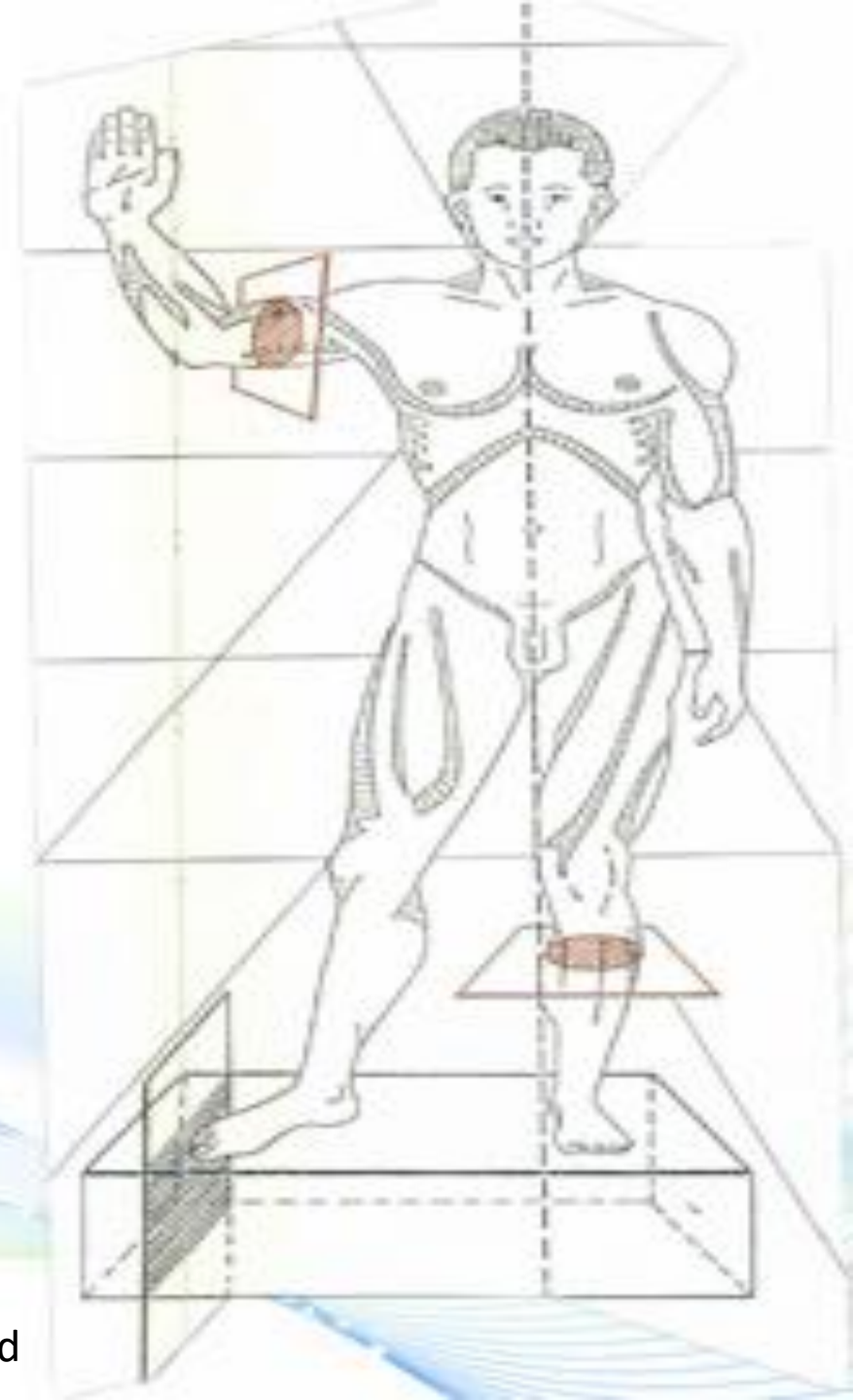


# RECTUM AND ANAL CANAL



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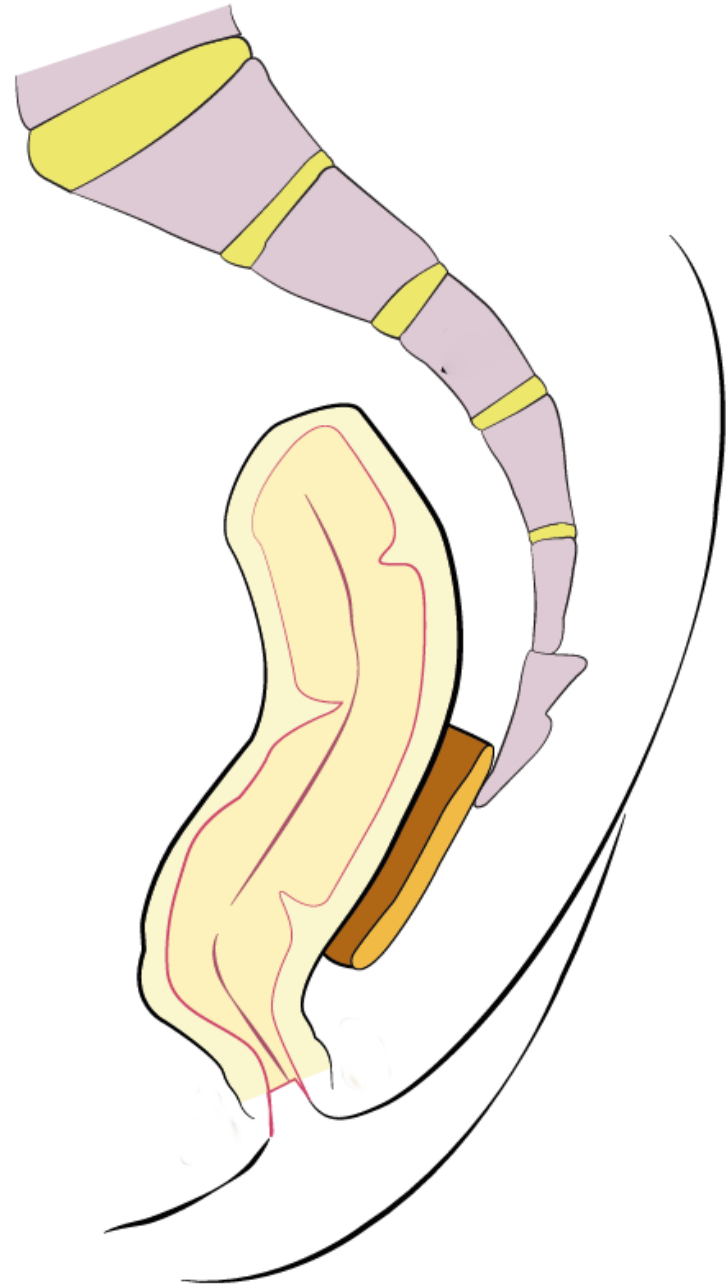
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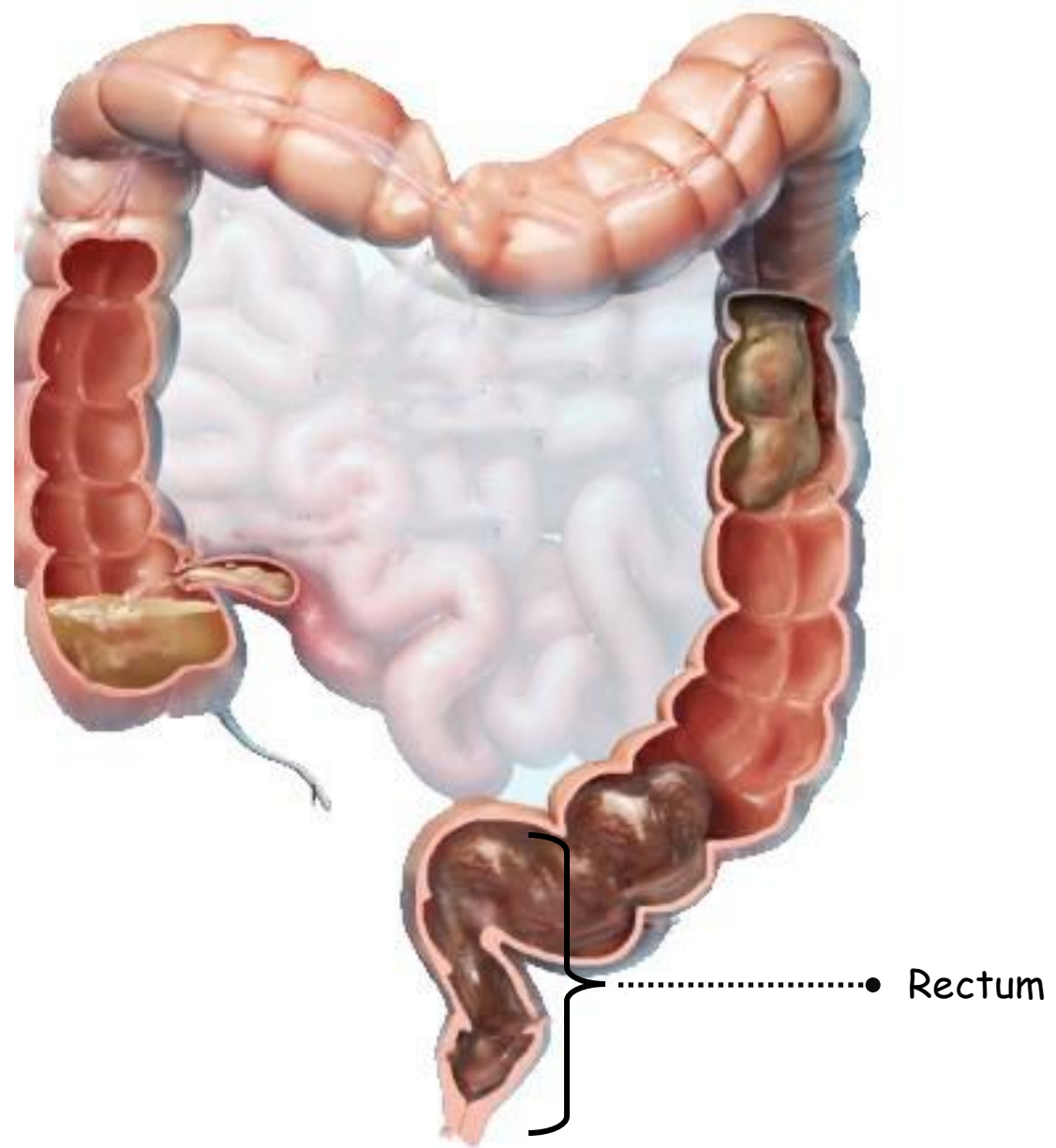
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# I. INTRODUCTION

- Terminal portion of the large intestine
- Faeces container
- Fecal continence and defecation
- The rectum ends at the anorectal junction where its muscle coats are replaced by the sphincters of the anal canal
- The anal canal ends at the anus and passes to the skin of the perineum
- Different embryologically



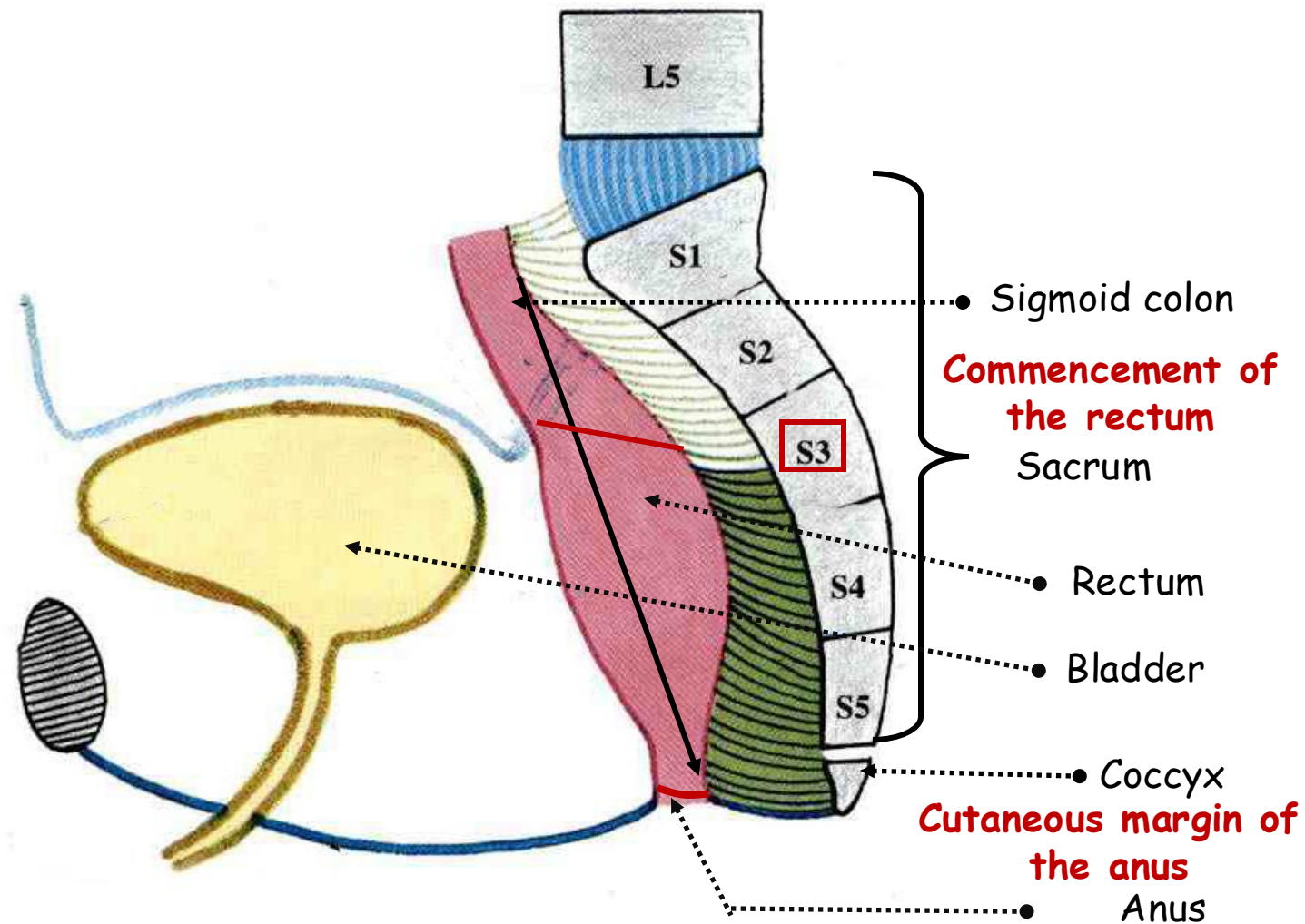
ANTERIOR VIEW OF THE LARGE INTESTINE



## II. DESCRIPTIVE ANATOMY

### A. SITUATION

- Positioned posteriorly in the midline within the pelvic cavity
- Straight following the posterior concavity of the sacrum and coccyx
- Behind the urogenital organs
- Continuous with the sigmoid colon at the level of the third piece of the sacrum
- Extends to the anus at the cutaneous margin of the anus and continues with the skin of the buttock

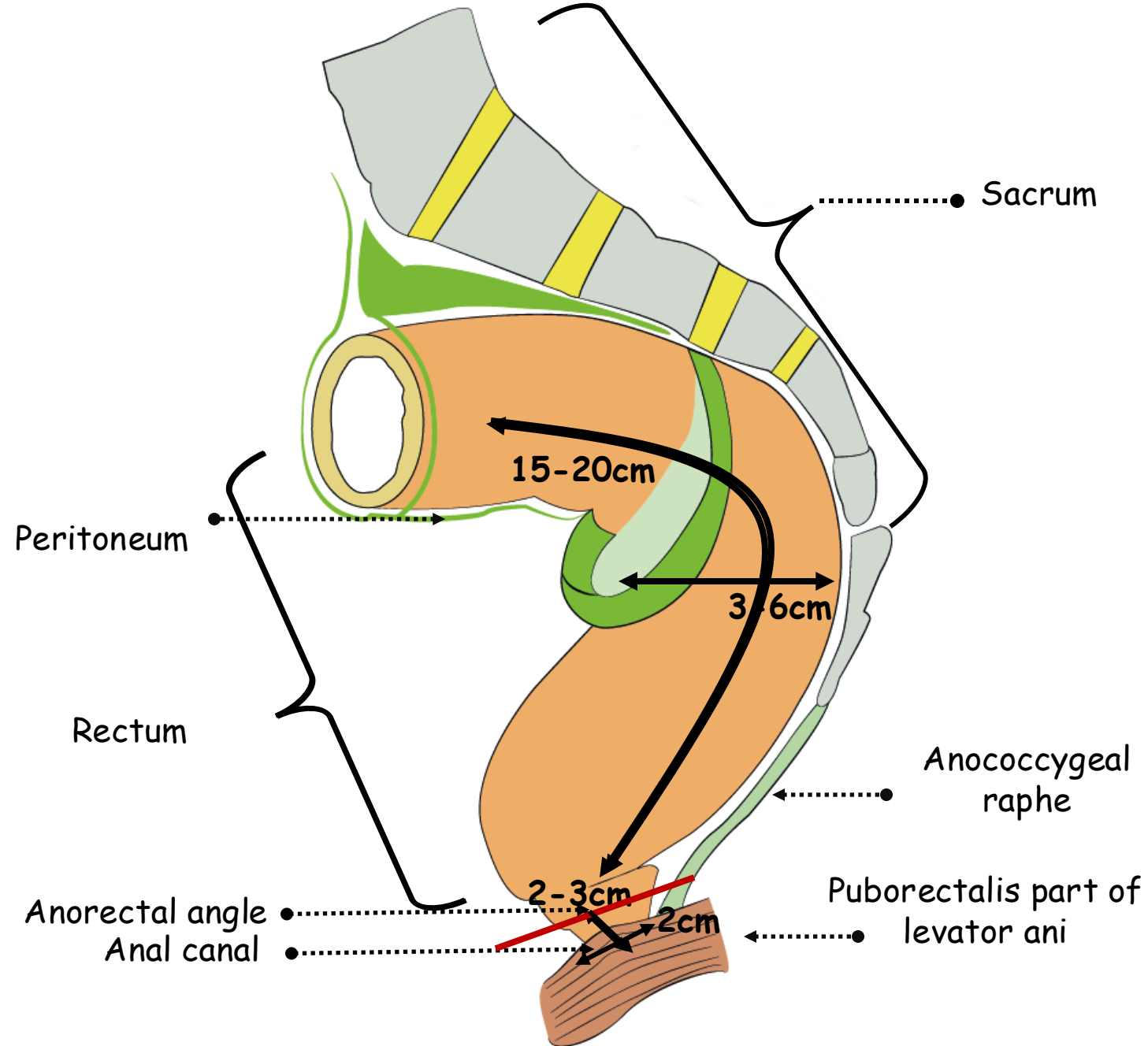


SAGITTAL SECTION OF PELVIS MINOR

## B. SHAPE

### 1. Lateral view:

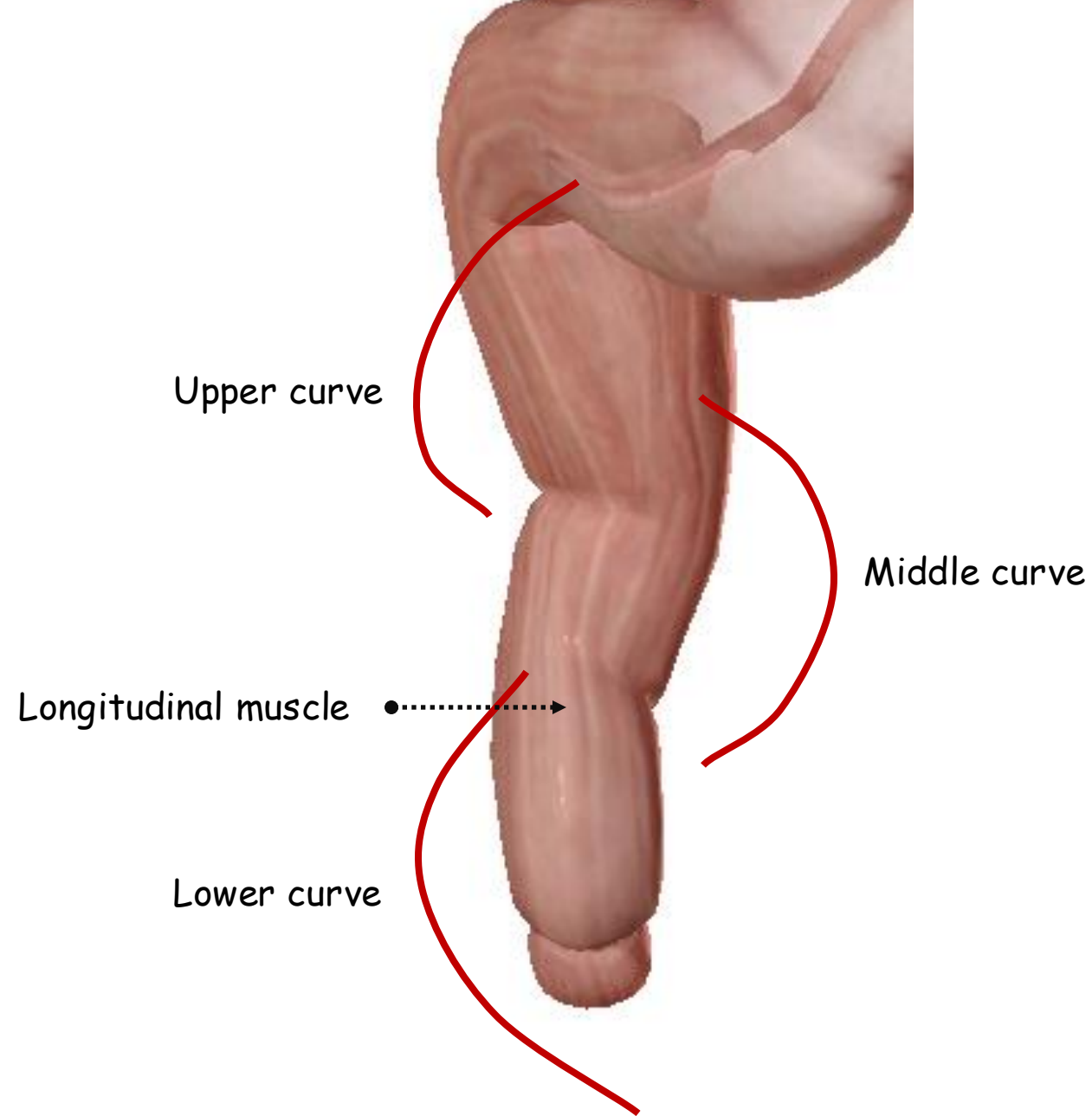
- S-shaped
- Commencement in the hollow of the sacrum at the level of the third piece
- Curves forward over the coccyx and anococcygeal raphe at the level where the puborectalis part of levator ani clasps the gut and angles it forwards
- From this right-angled junction with the rectum the anal canal passes downwards and somewhat backwards to the skin of the perineum through the anal perineum just behind the perineal body
- Peritoneum covers the upper third of the rectum at the front and sides, and the middle third only at the front; the lower third is below the level of the peritoneum which is reflected forwards to form the pouch of Douglas
- Total length: 16 cm
- Internal diameter of rectum: 4cm
- Internal diameter of anal canal: 2cm



SAGITTAL SECTION OF THE RECTUM

## 2. Frontal view:

- Three slight lateral curves or flexures that are most prominent when the viscus is distended
- Upper and lower curves convex to the right
- Middle curve convex to the left
- The middle part appears to bulge to the left
- Correspond to the three sickle shaped transverse rectal folds, the rectal valves of Houston that project into the lumen
- No haustra nor epiploic appendices
- Taeniae coli come together over the rectum to invest it in a complete outer layer of longitudinal muscle
- Real distinction: peritoneal attachments



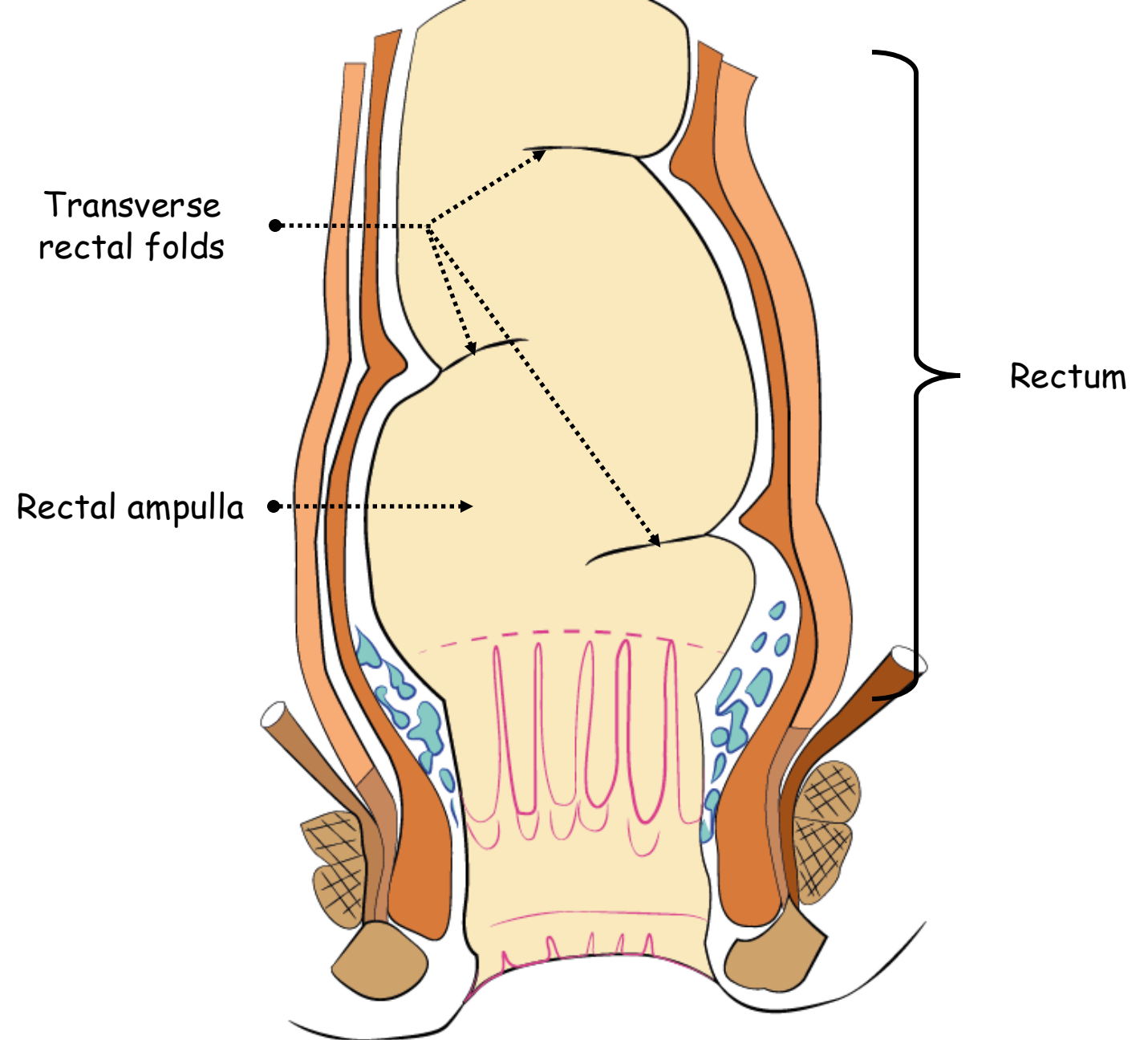
ANTERIOR VIEW OF THE RECTUM



### III. STRUCTURE

#### A. LUMEN OF RECTUM

- The lowest part is slightly dilated as the rectal ampulla
- Three sickle shaped transverse rectal folds, formerly called rectal valves of Houston that project into the lumen
- Produced by the circular muscle of the wall and are not confined merely to the mucous membrane
- May be concerned in the separation of flatus from the faecal mass
- Shelf-like support while allowing flatus to pass

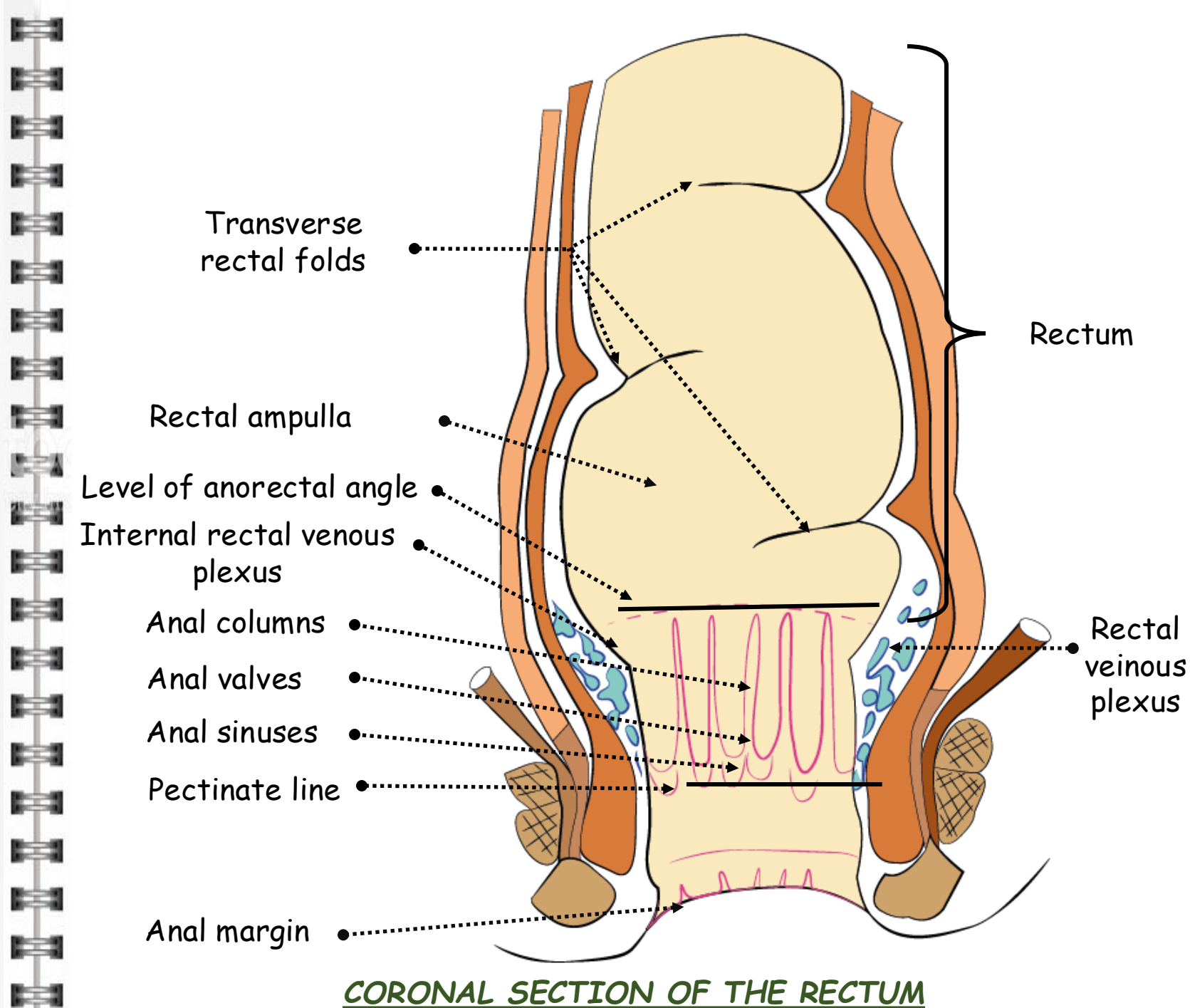


CORONAL SECTION OF THE RECTUM

## B. LUMEN OF ANAL CANAL

### 1. Upper third:

- Between the anorectal angle and the pectinate line
- Dozen longitudinal ridges, the anal column
- Prominent in children
- At their lower ends adjacent columns are joined together by small horizontal folds, the anal valves
- The pockets so formed above the valves are the anal sinuses into which open up to 10 mucous-secreting submucosal anal glands
- 3 and 11 o'clock venous cushions
- The level of the anal valves is the pectinate line or dentate line



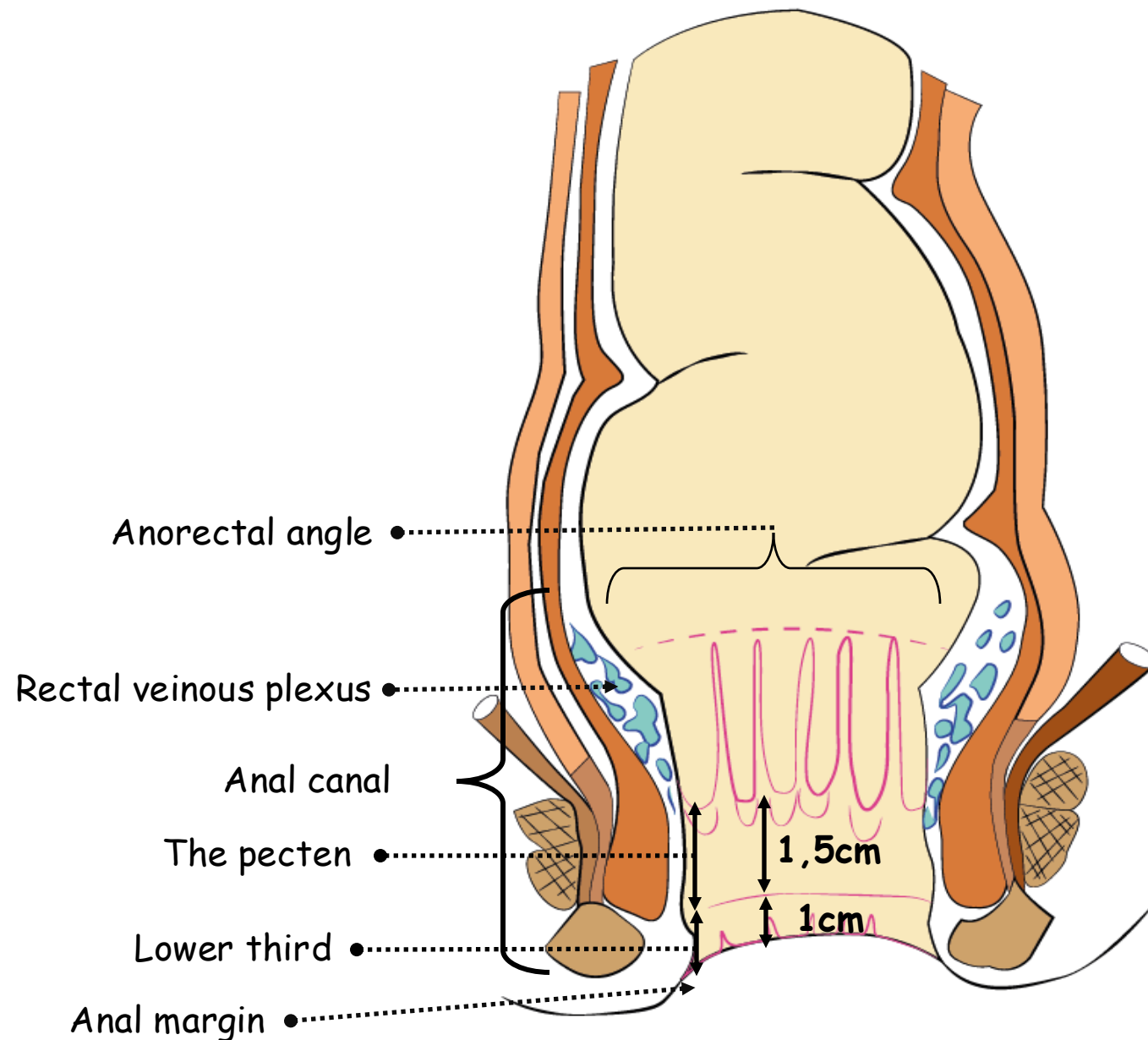


## 2. Middle third:

- The pecten
- Smooth-surfaced area
- 1.5 cm
- Extends down to the intersphincteric groove
- No hair follicles, sebaceous glands or sweat glands
- Internal rectal venous plexus

## 3. Lower third:

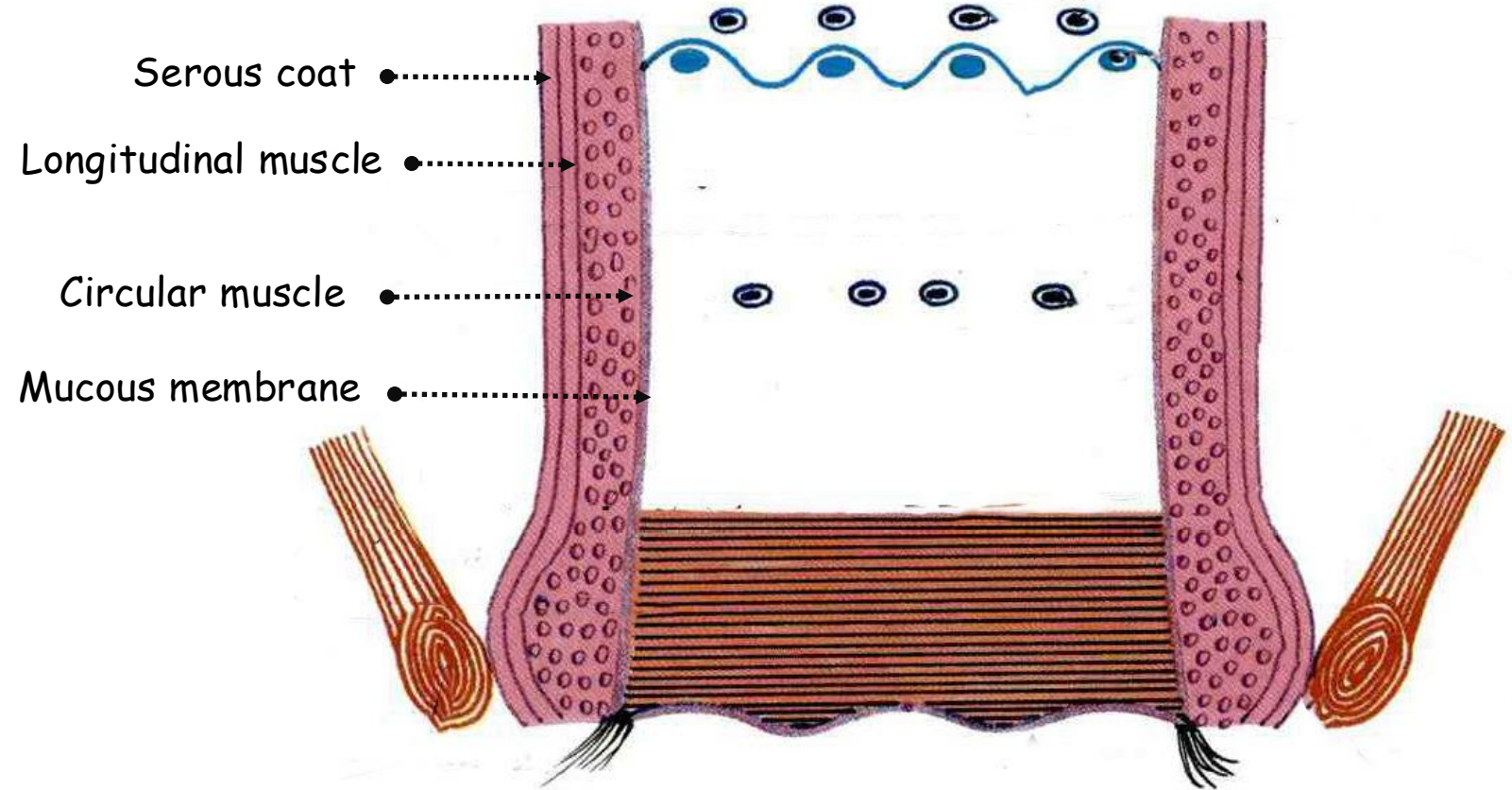
- Below the groove
- Truly cutaneous area
- Continuous at the anal margin with the skin of the buttock
- 1cm



CORONAL SECTION OF THE RECTUM

## C. WALL OF RECTUM AND ANAL CANAL

- 4 layers
- From the outer to the inner
- Serous coat
- Muscle
- Submucosa
- Mucous membrane
- Differences according to each part

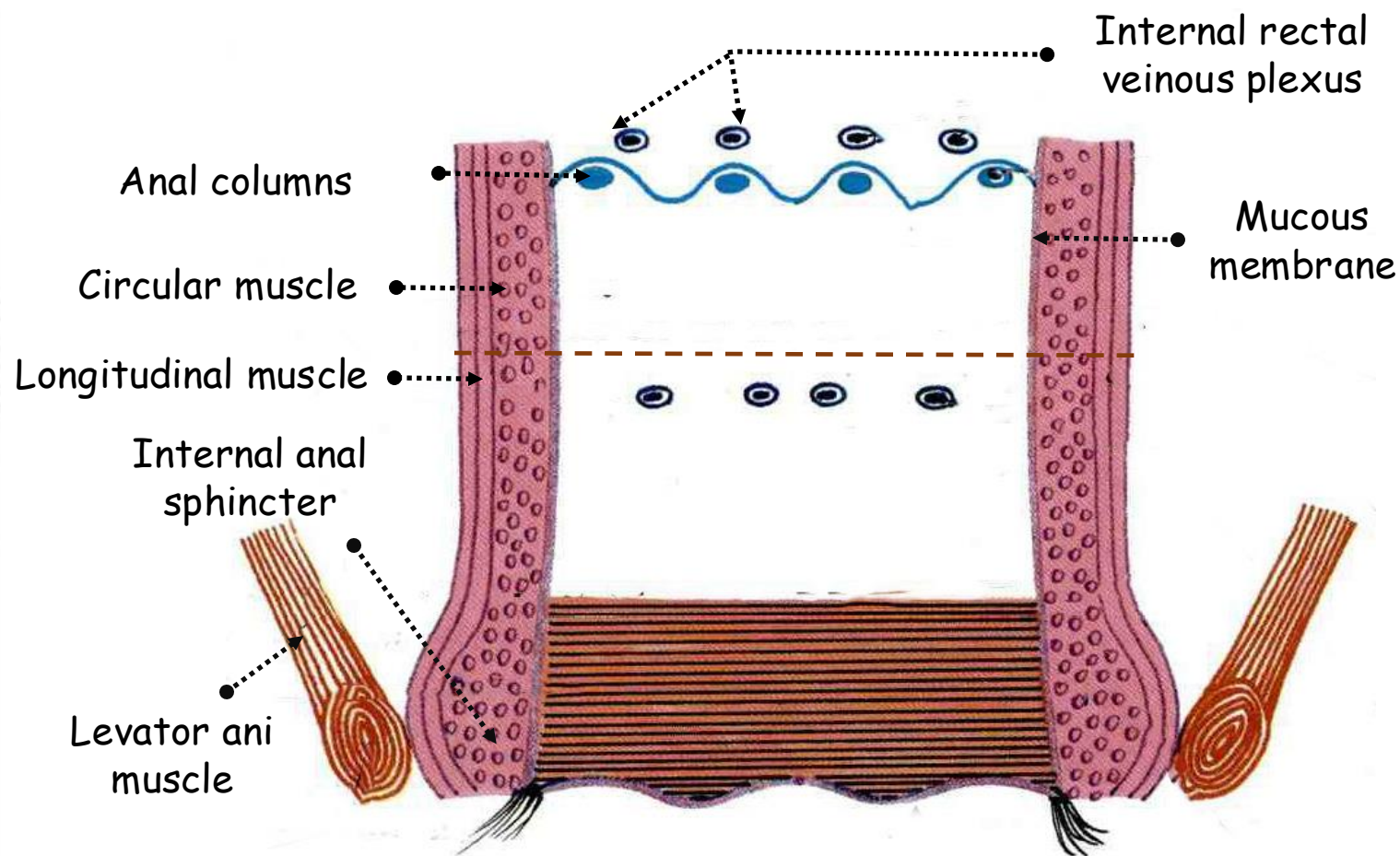


CORONAL SECTION OF THE ANAL CANAL

# 1. Rectum and upper part of the anal canal:

## canal:

- **Mucous membrane:**
  - Columnar intestinal cells and crypts
  - The lining of anal columns is mixed with columnar and stratified squamous epithelium with no abrupt line of change
- **Submucosa:**
  - Internal rectal venous plexus
  - Portosystemic anastomosis
- **Muscle:**
  - Inner layer: circular continuous with internal anal sphincter
  - Outer layer: longitudinal continuous with puborectal part of levator ani
- **Serous coat:**
  - Peritoneum and rectal fascia



CORONAL SECTION OF THE ANAL CANAL

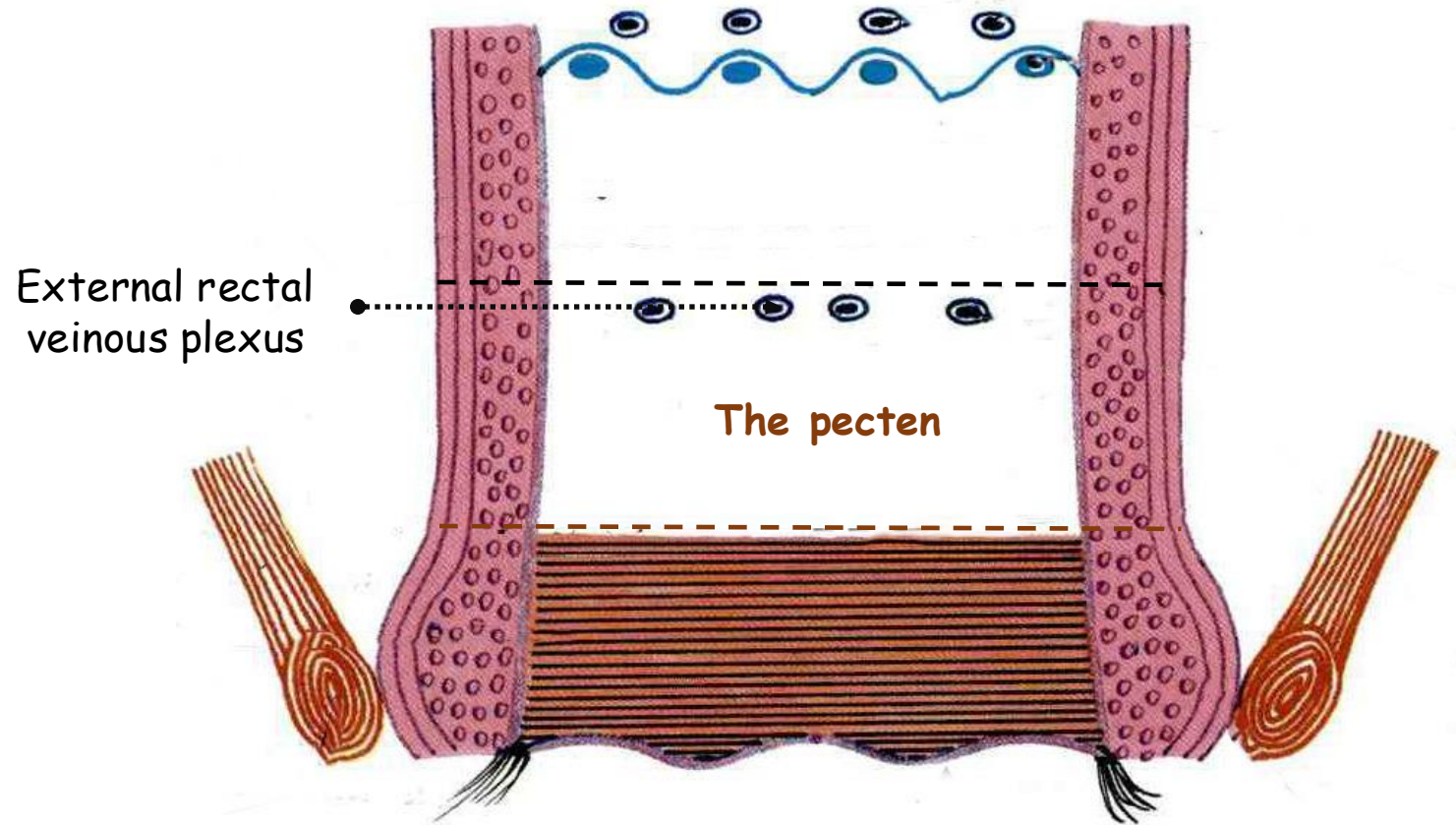


## 2. Middle part:

- Stratified non-keratinizing squamous epithelium
- Mucous membrane is particularly firmly attached to the lower part of the internal sphincter in the intersphincteric groove
- Submucosa above this is lax and known clinically as the submucous space

## 3. Lower part:

- External rectal venous plexus
- Fatty subcutaneous tissue adjacent to the anal margin, the perianal space
- Overlies the base of the ischioanal fossa



CORONAL SECTION OF THE ANAL CANAL

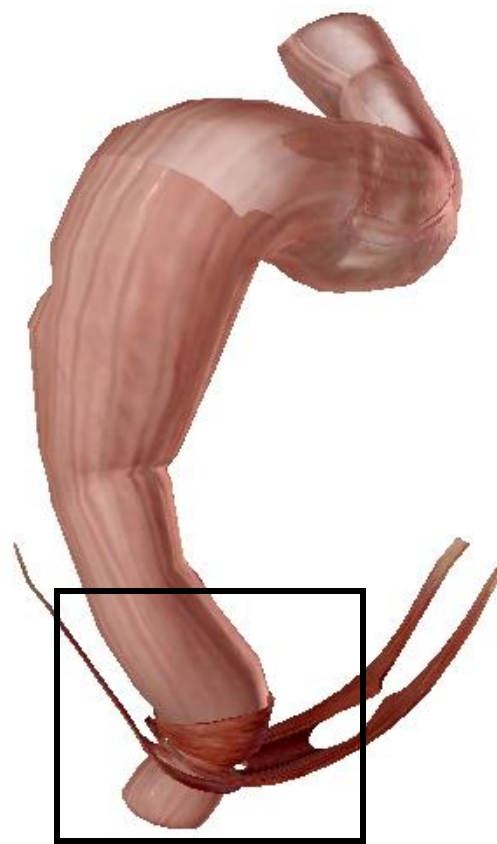
## D. ANAL SPHINCTERS

### 1. Internal anal sphincter:

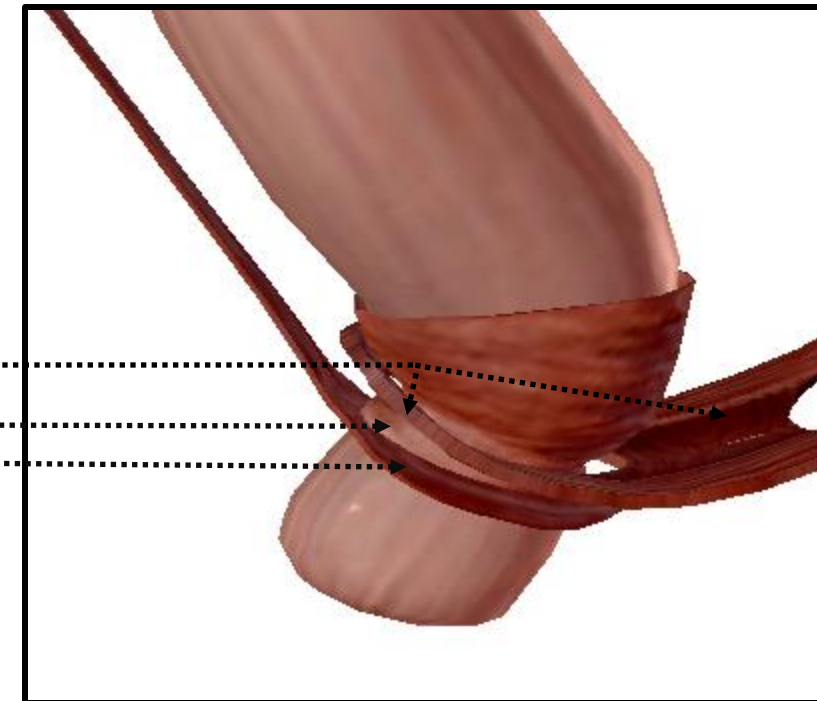
- 5 mm thickened downward continuation of the inner circular muscle of the rectum
- Does not occupy the whole length of the canal since the lowest part of the external sphincter comes to lie below its well-marked rounded lower border
- At the anorectal junction the outer longitudinal layer of rectal muscle fuses with fibrous elements of the puborectalis sling to form a thin fibroelastic sheet known as the conjoint longitudinal coat which runs down between the two sphincters

### 2. External anal sphincter:

- Skeletal muscle
- **Rectal deep part:** anorectal ring
- **Middle superficial part:** elliptical bony attached
- **Subcutaneous part:** intersphincteric groove



Puborectal part of levator ani  
Internal anal sphincter  
External anal sphincter



LATERAL VIEW OF THE RECTUM AND ANAL CANAL SHOWING THE ANAL SPHINCTERS

## IV. SUPPORTS

### 1. Rectum:

- Peritoneum
- **Lower part under the peritoneal level:**
  - The rectovesical fascia of **Denonvilliers** intervenes between this part of the rectum and the structures in front of it
  - Anchored **posteriorly to the curve of the lower sacrum** by a condensation of connective tissue commonly known as **Waldeyer's fascia**
  - **At the sides** retroperitoneal tissue round the middle rectal vessels constitutes the **lateral ligaments of the rectum**





## 2. Anal canal:

- Muscle fibres leave the lower part of each side of the rectal ampulla and **pass forwards** to the back of the urogenital diaphragm, the **rectourethralis muscles**
- The **levator ani** muscles become **continuous** with the **external anal sphincter**



## V. ANATOMICAL RELATIONS

### A. FRONT

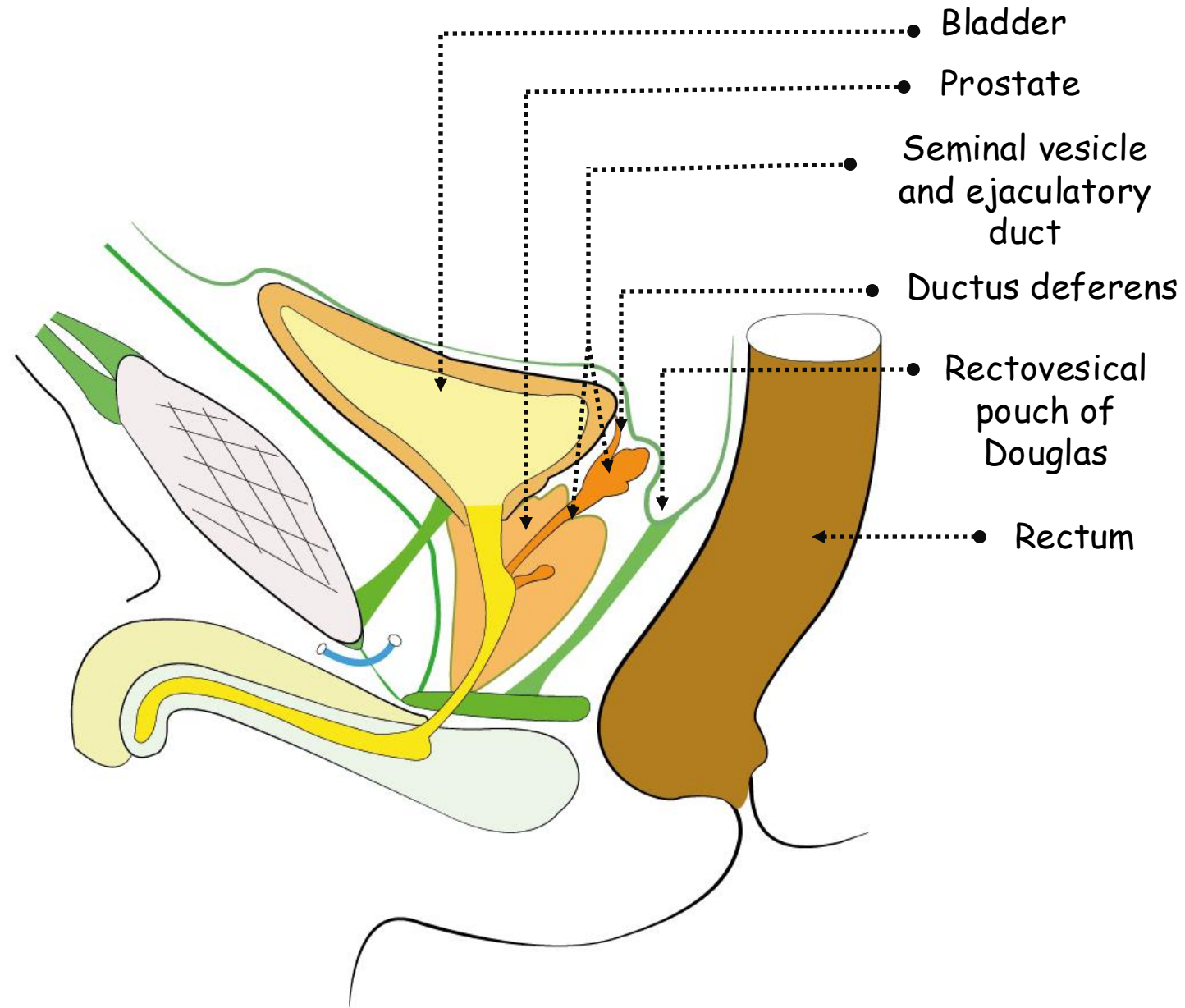
#### 1. In men:

#### • **Through the rectovesical pouch of Douglas:**

- Bladder
- Intestinal coils
- Sigmoid colon to the left
- Cecum and appendix to the right

#### • **Under the level of the pouch of Douglas:**

- Base of the bladder
- Tips of the seminal vesicles
- Prostate
- Ductus deferens
- Retrovesical portion of pelvic ureter



SAGITTAL SECTION OF PELVIS MINOR IN MEN

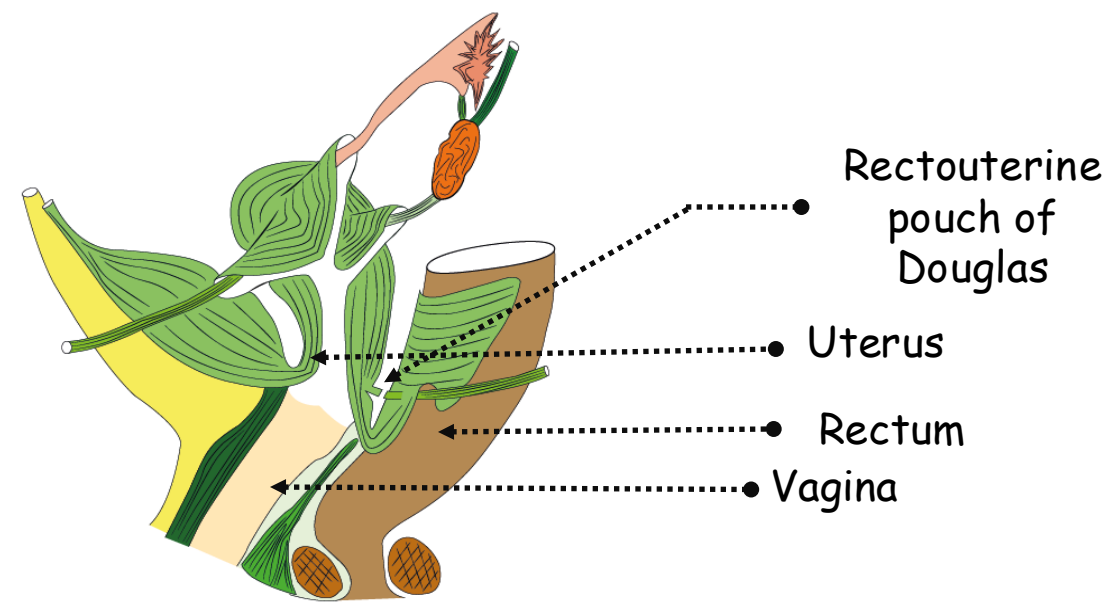
## 2. In women:

- **Through the rectouterine pouch of Douglas:**

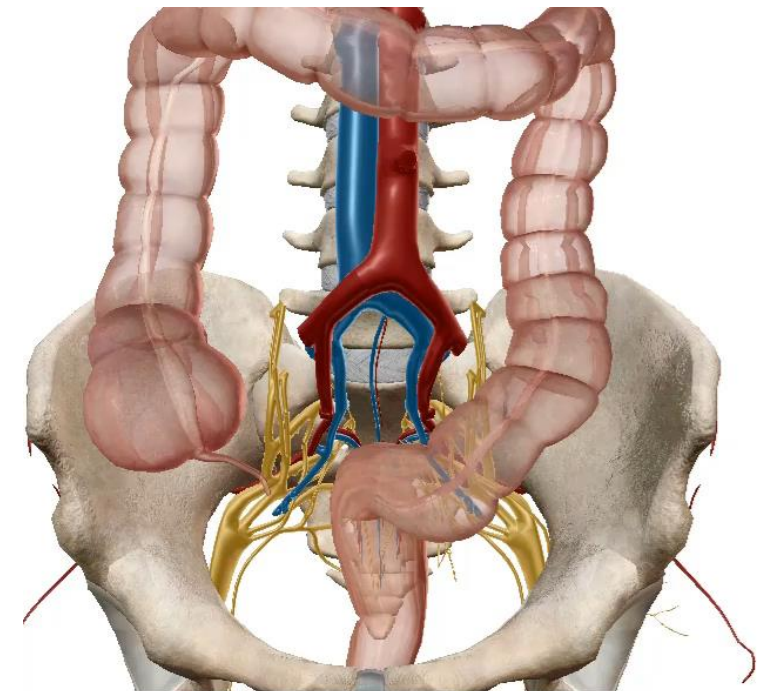
- Posterior face of the uterus
- Posterior fornix of the vagina

### **B. BACK AND LATEROALLY**

- Sacrum and coccyx
- Piriformis muscle
- Levator ani muscle
- Coccygeus muscle
- Anterior rami of the lower three sacral and coccygeal nerves
- Branches of rectal vessels
- Pelvic ureter



**SAGITTAL SECTION OF PELVIS MINOR IN WOMEN**

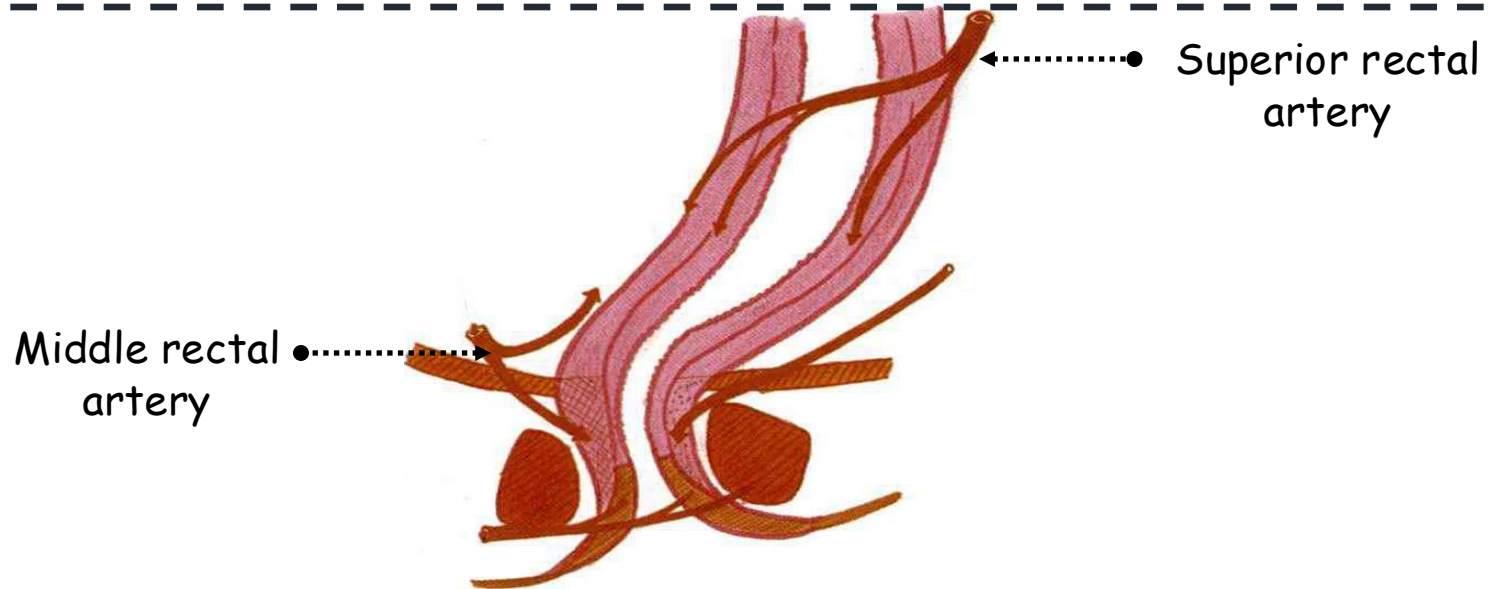
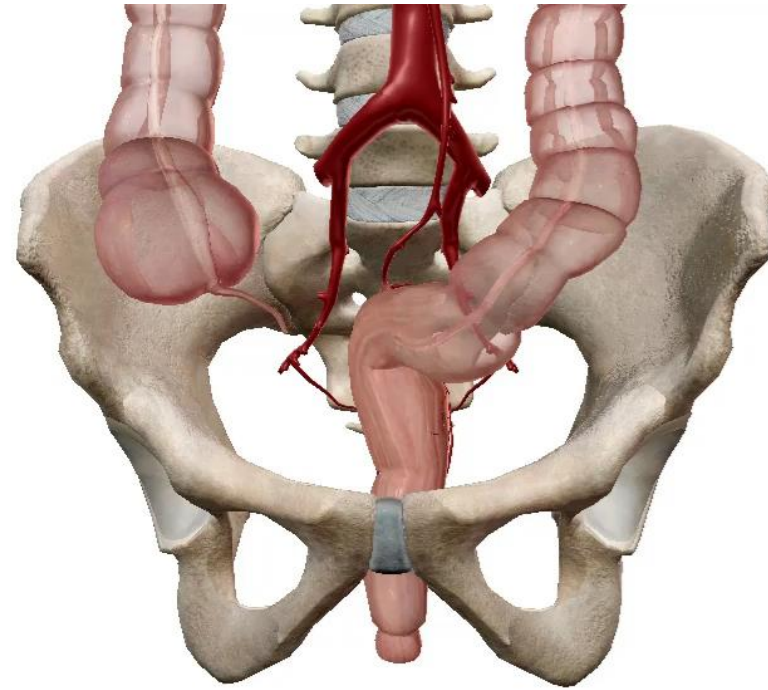




## VI. BLOOD SUPPLY; LYMPH DRAINAGE AND NERVE SUPPLY

### A. ARTERIES

- Supply all layers of the rectum and anastomose with each other
- 1. Superior rectal artery:
  - Principal artery of the rectum
  - Terminal branch of the inferior mesenteric artery in the sigmoid mesocolon after crossing the pelvic brim
  - Crosses the left common iliac vessels medial to the ureter and descends in the base of the medial limb of the mesocolon
  - At the level of S3 vertebra where the rectum begins it divides into various branches
  - Supplies the whole thickness of the rectal wall including the mucous membrane and continue within the mucosa into the anal canal



SAGITTAL SECTION OF THE RECTUM SHOWING ITS ARTERIES

## 2. Middle rectal artery:

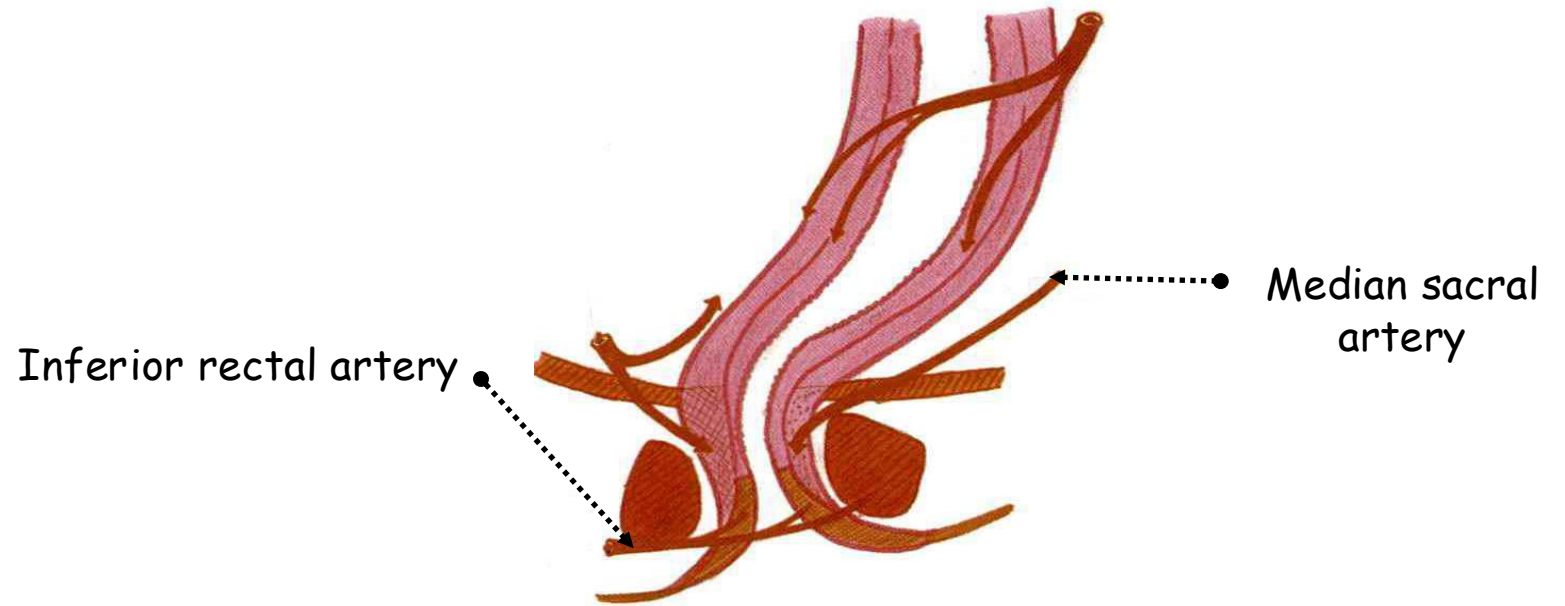
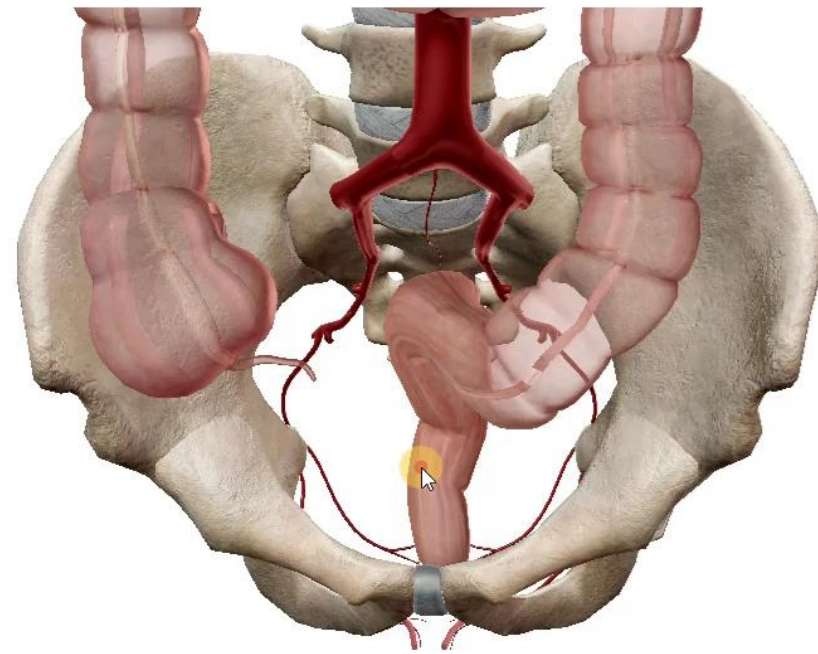
- Most posterior branch of the internal iliac artery
- May be double or absent
- Reaches the lower rectum from the side, along the lateral rectal ligaments

## 3. Inferior rectal artery:

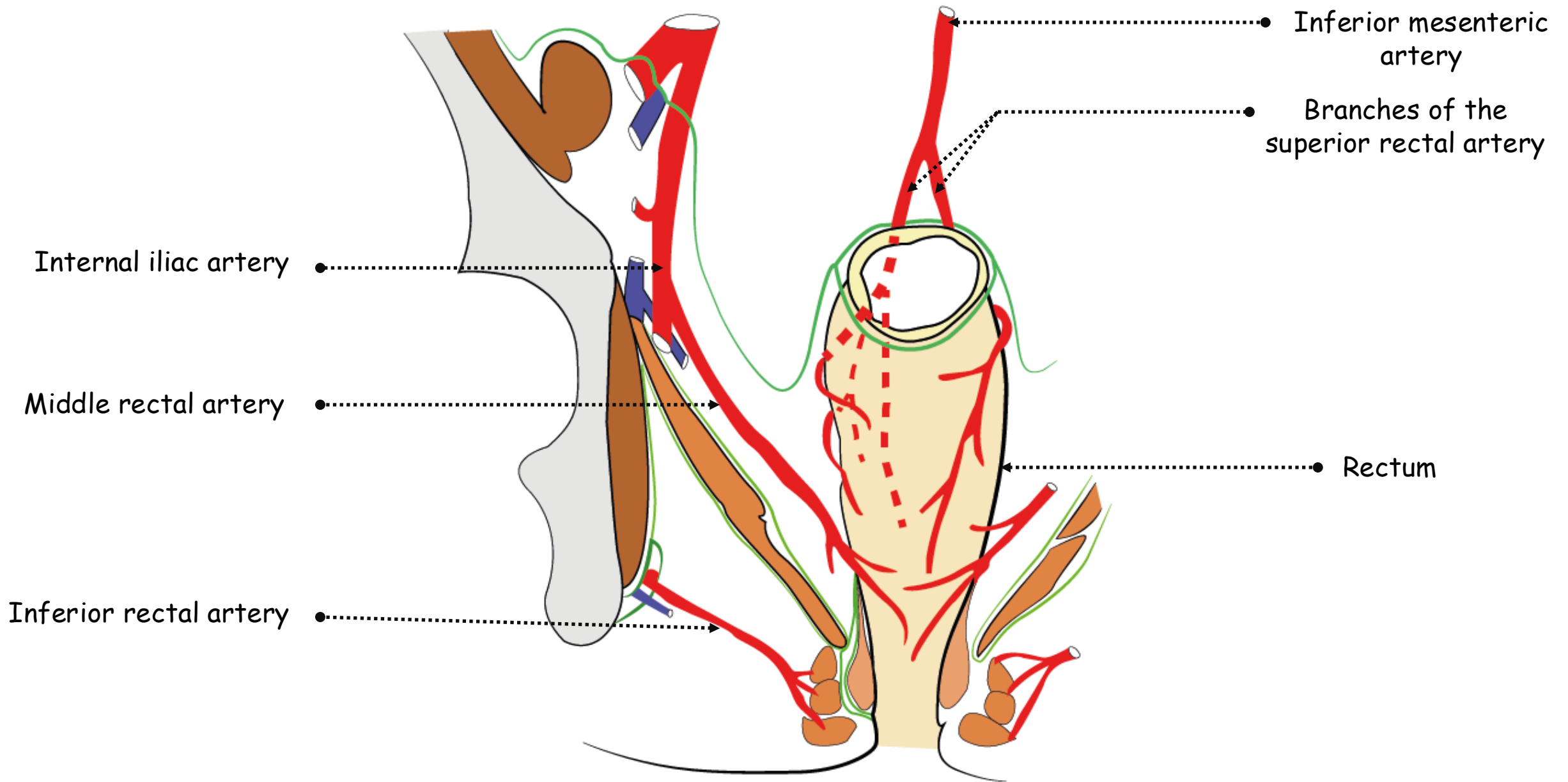
- Penetrates the walls of the anal canal below the level of levator ani and their branches run upwards within the walls to reach the rectum

## 4. Median sacral artery:

- Unimportant contribution to the posterior wall in the region



SAGITTAL SECTION OF THE RECTUM SHOWING ITS ARTERIES

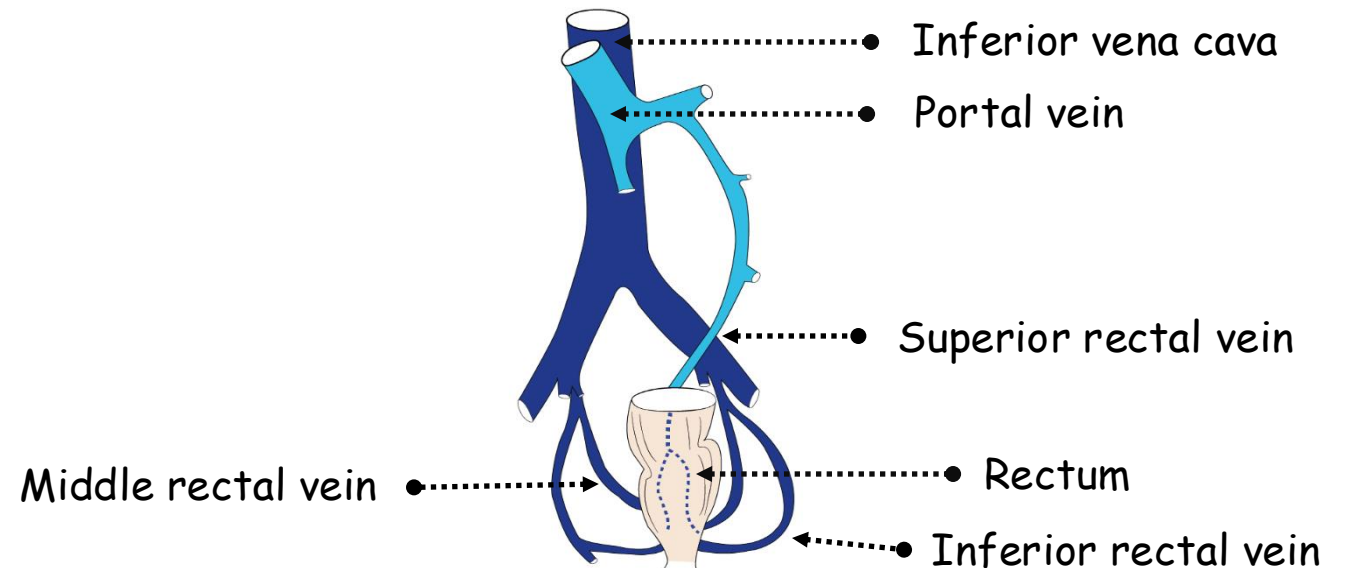
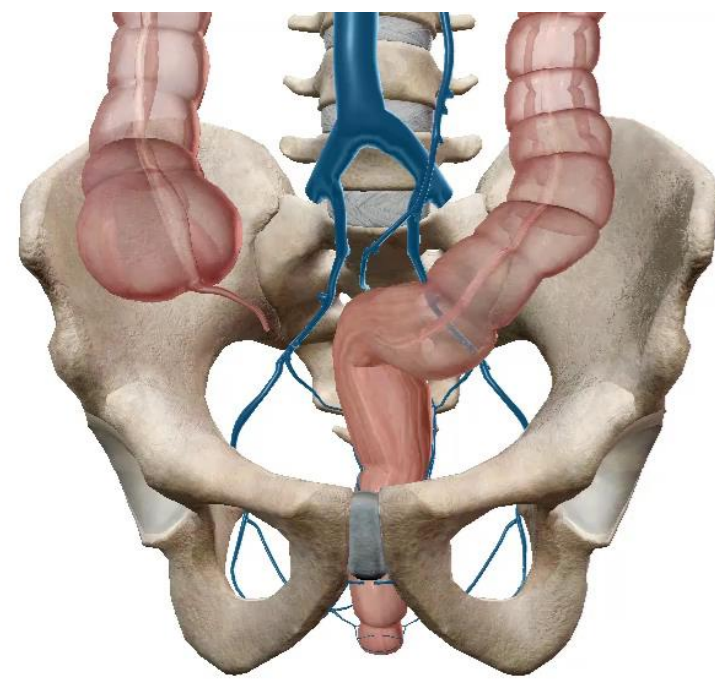


**CORONAL SECTION OF THE RECTUM SHOWING ITS ARTERIES**



## B. VEINS

- Correspond to the arteries
- Anastomose freely with one another
- Internal rectal plexus in the submucosa forming the 3, 7 and 11 o'clock venous cushions of the anal canal
- The lower end of the internal plexus is continuous with the vascular cushions of the anal canal
- External rectal plexus outside the muscular wall
- Superior and inferior rectal veins are the main veins and closely follow their arteries to, respectively, the inferior mesenteric and internal iliac veins
- Portosystemic anastomosis in the region of the anal columns



POSTERIOR VIEW OF THE RECTUM SHOWING ITS VEINS

### C. LYMPH DRAINAGE

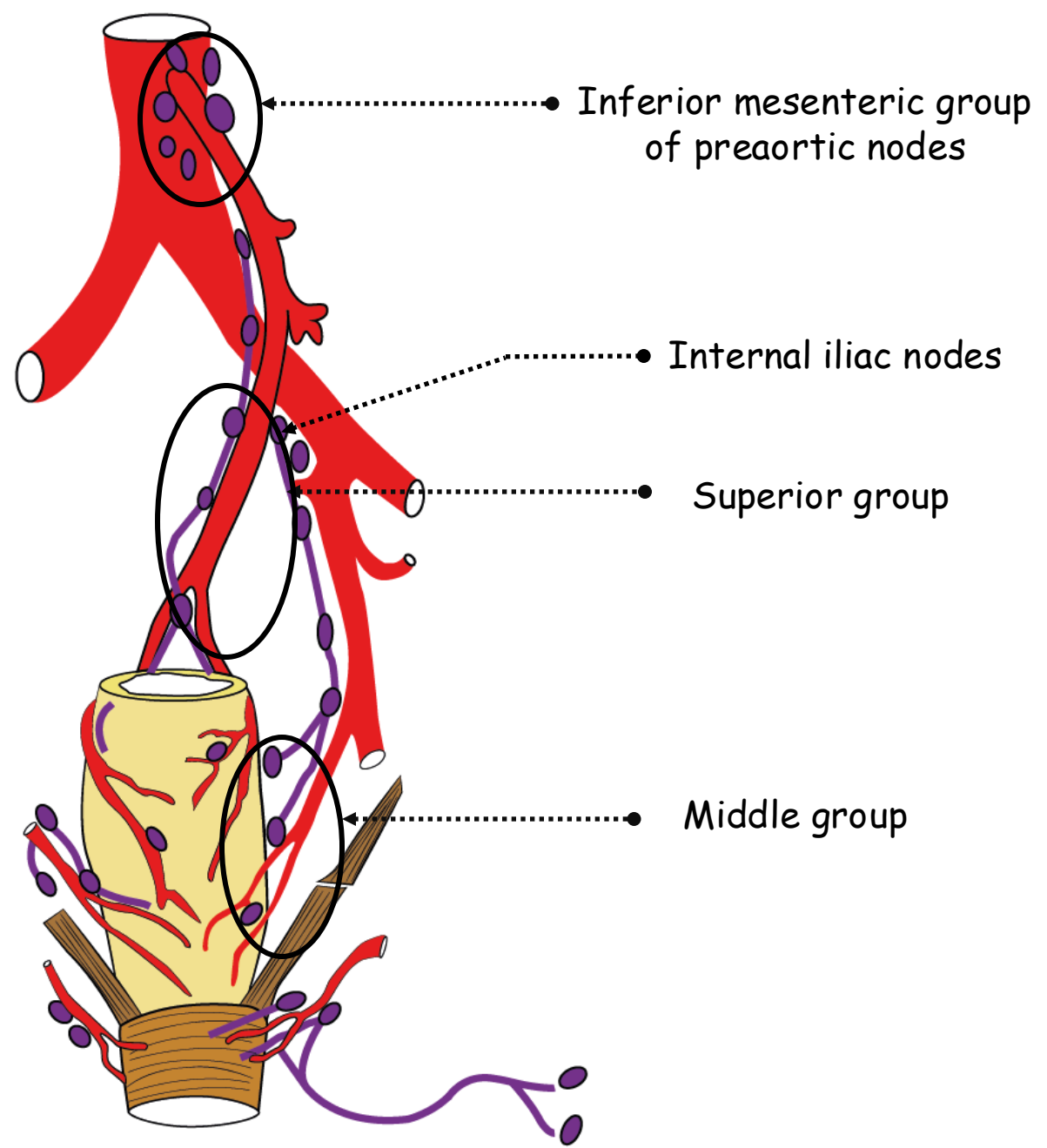
- Run back with the branches of the superior and middle rectal and median sacral arteries
- Lymphoid follicles in the mucous membrane provide the first filter
- Pierce the wall of the rectum and travel to 3 groups of nodes:

#### 1. Superior group:

- In the hollow of the sacrum along the median sacral artery and inferior mesenteric artery to preaortic nodes at its origin

#### 2. Middle group:

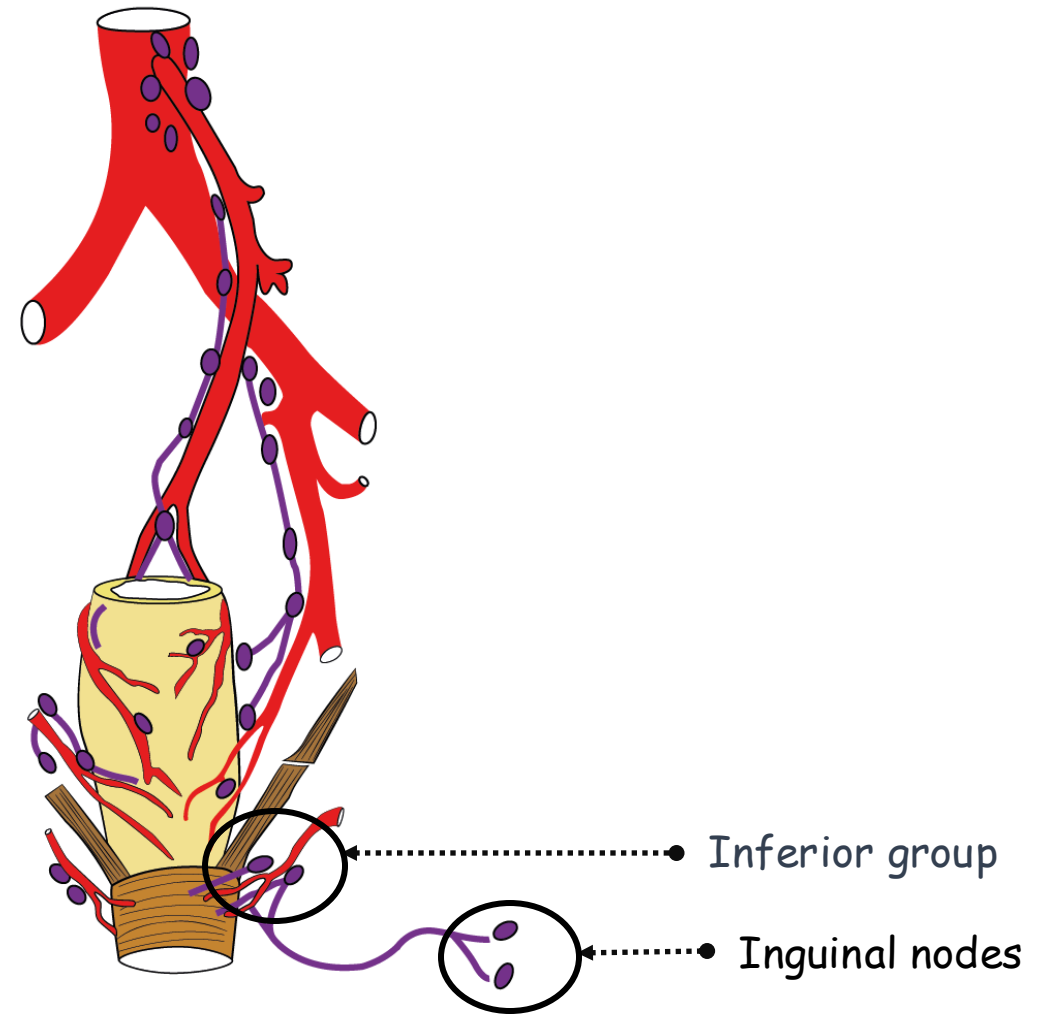
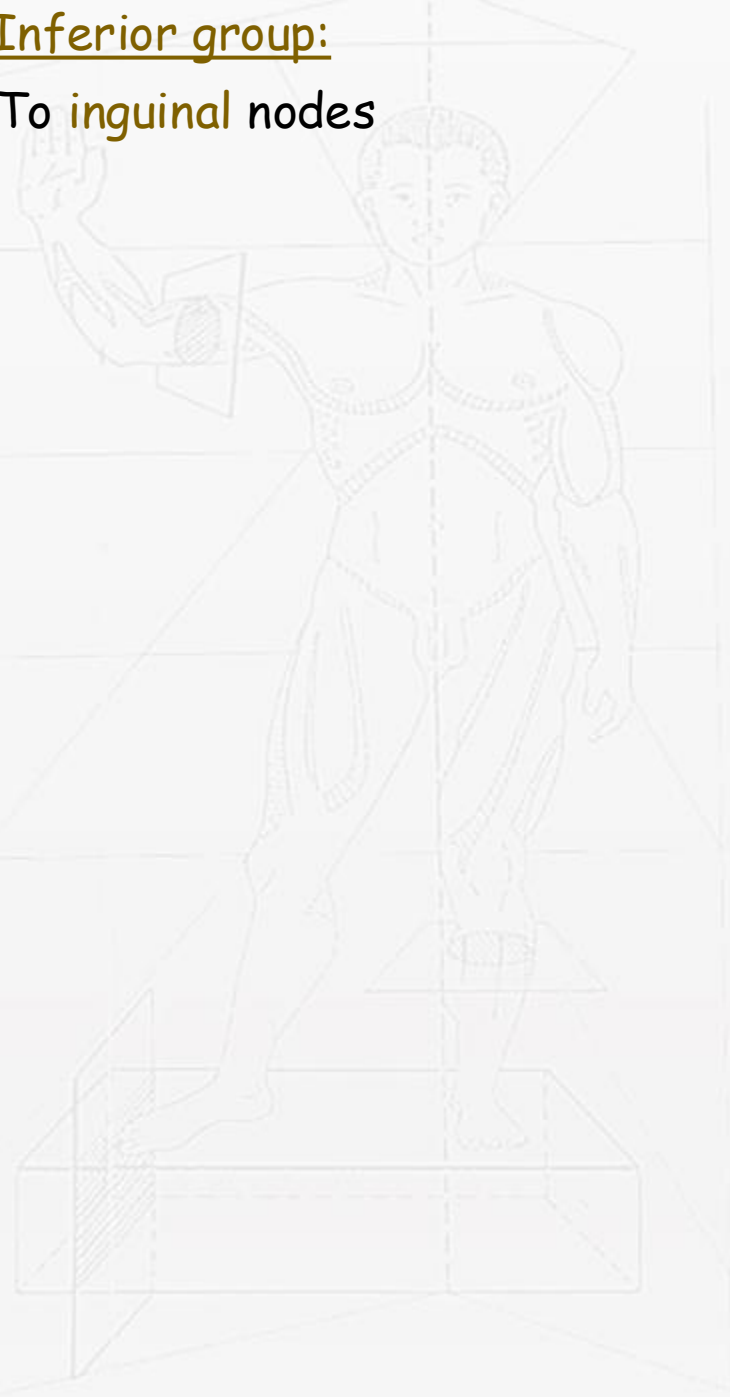
- On the side wall of the pelvis along the middle rectal artery to internal iliac nodes



ANTERIOR VIEW OF THE RECTUM SHOWING ITS LYMPH DRAINAGE

### 3. Inferior group:

- To inguinal nodes



ANTERIOR VIEW OF THE RECTUM SHOWING ITS LYMPH DRAINAGE



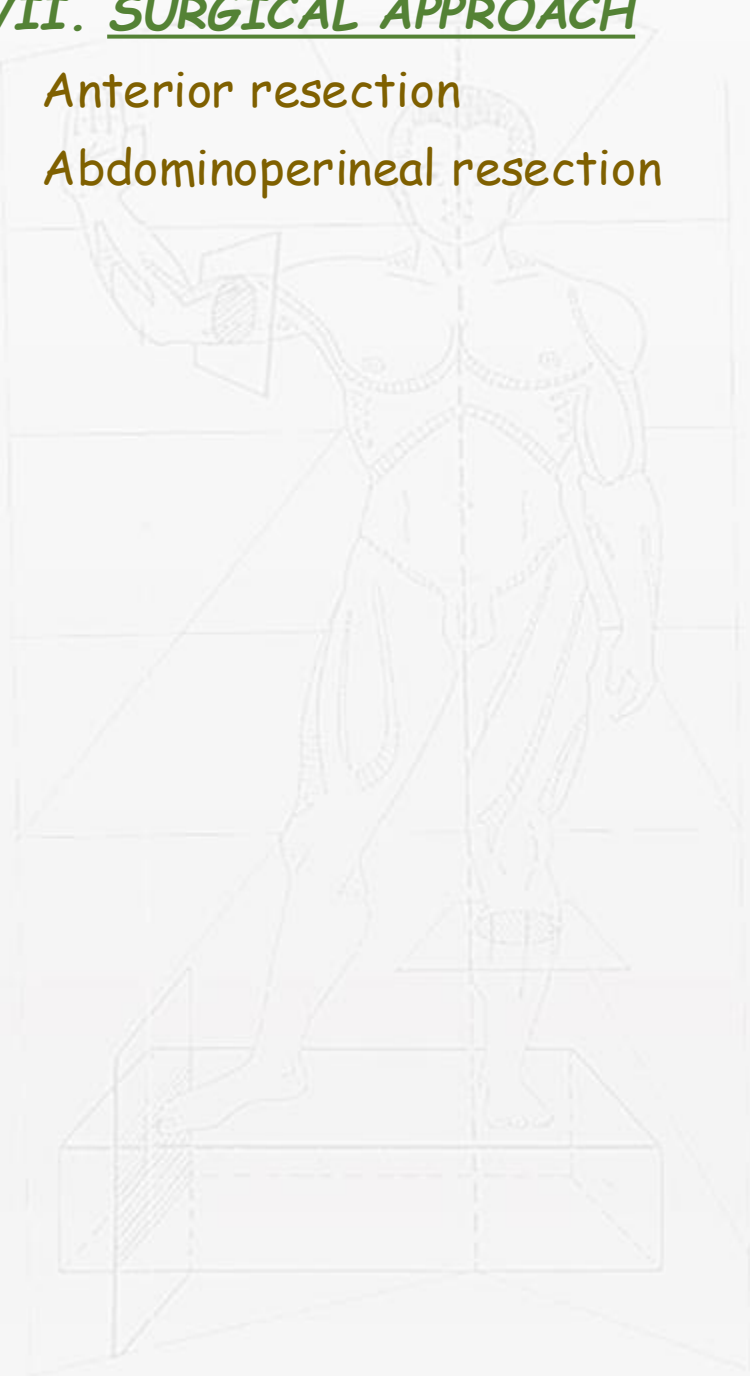
## D. NERVES

- **Sympathetic:**
  - Hypogastric plexuses
  - Direct branches from celiac plexus
- **Parasympathetic:**
  - S2 and 3 or S3 and 4 by the pelvic splanchnic nerves, which are motor to rectal muscle
- Pain fibres appear to accompany both sympathetic and parasympathetic supplies



## VII. SURGICAL APPROACH

- Anterior resection
- Abdominoperineal resection



## VIII. CONCLUSION

- Terminal part of the gastrointestinal tract
- Pelvic and perineal organ
- Different embryological origin
- Several pelvic and perineal anatomical relations
- Rich blood supply
- Large lymph drainage
- Portosystemic anastomosis







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