

RECTUM & ANAL CANAL

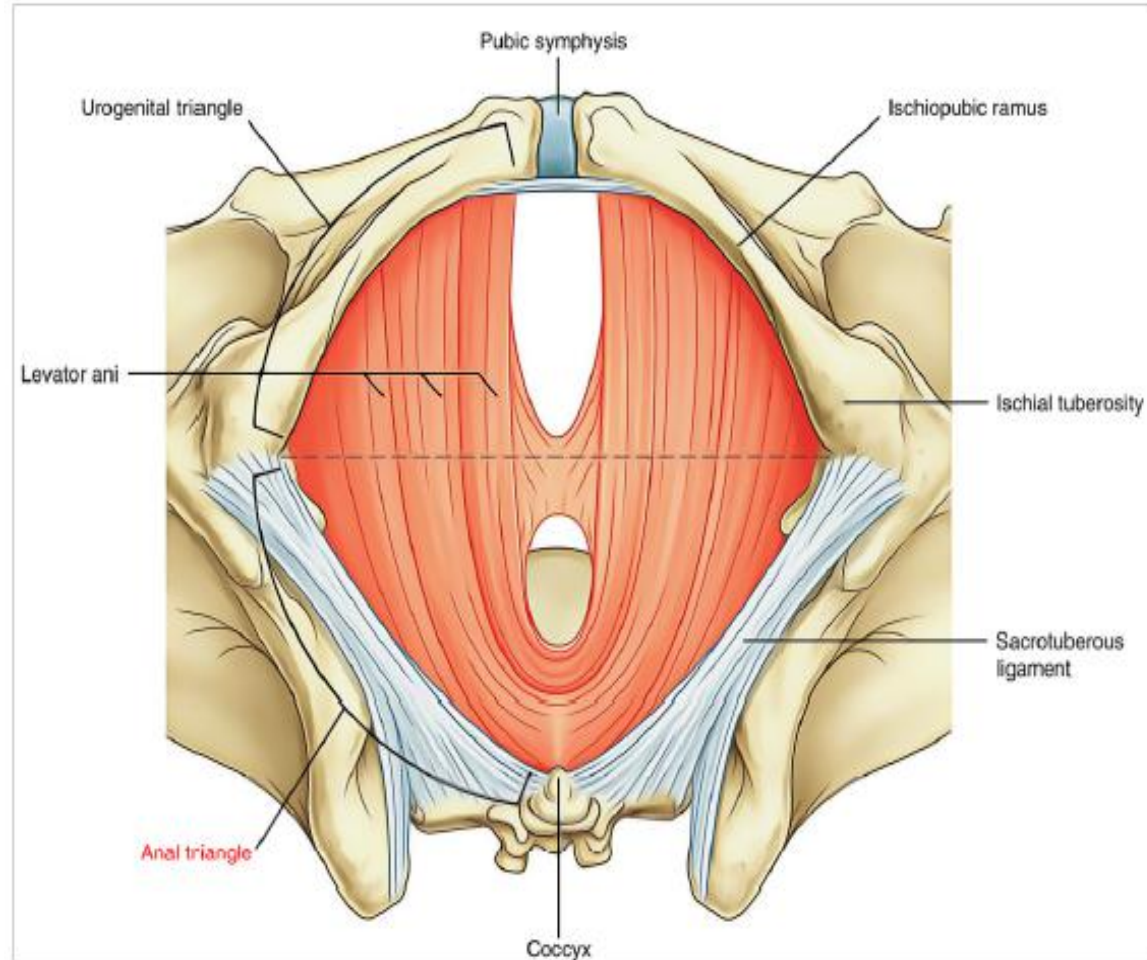
Anal triangle(Posterior Perineum)

Posterior part of
perineum

Boundaries:

Anteriorly: imaginary
line joining two ischial
Tuberosities.

POSTEROLATERALLY:
sacrotuberous
ligament



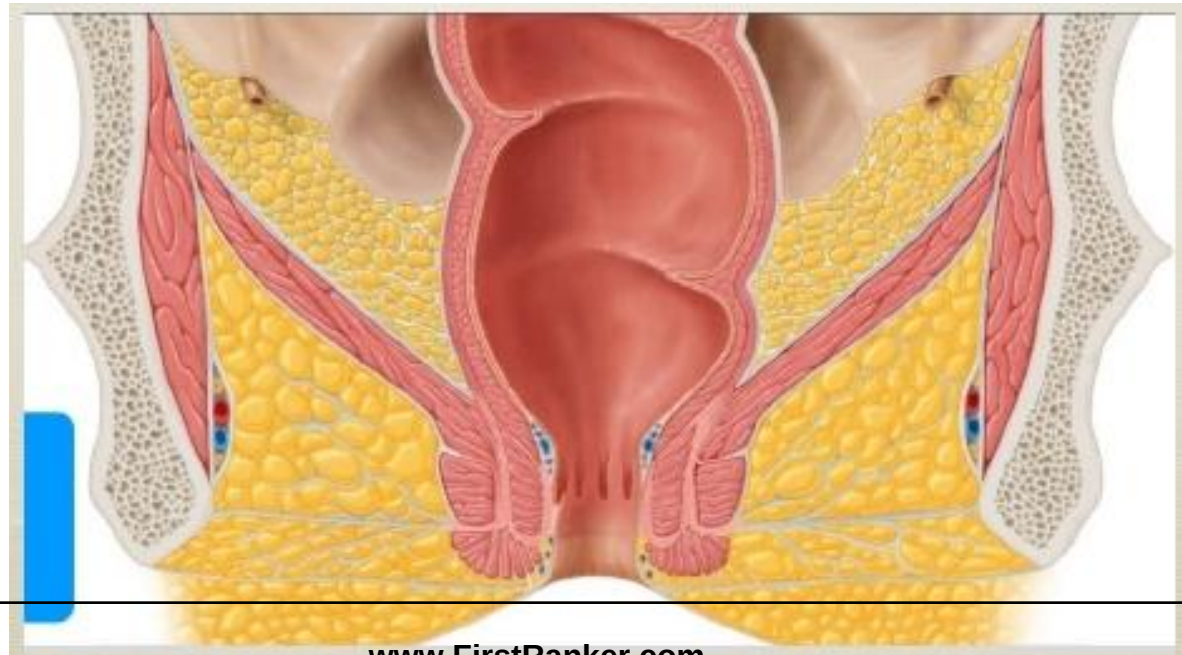
Ischioanal (ischiorectal) fossa:

A perineal space on both side of anal canal.

Wedge shaped with apex directed upwards.

Lateral wall vertical and medial wall sloping downward and medially.

Fat filled: allows expansion of rectum and anal canal during defecation.



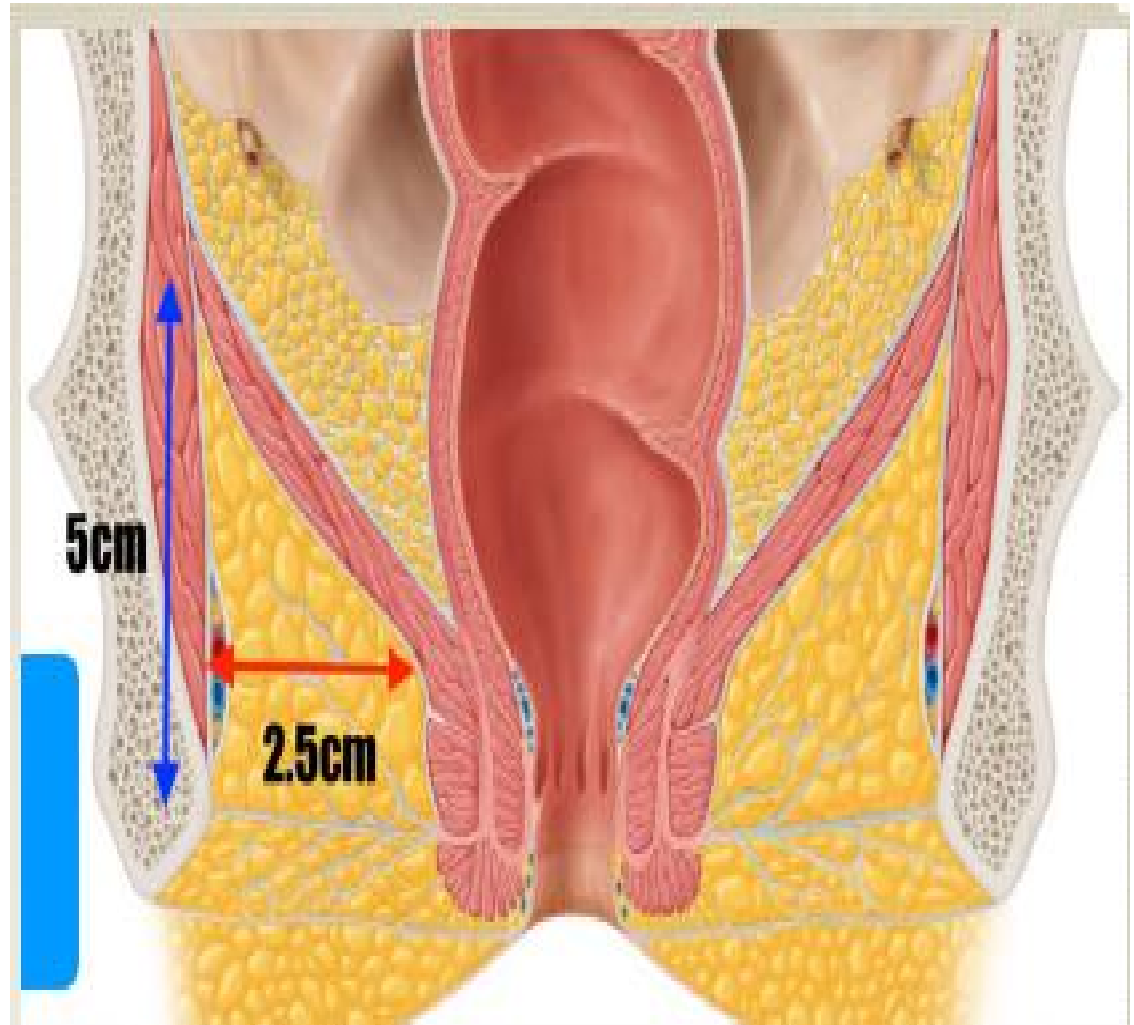
Ischioanal (ischiorectal) fossa:

Measurements:

Vertical- 5cm

Anteroposterior- 5cm

Transverse- 2.5cm



Ischioanal (ischiorectal) fossa:

Boundaries

Laterally : obturator internus and its fascia & ischial tuberosity

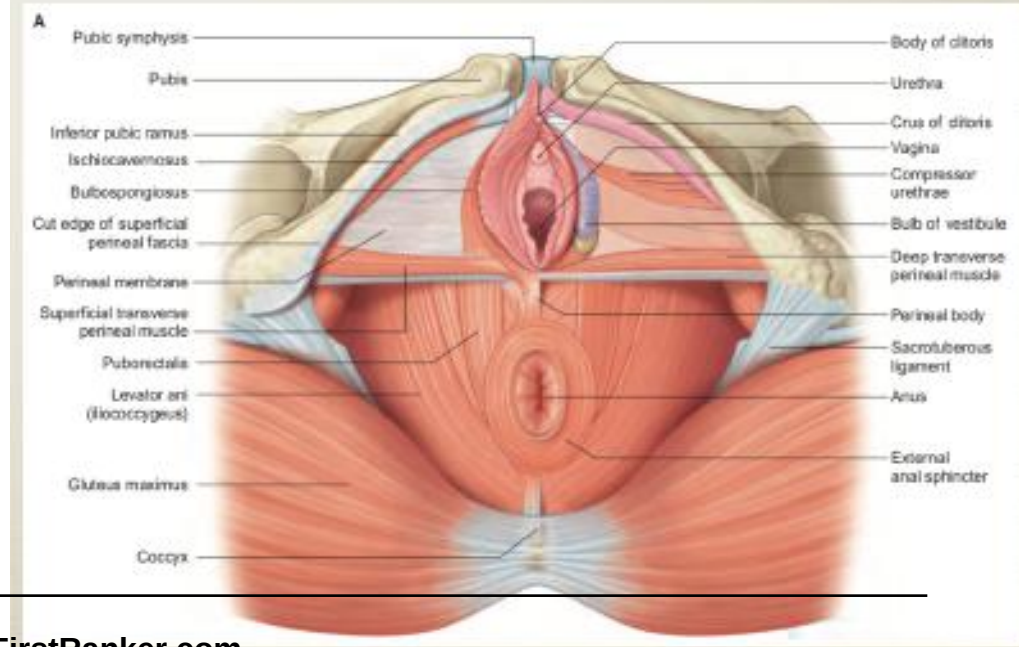
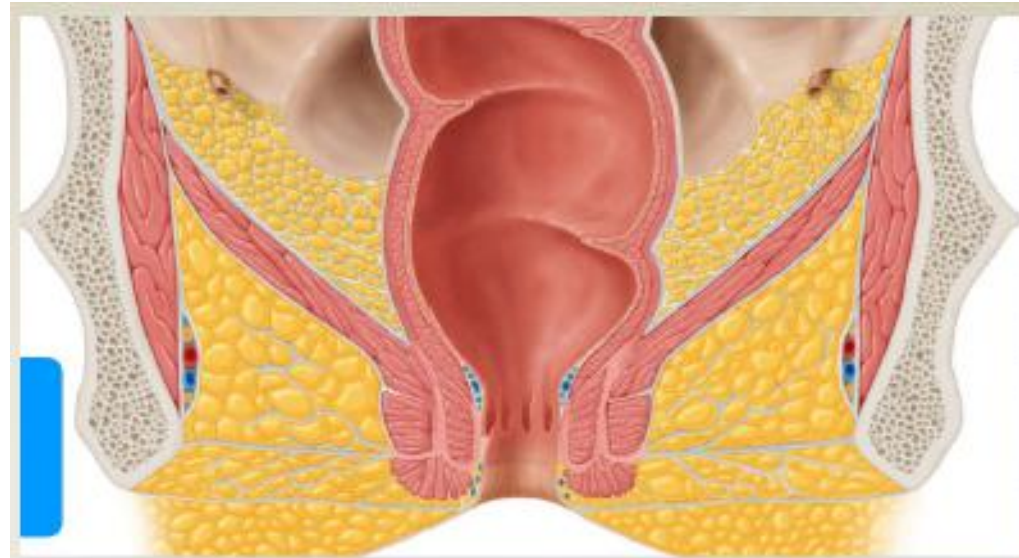
Medially: levator ani covered by anal fascia & external anal sphincter

Anteriorly: superficial and deep transverse perineal muscles.

Posteriorly: sacrotuberous ligament covered by Gluteus Maximus

Apex: fusion of obturator and anal fascia

Base: skin and superficial fascia



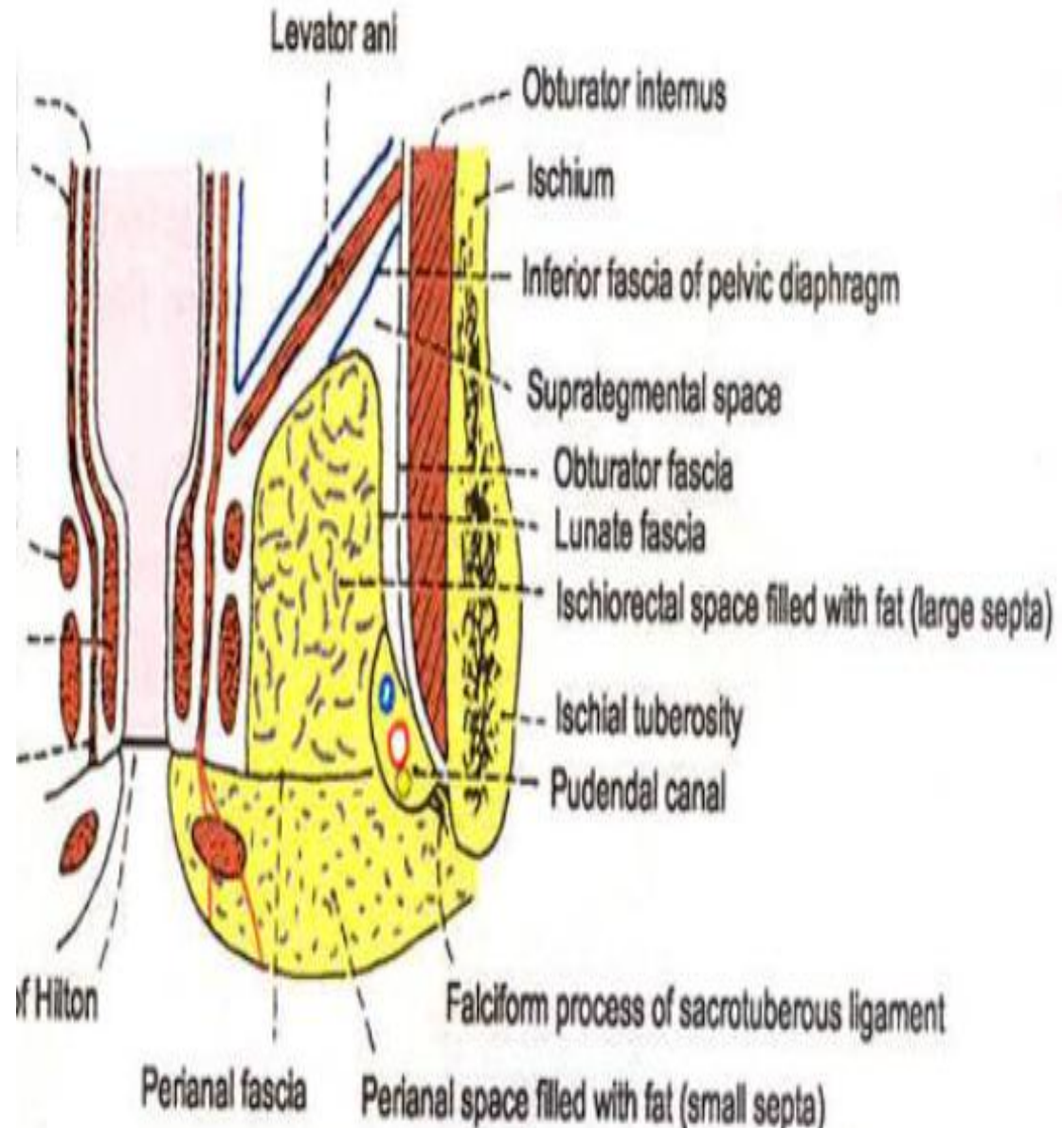
Ischioanal (ischiorectal) fossa:

Lunate fascia:

Arched fascia in ischiorectal fossa.

Starts from the periosteum of ischial tuberosity makes medial wall of pudendal canal, lines obturator fascia goes towards apex and lines anal fascia blends with it at the level of white line of Hilton.

Summit of this fascia called **tegmenum**.



Pudendal or Alcock's canal:

Fascial tunnel in lateral wall of ischiorectal fossa 2.5cm above ischial tuberosity.

Formed either by splitting of obturator fascia or by separation between lunate and obturator fascia or by splitting of perianal fascia.

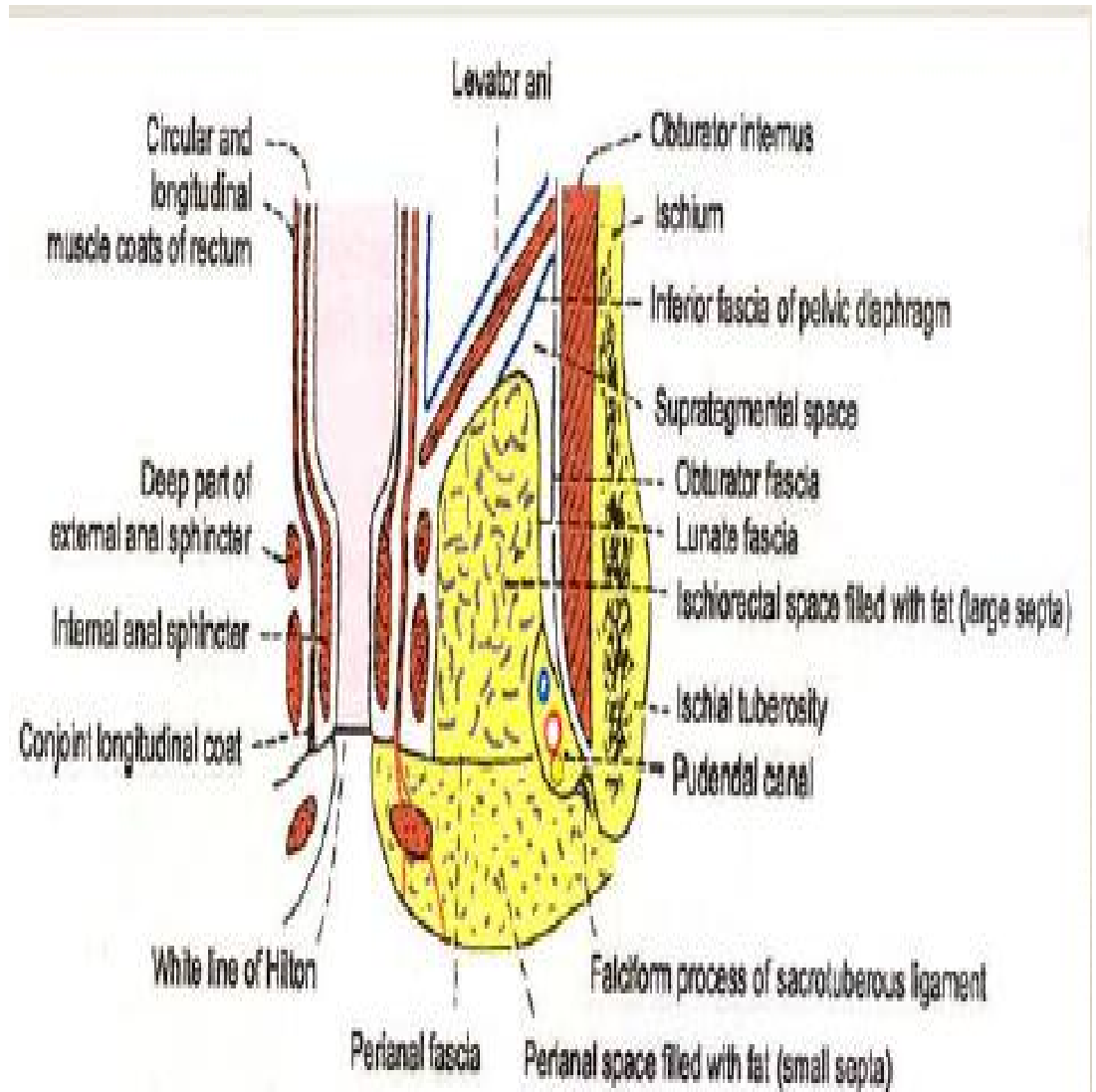
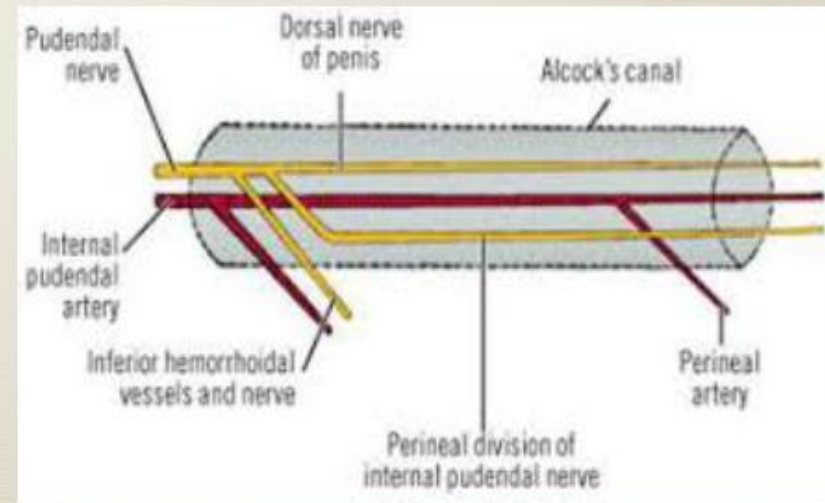
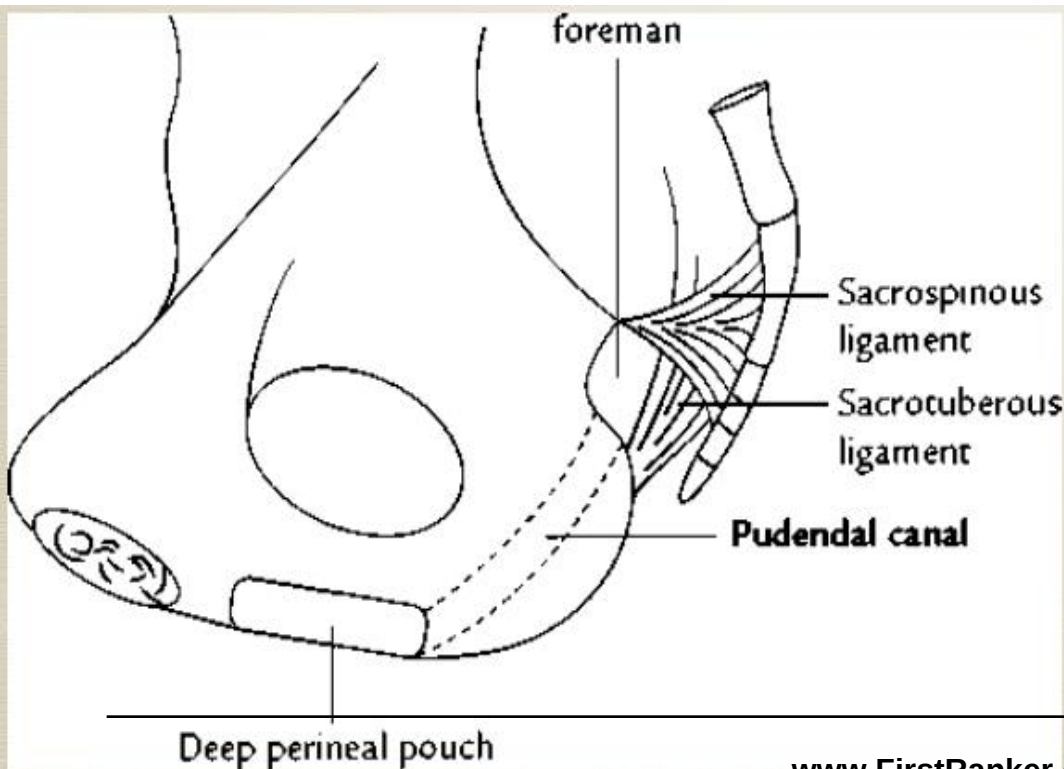


Fig. 28.7: Coronal section through the ischioanal fossa.

Pudendal or Alcock's canal:

- Extends from lesser sciatic foramen to posterior limit of deep perineal space.
- contents: internal pudendal vessels & pudendal nerve and its 2 branches- dorsal nerve of penis/clitoris and perineal nerve.

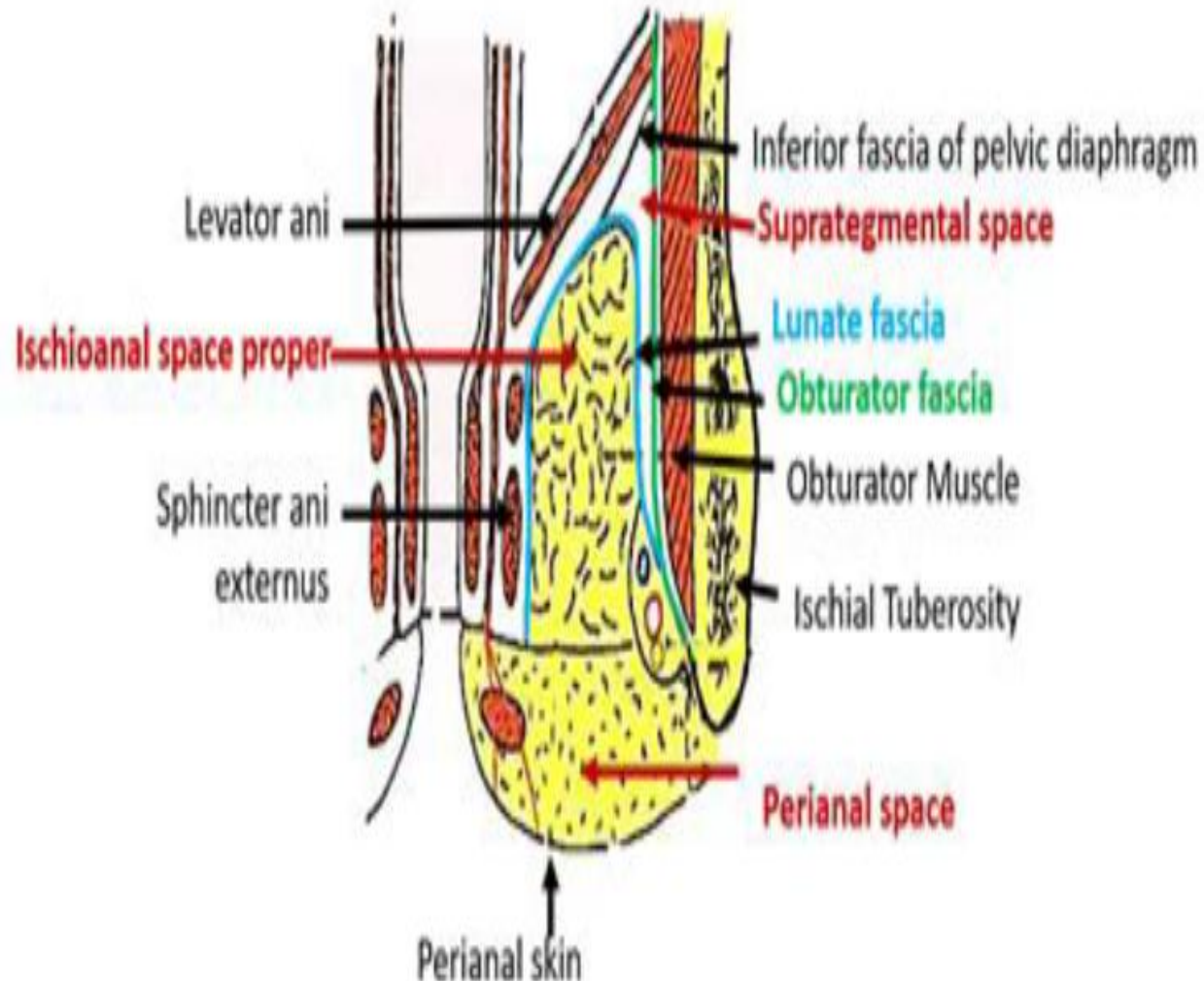


Parts of ischioanal fossa:

Suprategmental:
above lunate fascia
contains loose fat.

Ischioanal space proper: between
lunate and perianal
fascia. Contain fat
with fibrous tissue.

Perianal space:
between perianal
fascia and skin.
Contains loculated fat
in tight fibroelastic
compartments.



Contents

- Internal pudendal vessels and pudendal nerve
- Inferior rectal vessels and nerve
- Posterior scrotal/labial vessels and nerves
- Perineal branch of 4th and perforating branch of 2nd and 3rd sacral nerve.
- Fat pad.

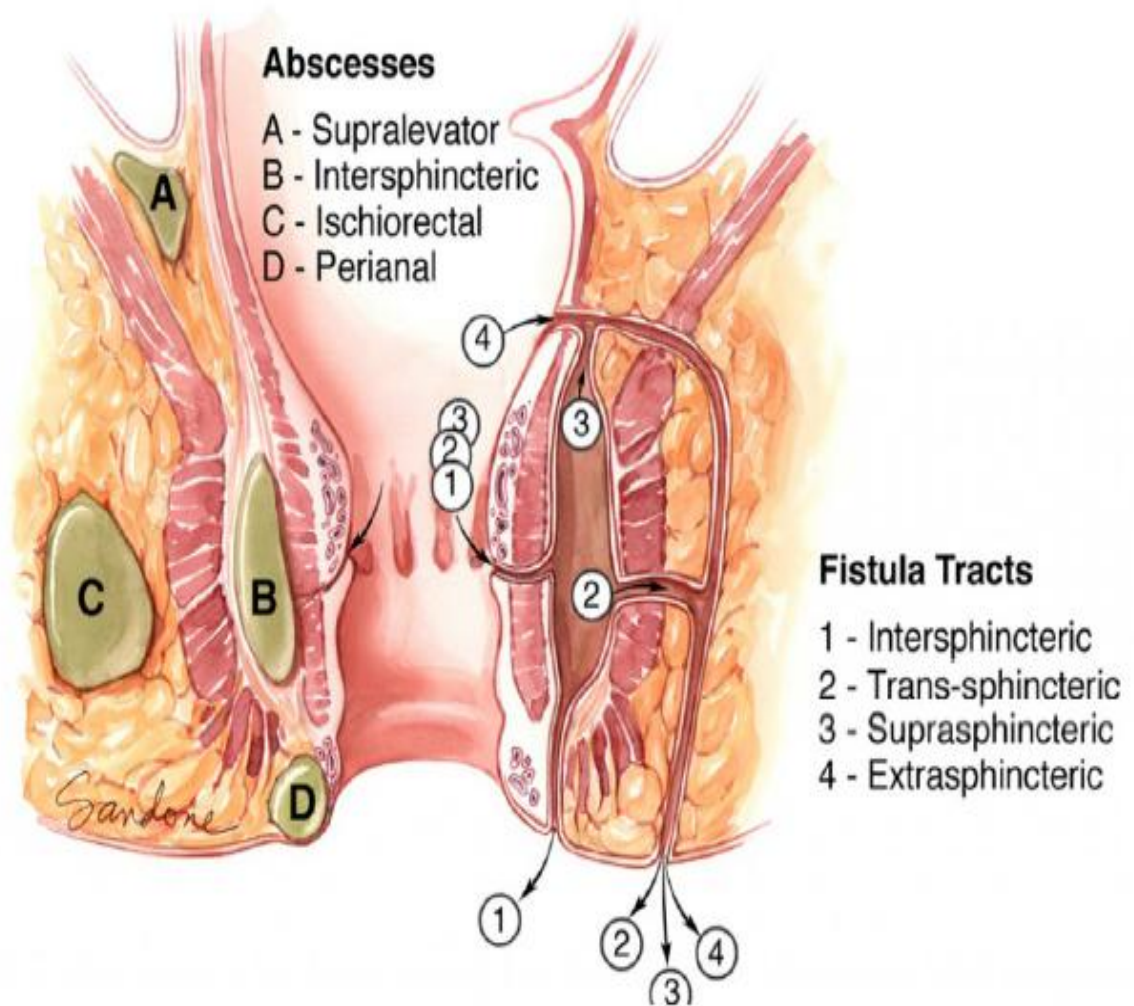
APPLIED ANATOMY

Ischiorectal abscess:

loose fat so an abscess in this region may grow to a large size before producing pain.

Perianal abscess: fat is in tight compartments so the abscess is very painful due to tension caused by building pus.

Abscess bursting in the anal canal may produce **fistula in ano.**

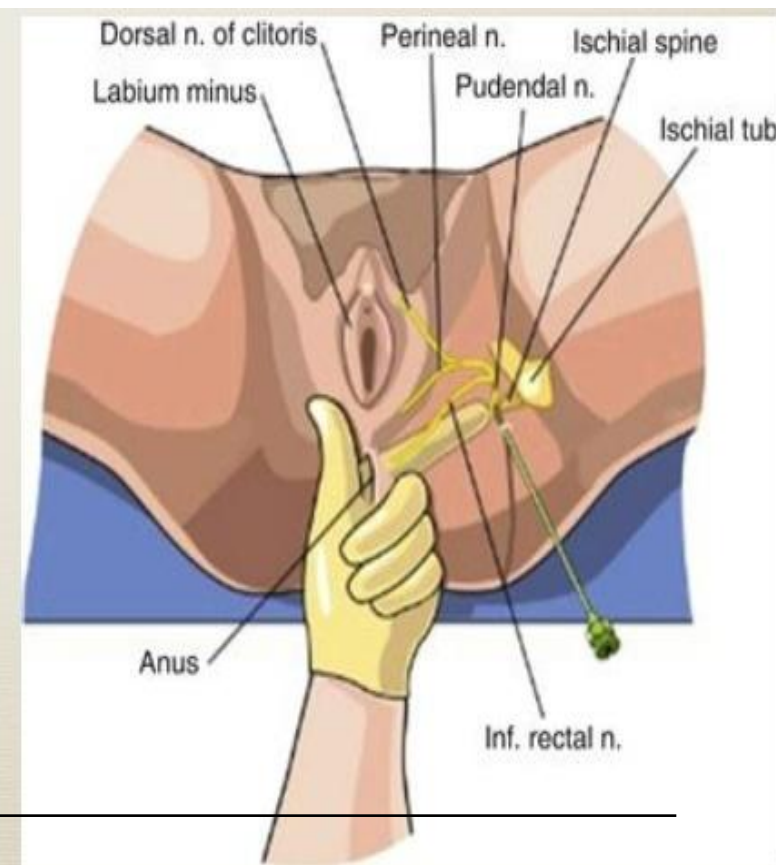
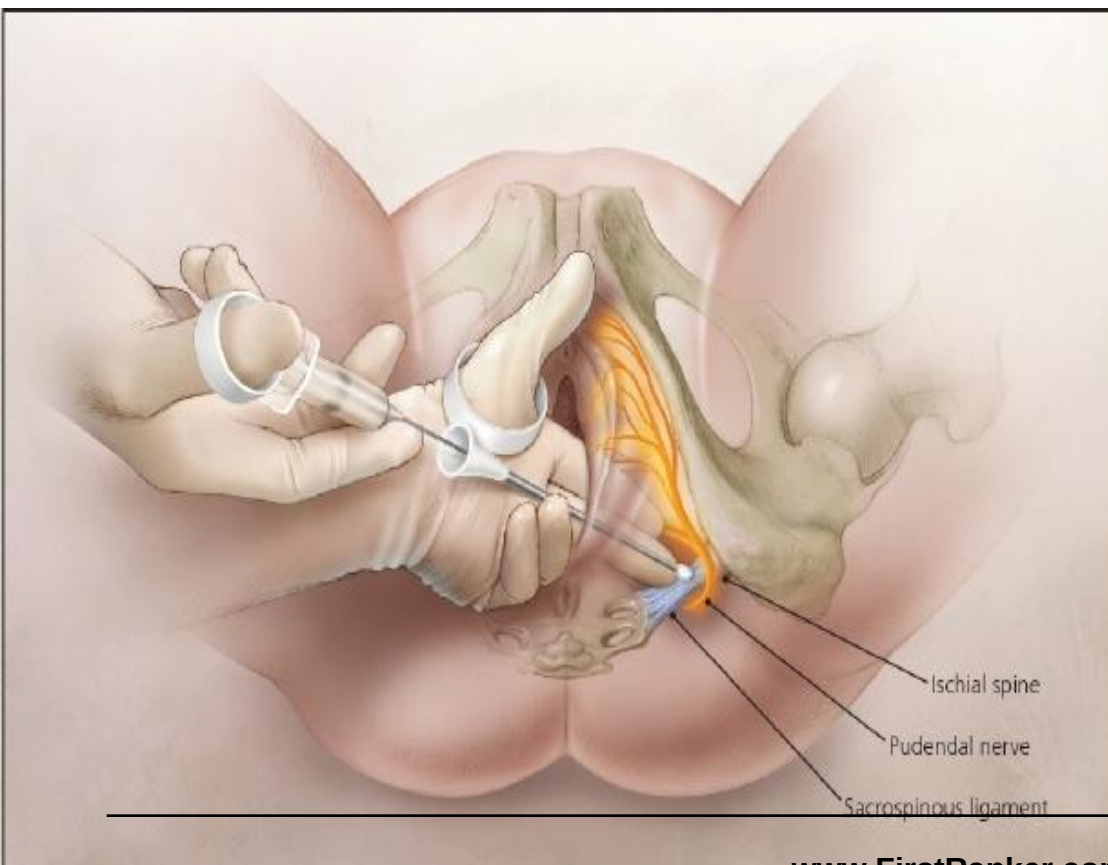


APPLIED ANATOMY

Pudendal block: for perineal anesthesia.

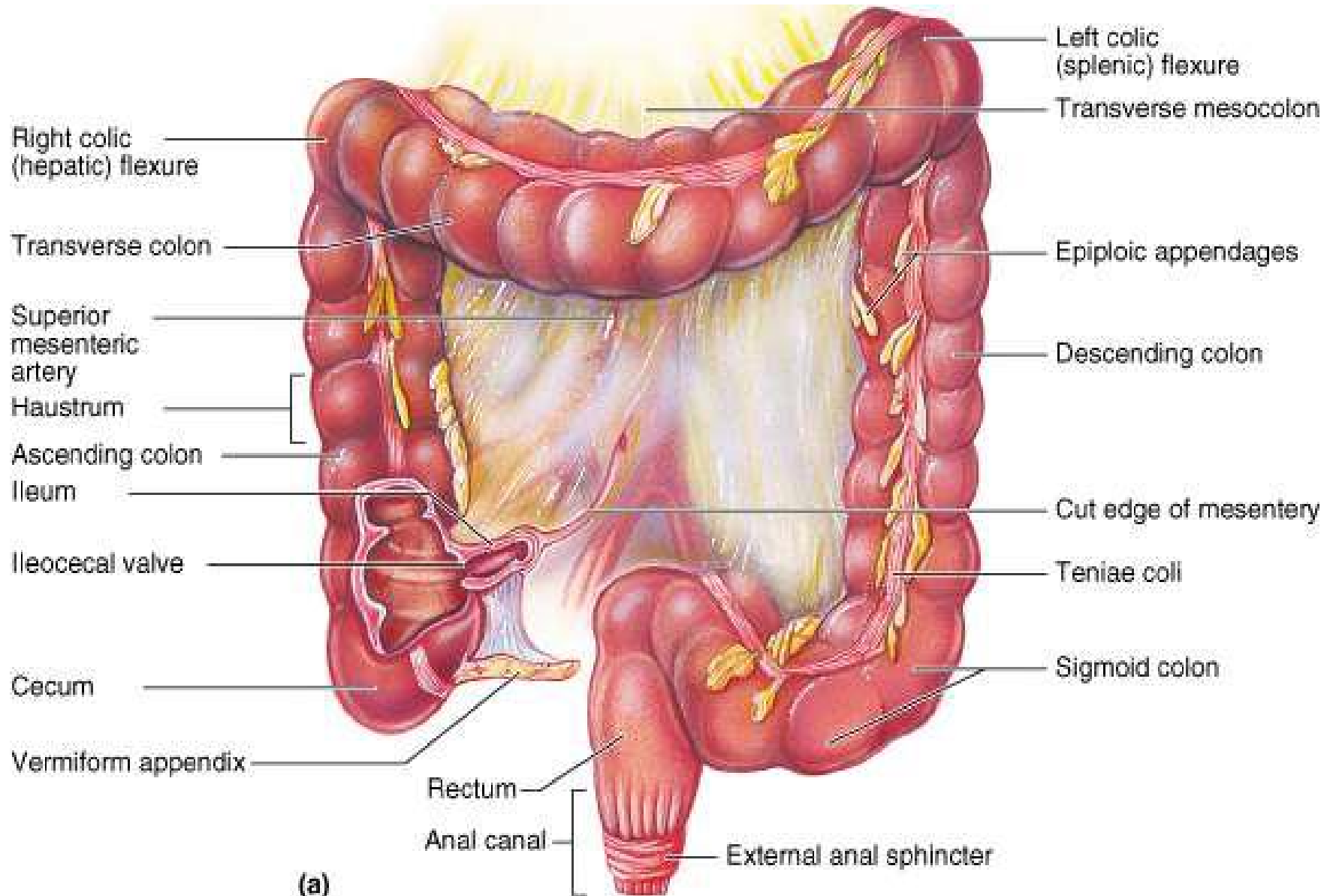
Generally done in 2nd stage of labour to perform or repair episiotomy.

Transvaginal and Transperineal approach.



RECTUM

LARGE INTESTINE



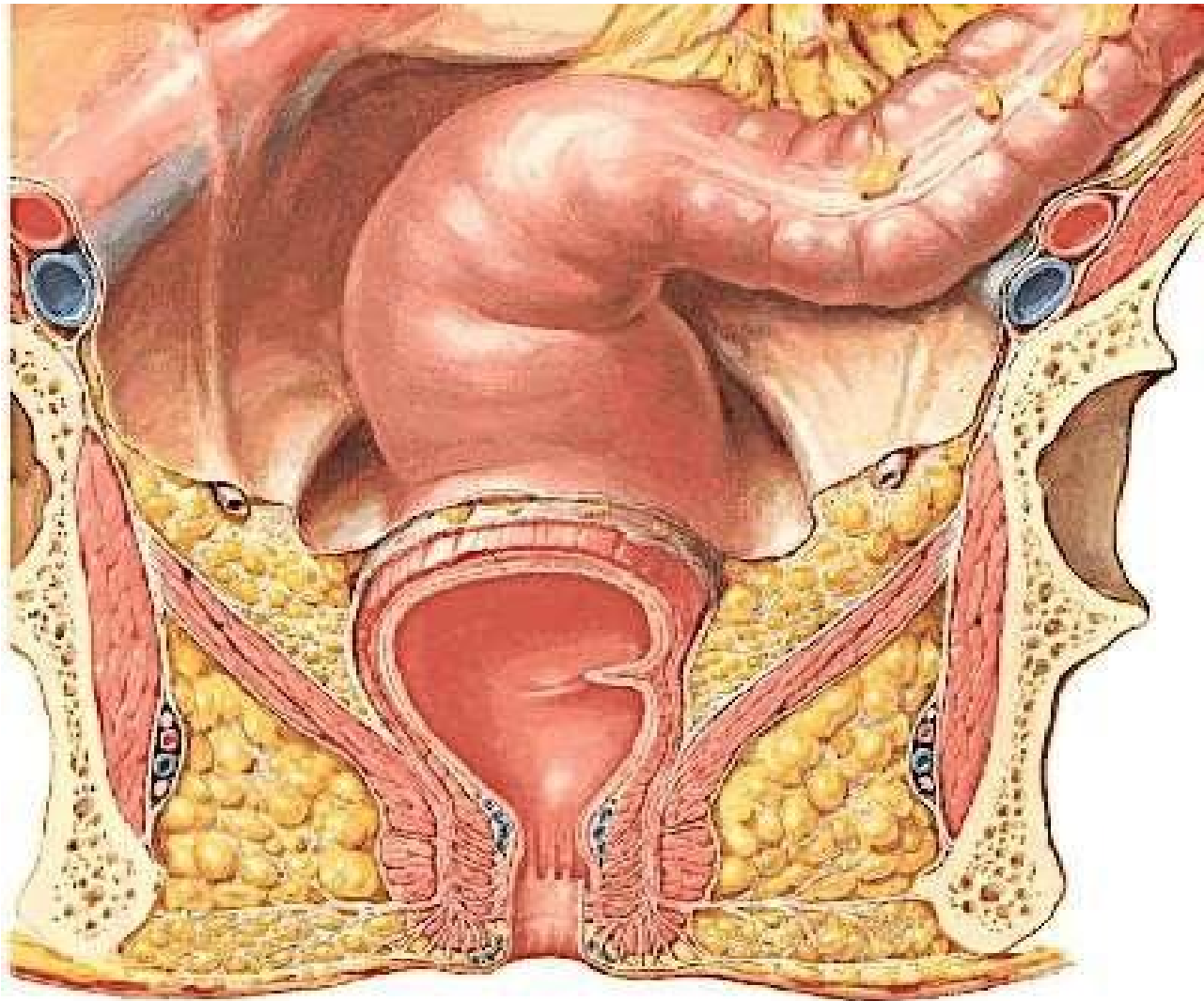
LARGE INTESTINE

3 unique features:

- **Teniae coli** – Three bands of longitudinal smooth muscle.
- **Haustrations** – Pocket like sacs caused by tone of teniae coli.
- **Epiploic appendages** – Fat-filled pouches of visceral peritoneum.
- Subdivided into Caecum, Appendix, Colon, **Rectum &**
- Anal canal

Rectum

- Introduction
- Extent
- Course & directions
- Relations
- Mucosal folds
- Blood & nerve supply
- Supports
- Applied anatomy



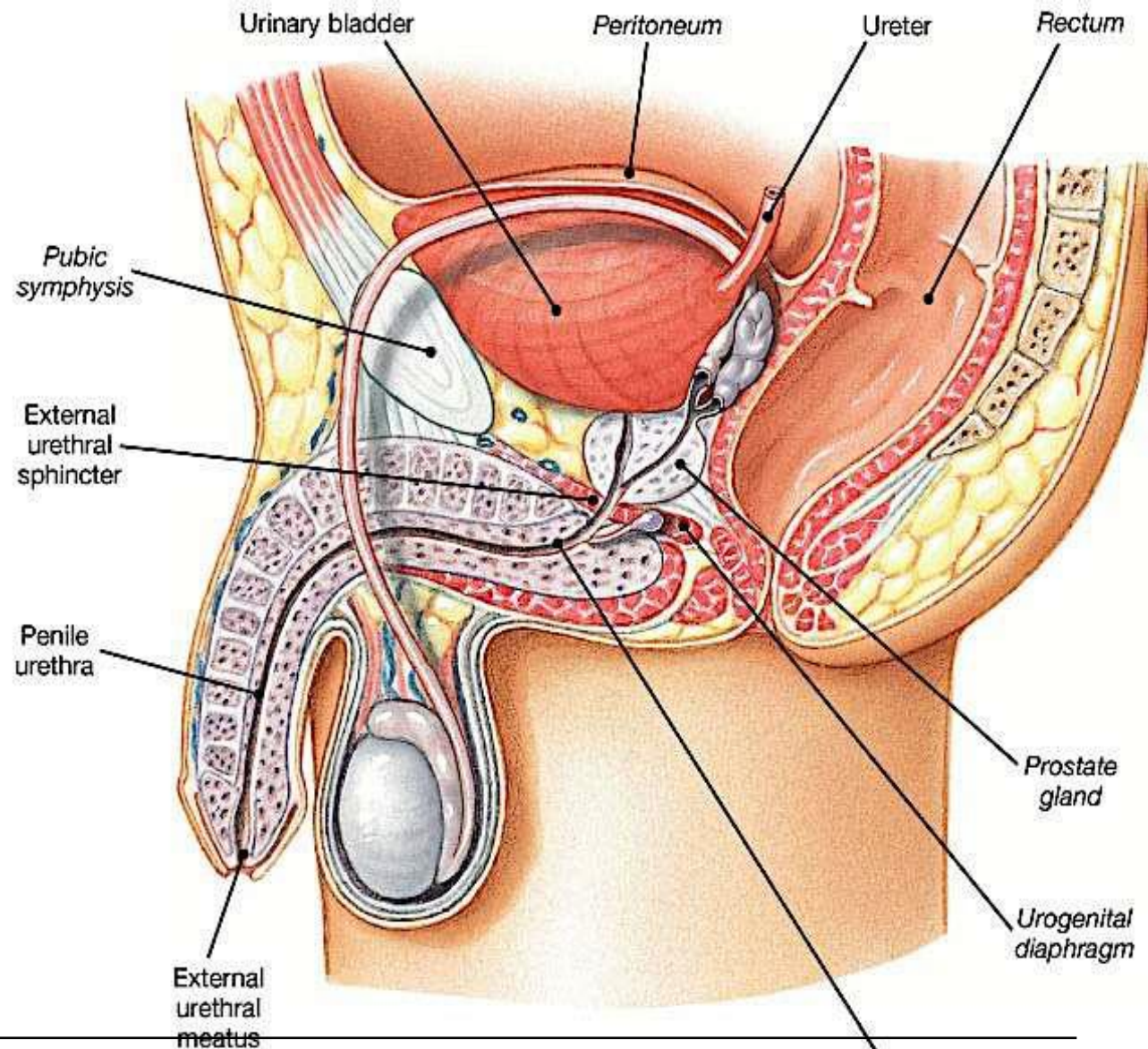
INTRODUCTION

Terminal part of large intestine before anal canal.

- Cardinal features of large intestine – absent
- Length – 12 cm
- Diameter – upper part 4 cm, lower part dilated as rectal ampulla
- Curved in both sagittal and coronal planes
- Function – temporary storage of fecal matter; distension causes desire to defecate

Extent

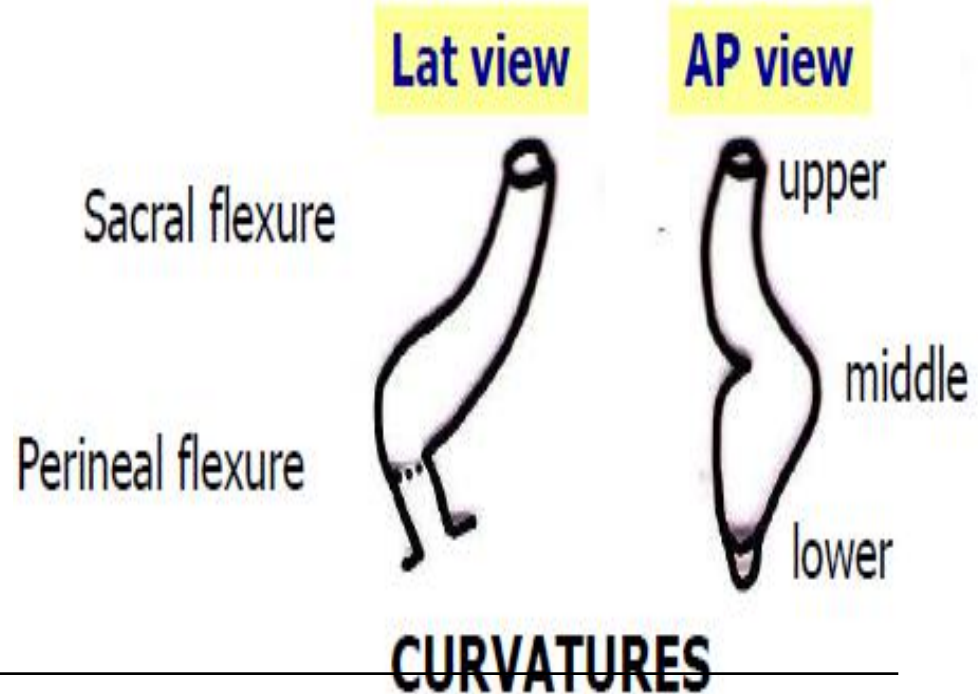
- Begins at S3, lower end of sigmoid mesocolon – recto-sigmoid junction.
- Ends slightly below and 2- 3 cm in front of tip of coccyx – anorectal junction.
- Males – at level of apex of prostate.



(a) Male

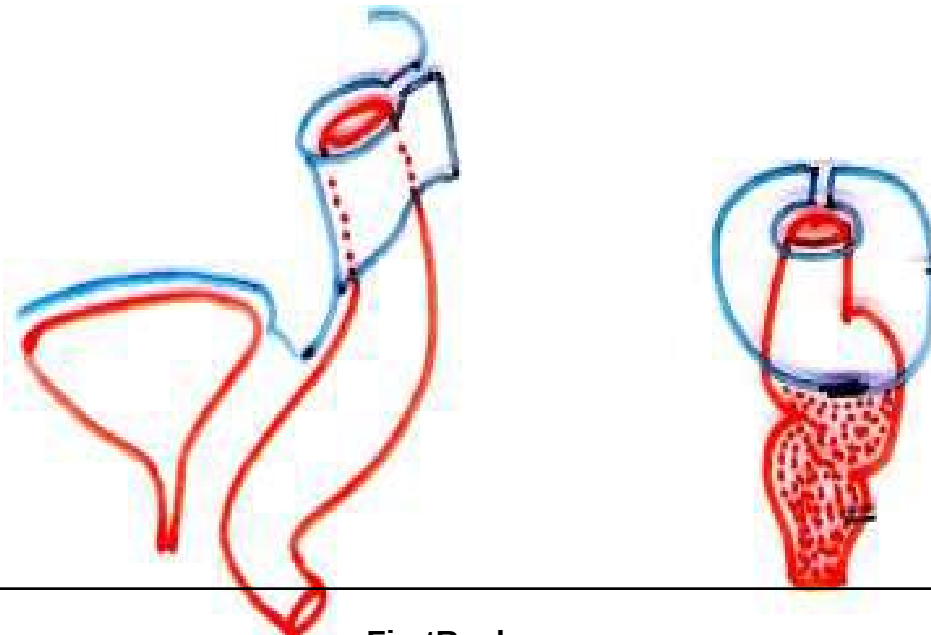
Course and directions

- Beginning and end lie in median plane
- **2 AP curvatures**
 - Sacral flexure – follows curvature of sacrum and coccyx
 - Perineal flexure – backward bend in anorectal junction
- **3 lateral curvatures**
 - Upper – convex to right
 - Middle – convex to left
– most prominent
 - Lower – convex to right



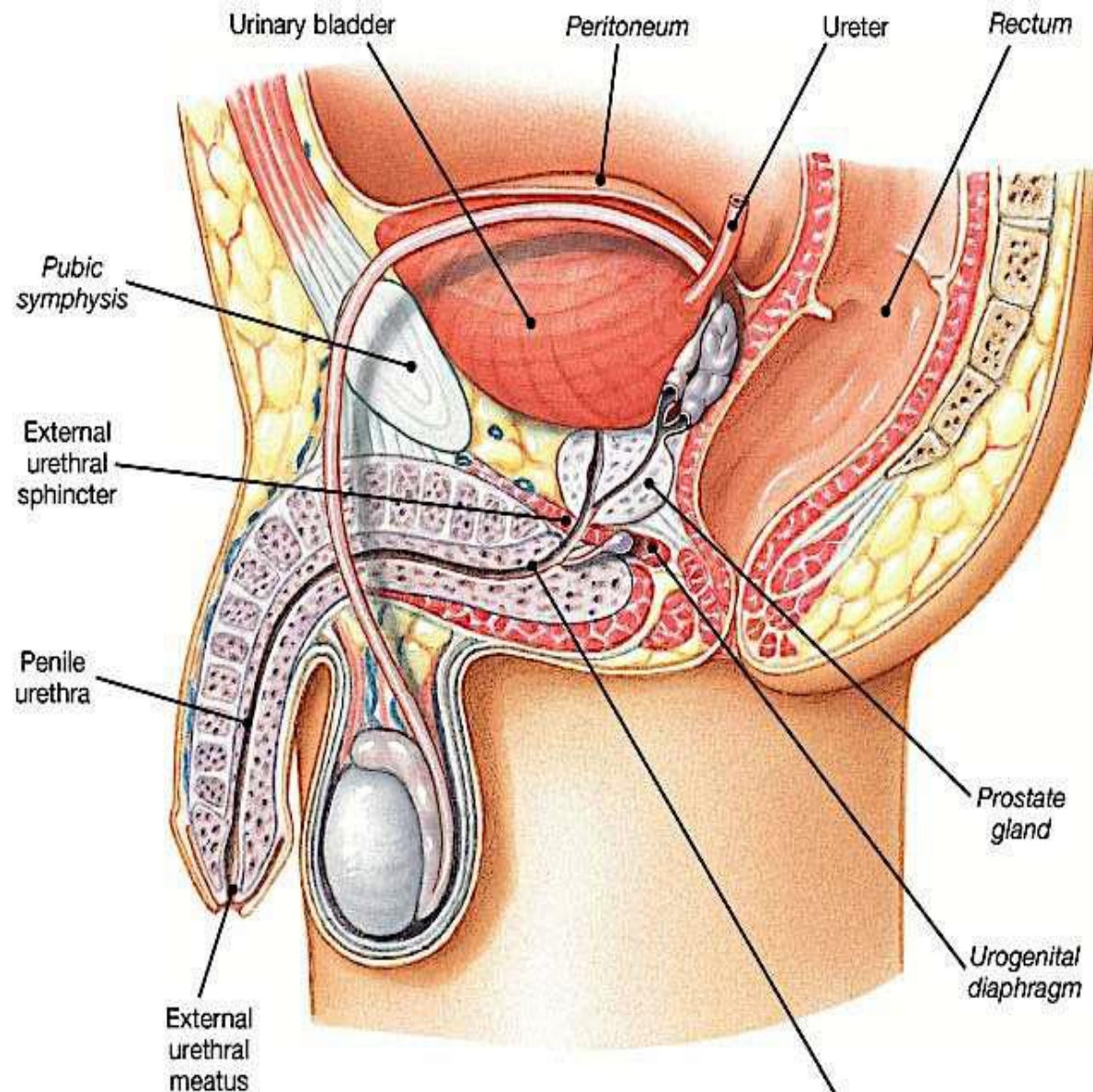
Peritoneal relations

- Upper 1/3 – in front and sides
- Middle 1/3 – only in front
- Lower 1/3 – devoid of peritoneum
 - Dilated to form ampulla
 - Below rectovesical pouch in males
 - Below recto uterine pouch in females



Visceral relations

- Anteriorly - in males
 - Upper 2/3 – rectovesical pouch with coils of Intestine
 - Lower 1/3 – base of urinary bladder, ureters, seminal vesicle, vas and prostate

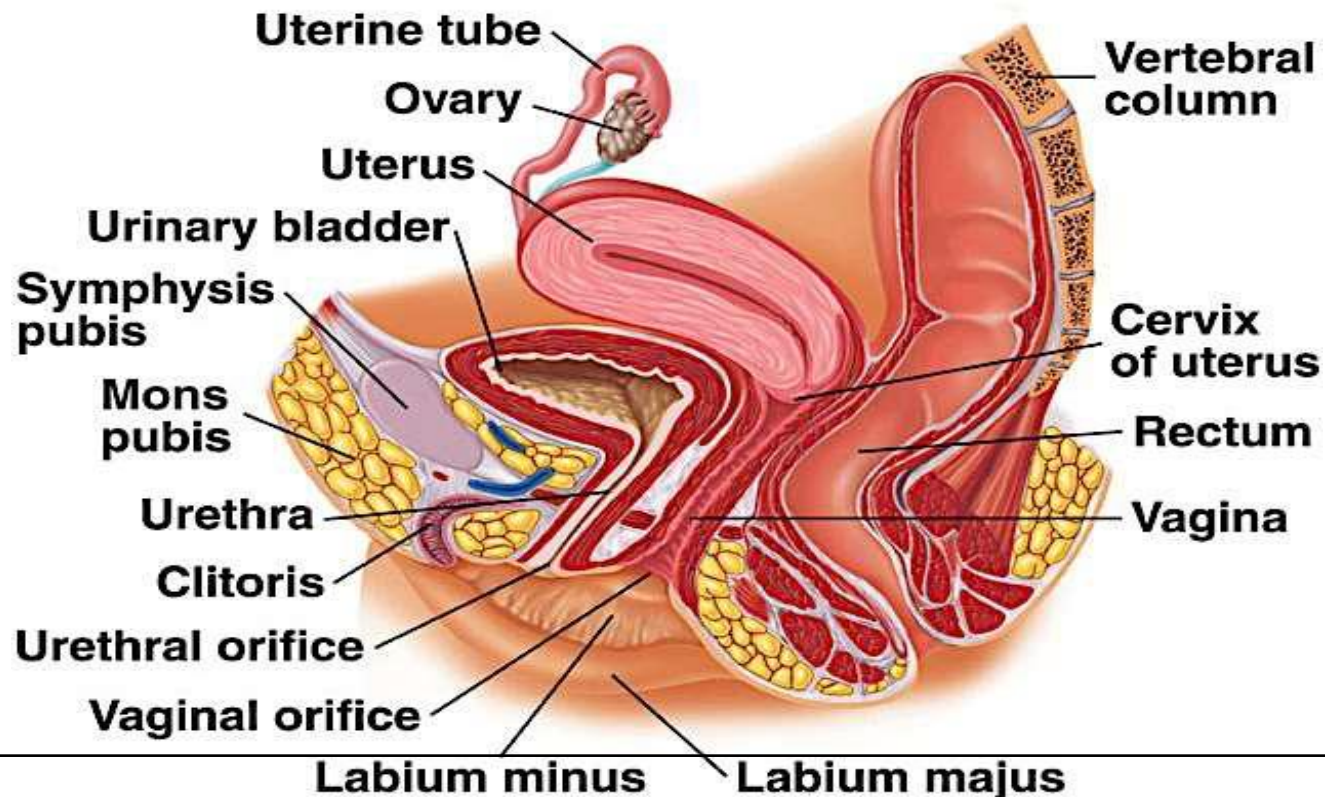


(a) Male

Urethra [see part (c)]

Visceral relations

- Anteriorly in females
- Upper 2/3 – recto- uterine pouch with coils of intestine and sigmoid colon, pouch separates the rectum from uterus and upper part of vagina
- Lower 1/3 – lower part of vagina

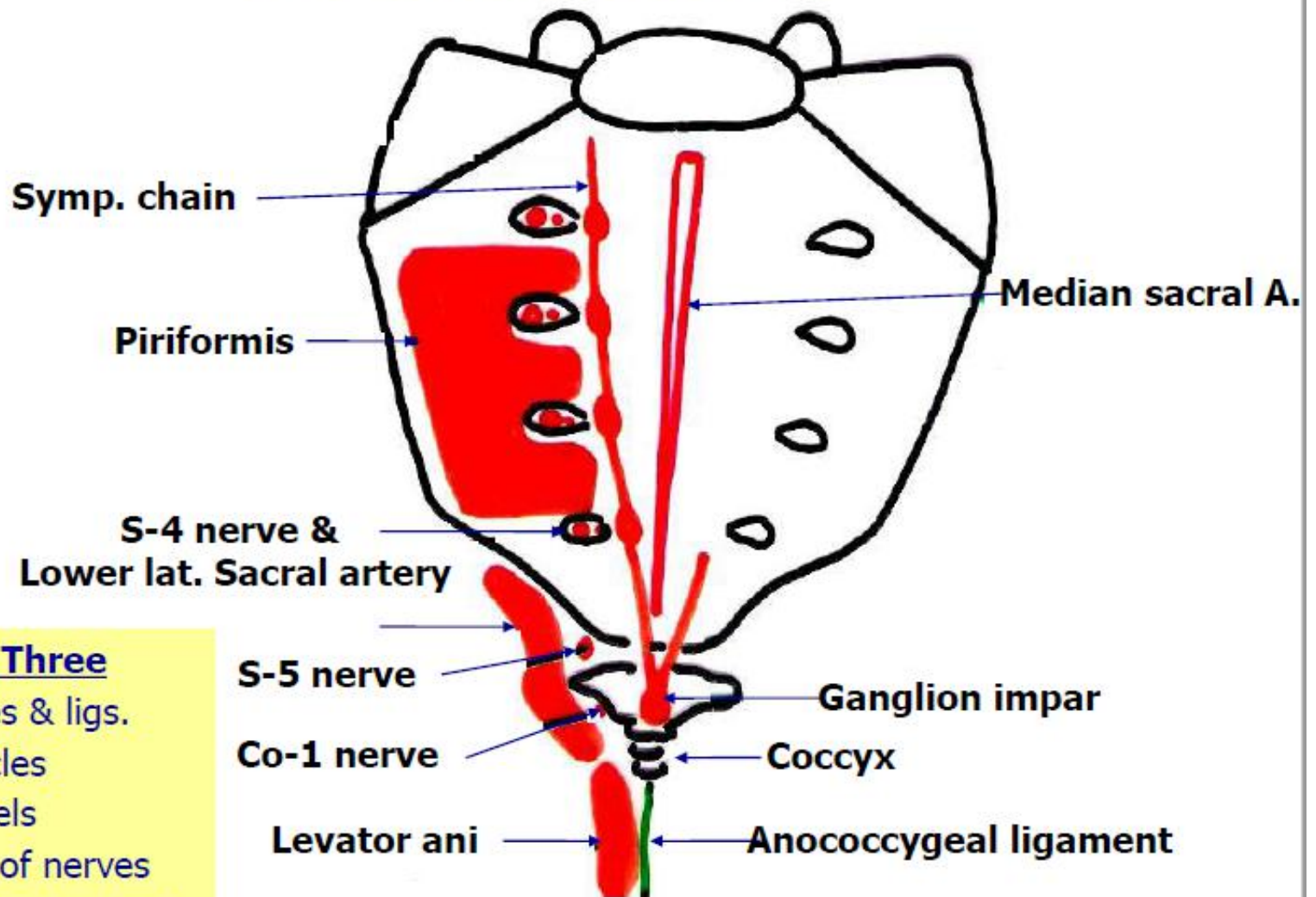


Visceral relations

- Posterior in both sexes.
 - Lower 3 sacrum, coccyx and anococcygeal ligament
 - Piriformis, coccygeus and levator ani
 - Median sacral, sup rectal and lower lat sacral vessels
 - Sympathetic chain with ganglion impar, ant primary rami of S3-5, Co1, and pelvic splanchnic nerves
 - Lymph nodes, lymphatics and fat

POST. RELATIONS

POST. RELATIONS

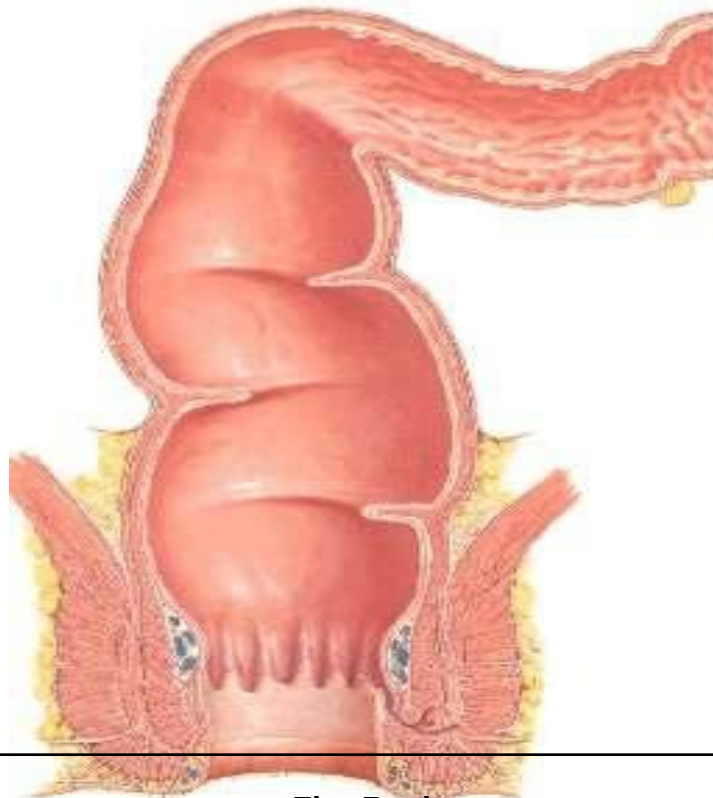


Rule of Three

- 3 Bones & ligs.
- 3 Muscles
- 3 Vessels
- 3 Sets of nerves
- 3 Other structures

Mucosal folds

- 2 types of folds
 - Longitudinal – temporary, in lower part, disappear on distension
 - Transverse / Houston's valves – permanent



INTERIOR OF RECTUM: MUCOSAL FOLDS

Upper fold

- At commencement (S-3)
- 12 cm from anal orifice
- From Rt. Lt. Ant. wall

Middle fold

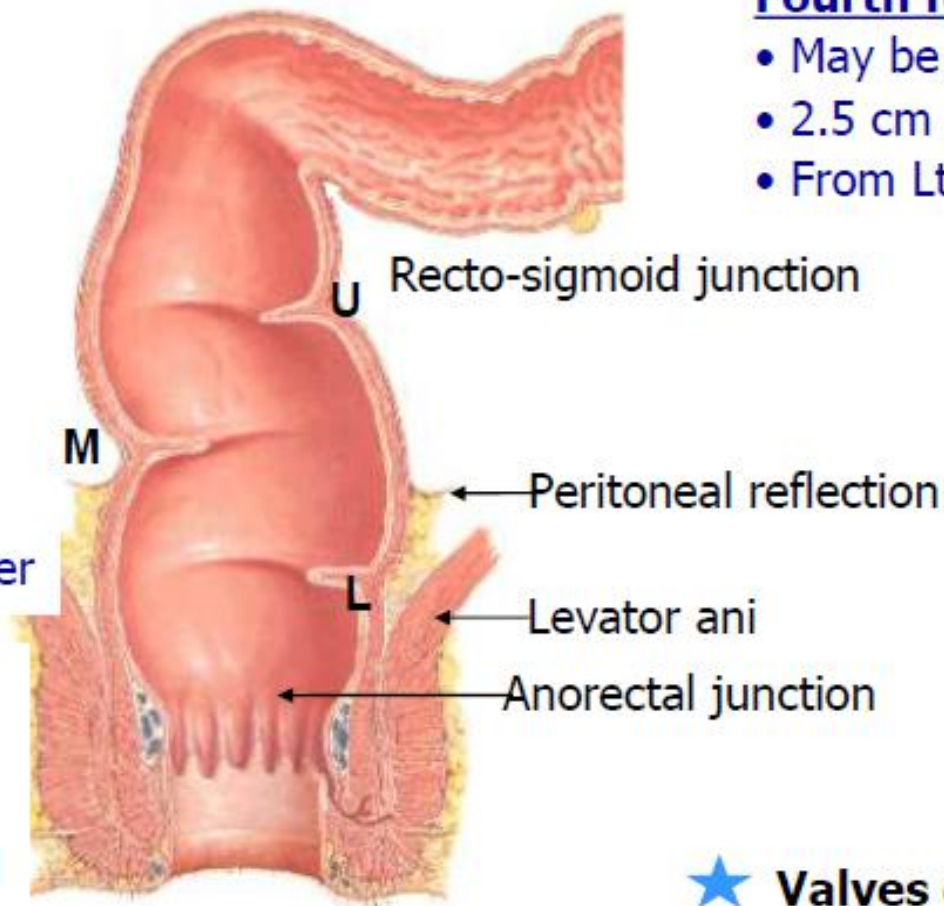
- Largest & most constant
- Projects from Rt. Wall
- At jn. of upper 2/3 with lower 1/3
- 5 cm above anal margin
- Forms **Neleton's** sphincter

Lower fold

- Inconstant
- Projects from Lt. wall
- 2.5 cm below middle fold

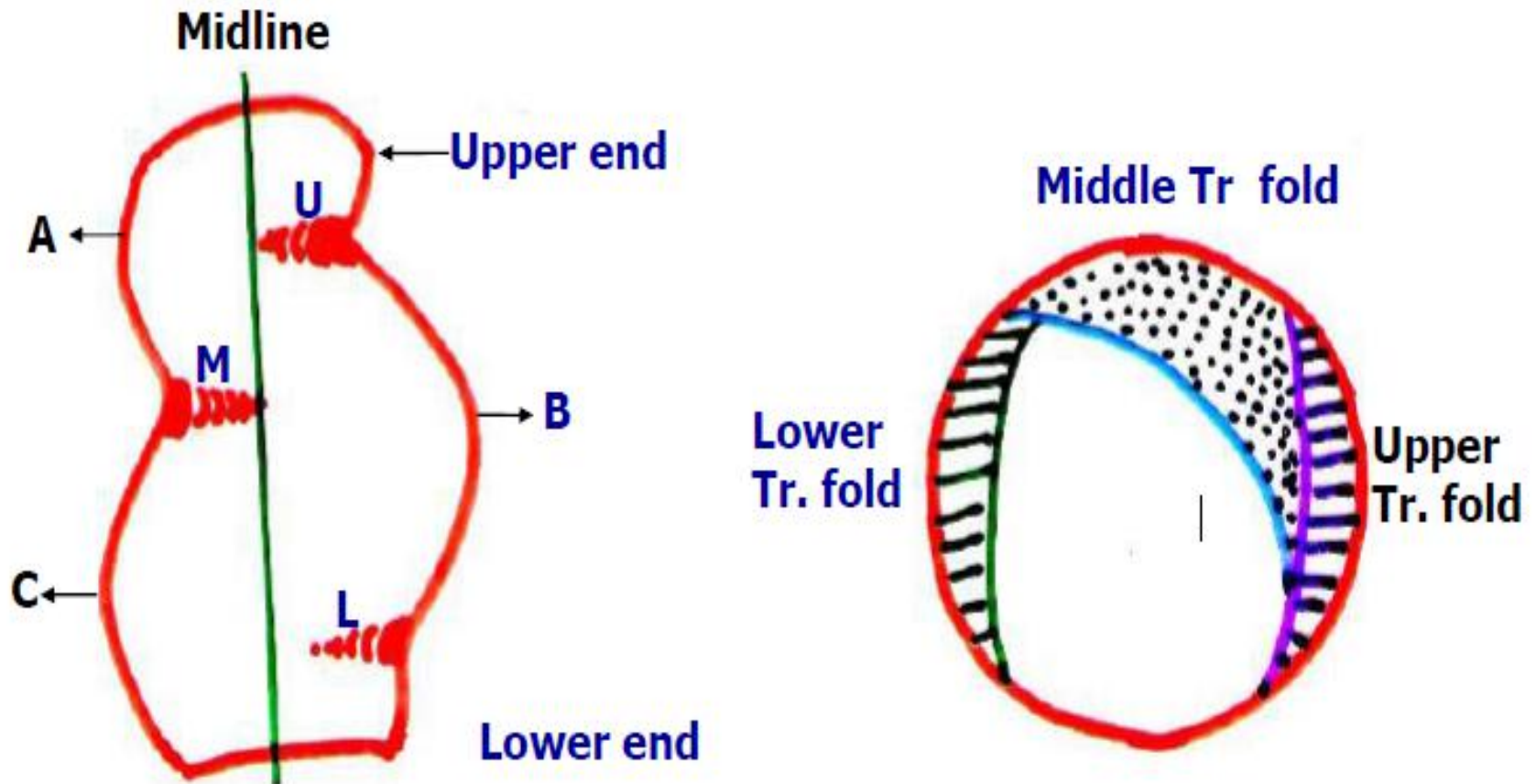
Fourth fold

- May be present
- 2.5 cm above M F
- From Lt. wall



★ **Valves of HOUSTON**

TRANSVERSE MUCOSAL FOLDS



- Three valves of rectum stop feces from being passed with gas

Blood supply

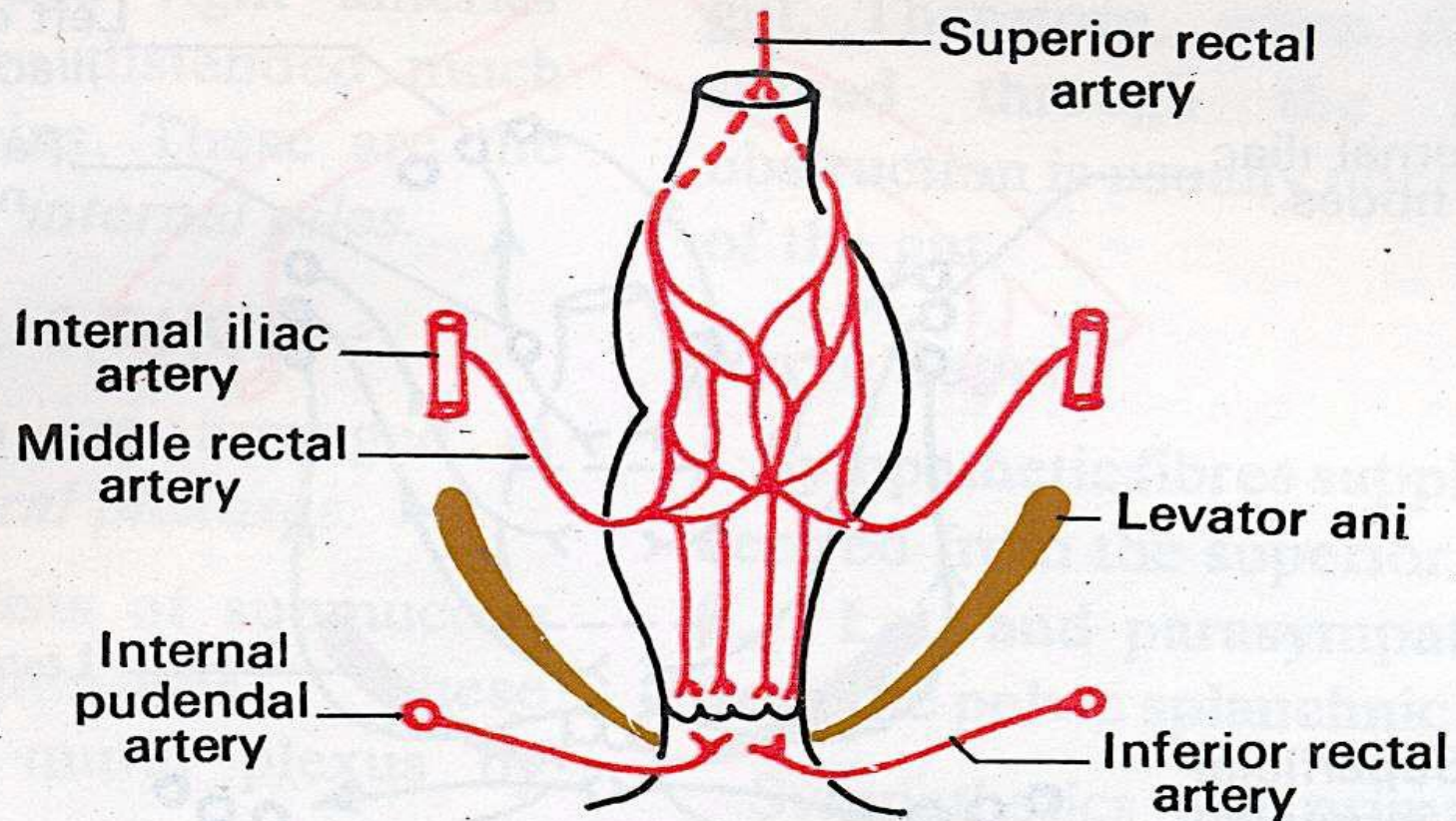
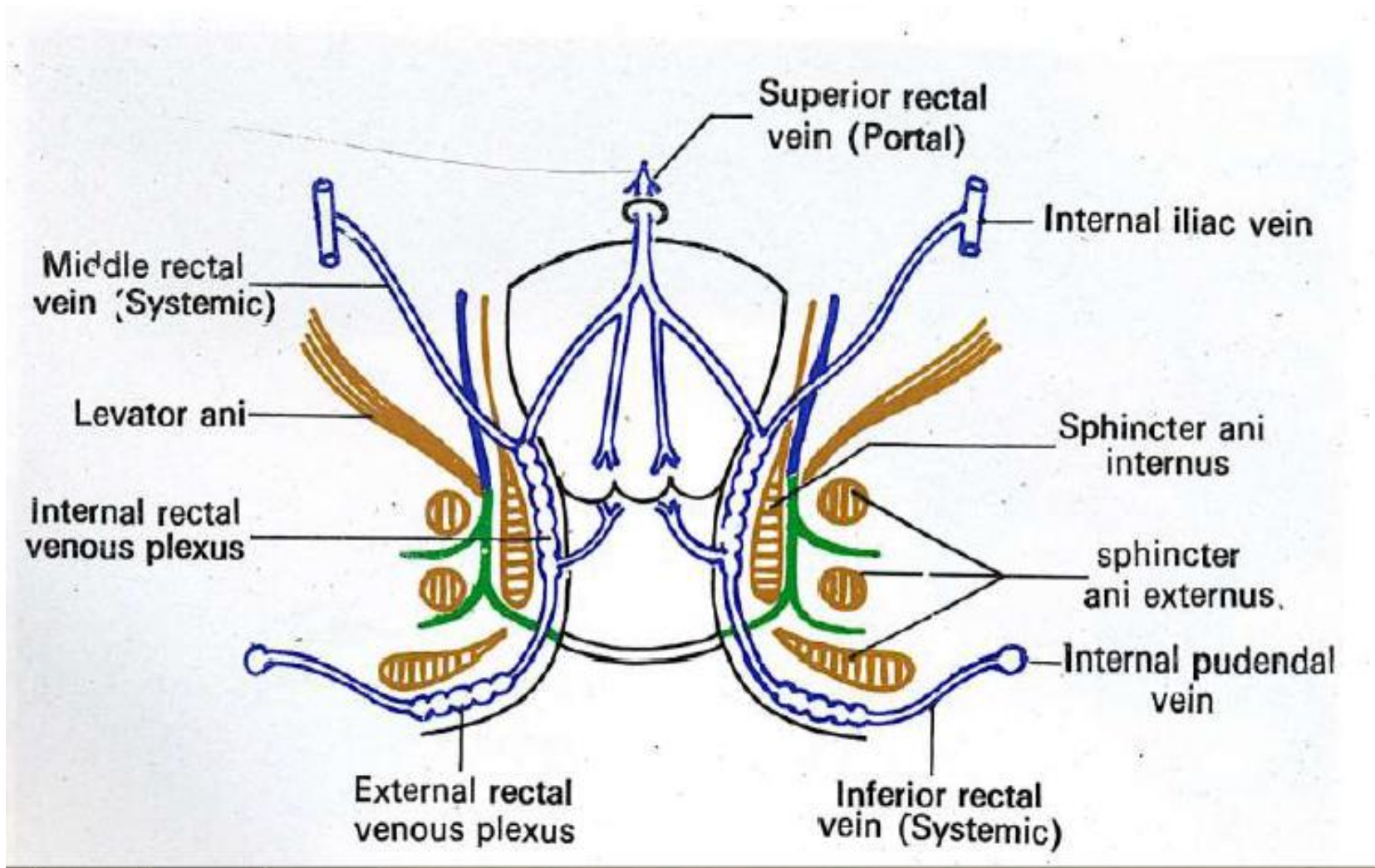


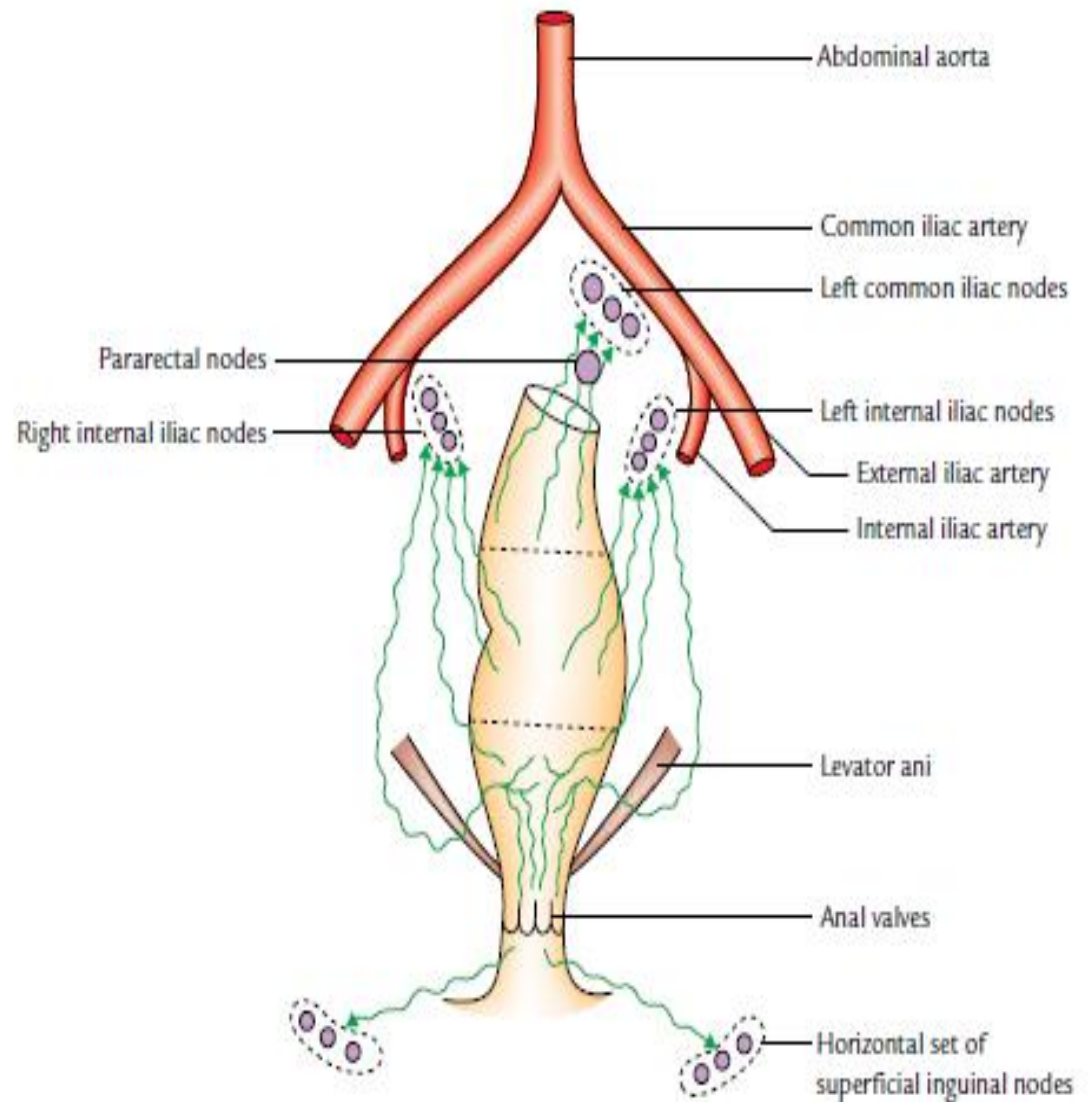
Fig. 2.51(c) Arterial supply of rectum and anal canal.

Venous drainage



Lymphatic drainage

- Upper ½ - sup rectal vessels -> para rectal & sigmoid nodes -> inf mesenteric nodes
- Lower ½ - middle rectal vessels -> internal iliac nodes



Nerve supply

- Sympathetic – L 1-2
- Parasympathetic – S 2-4
- Distension – Parasympathetic
- Pain - both

Supports

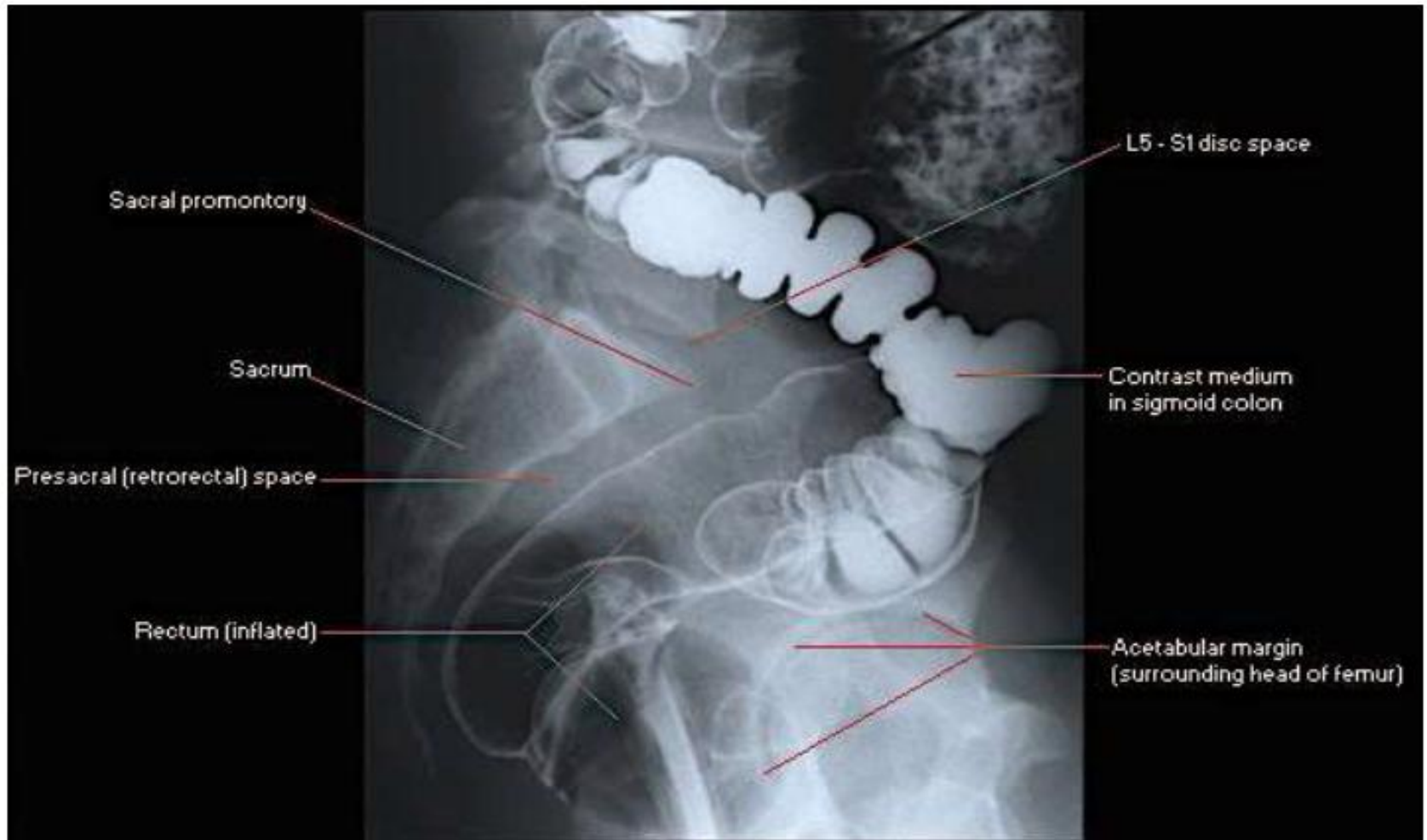
- Pelvic floor by levator ani
- Waldeyer's fascia – lower part of rectal ampulla to sacrum, contain sup rectal vessels and Lymphatics
- Lateral ligaments – contain middle rectal vessels, nerves
- Rectovesical pouch
- Pelvic peritoneum
- Perineal body

APPLIED ANATOMY

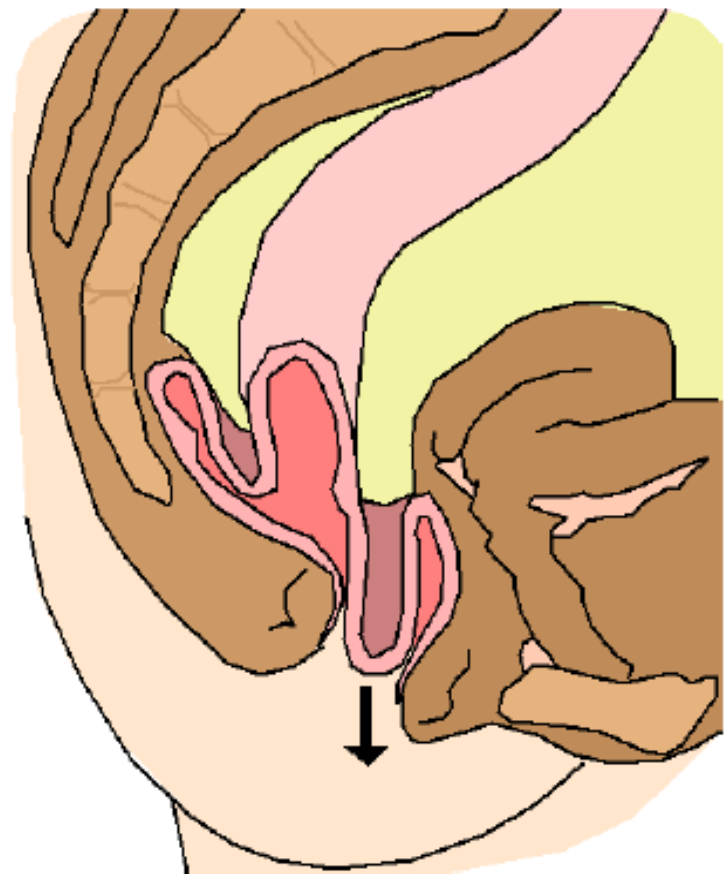
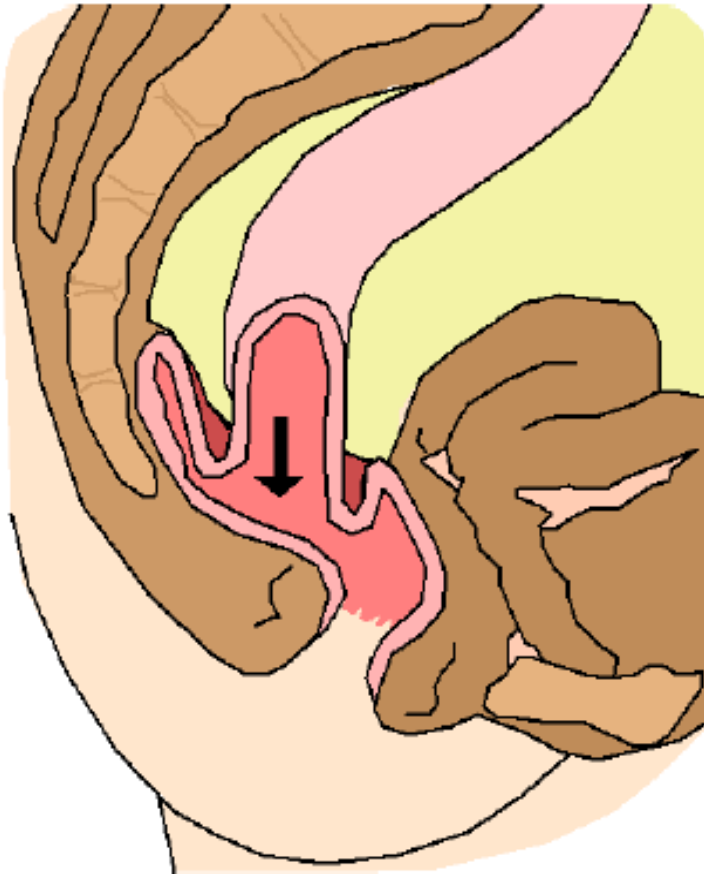
- PR EXAM
- PROCTOSCOPY
- RADIOLOGICAL STUDIES
- PROLAPSE AND INTUSUCEPTION
- POLYP
- CARCINOMA

Applied anatomy

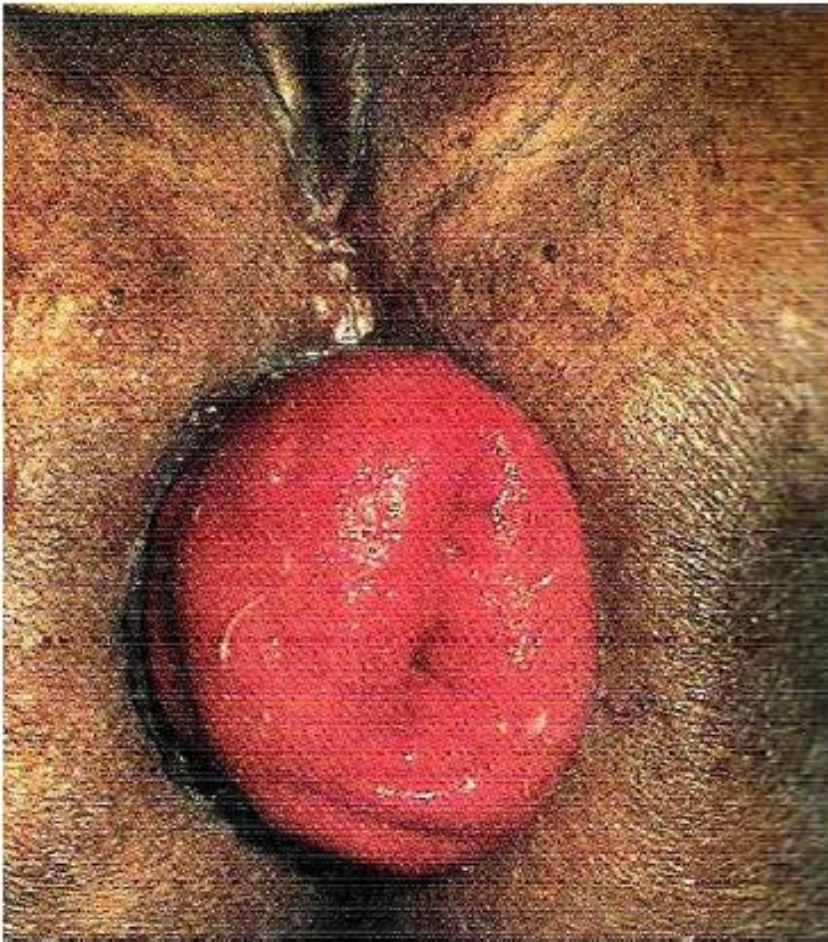
RECTUM: DOUBLE CONTRAST STUDY



RECTAL INTUSSUSCEPTION & RECTAL PROLAPSE



PROLAPSE OF RECTUM



- Complete - consists of full thickness of rectal wall.
- Partial prolapse - only mucous membrane of rectal wall.

COMPLETE PROLAPSE

RECTAL POLYP

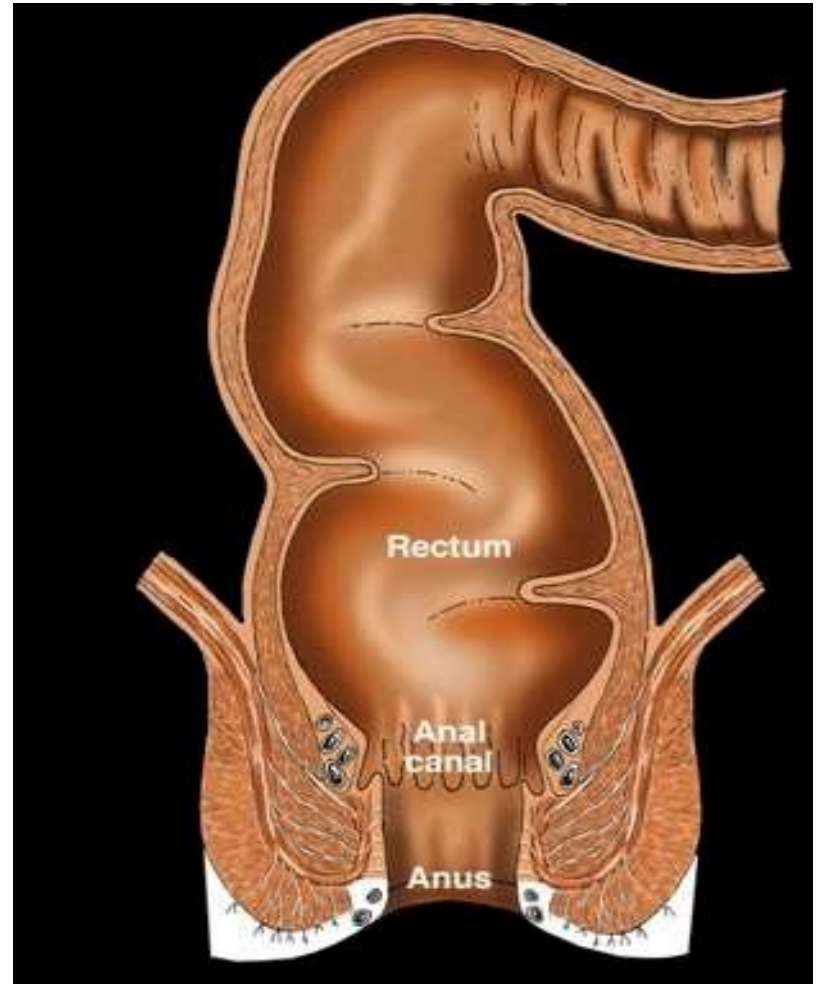
- Growth or mass
Protruding from the
mucous membrane

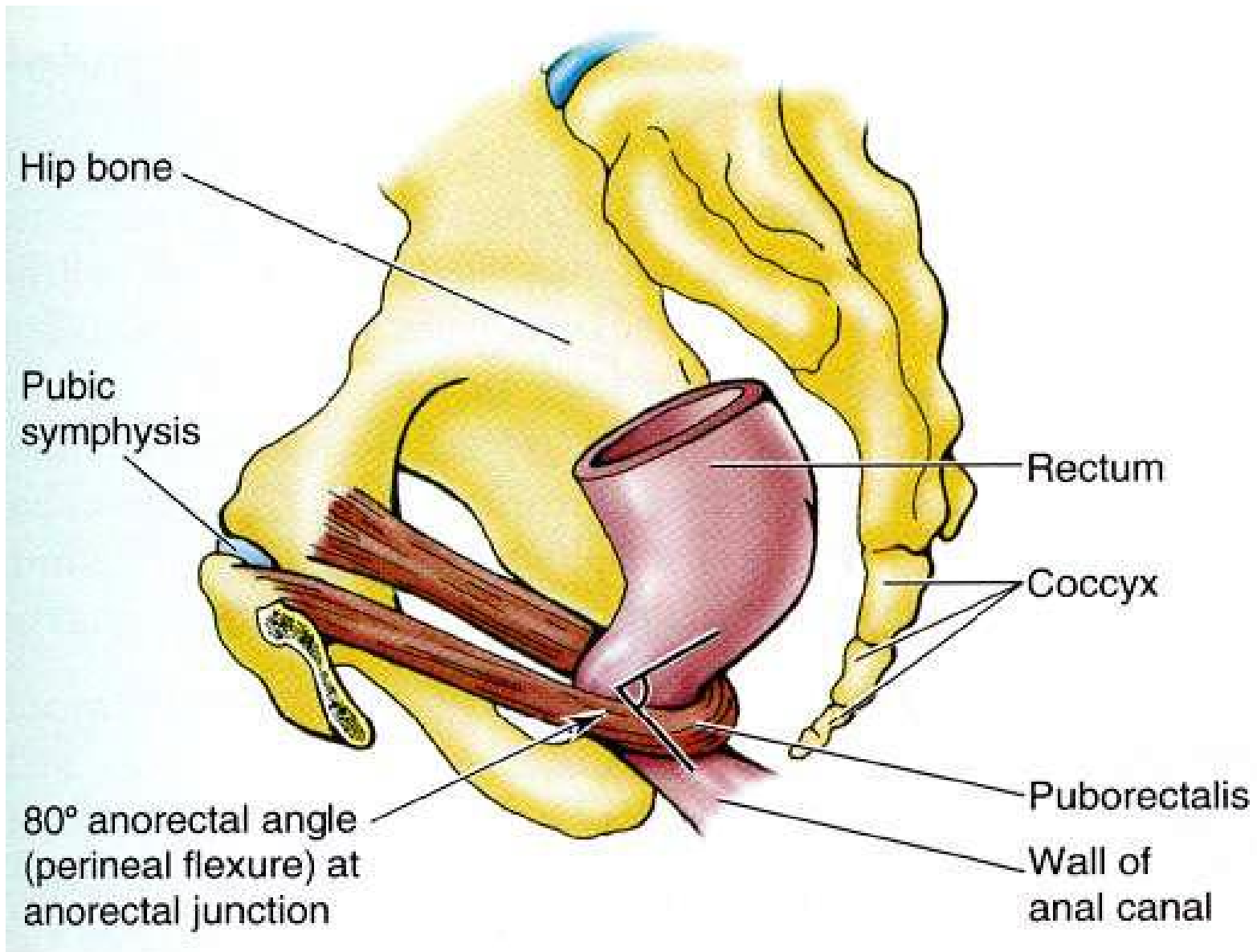


ANAL CANAL

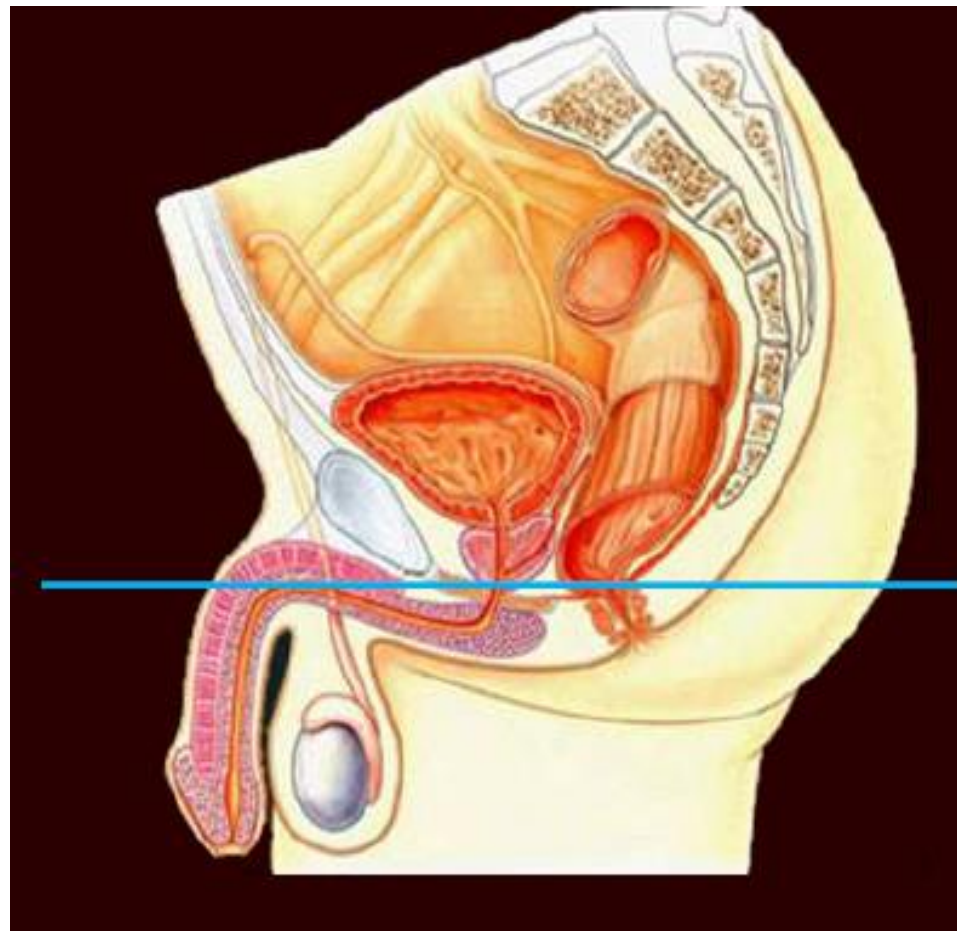
INTRODUCTION

- Terminal part of alimentary tract, begins at ano-rectal junction.
- Rectal ampulla suddenly narrows at ano-rectal junction 2-3 cms in front and slightly below tip of coccyx.
- From ano-rectal junction canal passes downwards & backwards through Pelvic diaphragm.
- Opens at anal orifice situated in the cleft between buttocks 4 cms below & in front of tip of coccyx.





**Ano-rectal junction in male
corresponds to apex of prostate
4 cms in front of tip of coccyx**



Features

Anterior wall shorter than posterior wall

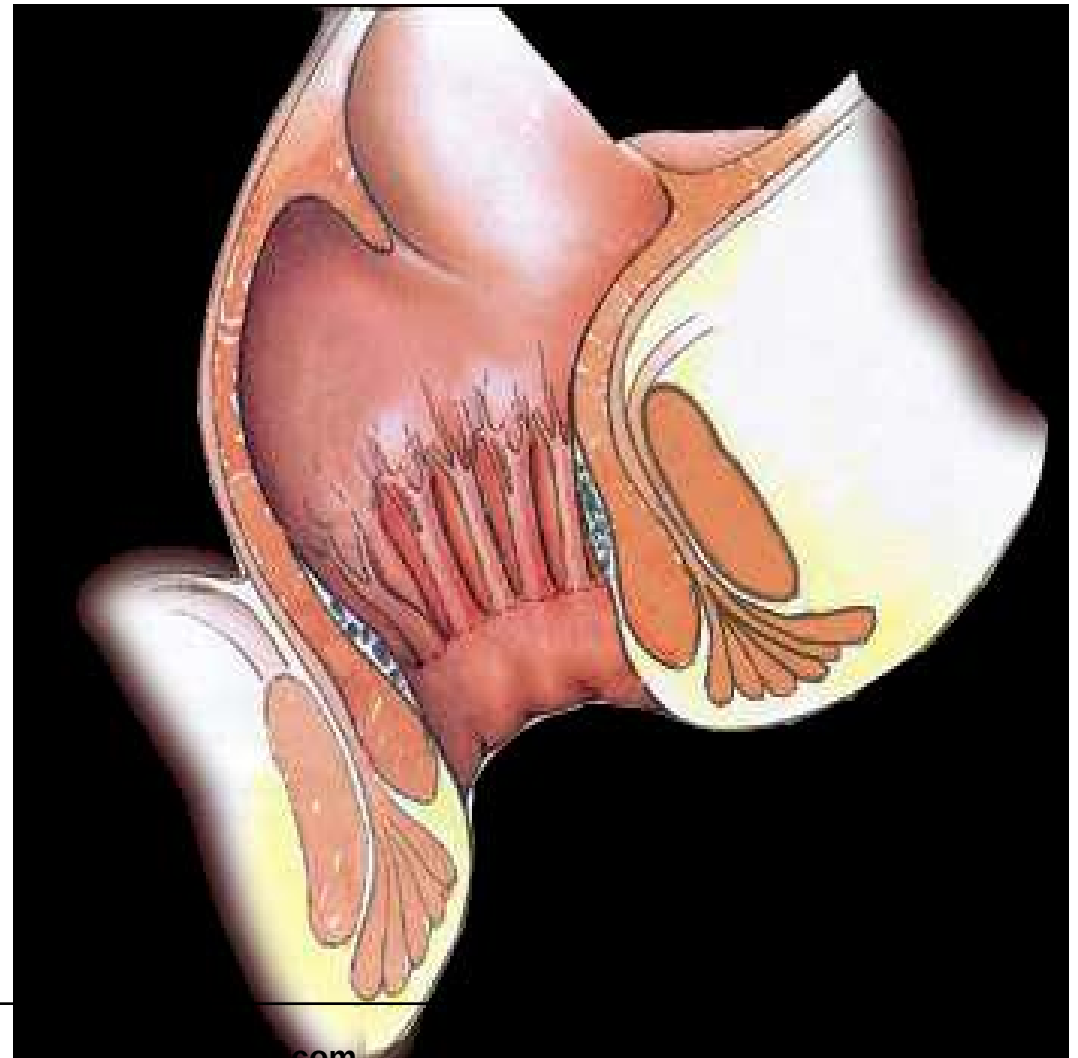
Surrounded by sphincter ani muscles

Canal closed except during defaecation

Measurements

Length (adult) 3.8 cms

Breadth when empty
lateral walls approximated
(antero-posterior slit)



RELATIONS

In front:

1. Perineal body
2. In male – bulb of penis & spongy urethra

In female – Lower part of post. wall of vagina

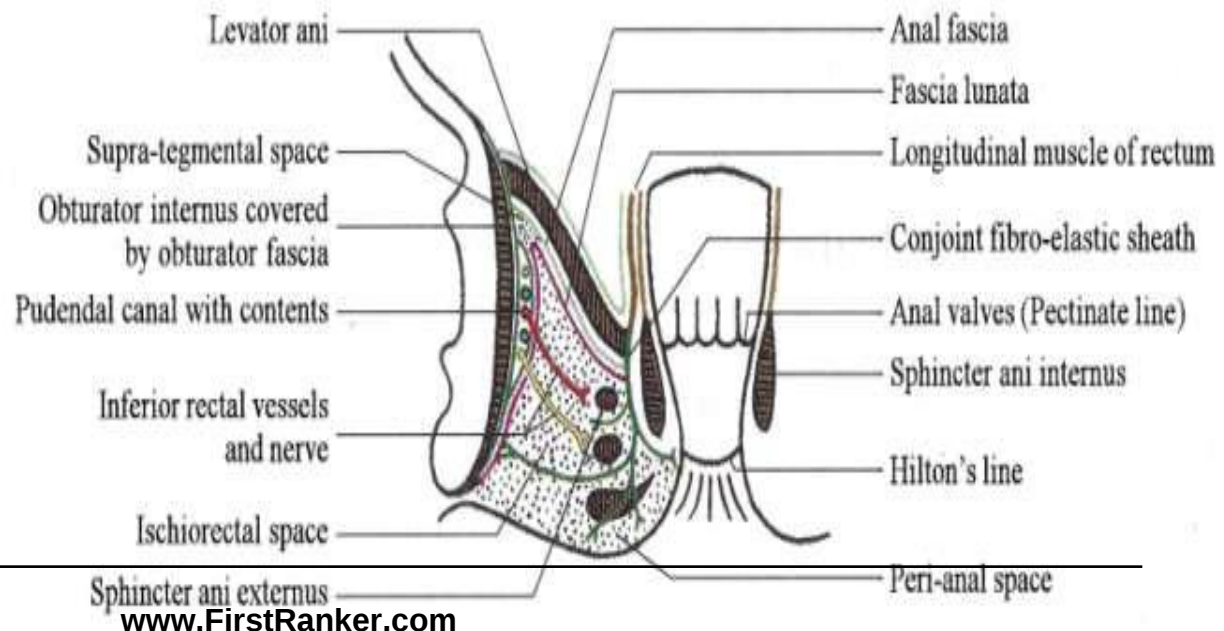
Behind:

Ano-coccygeal raphe

Fibro-fatty tissue bet' peri-anal skin & raphe

On each side:

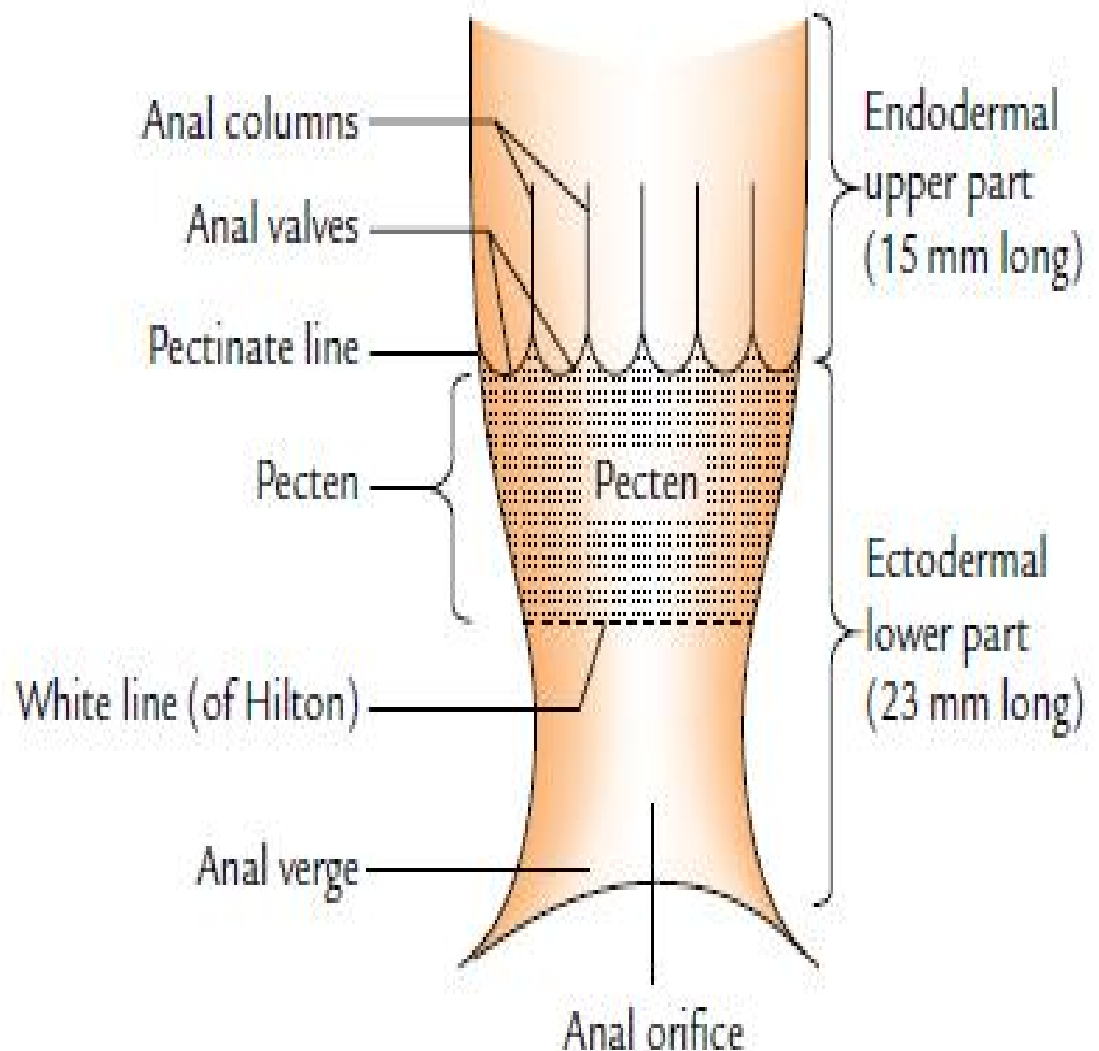
Ischio-rectal fossa and its contents



INTERIOR OF ANAL CANAL

Divided by pectineal line & Hilton's line into 3 areas

1. Upper (15 mm)
2. Intermediate (15 mm)
3. Lower (8 mm)
(Anal verge)



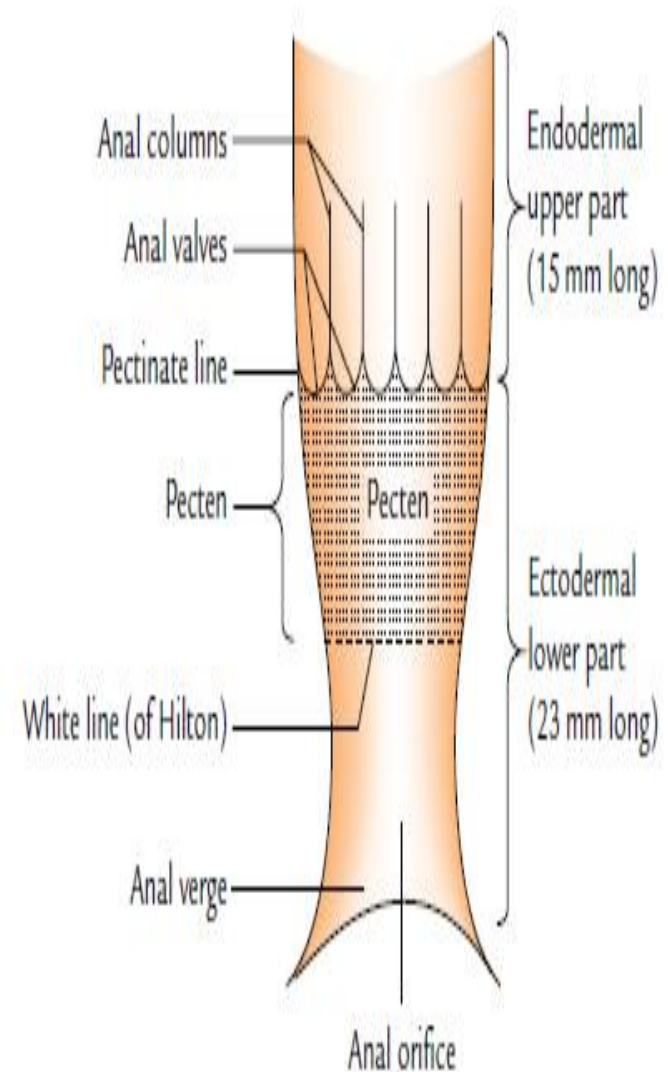
FEATURES IN THE UPPER PART OF ANAL CANAL

1. *Anal columns (columns of Morgagni):*

These are permanent longitudinal mucous folds numbering 6 to 10. They contain radicles of the superior rectal vein.

2. Anal valves (valves of Morgagni): *These are crescentic folds of mucous membrane which connect the lower ends of adjacent anal columns. The free margins of these valves are directed upward. The position of these valves is indicated by the wavy pectinate line (also called dentate line).*

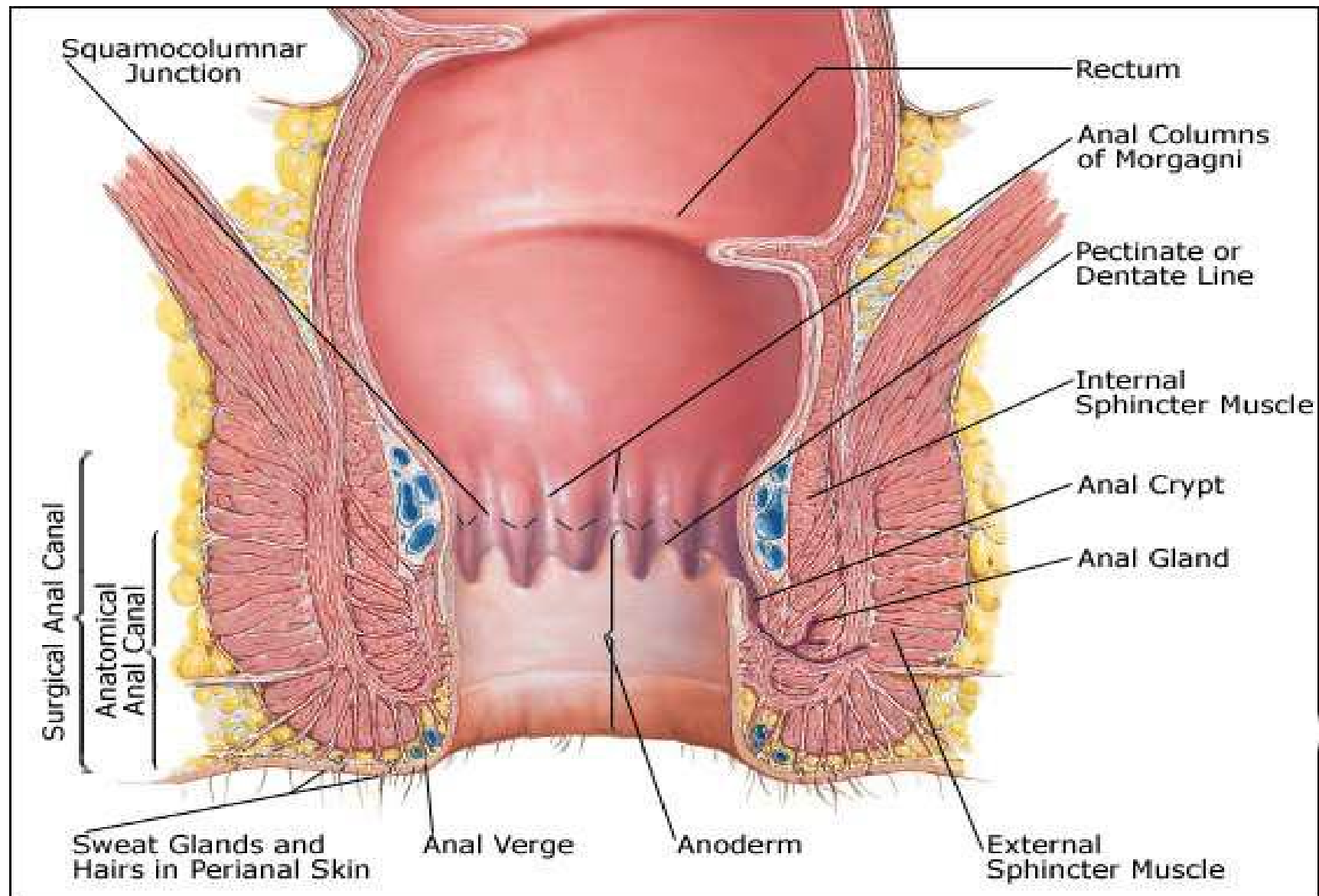
3. Anal sinuses: *These are vertical recesses between the anal columns and above the anal valves. The ducts of **tubular anal glands present in the submucosa open in the floor** of anal sinuses.*



FEATURES IN THE LOWER PART OF ANAL CANAL

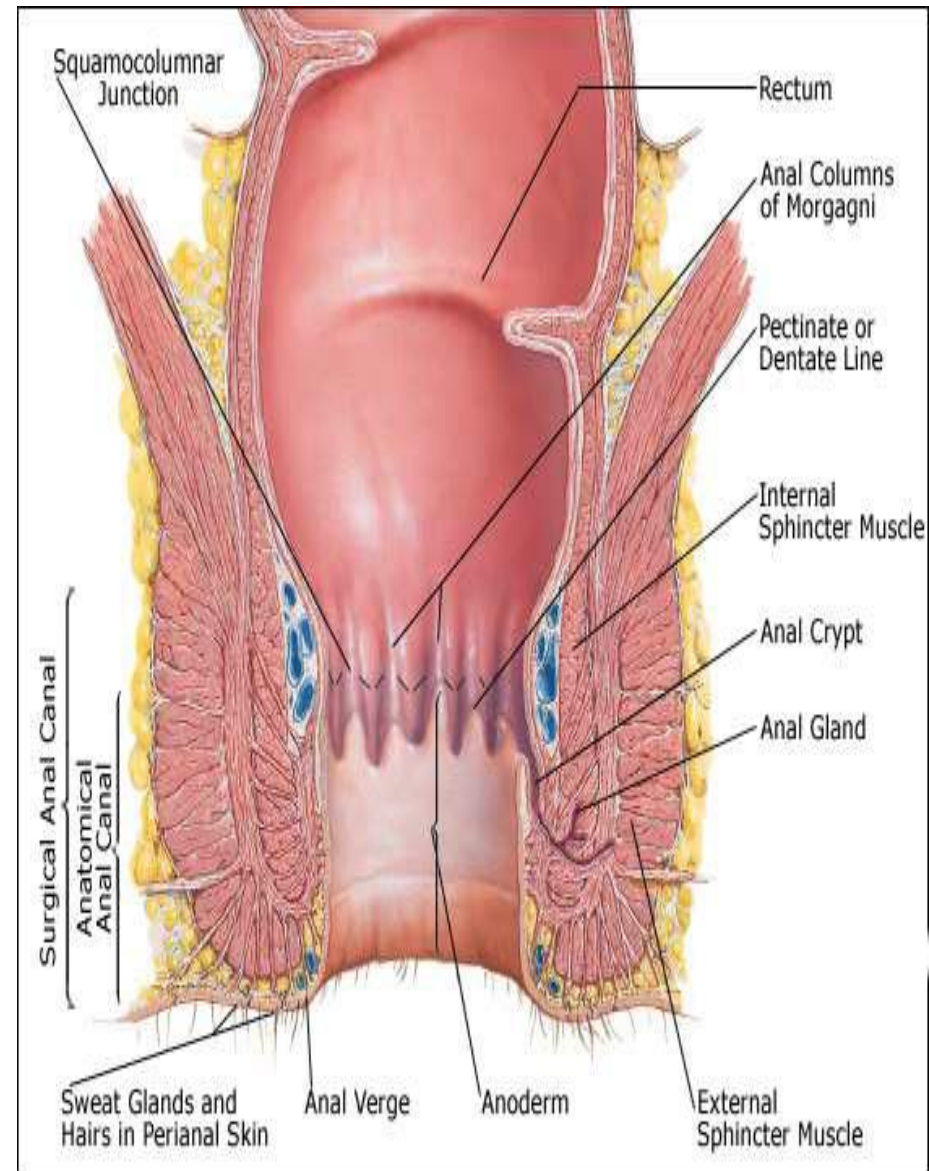
(a) Upper region (often called pecten): It is 15 mm long and extends from the pectinate line to Hilton's line. It is lined by the non-keratinized stratified squamous epithelium. The mucous lining in this region appears bluish in colour due to underlying dense venous plexus and is adherent to the underlying structures.

(b) Lower region of lower anal canal: It is about 8 mm in extent and lined by the true skin containing sweat and sebaceous gland. It shows pigmentation. In adult males, coarse hairs are often found around the anal orifice.



PECTINATE LINE

- Muco-cutaneous junction of anal canal
- Corresponds with position of anal valves
- Situated at the middle of internal sphincter
- Divides anal canal into upper and lower areas (proctodeum) which are different in development, blood supply, lymph drainage and in nerve supply



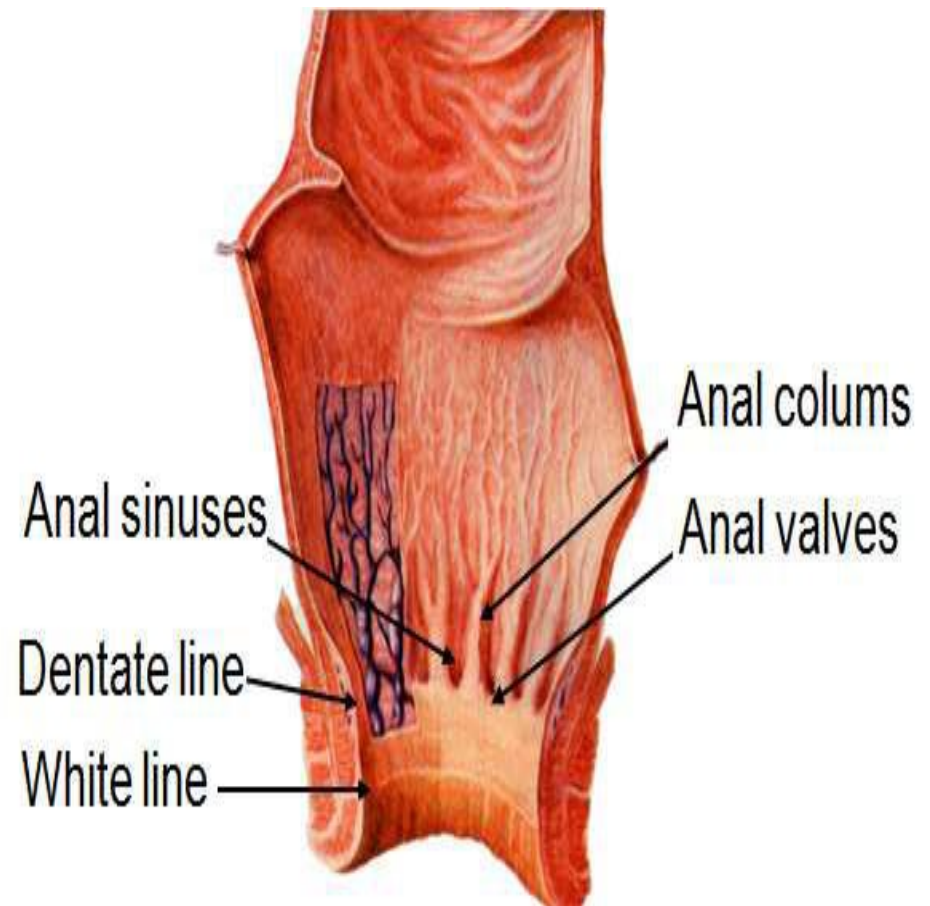
Distinction	Above Pectinate line	Below Pectinate line
Destination of lymph drainage	Internal iliac lymph nodes (pararectal lymph nodes)	Superficial inguinal lymph nodes (Below Hilton's line)
Epithelium	Columnar epithelium (as is most of the digestive tract – the line represents the end of the part derived from the hind gut)	Stratified squamous epithelium, non keratinized (until Hilton's white line, where the anal verge becomes continuous with the perianal skin containing keratinized epithelium)
Embryological origin	Endoderm	Ecotoderm
Artery	Superior rectal artery	Middle & inferior rectal arteries
Vein	Superior rectal vein	Middle & inferior rectal veins
Hemorrhoids classification	Internal hemorrhoids (not painful)	External hemorrhoids (painful)
Nerves	Inferior hypogastric plexus Symp L1,L2 & parasymp S2,S3,S4	Inferior rectal nerves

HILTON'S LINE

It is a color contrast bet'
bluish pink area above and
black skin below

The line is represented by
inter-sphincteric groove at
the lower end of the internal
sphincter

Indicates lower end of
internal sphincter



SPHINCTERS OF THE ANAL CANAL

Two – Internal & external, surround the anal canal.

SPHINCTER ANI INTERNUS

Involuntary sphincter, Thickening of circular muscle of lower part of rectum

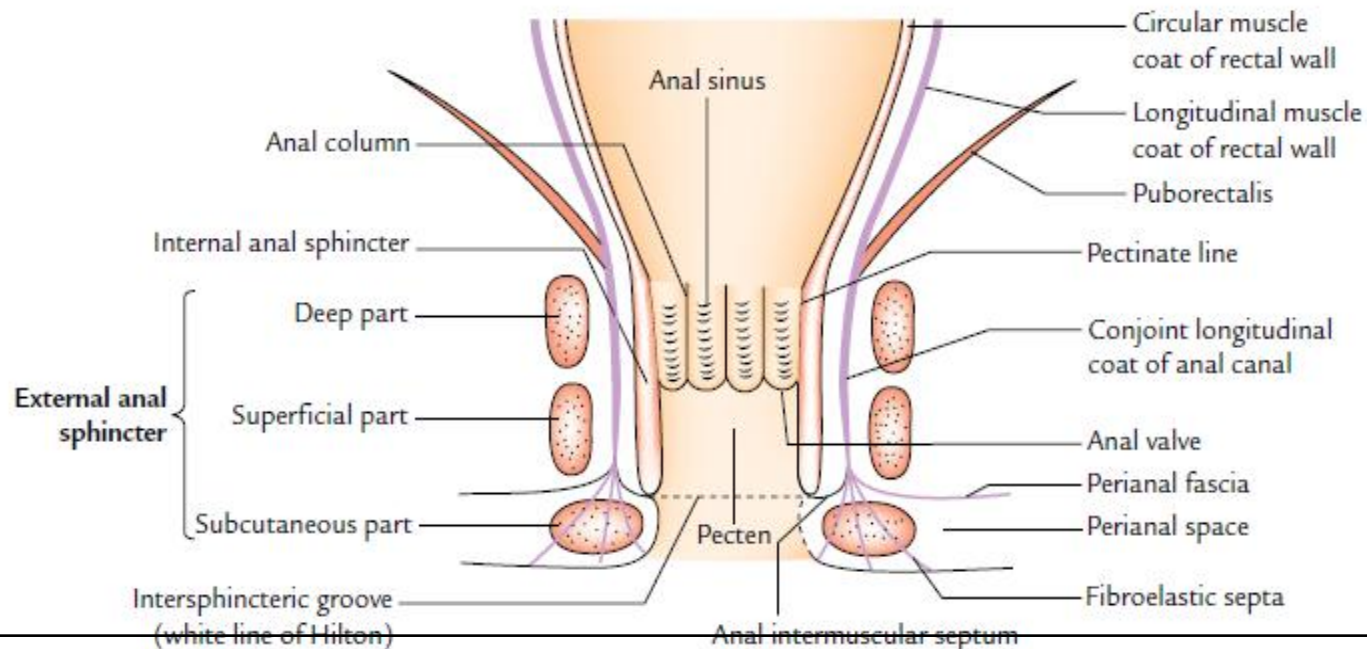
Surrounds upper 3/4th of anal canal

Lower end corresponds with Hilton's line

Middle corresponds with pectinate line

Internally the sphin. Is separated from mucous membrane by internal venous plexus

Externally separated from ext. sphin. Muscle by Conjoint sheath derived from levator ani and longitudinal muscles of rectum

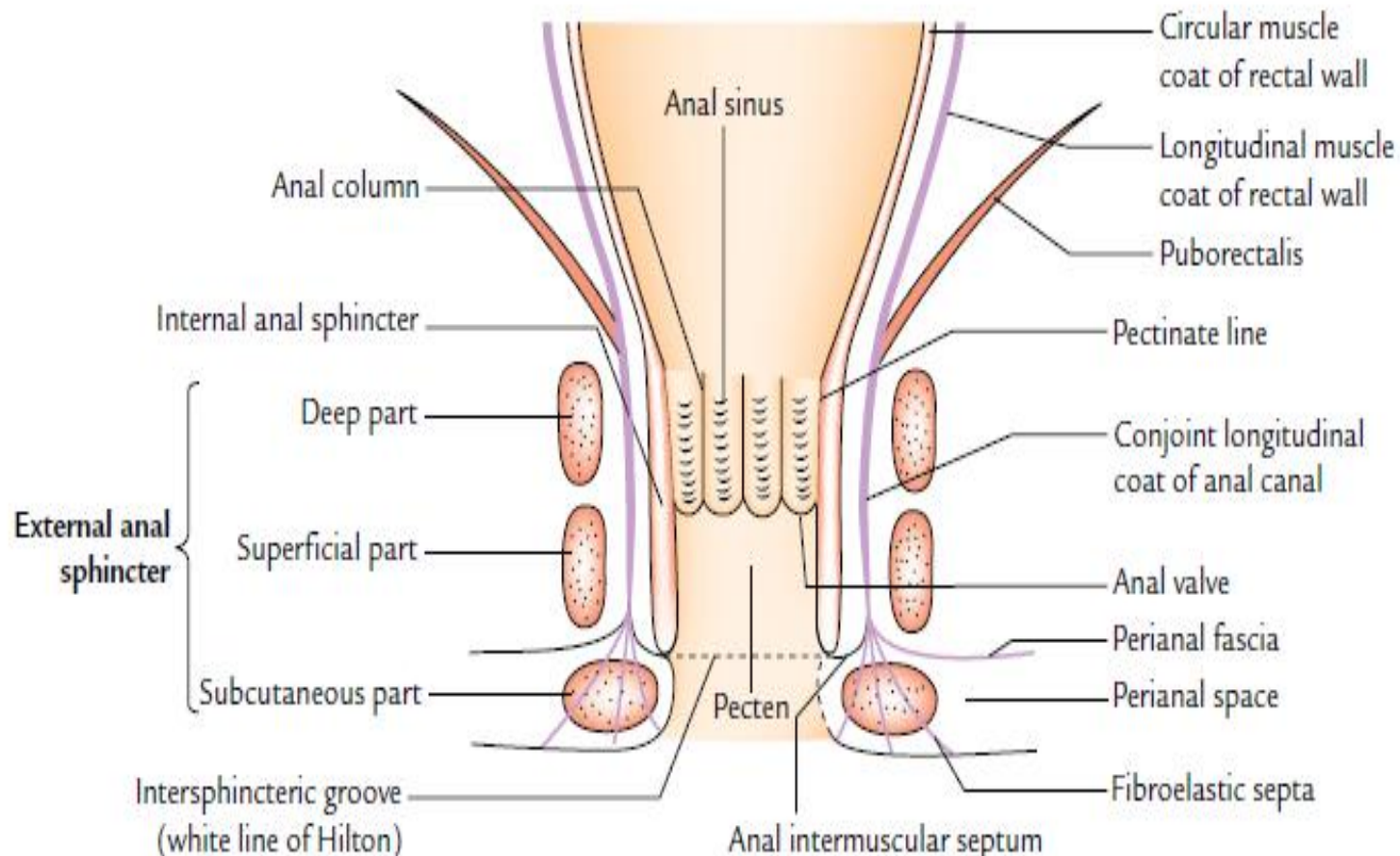


SPHINCTER ANI EXTERNUS

Voluntary sphincter

Surrounds entire length of anal canal

Consists of 3 parts – Subcutaneous, Superficial & Deep

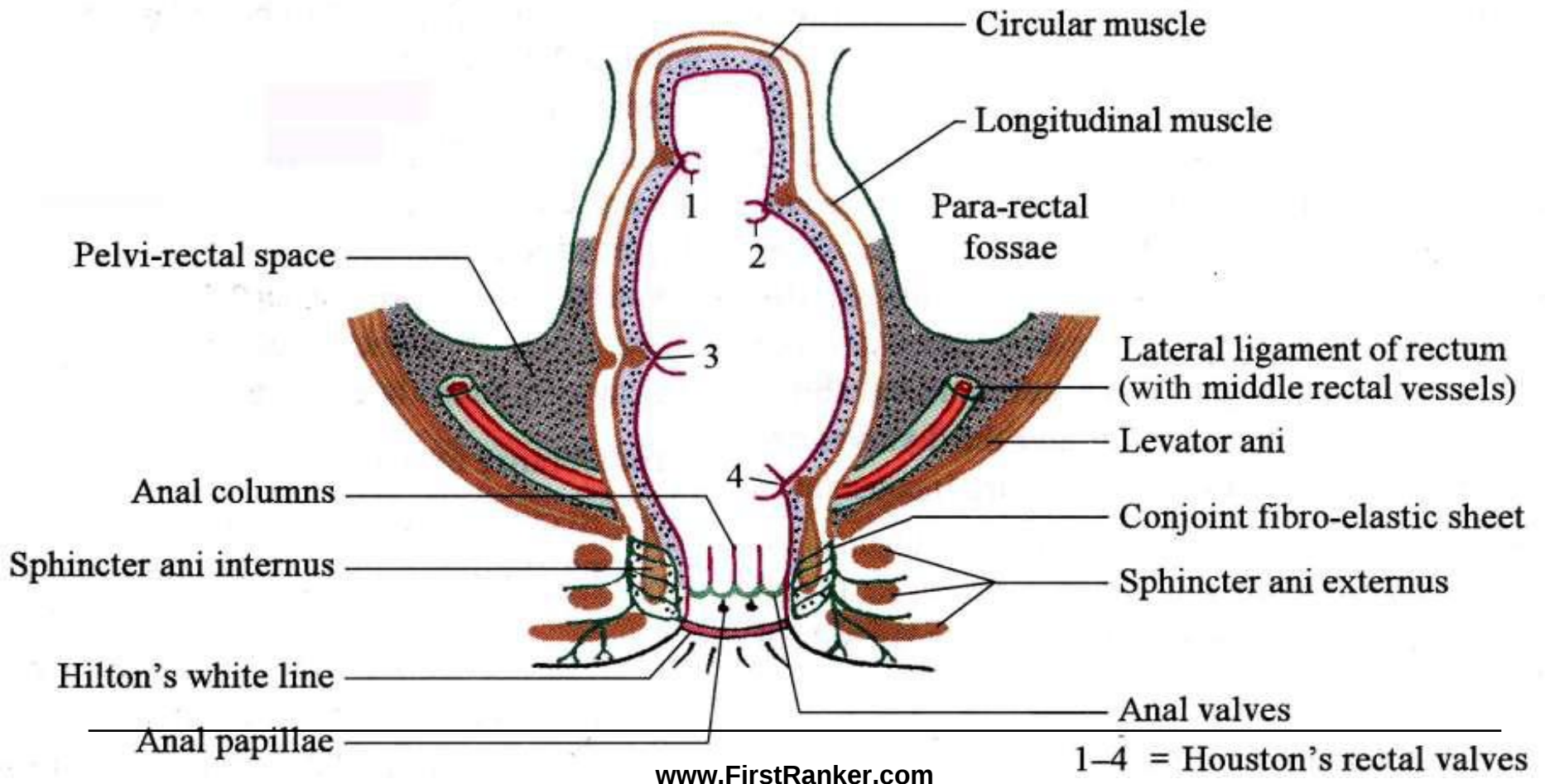


Nerve Supply of Sphincter

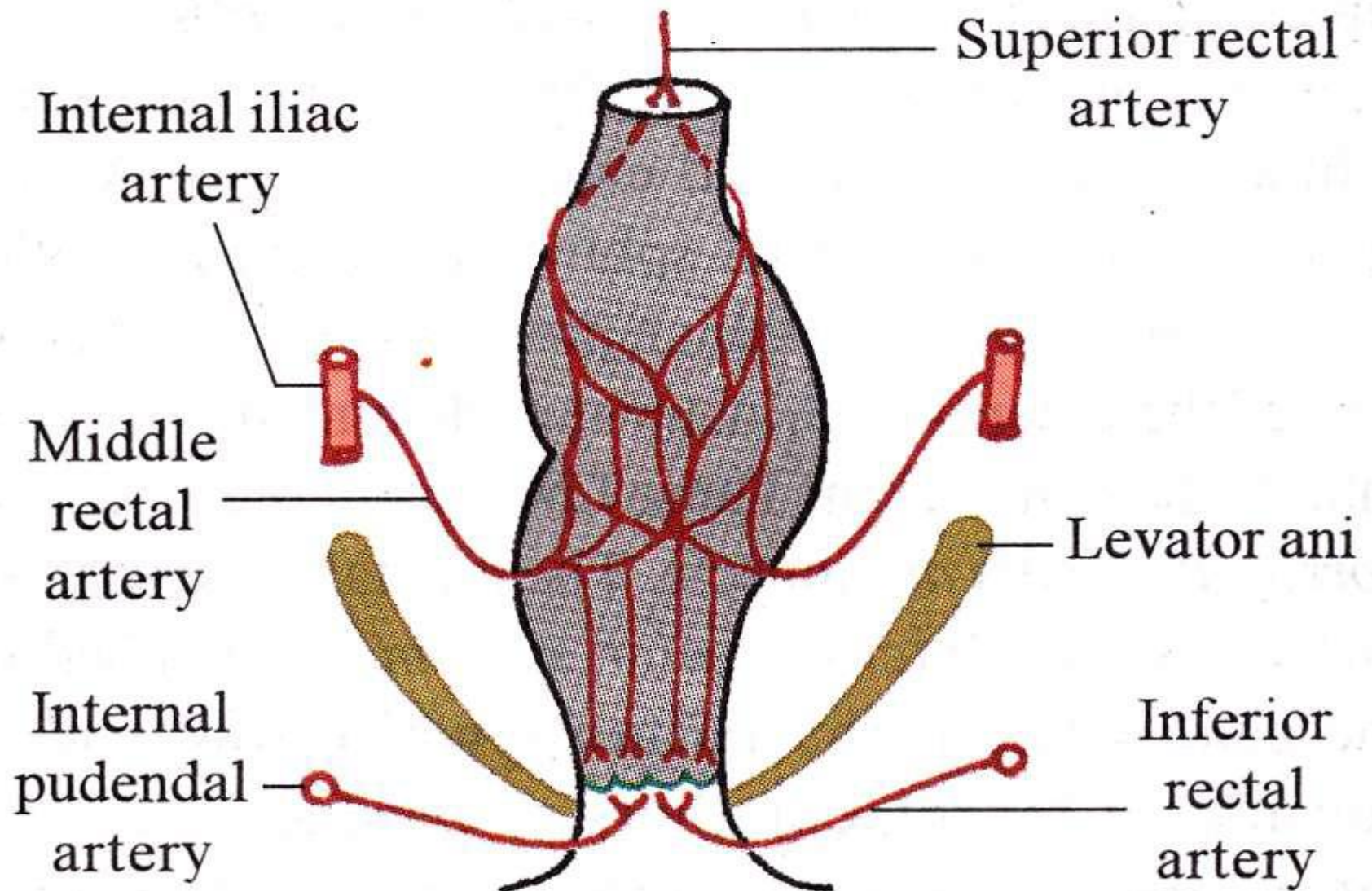
1. The *internal sphincter is made up of smooth muscle and* supplied by the autonomic nerve fibres (sympathetic and parasympathetic), hence it is involuntary.
2. The *external anal sphincter is made up of striated muscle* and hence, supplied by the somatic nerve—inferior rectal nerve and perineal branch of 4th sacral nerve. It is therefore under voluntary control.

CONJOINT FIBRO – ELASTIC SHEATH

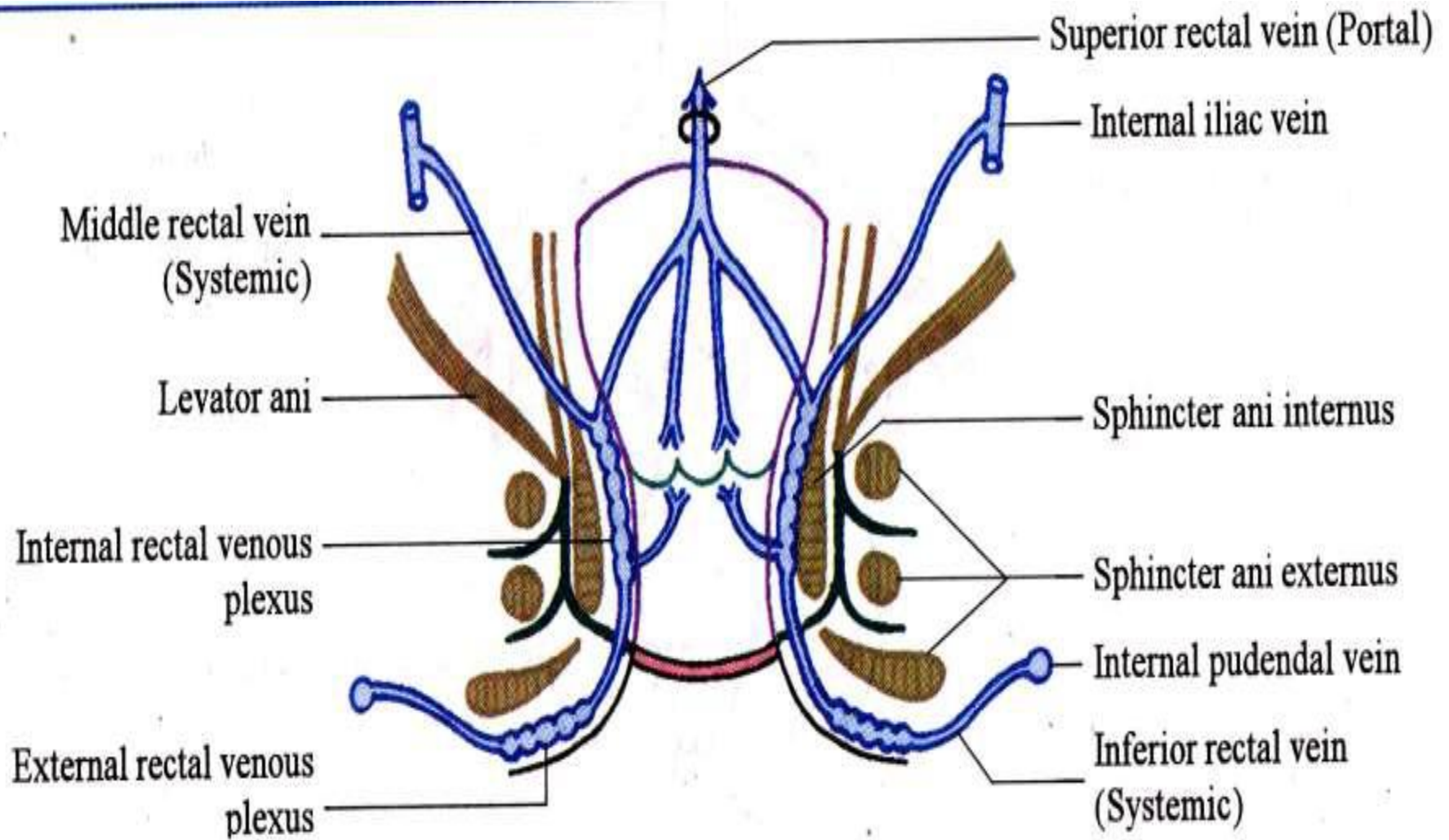
Formed by longitudinal muscle of rectum blending at ano-rectal Junction with puborectalis part of levator ani



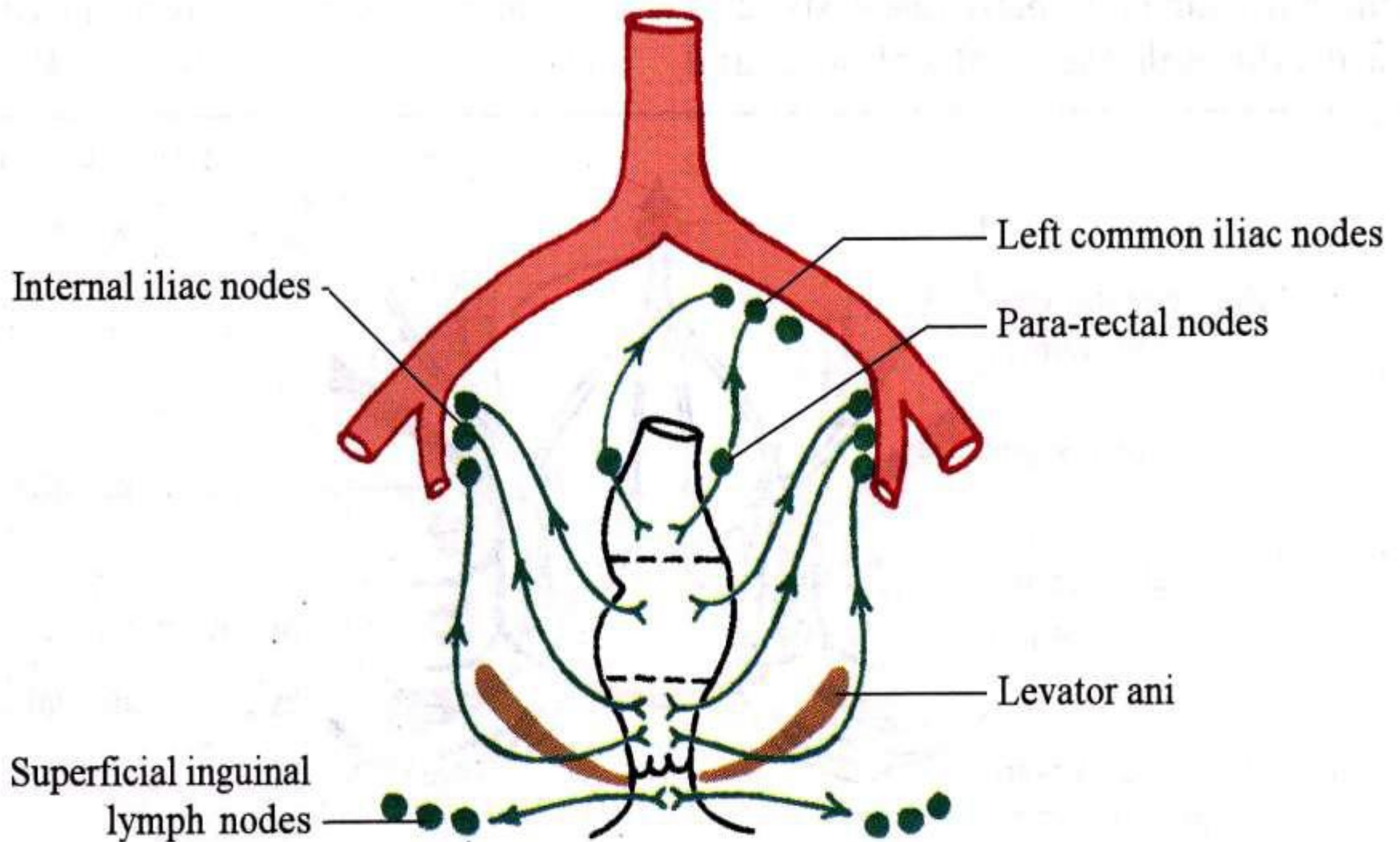
BLOOD SUPPLY



VENOUS DRAINAGE

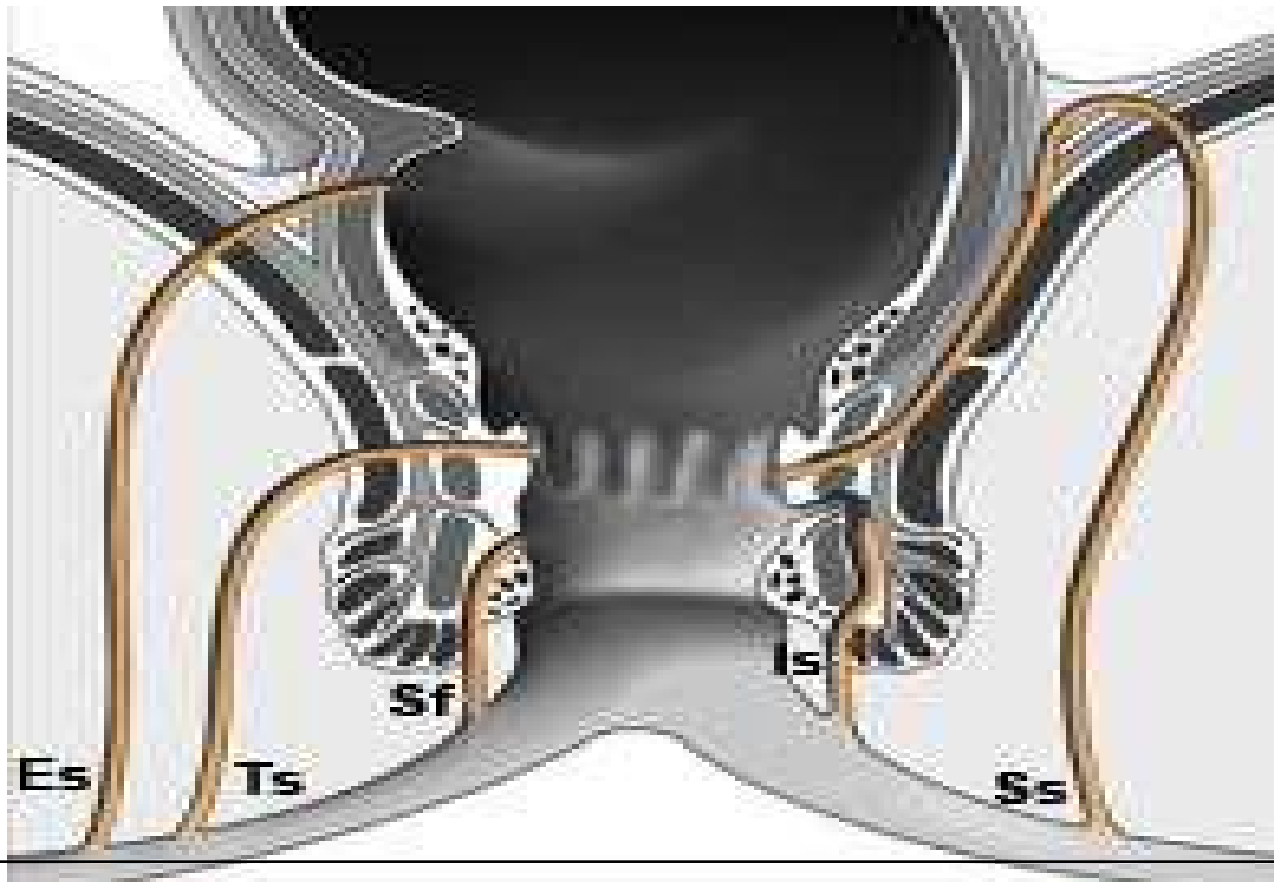


LYMPHATIC DRAINAGE



APPLIED ANATOMY

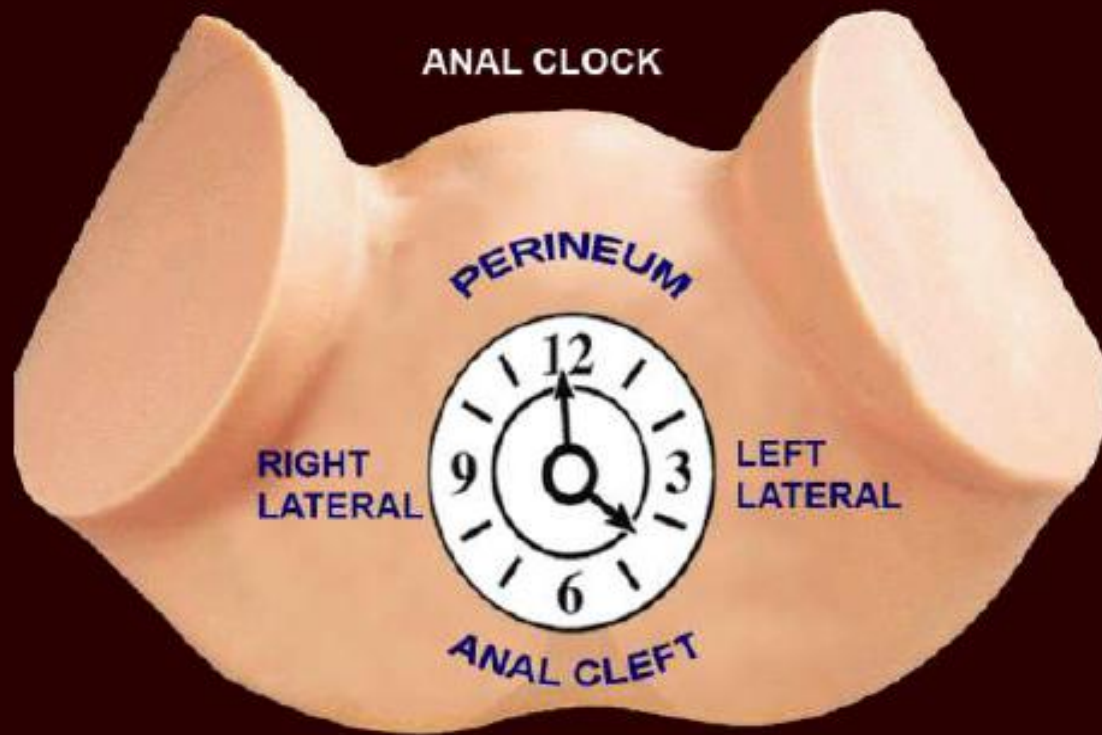
Fibrous tracts communicating with two surfaces
Ano-rectal mucosa and skin



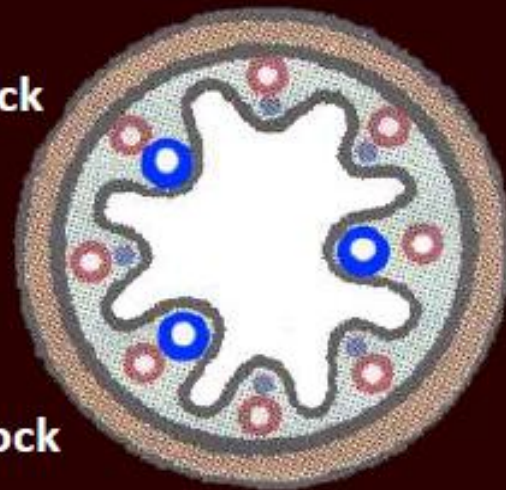


Normal Veins

Internal & external haemorrhoids

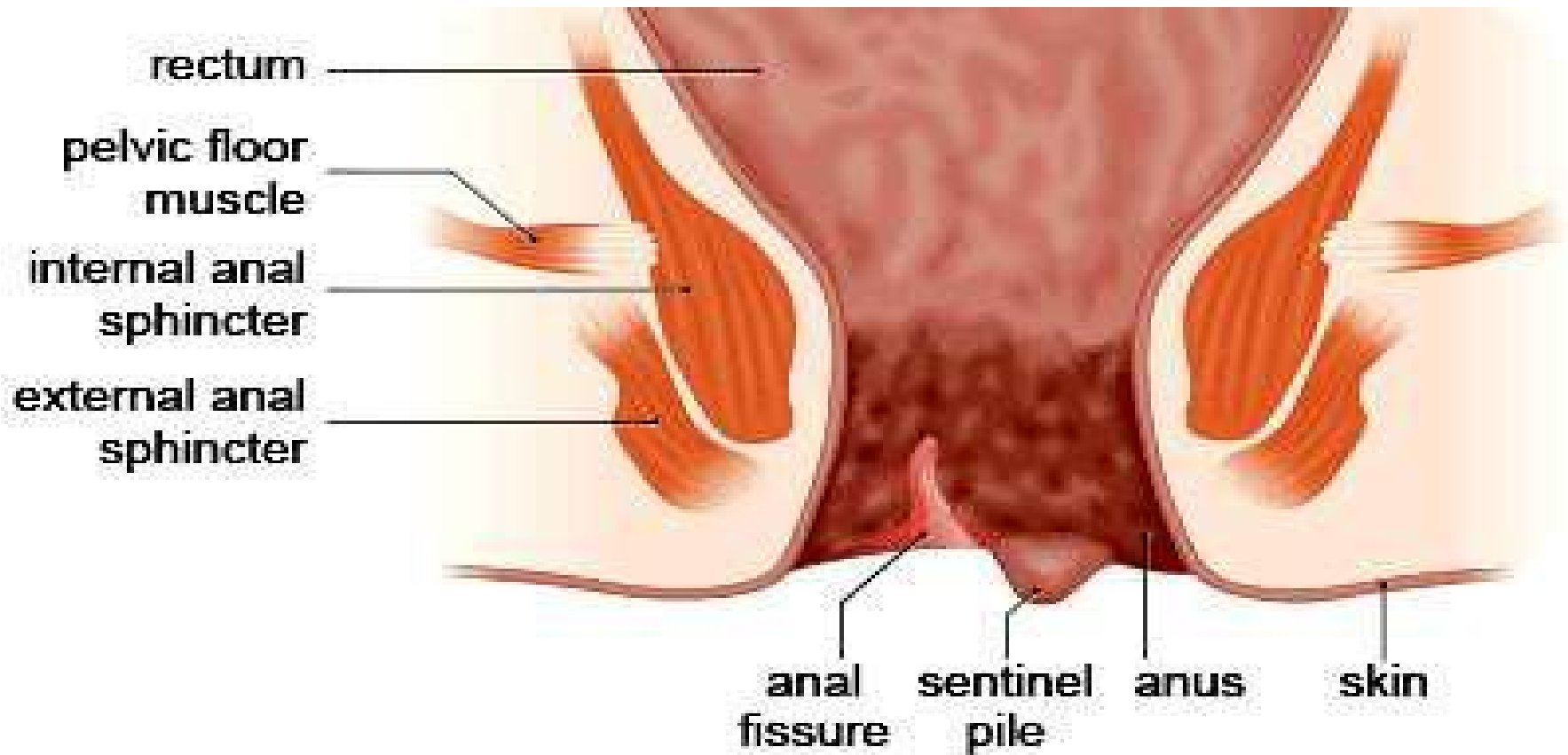


11 O' clock



3 O' clock

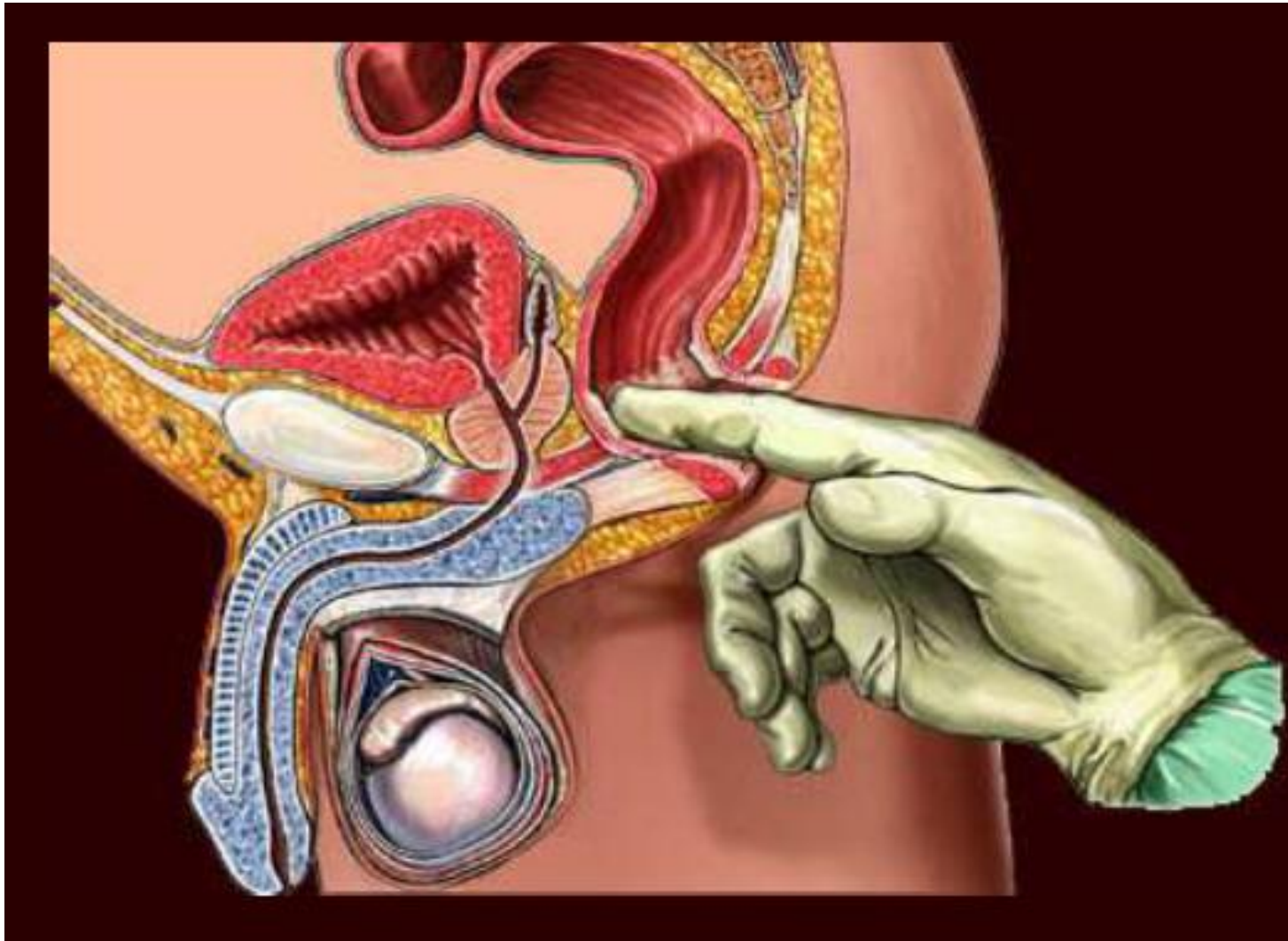
7 O' clock



The anus with an anal fissure

Sentinal pile is a tag formed by a ruptured anal valve

PR - Per rectal examination



THANK U