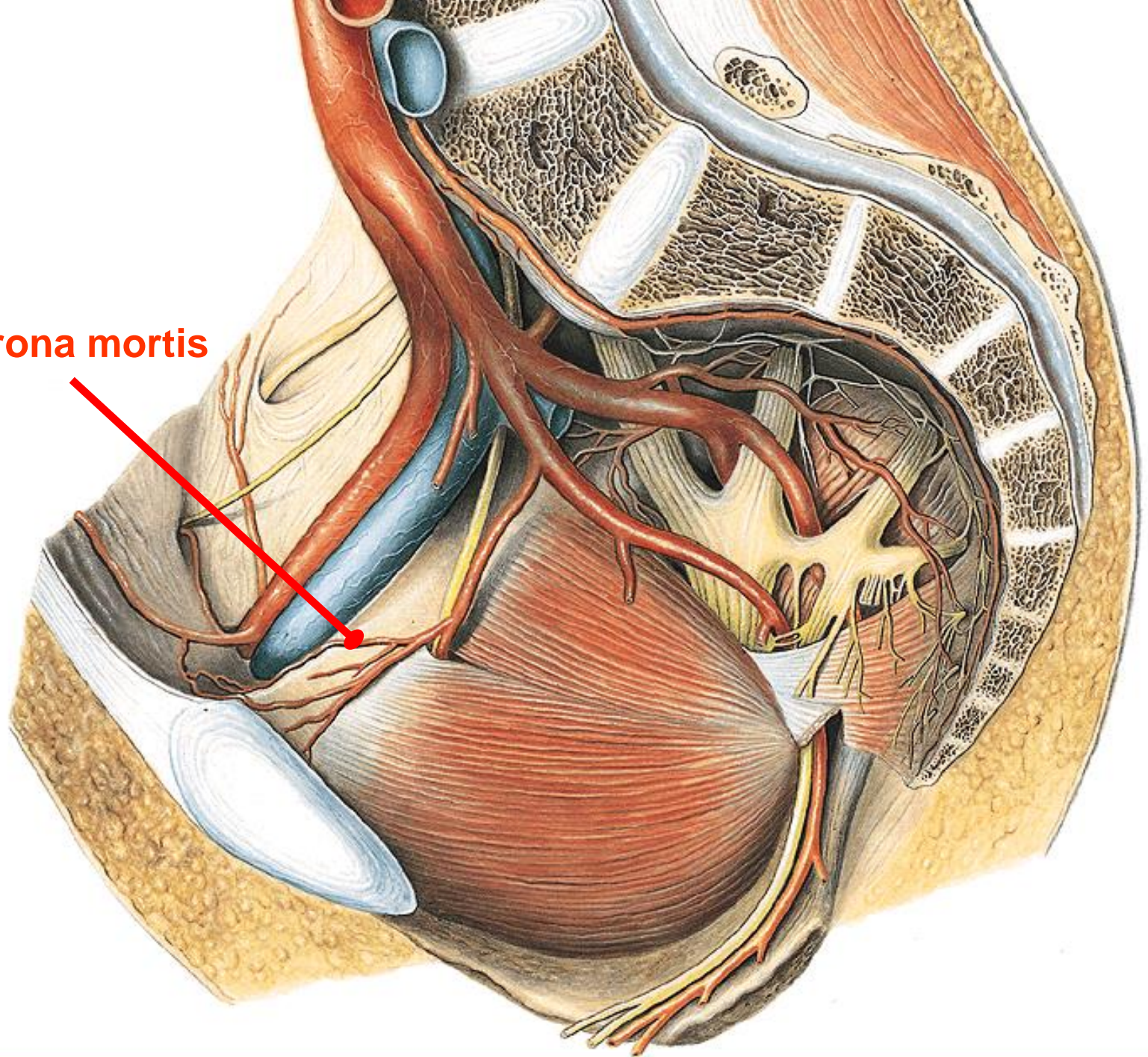




**Mesovarium, Uteroovarian lig., Suspensory lig. of ovary, Mesosalpinx, Mesometrium, Round ligament of uterus**

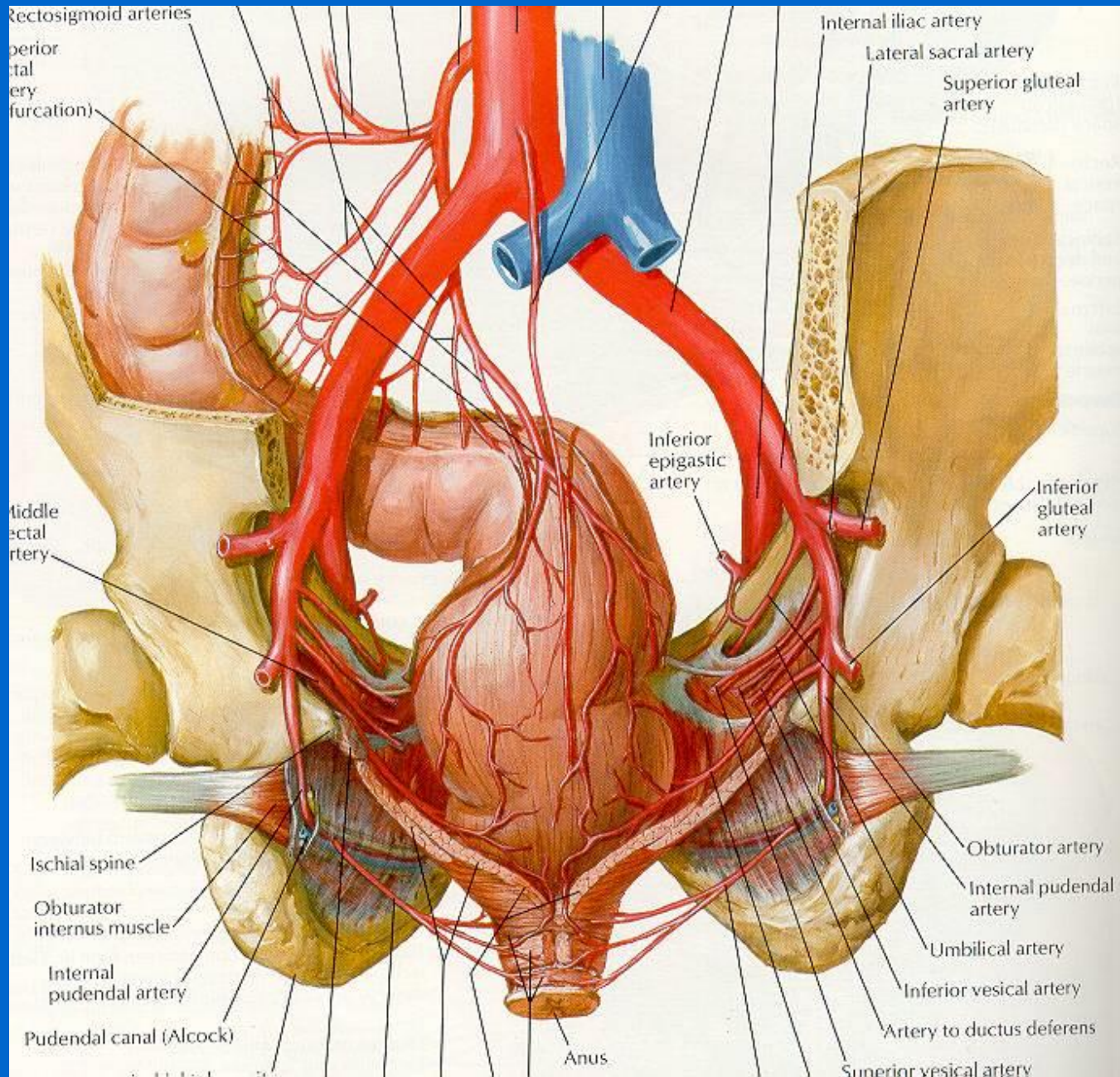
# Innervation and blood supply of pelvic viscera

**Corona mortis**

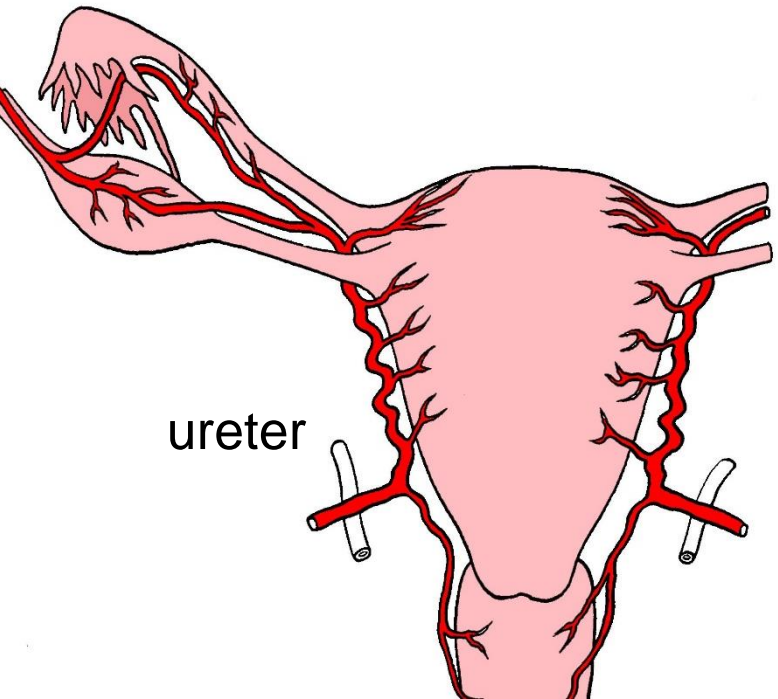
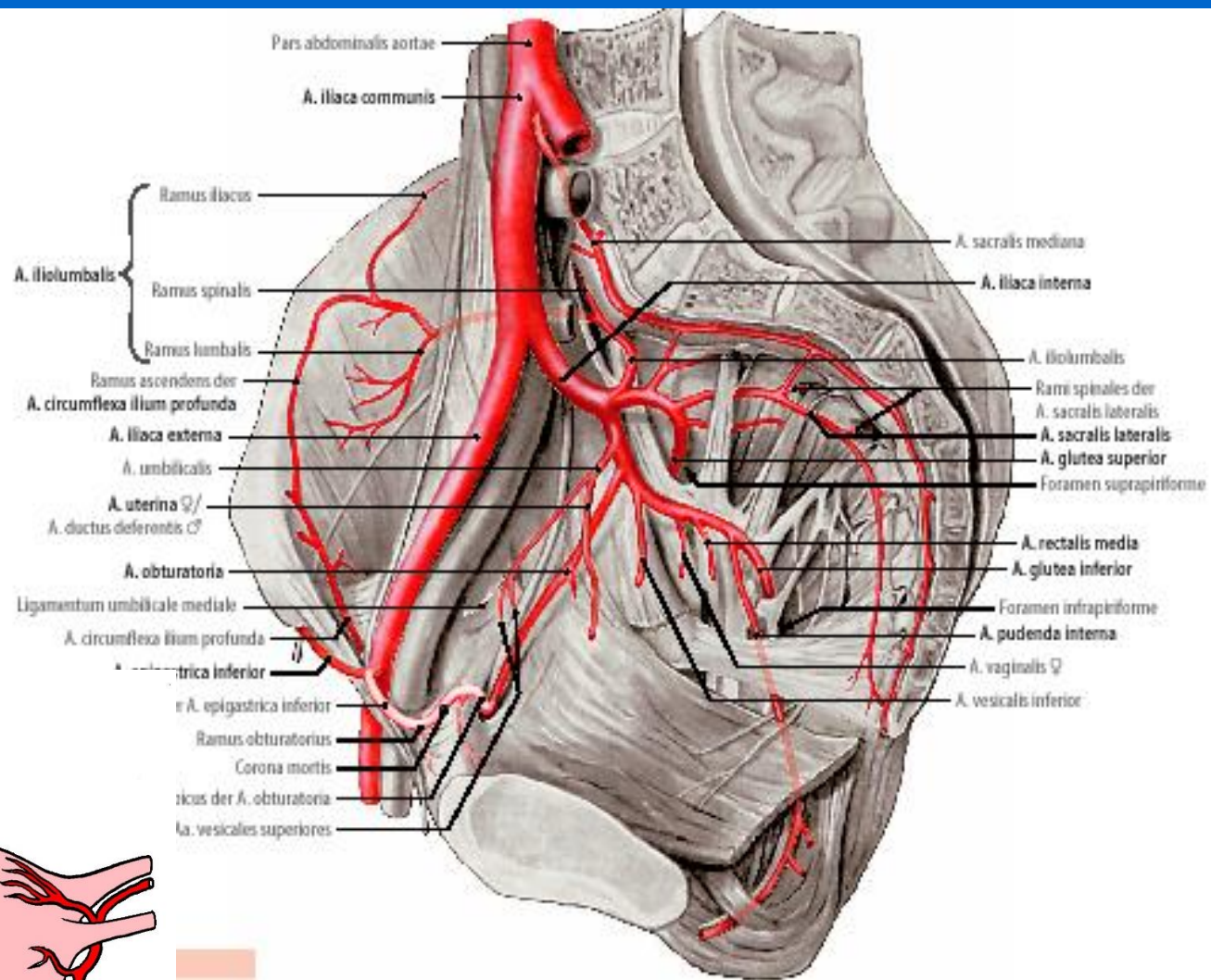




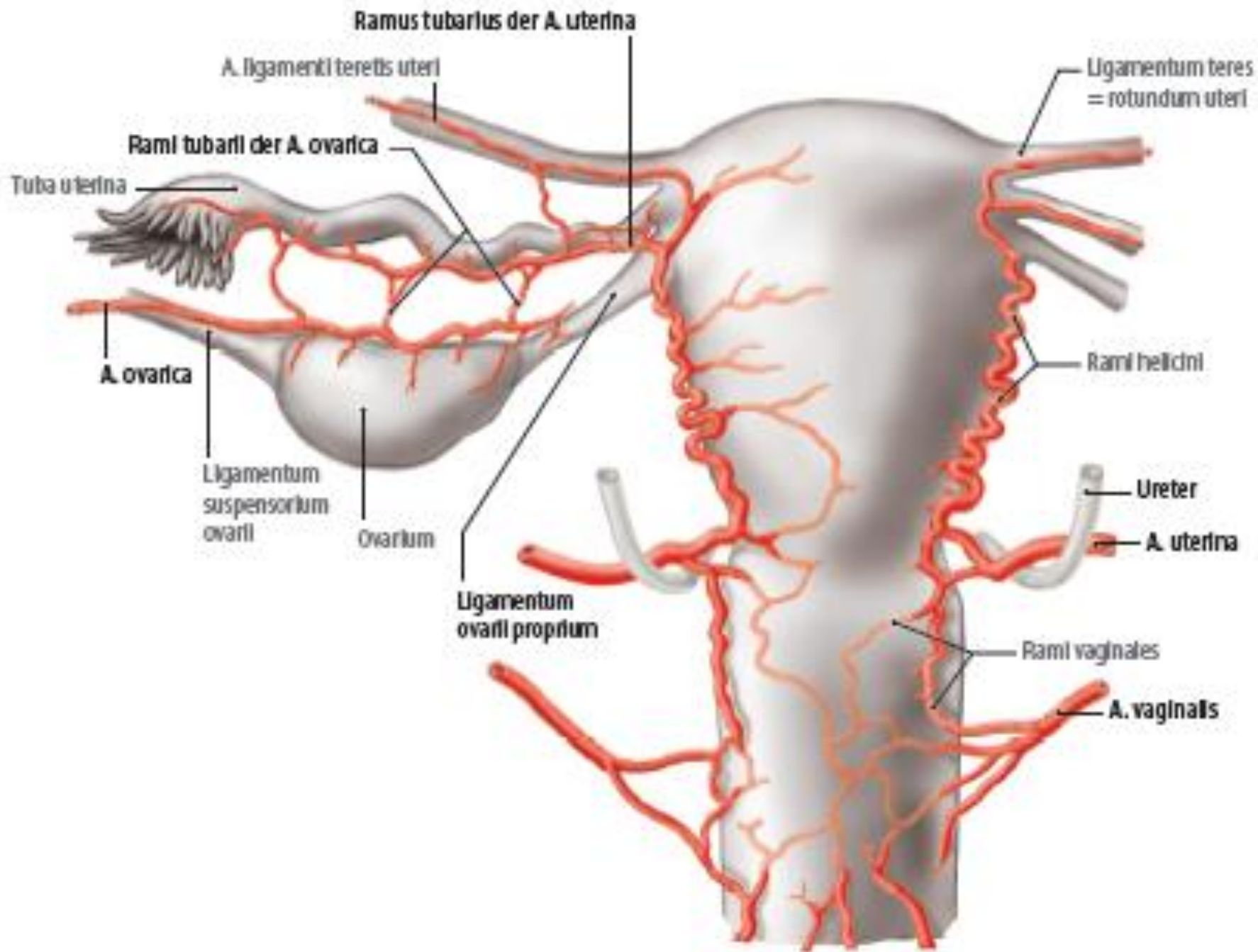
# Blood supply of the rectum



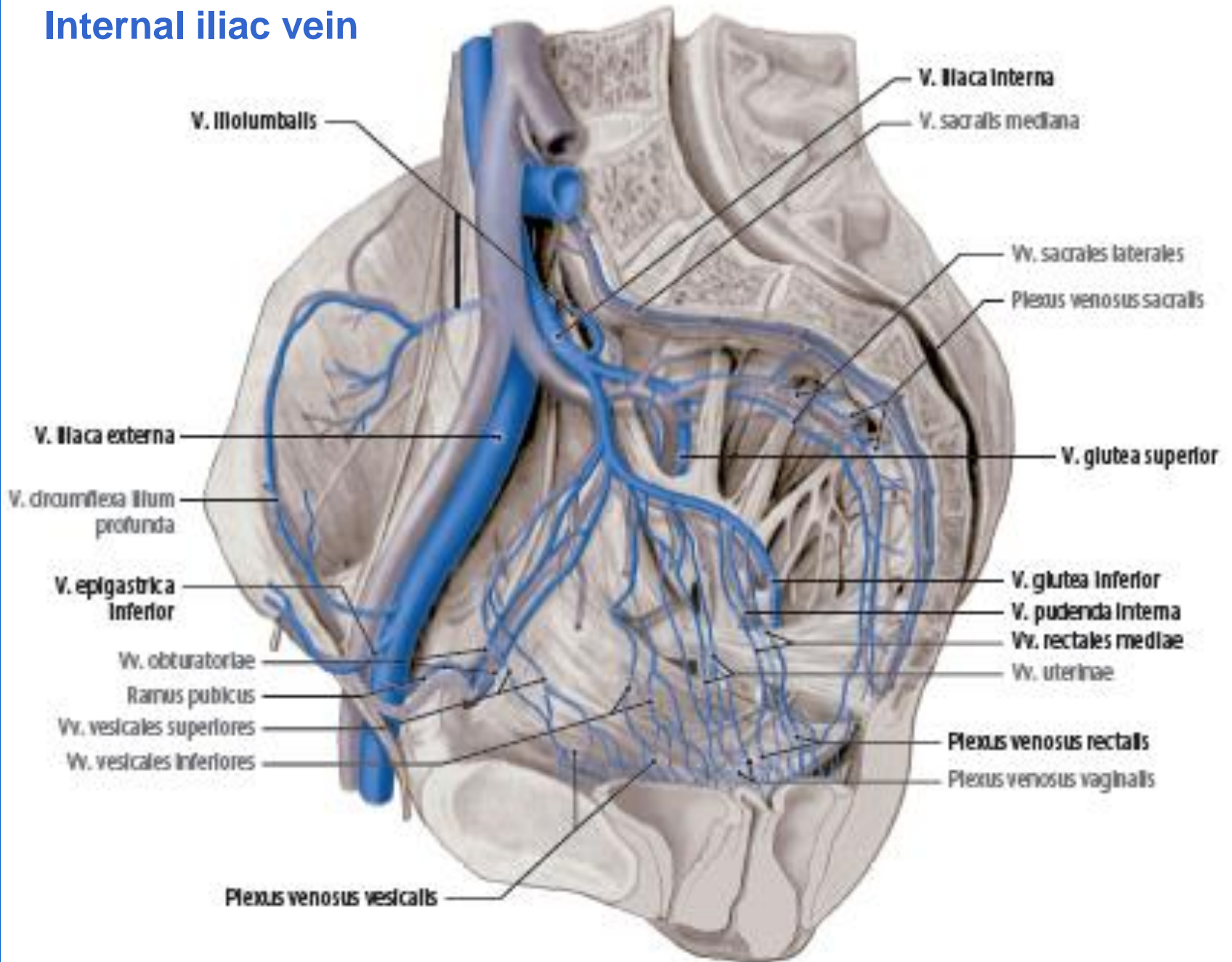
# A. Iliaca interna

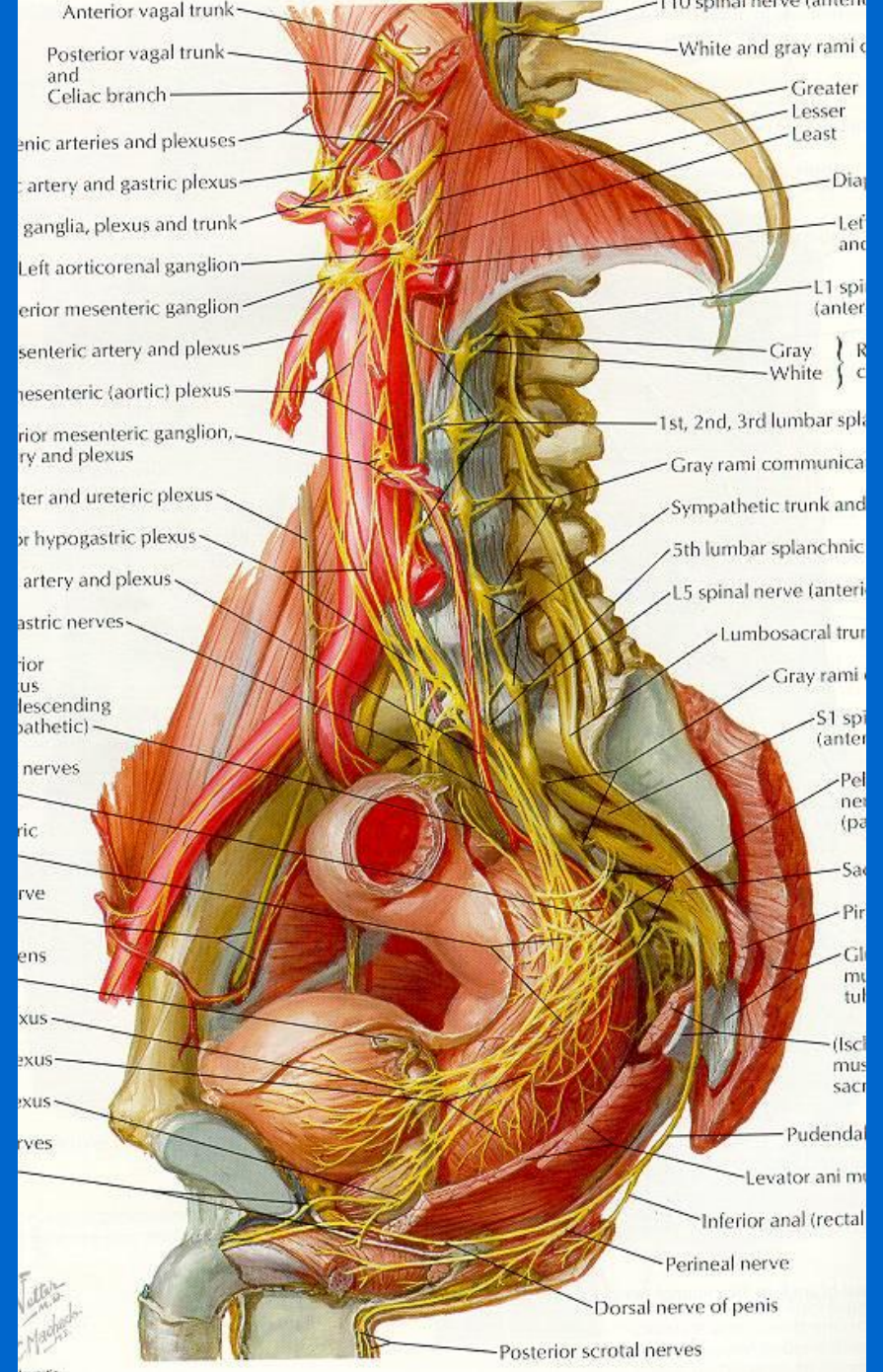


# A. ovarica, a. uterina

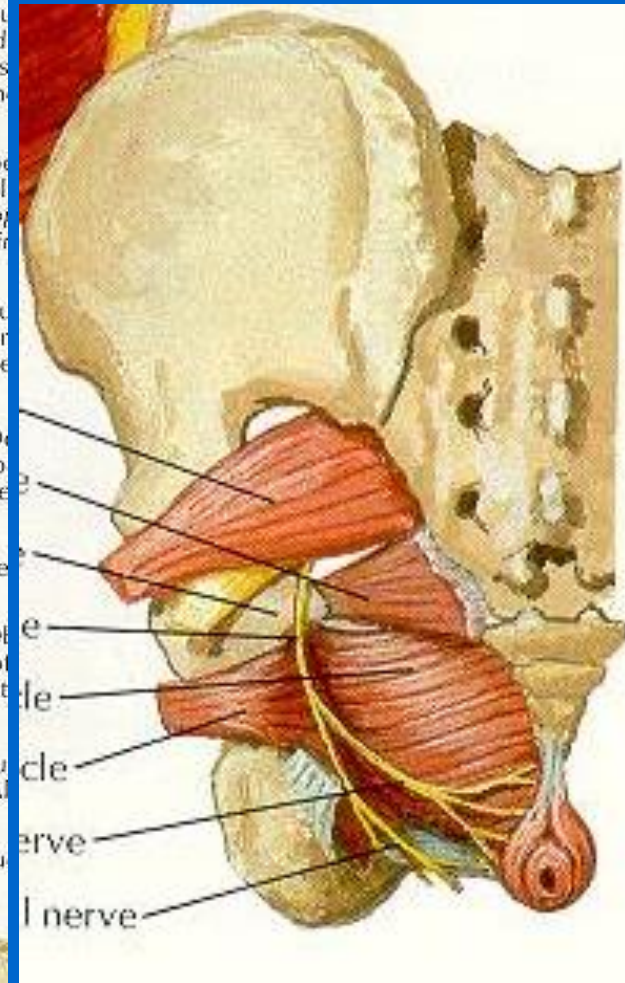
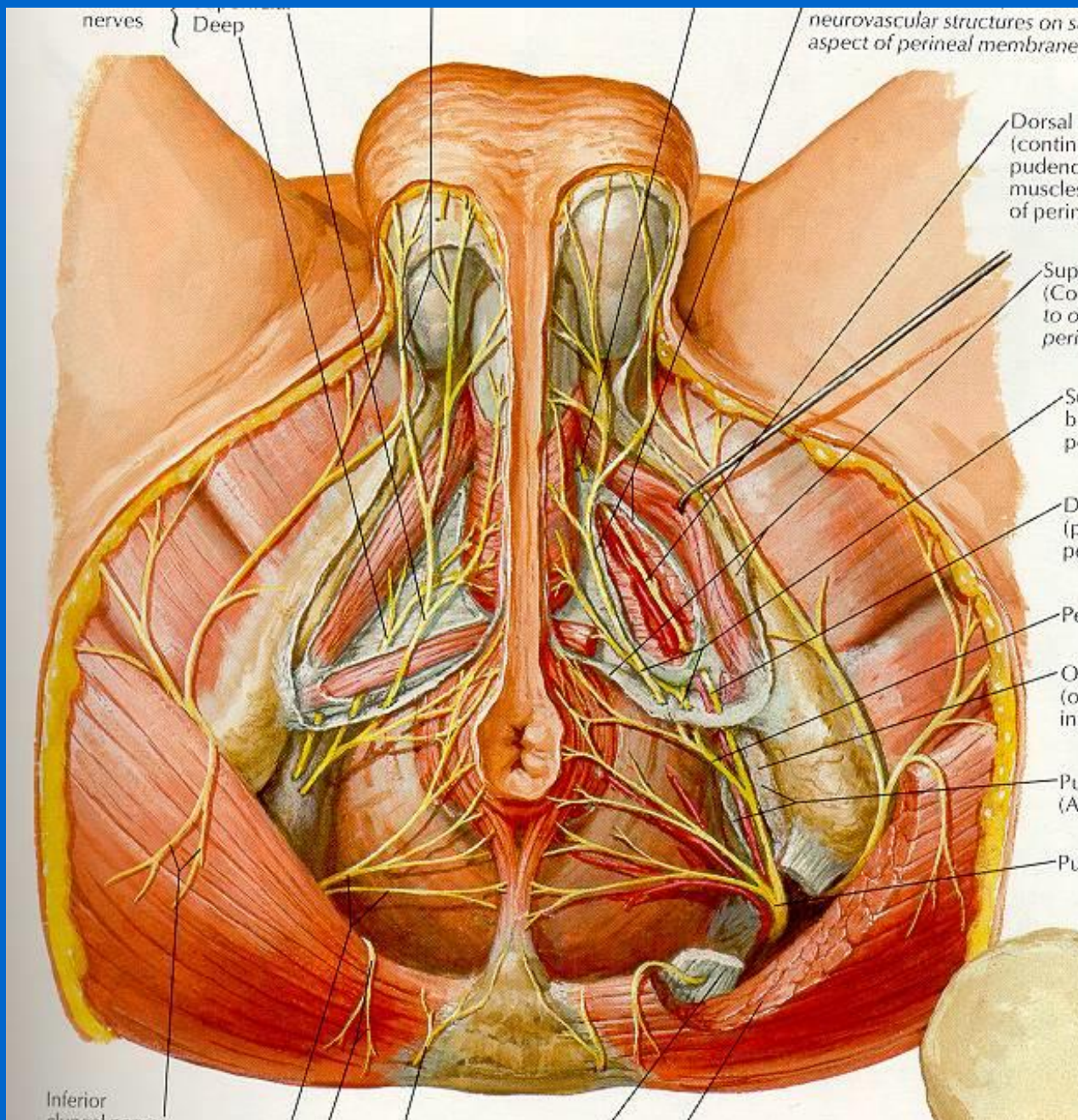


# Internal iliac vein

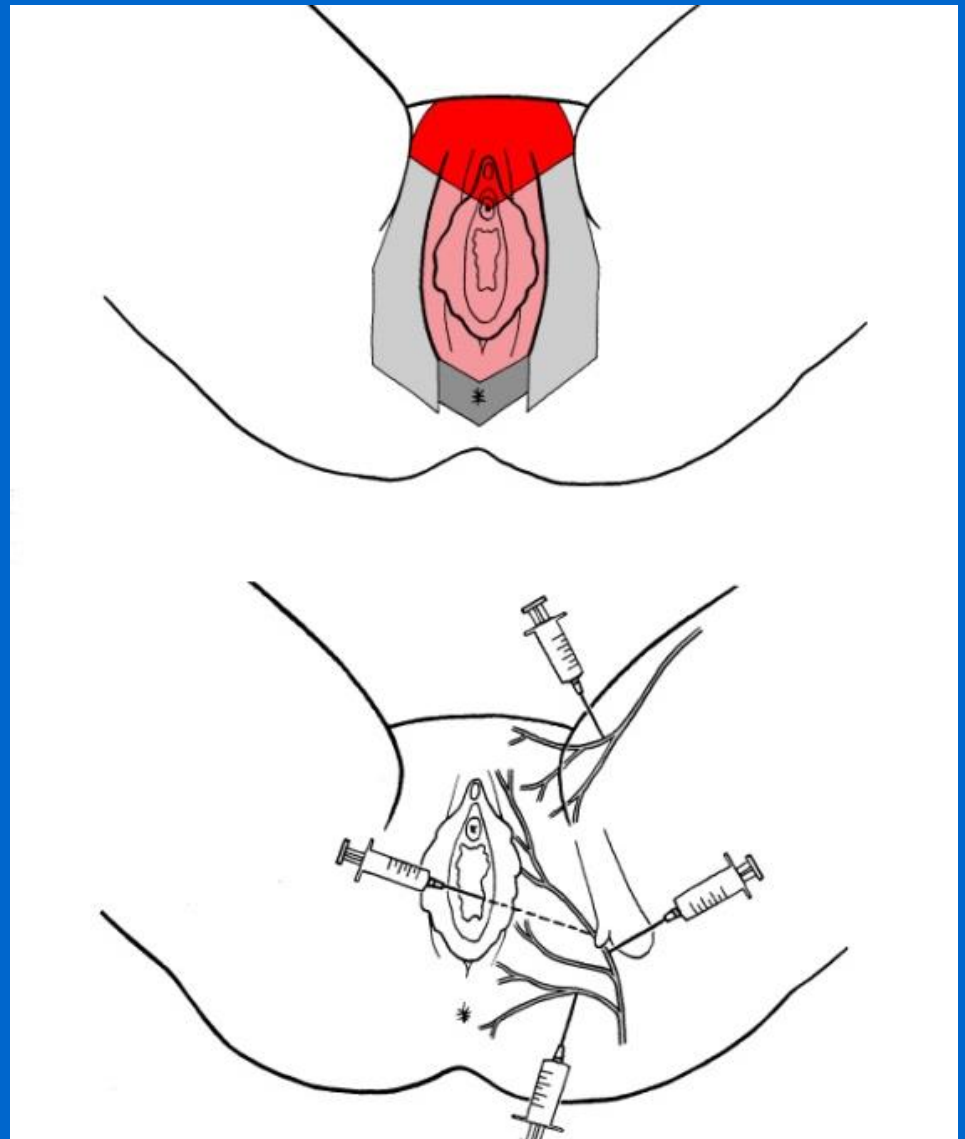




# Innervation of pelvic organs and perineum

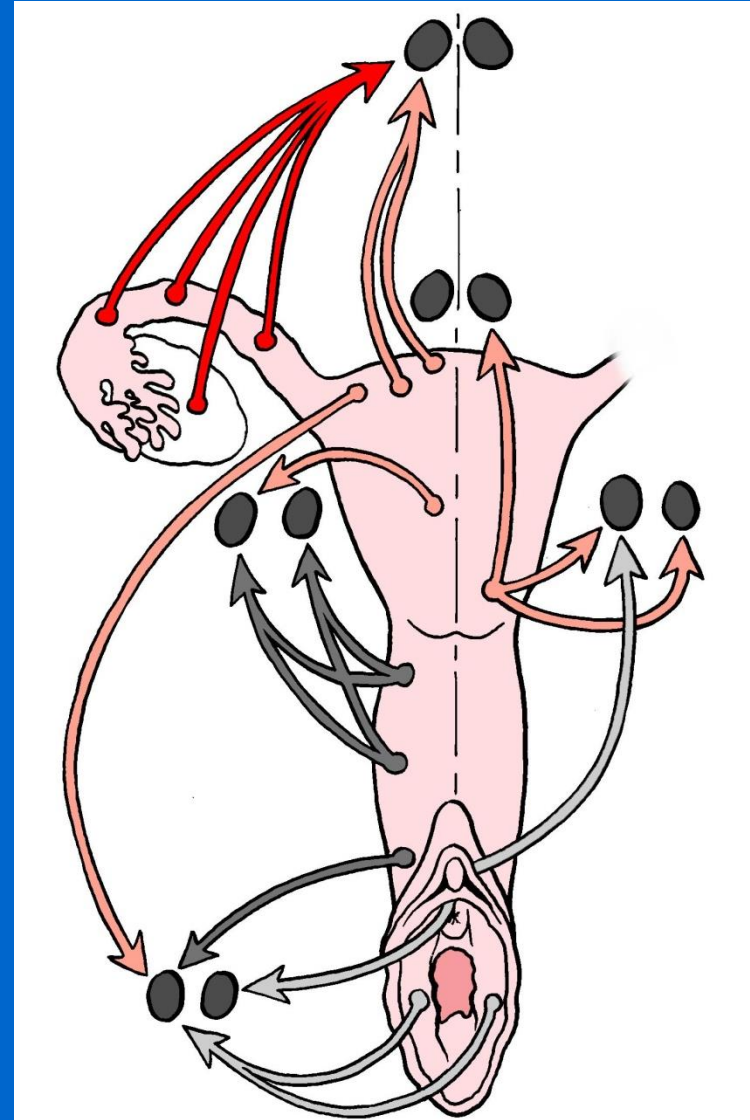
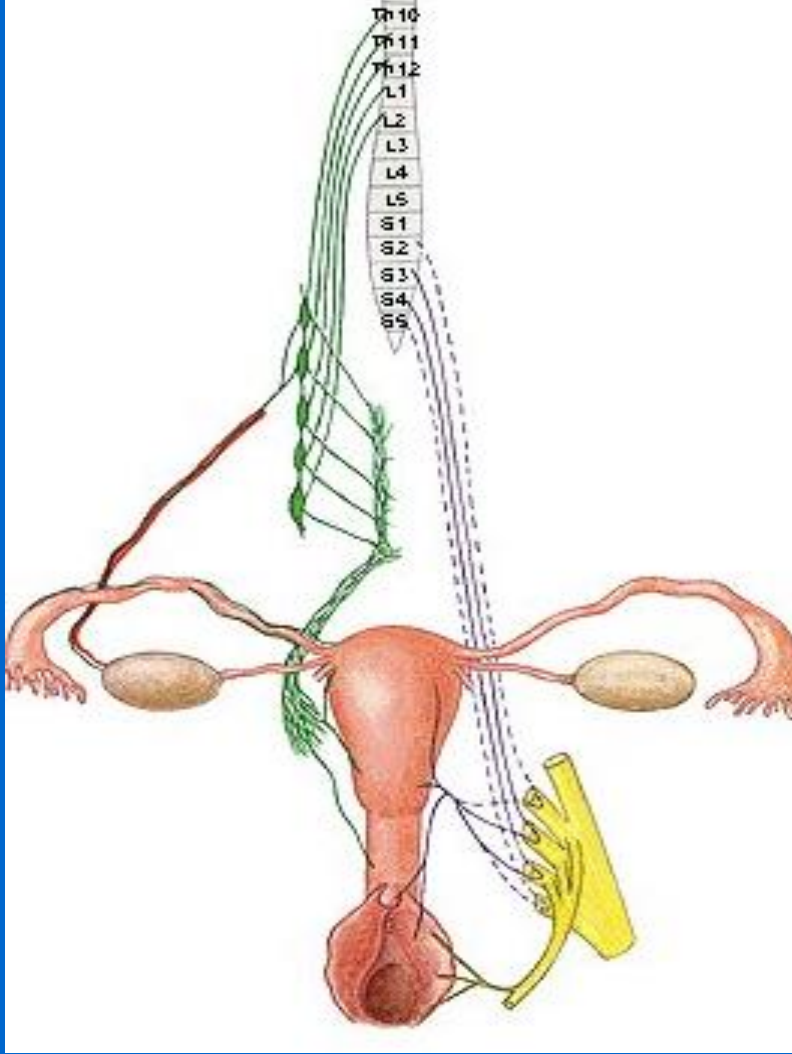


**Female external genitalia:** mons pubis, pudendal cleft, labia majora, praepuce of clitoris, glans of clitoris, frenulum of clitoris, labia minora, ostium urethrae externum, ostium vaginae, carunculae hymenales, commissura labiorum posterior, perineum, ostium of greater vestibular gland



n. ilioinguinalis, n. genitofemoralis,  
n. cutaneus femoris posterior, n. pudendus

**Lymph nodes: lumbar, sacral, internal iliac, external iliac, superficial inguinal**



**Uterovaginal plexus  
sympathetic, parasympathetic,  
sensory fibres from ovarian  
and inf. hypogastric plexuses**





**Lymph nodes: common iliac, external iliac, inguinal**

## Sources of used illustrations:

**Gray's Anatomy,**

**Sobotta: Atlas der Anatomie des Menschen**

**Grim, Druga: Regional anatomy Galén, 2012**

**Benninghoff, Drenckhahn: Anatomie I., II.**

## Recommended Textbooks:

**R. S. Snell: Clinical Anatomy. 7th Edition, Lippincott Williams & Wilkins, 2004, pp. 478 – 562**

**or**

**K. L. Moore: Clinically oriented Anatomy, 3rd Edition, Williams & Wilkins 1992, pp. 501 – 635**

**and**

**W. Platzer: Color Atlas of Human Anatomy, Vol. 1 Locomotor System. Thieme, 5th English Edition, 2004, pp. 137 – 183**

**or**

**Grim, Druga: Regional anatomy Galén, 2012**