

# ANAL AND PERI-ANAL CONDITIONS

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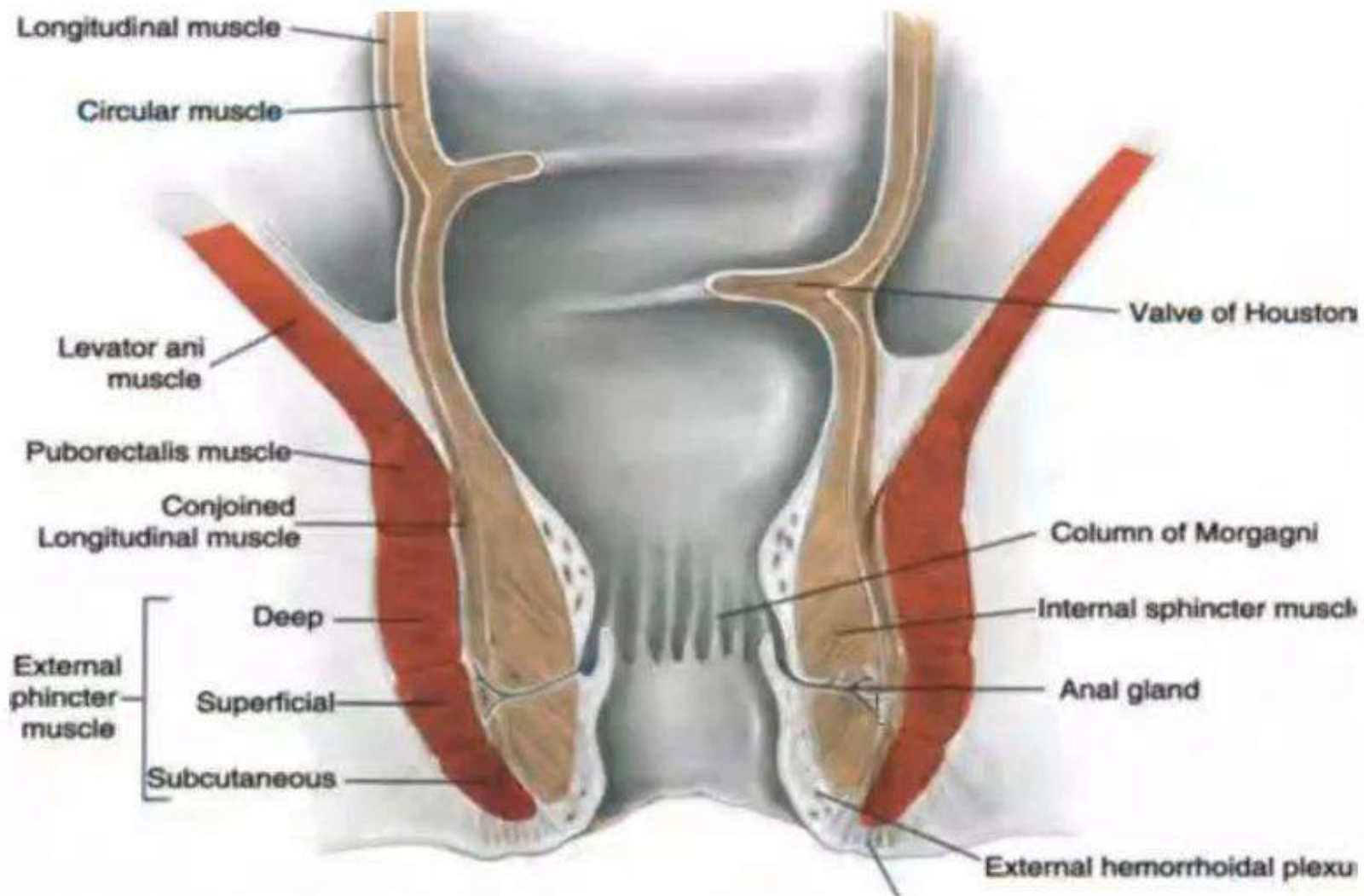
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# Anatomy of Rectum And Anus

- The rectum is the last part of the large intestine and connects the sigmoid colon to the anal canal.
- The rectum begins at the height of S2-S3 and ends at the perineum. It is about 12 to 16 cm long and may be subdivided into three parts:
- The upper third lies intraperitoneally
- The middle third retroperitoneally
- The lower third under the pelvic diaphragm and therefore extraperitoneally.

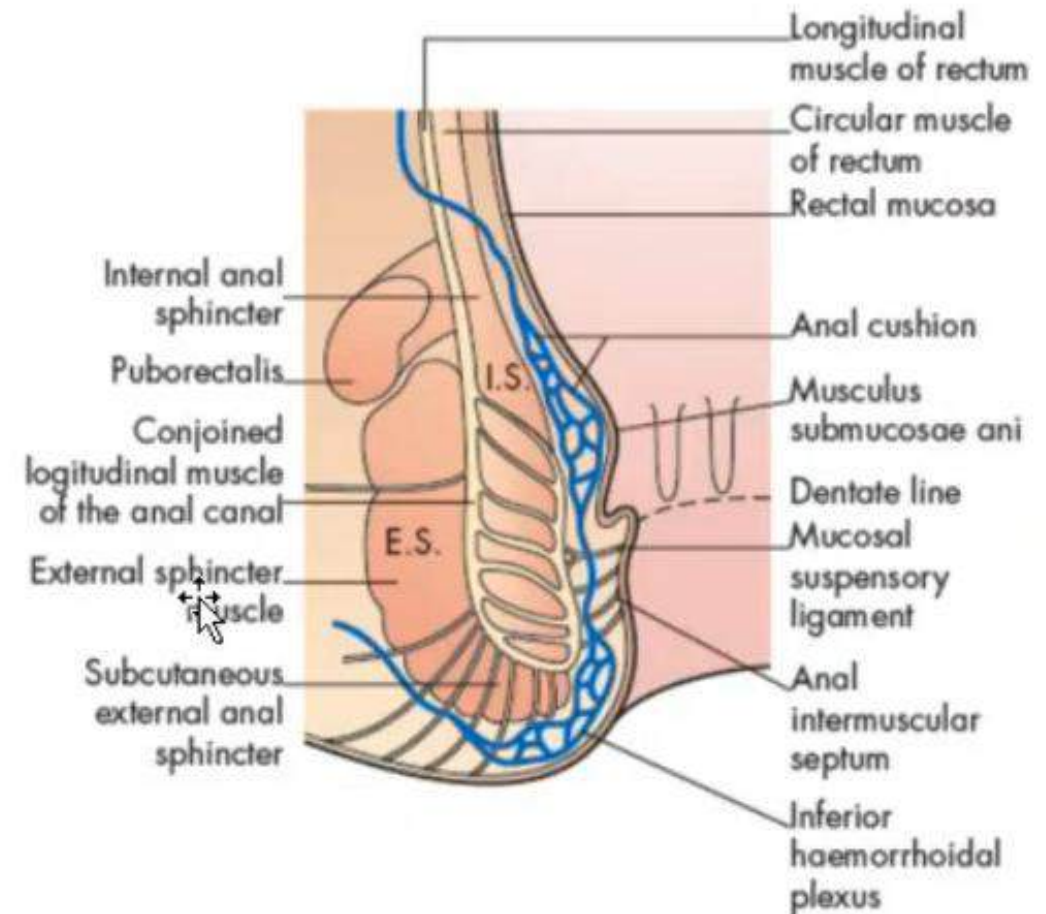
# Anatomy of Rectum And Anus

- The rectum differs from the colon in that the outer layer is entirely longitudinal muscle, characterized by the merging of the three taenia bands.
- It measures 12–15cm in length and lacks a mesentery, sacculations, and appendices epiploicae.
- The rectum describes three lateral curves: the upper and lower curves are convex to the right, and the middle is convex to the left.
- On their inner aspect these in foldings into the lumen are known as the valves of Houston.



# Anatomy of Rectum And Anus

- The anorectal ring :
- The anorectal ring marks the junction between the rectum and the anal canal.
- It is formed by the joining of the puborectalis muscle, the deep external sphincter, conjoined longitudinal muscle and the highest part of the internal sphincter.
- The anorectal ring can be clearly felt digitally, especially on its posterior and lateral aspects

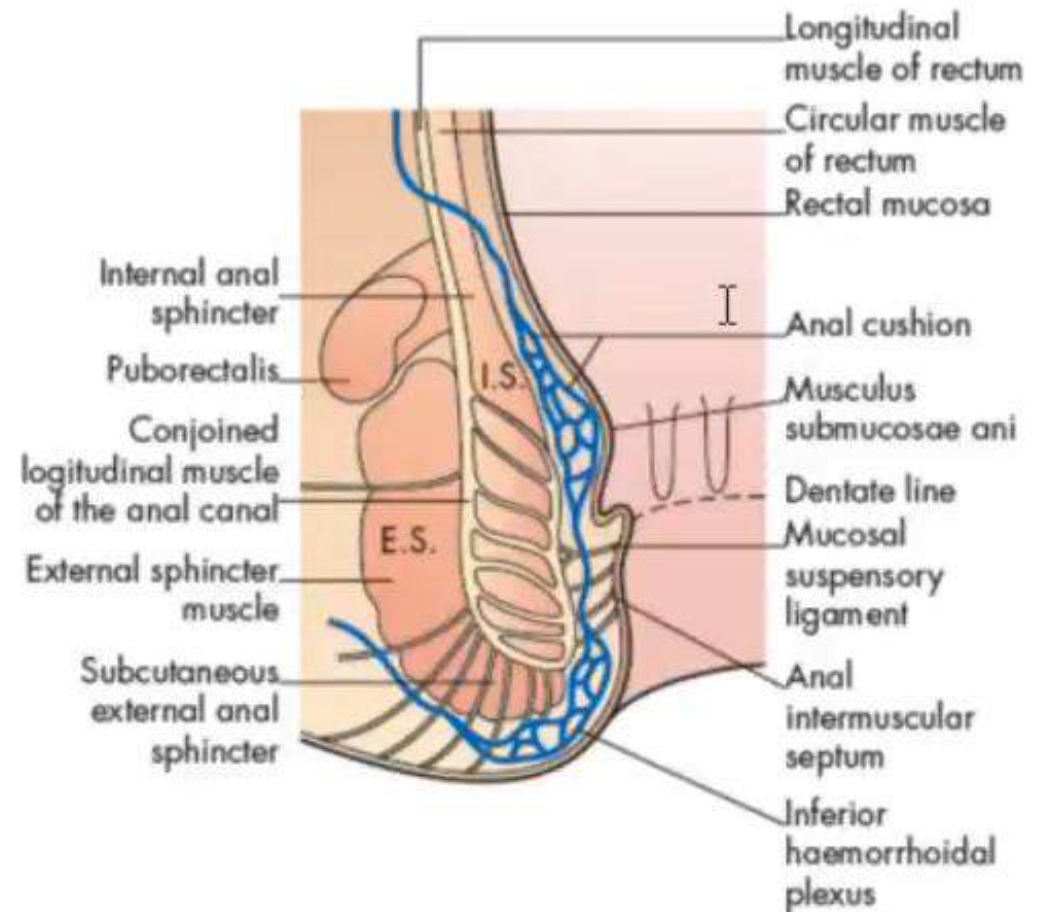


## Anal Canal

- It is about 4 cm long, and terminates at the anal verge. (This definition differs from that of the anatomist, who designates the anal canal as the part of the intestinal tract that extends from the dentate line to the anal verge).
- Dentate line. This line is approximately 2 cm from the anal verge.
- Longitudinal folds (columns of Morgagni) , of which there are 6 to 14, are known as the. There is a small pocket or crypt at the lower end of the folds.
- These crypts are of surgical significance because foreign material may become lodged in them, obstructing the ducts of the anal glands and possibly resulting in sepsis.

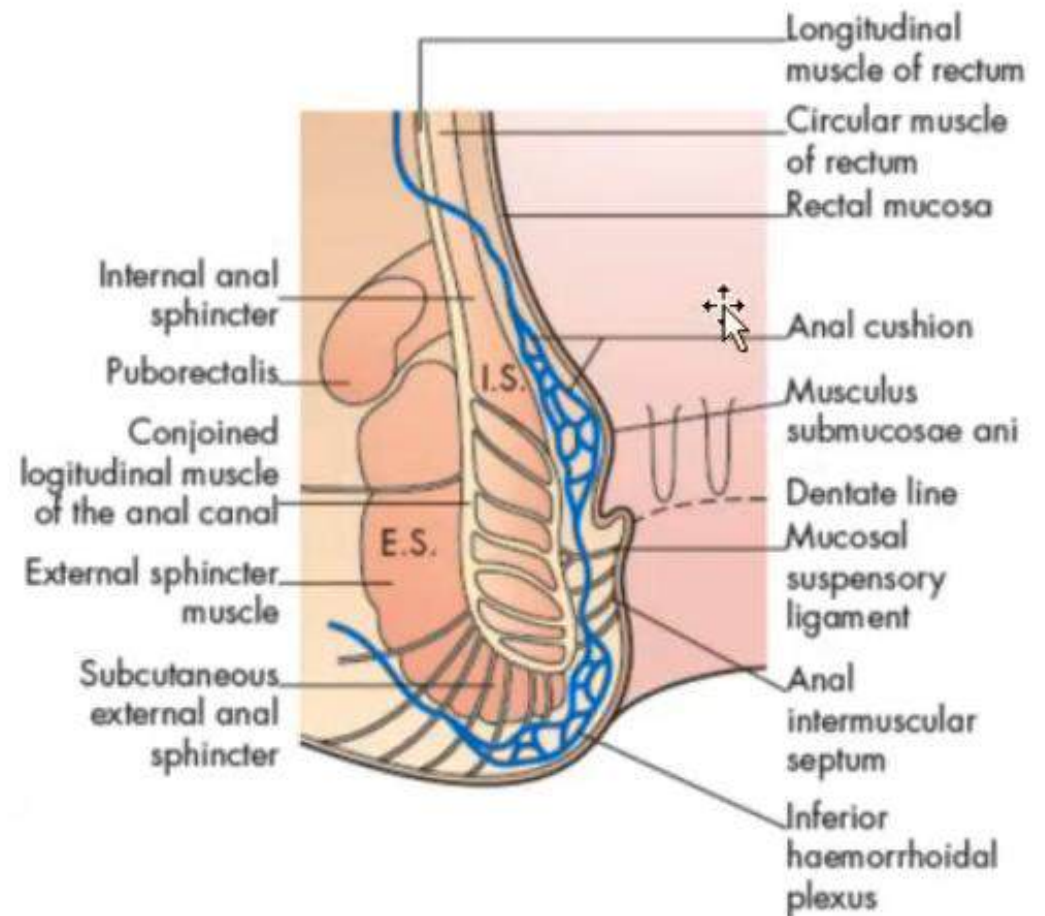
# Anal Canal

- The external sphincter :
- The external sphincter forms the bulk of the anal sphincter complex and, although traditionally it has been subdivided into deep, superficial and subcutaneous portions, it is a single muscle (Goligher), which is variably divided by lateral extensions from the longitudinal muscle layer.
- Some of its fibres are attached posteriorly to the coccyx, whereas anteriorly they fuse with the perineal muscles.
- Being a somatic voluntary muscle, the external sphincter is red in colour and is innervated by the puddental nerve.



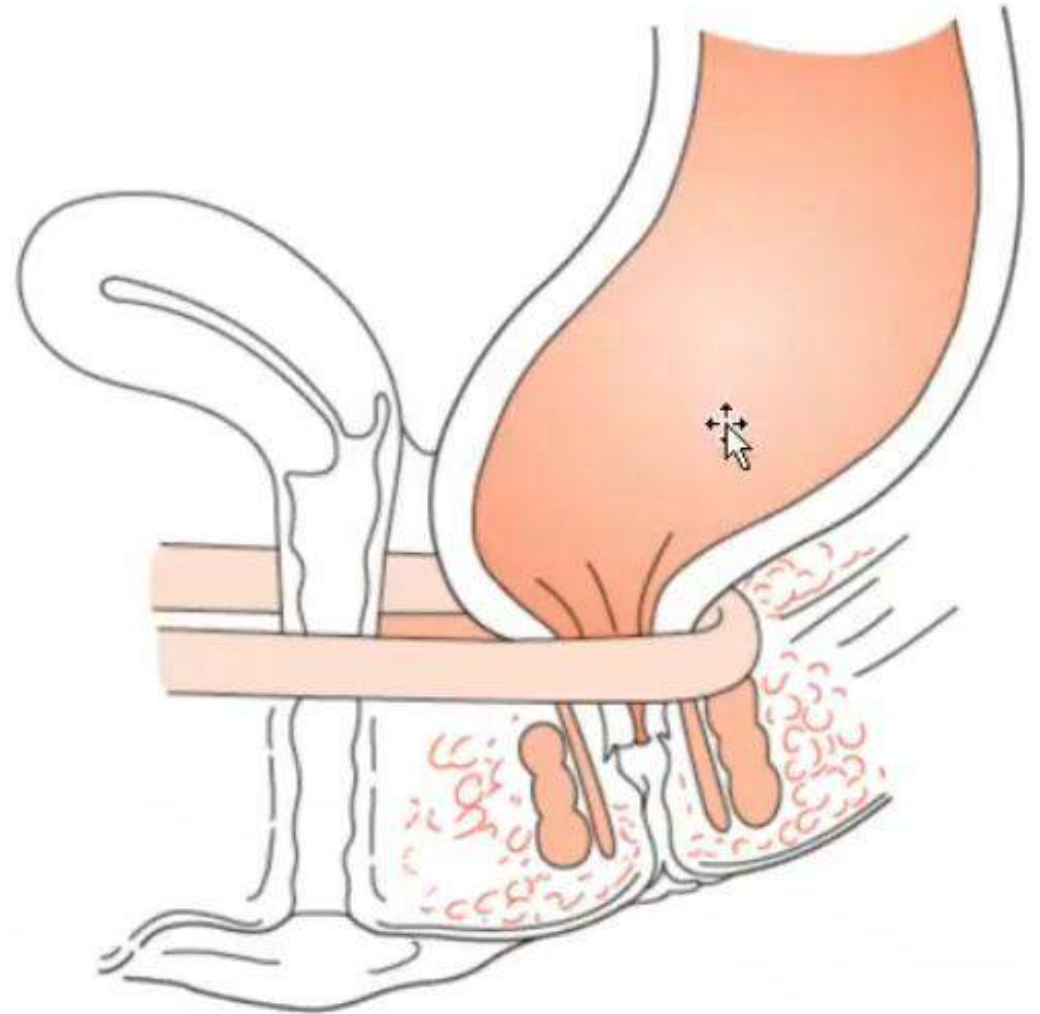
# Anal Canal

- The internal sphincter :
- Is the thickened (2–5 mm) distal continuation of the circular muscle coat of the rectum, which is in a tonic state of contraction.
- It is pearly-white in colour.
- Innervated by the autonomic nervous system



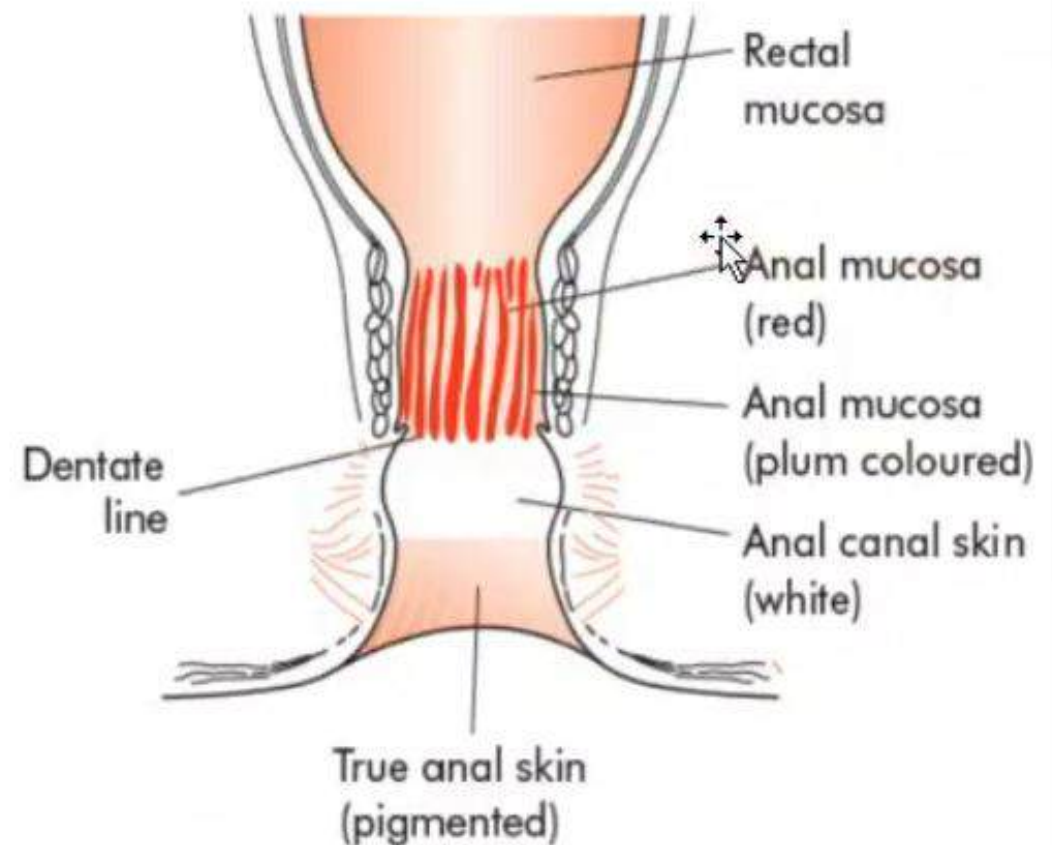
# Anal Canal

- Puborectalis muscle
- Puborectalis, part of the funnel-shaped muscular pelvic diaphragm, maintains the angle between the anal canal and rectum and hence is an important component in the continence mechanism.
- The muscle derives its nerve supply from the sacral somatic nerves, and is functionally indistinct from the external anal sphincter.
- The position and length of the anal canal, as well as the angle of the anorectal junction, depend to a major extent on the integrity and strength of the puborectalis muscle sling.



# Anal Canal

- The epithelium :
- The pink columnar epithelium lining the rectum extends through the anorectal ring into the surgical anal canal.
- Passing downwards, the mucous membrane becomes cuboidal and redder in colour, whereas above the anal valves it is plum coloured. Just below the level of the anal valves there is an abrupt, albeit wavy, transition to stratified squamous epithelium, which is the colour of parchment. This wavy junction constitutes the dentate line.
- The dentate line is a most important landmark both morphologically and surgically, representing the site of the crypts of Morgagni (synonym: anal crypts, sinuses).



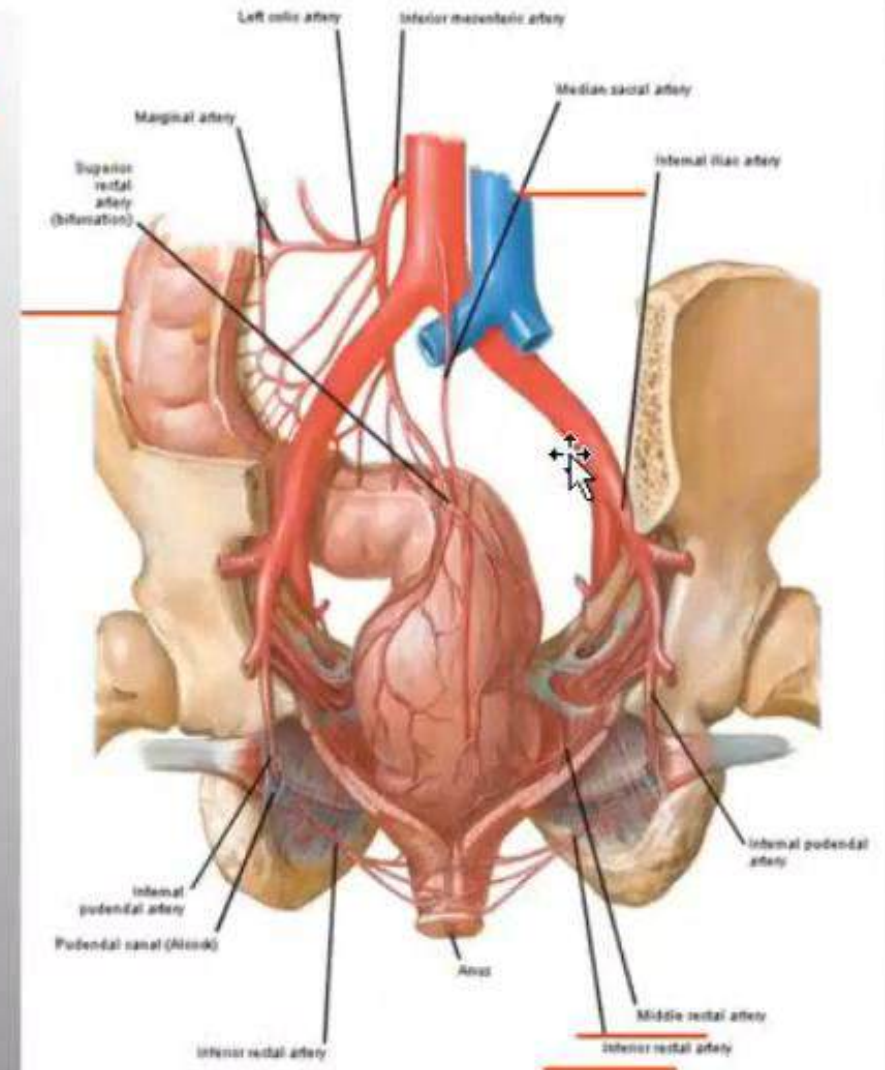
# ANAL CANAL

## *Arterial supply*

The historical description of the blood supply to the upper anal canal is bifurcation of the main trunk of the superior rectal artery into right and left branches and with subsequent division of the former into anterior and posterior divisions thereby determining the sites of haemorrhoids around the anal circumference

### Arterial supply of the rectum and anal canal

median sacral artery  
superior rectal artery (inferior mesenteric)  
middle rectal artery (internal iliac)  
inferior rectal artery (internal pudendal)



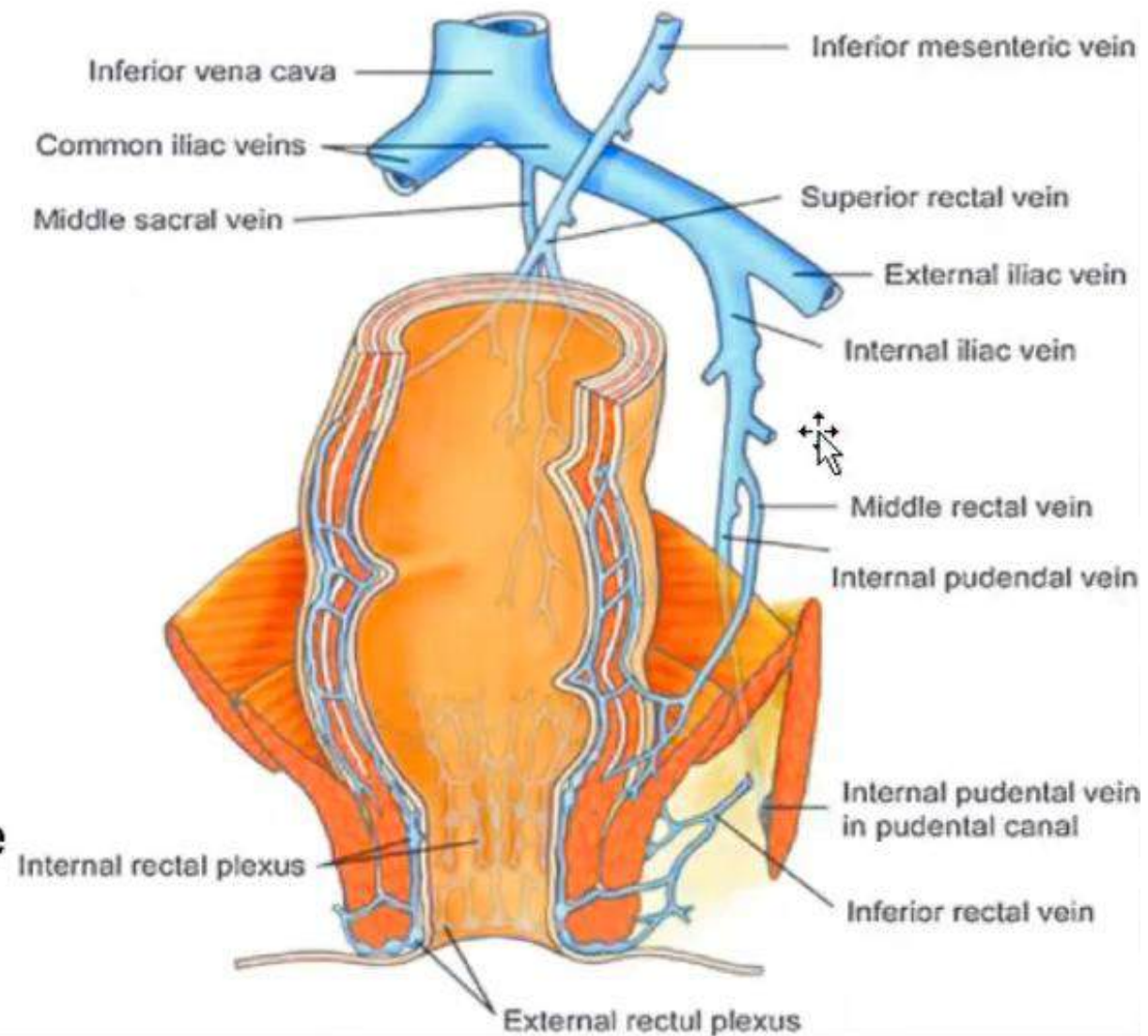
# ANAL CANAL

## *Venous drainage*

The anal veins are distributed in a similar fashion to the arterial supply.

The upper half of the anal canal is drained by the superior rectal veins, tributaries of the inferior mesenteric vein and thus the portomesenteric venous system, and the middle rectal veins, which drain into the internal iliac veins.

The inferior rectal veins drain the lower half of the anal canal and the subcutaneous perianal plexus of veins: they eventually join the internal iliac vein on each side.



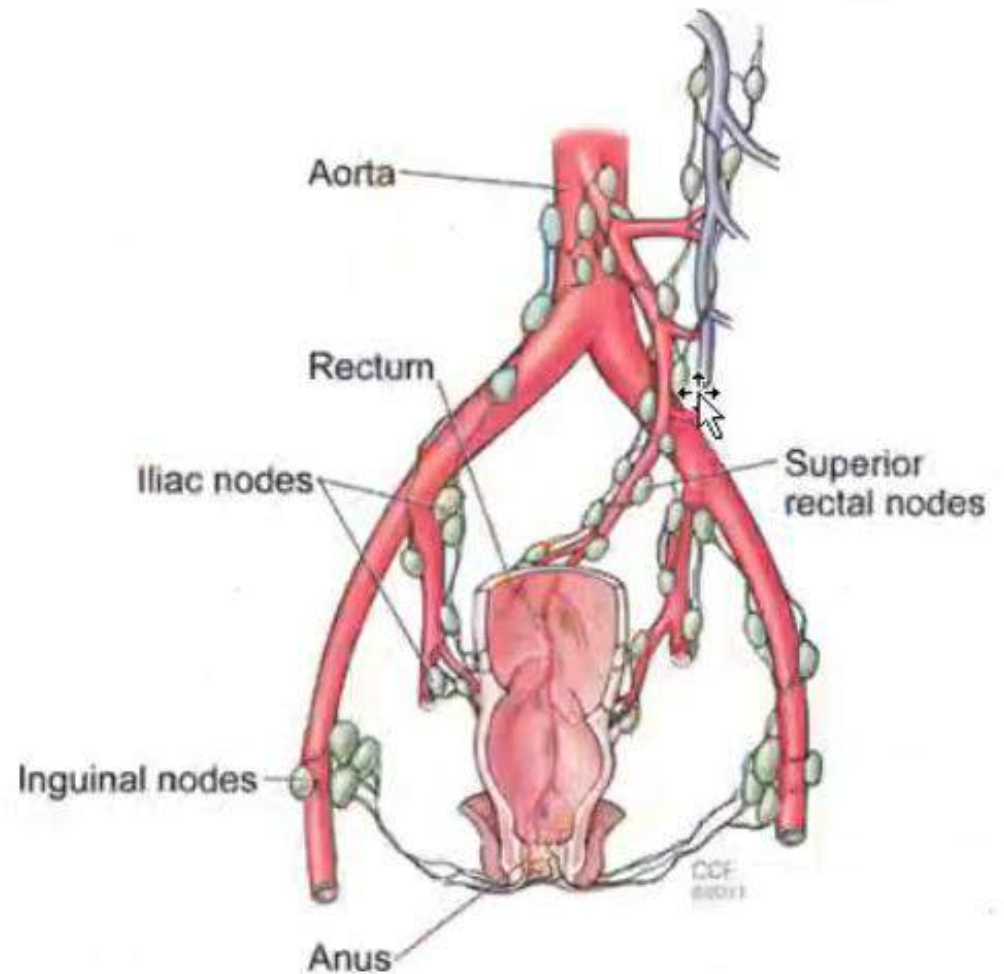
# ANAL CANAL

## *Lymphatic drainage*

Lymph from the upper half of the anal canal flows upwards to drain into the postrectal lymph nodes and from there goes to the para-aortic nodes via the inferior mesenteric chain.

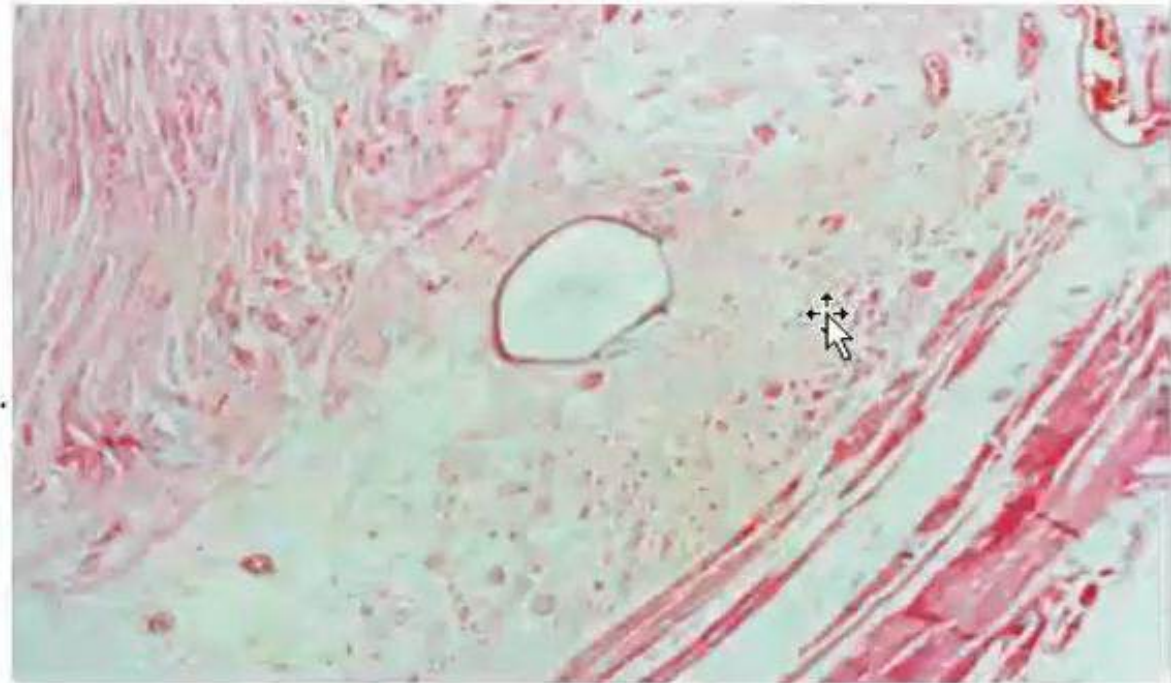
Lymph from the lower half of the anal canal drains on each side first into the superficial and then into the deep inguinal group of lymph glands.

However, if the normal flow is blocked, e.g. by tumour, the lymph can be diverted into the alternative route



# ANAL CANAL

- The anal glands
- They are found in the submucosa and intersphincteric space and normally number between 0 and 10 in an individual.
- They drain via ducts into the anal sinuses at the level of the dentate line. Not all sinuses have a duct draining into them and, occasionally, more than one gland can discharge into the same sinus.
- Their function is unknown, although they secrete mucin (distinct from that secreted by the rectal epithelium), which perhaps lubricates the anal canal to ease defaecation.
- The importance of intersphincteric anal glands is that they are widely considered to be the potential source of anal sepsis, either acute, presenting as perianal, ischiorectal or even pelvic sepsis, or chronic, presenting as a cryptoglandular (non-specific) anal fistula.



Intersphincteric anal gland lying between the voluntary muscle of the external sphincter and the longitudinal muscle. The internal sphincter is also seen.

| Distinction ⇅                       | Above pectinate line ⇅                                                                                                                 | Below pectinate line ⇅                                                                                                                                                         |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lymph drainage                      | internal iliac <sup>[1]</sup>                                                                                                          | superficial inguinal lymph nodes (below Hilton's white line)                                                                                                                   |
| Epithelium                          | columnar epithelium (as is most of the digestive tract - the line represents the end of the part of the body derived from the hindgut) | 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 <sup>[2]</sup> | endoderm                                                                                                                               | ectoderm                                                                                                                                                                       |
| Artery                              | superior rectal artery                                                                                                                 | middle and inferior rectal arteries                                                                                                                                            |
| Vein                                | superior rectal vein draining into the inferior mesenteric vein and subsequently the hepatic portal system                             | middle and inferior rectal veins                                                                                                                                               |
| Hemorrhoids classification          | internal hemorrhoids (not painful)                                                                                                     | external hemorrhoids (painful)                                                                                                                                                 |
| Nerves                              | inferior hypogastric plexus                                                                                                            | inferior rectal nerves                                                                                                                                                         |

# HEAMORRHOIDS

- Hemorrhoids are not varicose veins, and not every one has hemorrhoids.
- Everybody has anal cushions.
- The anal cushions are composed of blood vessels, smooth muscle (Treitz' s muscle), and elastic connective tissue in the submucosa
- They are located in the upper anal canal, from the dentate line to the anorectal ring (puborectalis muscle).
- Three cushions lie in the following constant sites: left lateral, right anterolateral, and right posterolateral (3, 7 and 11 o'clock positions)

## Etiology

- Chronic constipation has been considered the cause of hemorrhoids
- more common when intra-abdominal pressure is raised, e.g. in obesity, constipation and pregnancy
- Other studies show that patients with hemorrhoids are not necessarily constipated but tend to have abnormal anal pressure.

A-Pregnancy hormonal changes

B-Portal hypertension

# Hemorrhoids: Pathogenesis and clinical findings

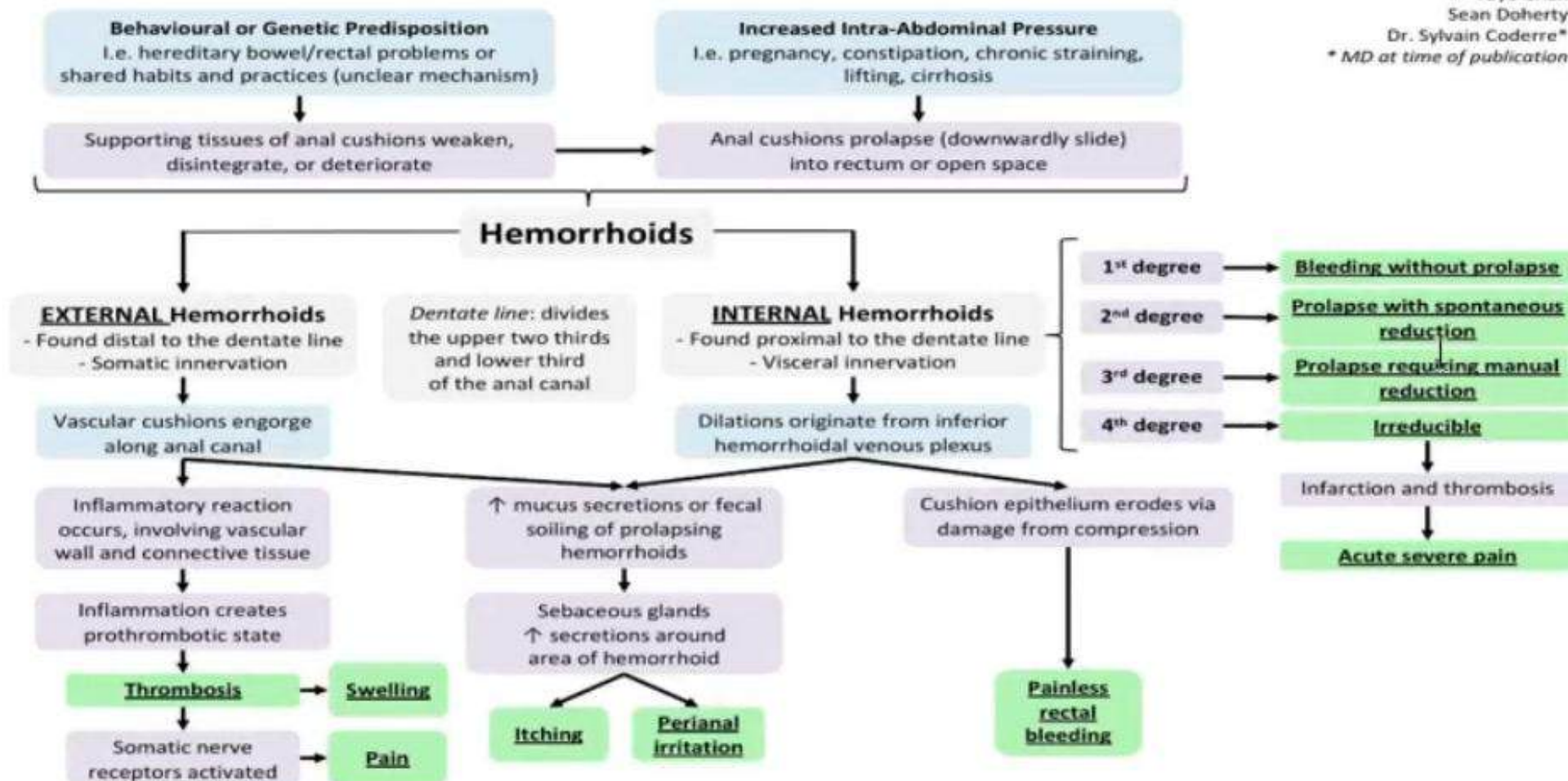
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# CLINICAL PRESENTATION

- Bleeding
- Mucosal prolapse
- Chronic states of prolapse predispose to mucous and fecal leakage, resulting in pruritus and excoriation of the perianal skin. 
- Pain per se is not a symptom of uncomplicated hemorrhoids. It may indicate associated disease, such as anal fissure, perianal abscess.
- Prolapsed, strangulated hemorrhoids present as an acute problem, with the symptom of pain associated with discharging, edematous, tender, irreducible hemorrhoids. Gangrene and infection with sloughing and secondary bleeding

# Treatment of hemorrhoids

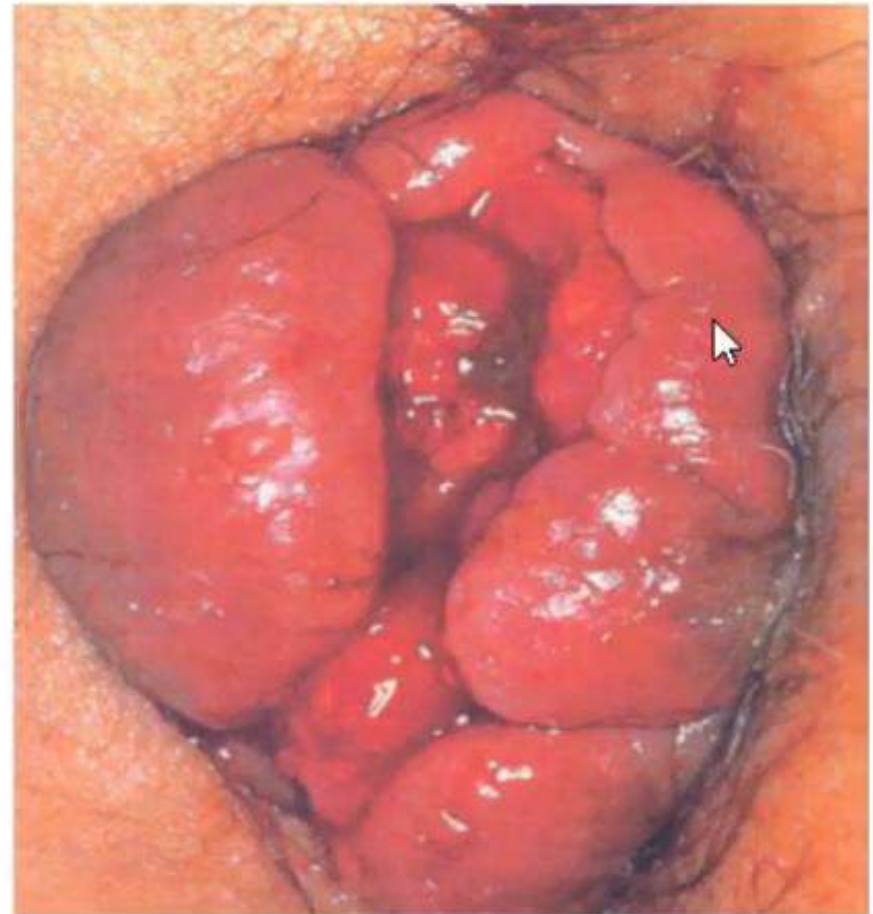
- DIET AND BULKFORMING AGENTS
- OFFICE, OUTPATIENT, AND MINOR PROCEDURES
  1. Rubber Band Ligation : first- & second- degree haemorrhoids
  2. Transanal haemorrhoidal dearterialisation: second- & third- and fourth-degree haemorrhoids
  3. Haemorrhoidectomy: third- and fourth-degree haemorrhoids
  4. Sclerotherapy
  5. Cryotherapy
  6. Infrared Photocoagulation
  7. Electrocoagulation

# Treatment of hemorrhoids

- Anal Stretch
- Lateral Internal Sphincterotomy
- Hemorrhoidectomy
  1. Closed hemorrhoidectomy
  2. Excision and Ligation
  3. Laser Hemorrhoidectomy
  4. PPH
  5. Ligature
  6. Harmonic scalpel

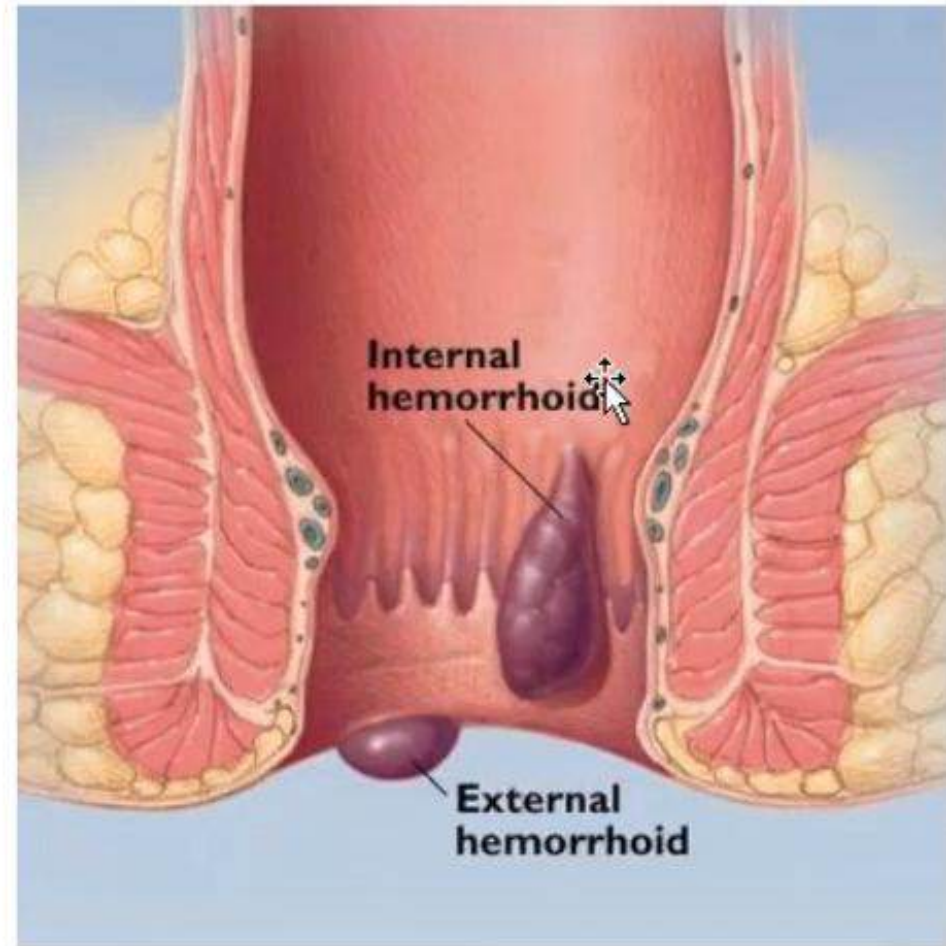
## *Complications of haemorrhoids*

- Strangulation and thrombosis
- Ulceration
- Gangrene
- Portal pyaemia
- Fibrosis



## *External haemorrhoids, 'perianal haematoma'*

- A thrombosed external haemorrhoid relates anatomically to the veins of the superficial or external haemorrhoidal plexus.
- It presents as a sudden onset, olive-shaped, painful blue subcutaneous swelling at the anal margin.
- Usually consequent upon straining at stool, coughing or lifting a heavy weight.
- If the patient presents within the first 48 hours, the clot may be evacuated under local anaesthesia.
- Indeed, this condition has been called 'a 5-day, painful, self-curing lesion' (Milligan).



# FISSURE

- Definition : A fissure in ano is a painful linear ulcer situated in the anal canal and extending from just below the dentate line to the margin of the anus.
- In the acute phase, the lesion is often a crack in the epithelial surface but causes much pain and spasm.
- Affects both sex equally (women, 51.1%; men, 49.9%).
- Posterior fissure in 73.5%, the anterior in 16.4%, and in both in 2.6%.
- Anterior midline in 45% of women and 15% of men.

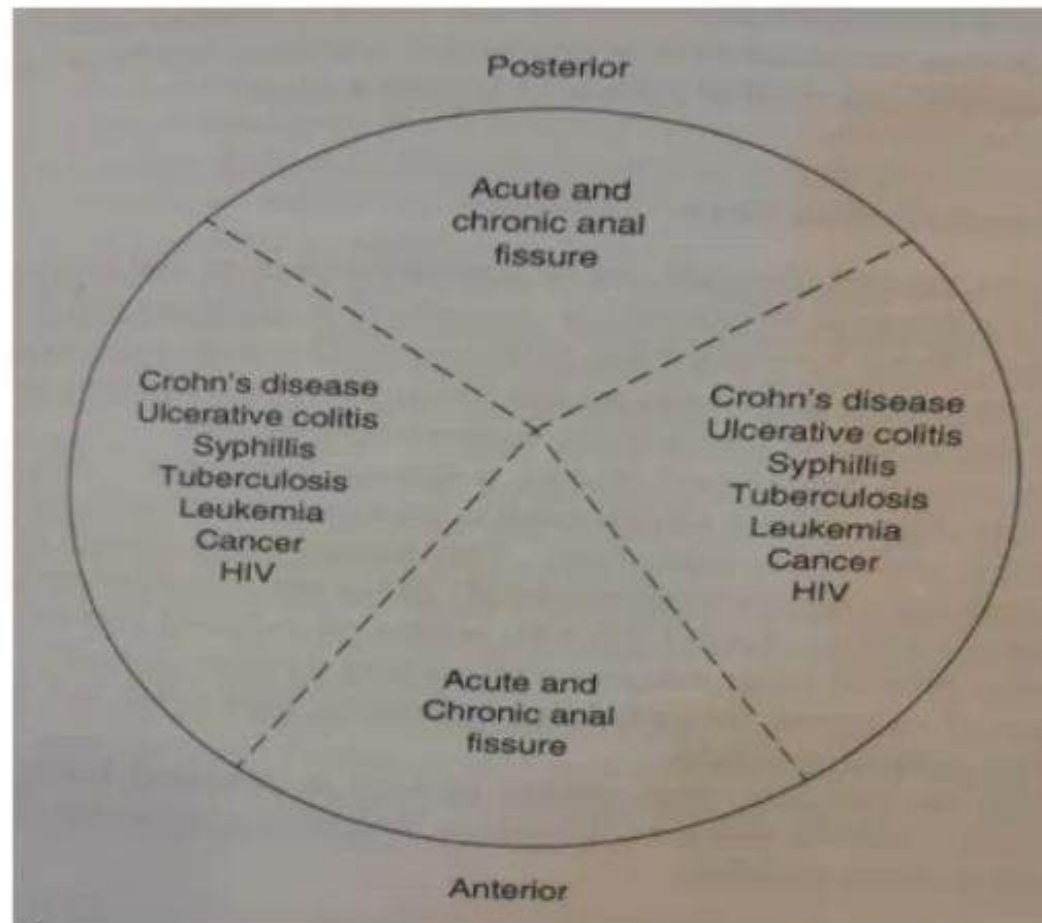


# FISSURE

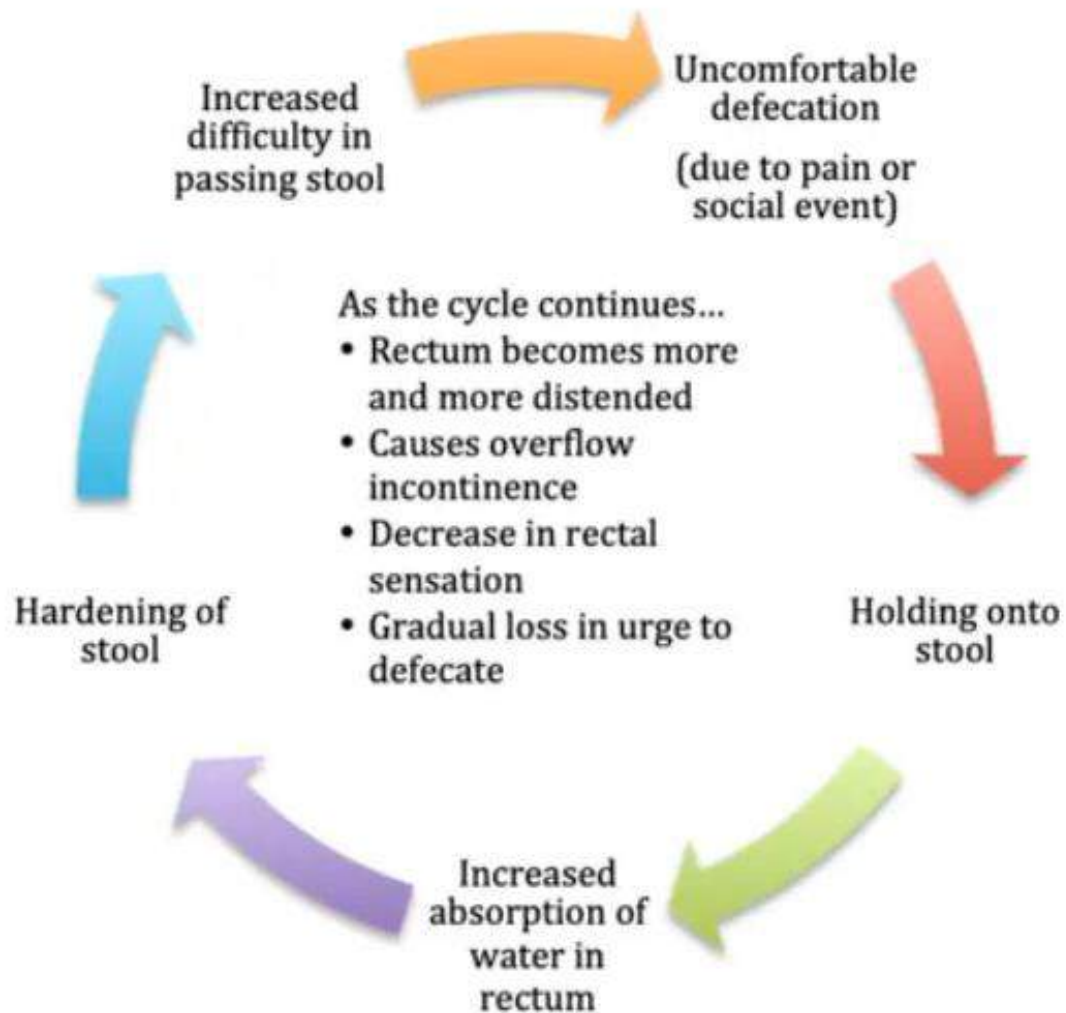
- The vessels passing through the sphincter muscle are subject to contusion during periods of increased sphincter tone and that the resulting decrease in blood supply might lead to a path genetically relevant ischemia at the posterior commissure.



the location of anal fissure suggest etiology



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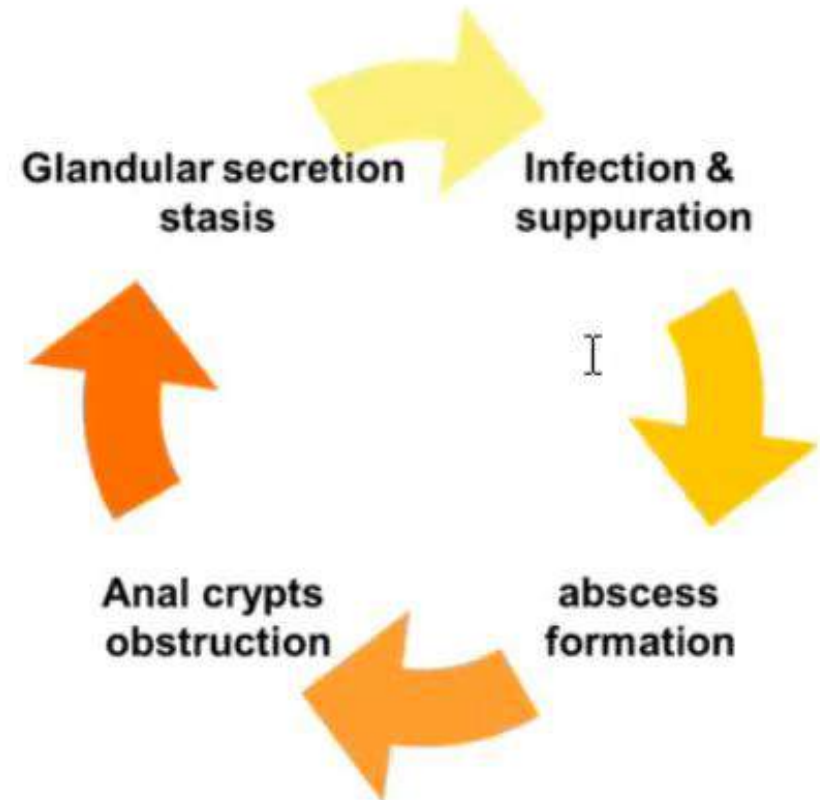
# TREATMENT OF FISSURE

- **ACUTE FISSURE**

- The aim treatment of an acute fissure In ano is to break the cycle of a hard stool, pain, and reflex spasm.
- Avoidance of constipation by ingestion of bulk forming foods.
- simple measures such as warm baths , Anesthetic ointments , suppositories that contain anesthetics, analgesics, astringents, anti-inflammatory agents (usually hydrocortisone), Nitroglycerin GTN , Calcium channel blocker e.g. Diltiazem, Nifedipine , Botulinum Toxin (BT), Sympathetic Neuromodulators.
- Surgery : Dilatation, Lateral sphincterotomy ( open or closed)

# Anorectal Abscess

- Infection originates in the intersphincteric plane, most likely in one of the anal glands.
- This may result in
  - simple intersphincteric abscess
  - extend vertically either upward
  - downwards horizontally
  - circumferentially resulting in varied clinical presentations.



# Anorectal Abscess

## **Aetiology & Pathogenesis:**

- 4-10 glands at dentate line.
- Infection of the cryptoglandular epithelium resulting from obstruction of the glands.
- Ascending infection into the intersphincteric space and other potential spaces.
- Bacteria implicated:  
E.Coli., Enterococci, bacteroides

## **Other causes:**

- Crohn
- TB
- Carcinoma, Lymphoma and Leukaemia
- Trauma
- Inflammatory pelvic conditions (appendicitis)

Table 13.2 Etiology of anorectal abscess

### Nonspecific

#### Cryptoglandular

### Specific

#### Inflammatory bowel disease

Crohn's disease

Ulcerative colitis

Infection

Tuberculosis

Actinomycosis

Lymphogranuloma venereum

#### Trauma

Impalement

Foreign body

Surgery

Episiotomy

Hemorrhoidectomy

Prostatectomy

#### Malignancy

Carcinoma

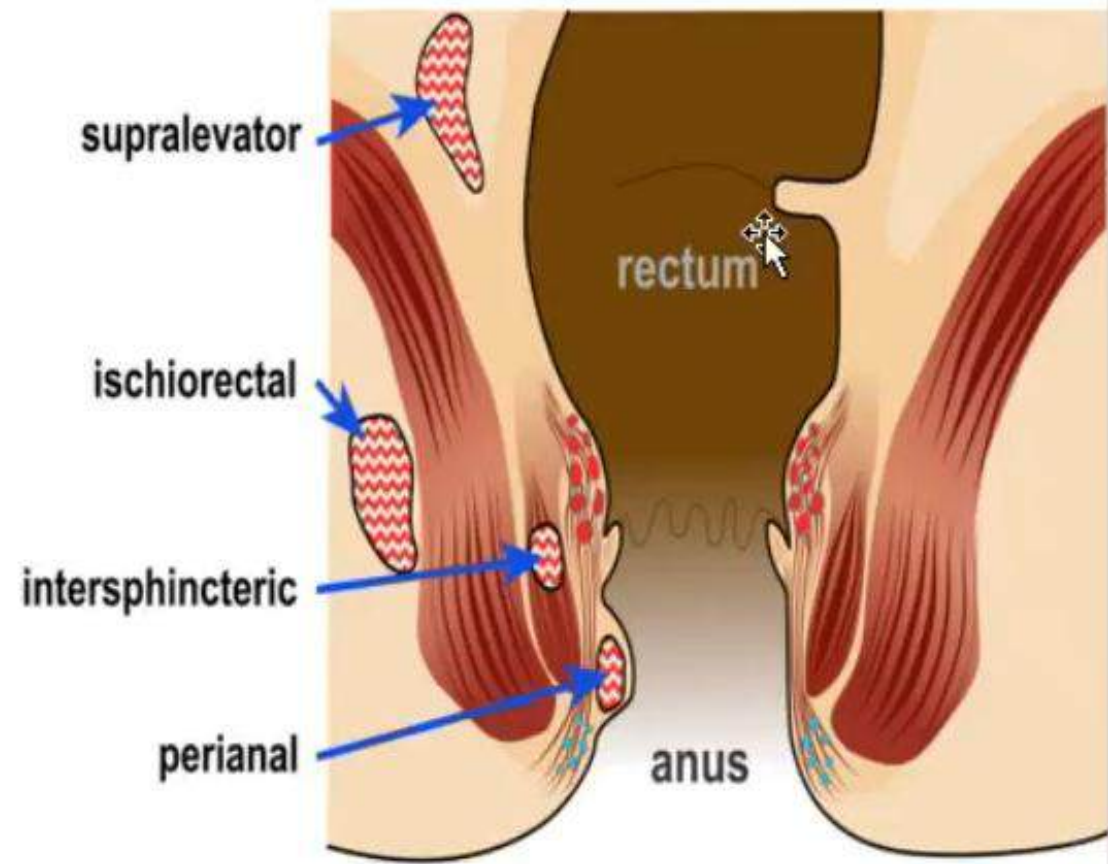
Leukemia

Lymphoma

Radiation

# Clinical presentation

- **Perianal** : Perianal pain, discharge (pus) and fever , Tender, fluctuant, erythematous subcutaneous lump.
- **Ischio-rectal**: Chills, fever, ischio-rectal pain , Indurated, erythematous mass, tender.
- **Intersphincteric** : Rectal pain, chills and fever, discharge
- **Supralevator** : PR tender. Difficult to identify are. EUA needed

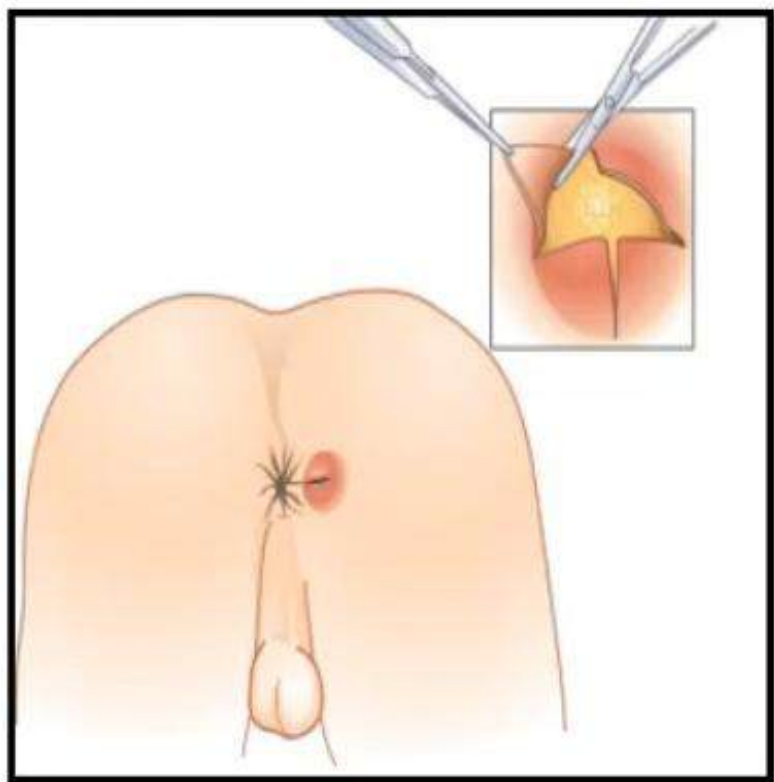


# Treatment

- Abscesses should be drained when diagnosed.
- Simple and superficial abscesses can most often be drained under local anesthesia
- Patients who manifest systemic symptoms, immunocompromised and those with complex, complicated abscesses are best treated in a hospital setting.
- An intersphincteric abscess is drained by dividing the internal sphincter at the level of the abscess



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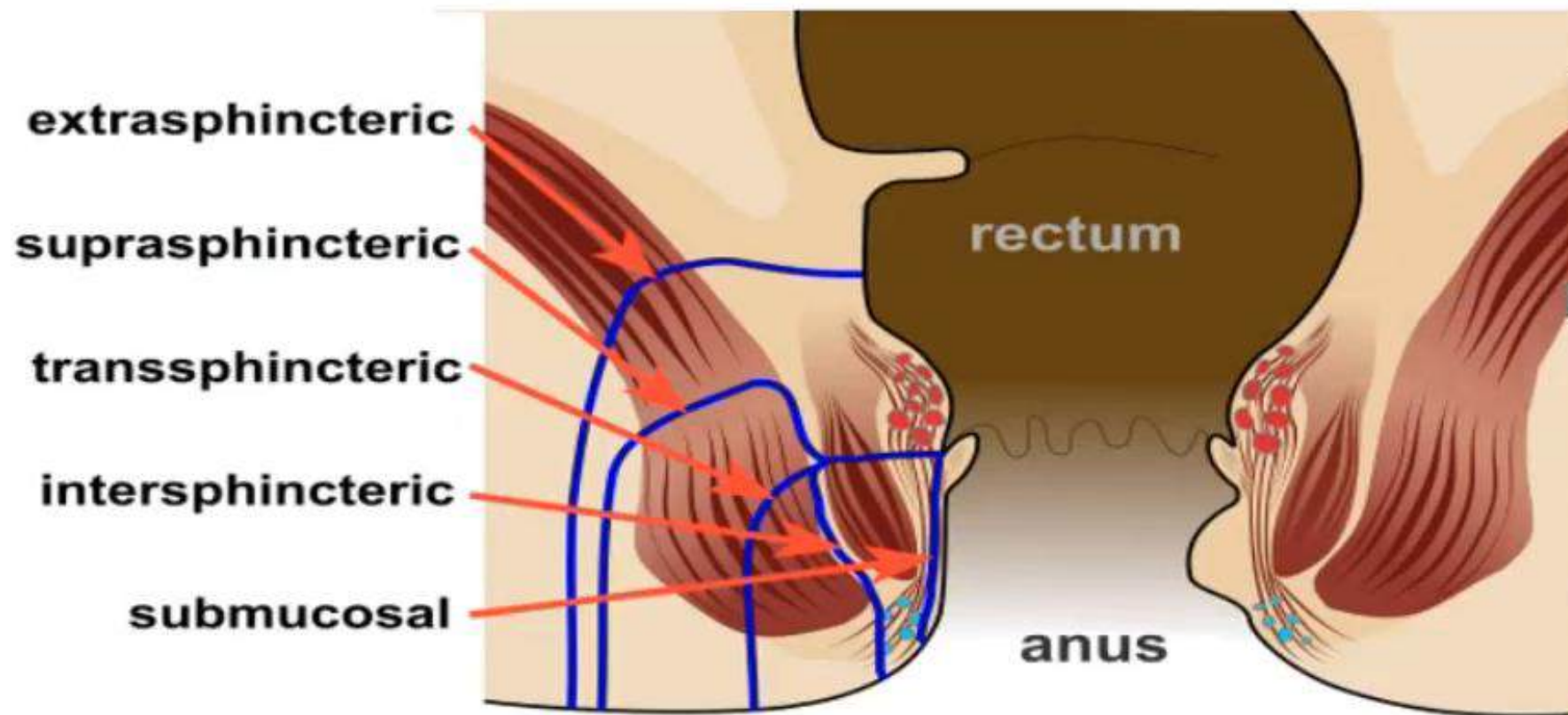


# Anal Fistula

- **Definition:** It is an opening between perianal skin and the cavity of the anal canal or rectum.
- According to the site of their internal opening they can be classified into:
  - **1. Low level fistula**, the internal opening open into the anal canal below the anorectal ring.
  - **2. Highlevel fistula**, the internal opening open into the anal canal at or above the anorectal ring .

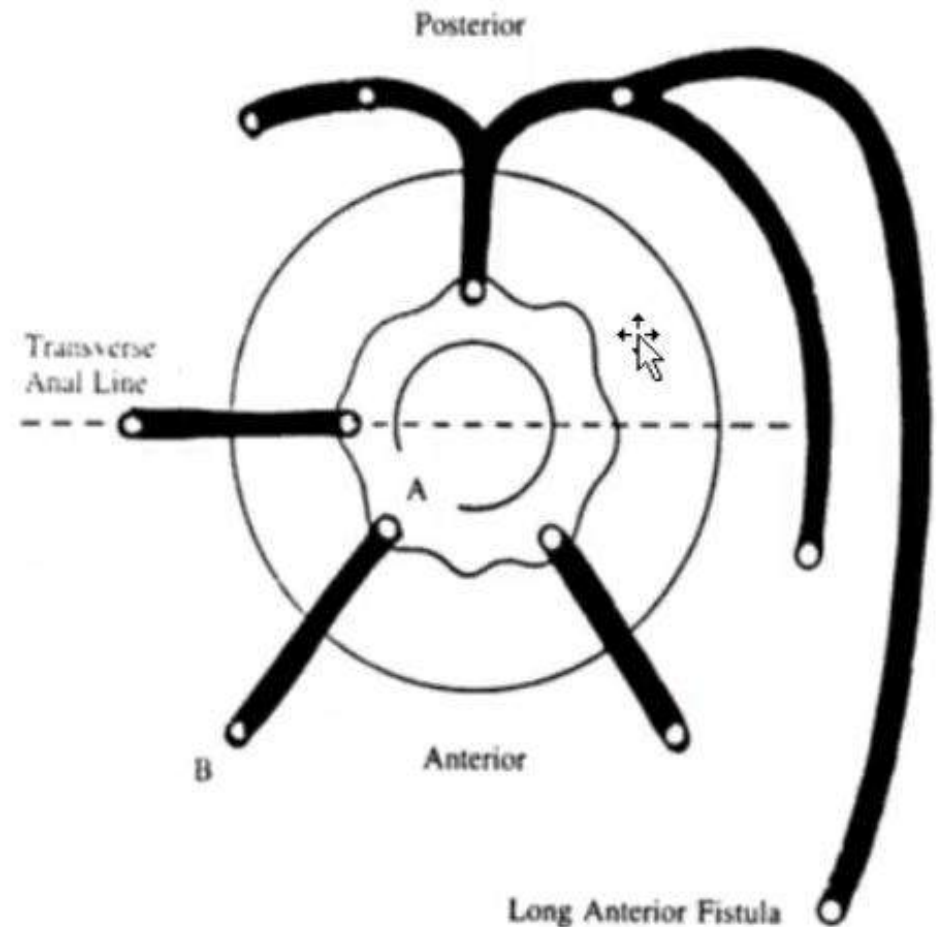
# Anal Fistula

- According to the relation to external and internal sphincters Parks classified fistulas into:
  - – Intersphincteric fistula: originates from abscess in intersphincteric anal gland and runs between internal and external sphincters along the plane of longitudinal muscle fibers.
  - – Transsphincteric fistula : have a primary track that passes through the external sphincter at varying levels into the ischiorectal fossa Such fistula may be uncomplicated, consisting only of the primary track, or may have a blind high track which may terminates below or above the levator ani muscles.
  - – Suprasphincteric fistula : have a primary track running up to a level above puborectalis and then curl down through the levators and ischiorectal fossa to reach the skin.
  - – Extrasphincteric : fistula run without relation to the sphincters.

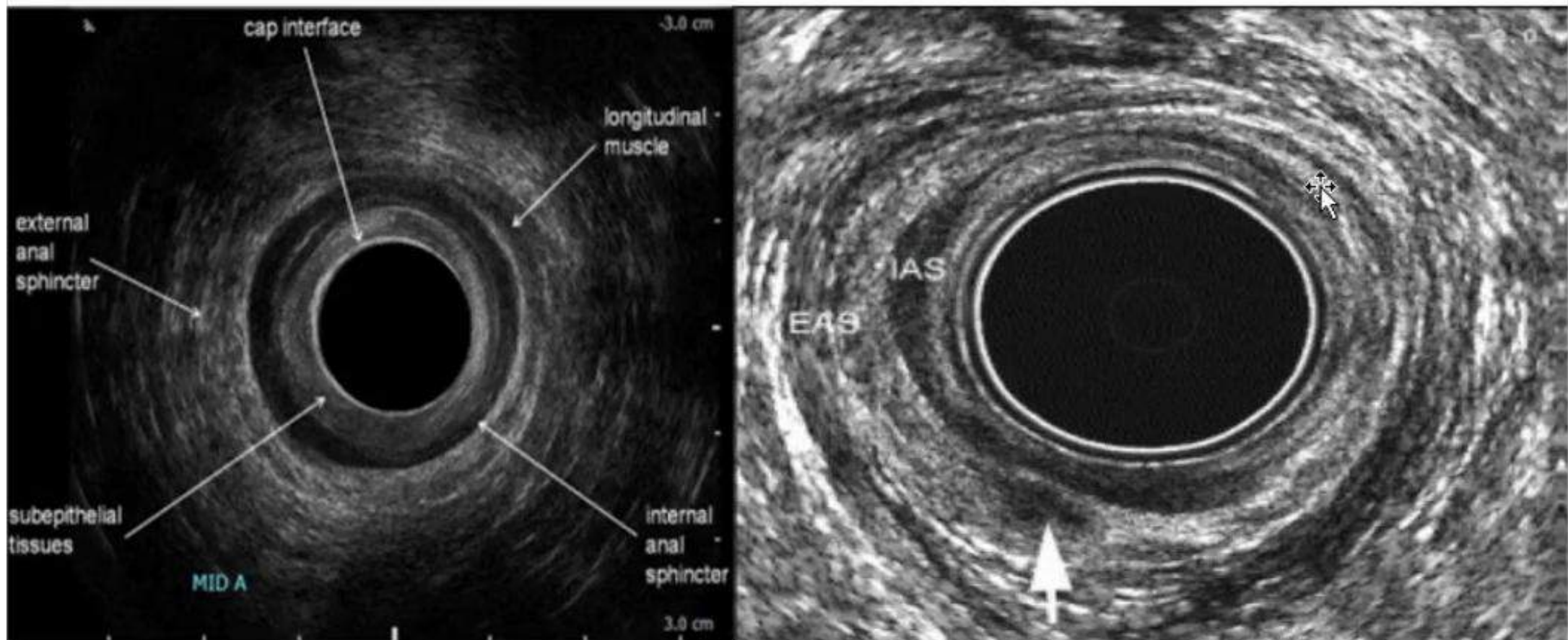


# Anal Fistula

- Goodsall's rule. The usual relationship of primary and secondary fistula orifices is diagrammed. The internal (primary orifice) is marked.
- A, The rule predicts that if a line is drawn transversely across the anus, an external opening
- (B) Anterior to this line will lead to a straight radial tract, whereas an external opening that lies posterior to the line will lead to a curved tract and an internal opening in the posterior commissure. The long anterior fistula is an exception to the rule.



## Endoanal or transrectal ultrasonography (EUS/TRUS)



## *Special investigations*

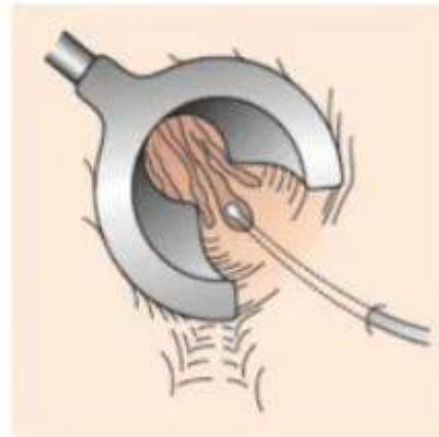
Magnetic resonance imaging (MRI) is the 'gold standard' for fistula imaging,



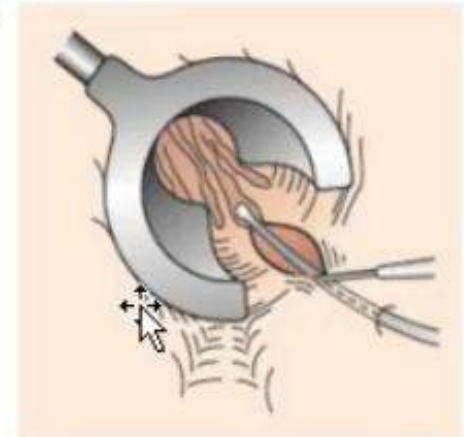
# Treatment of fistula

- Principles of fistula surgery: Treatment of fistulas is aimed at draining sepsis , defining and eradicating fistulous tracts whilst preserving sphincter integrity and function (Gordon, 1999).
- Fistulotomy and drainage: Fistulotomy means laying open and allowing to heal by secondary intention. It should be used only when a significant degree of incontinence would not result. Intersphincteric and low transsphincteric tracks are probably best treated by this method.

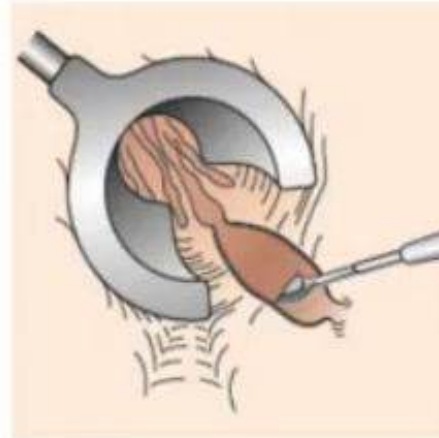
(a)



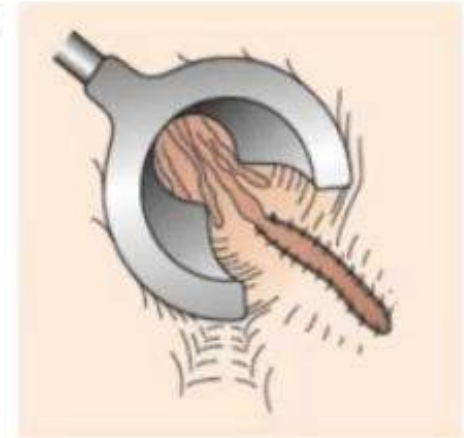
(b)



(c)



(d)

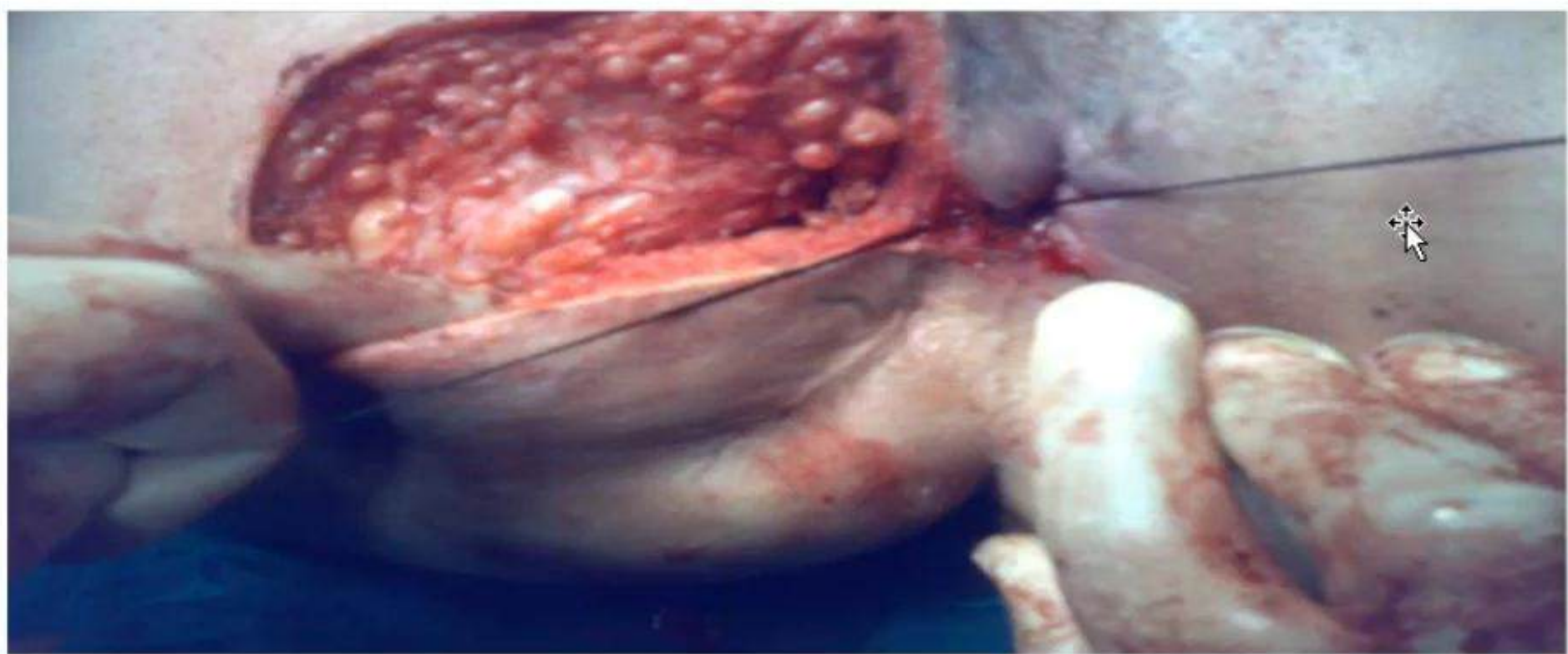


## Treatment of fistula

- Advancement flaps: The rectal advancement flap achieves healing of the fistula in a shorter time, & avoiding any sphincter division.
- Fistulectomy and coring out: Fistulectomy means to excises rather than to incise the fistula track. It has advantage of low rate of  recurrence but it leads to greater tissue loss with delayed healing and more risk of incontinence (Kronborg, 1985).
- Setons: A seton is used as a drain for the primary track, but use of the seton to transect the muscle carries a significant risk of incontinence Setons may be classified as loose, tight or chemical according to their different properties and modes of action (Fleshman et al., 1999)







# PILONIDAL SINUS

- The term “pilonidal sinus” (pilus, meaning hair, and nidus, meaning nest) to describe the chronic sinus containing hair and found between the buttocks.
- Pilonidal sinus is a chronic subcutaneous abscess in the natal cleft, which spontaneously drains through the openings.
- The acquired theory is now widely accepted. The affected hair follicles become distended with keratin and subsequently infected, leading to folliculitis and the formation of an abscess that extends down into the subcutaneous fat.

# PILONIDAL SINUS

- Treatment of pilonidal sinus can be done in one of several ways:
  1. Nonoperative treatment,
  2. Lateral incision and excision of midline pits, incision and marsupialization,
  3. Wide local excision with or without primary closure, excision and a ZPlasty , or advancing flap operation

# PILONIDAL SINUS



## Rectal prolapse

- Rectal prolapse is the protrusion of a few or all layers of the rectal mucous membrane through the anus.
- Prolapse of the rectum may involve only the mucosa, or it may involve all layers of the rectum protruding through the anus (procidentia).
- Most cases of childhood prolapse occur in patients younger than 4 years. Equal in both sex, Pediatric rectal prolapse is more common in tropical and underdeveloped countries, where diarrhea and parasitic infection play much greater roles.

# Rectal prolapse

- 1. Increased intraabdominal pressure** Straining due to constipation or diarrhea , toilet training, protracted coughing (pertussis), excessive vomiting , Benign prostatic hypertrophy ,Chronic obstructive pulmonary disease (COPD) , Pertussis (i e, whooping cough)
- 2. Parasitic** Trichuriasis (whipworm), Entamoeba histolytica , Amebiasis , Schistosomiasis and Giardia
- 3. Neoplastic disease** Polyps
- 4. Malnutrition** Loss of ischiorectal fat reduces perirectal support.
- 5. Cystic fibrosis**  
– This accounts for about 11% of rectal prolapse.  
– Sweat test is diagnostic.
- 6. Ulcerative colitis**
- 7. Ehlers Danlos Syndrome**
- 8. Rectal neoplasm**
- 9. Previously repaired anorectal anomaly**
- 10. Neurologic disorders** Previous lower back or pelvic trauma/lumbar disk disease ,Cauda equina syndrome , Spinal tumors , Multiple sclerosis
- 11. Pelvic floor dysfunction**

## Rectal prolapse



## Treatment of Rectal prolapse

- Perineal procedures have a higher recurrence rate but a lower morbidity rate and are often performed in the elderly population or inpatients who have a contraindication to general anesthetic.
- **Anal encirclement (Thiersch wire)** This procedure is no longer performed 
- **Delorme mucosal sleeve resection** This procedure is often used for small prolapses
- **Altemeier perineal Rectosigmoidectomy**
- **Surgery for mucosal prolapse**