Anal Surgery

By:

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Anatomy

- The anal canal may be defined in two ways, as follows:

➢ Functional (or surgical) anal canal

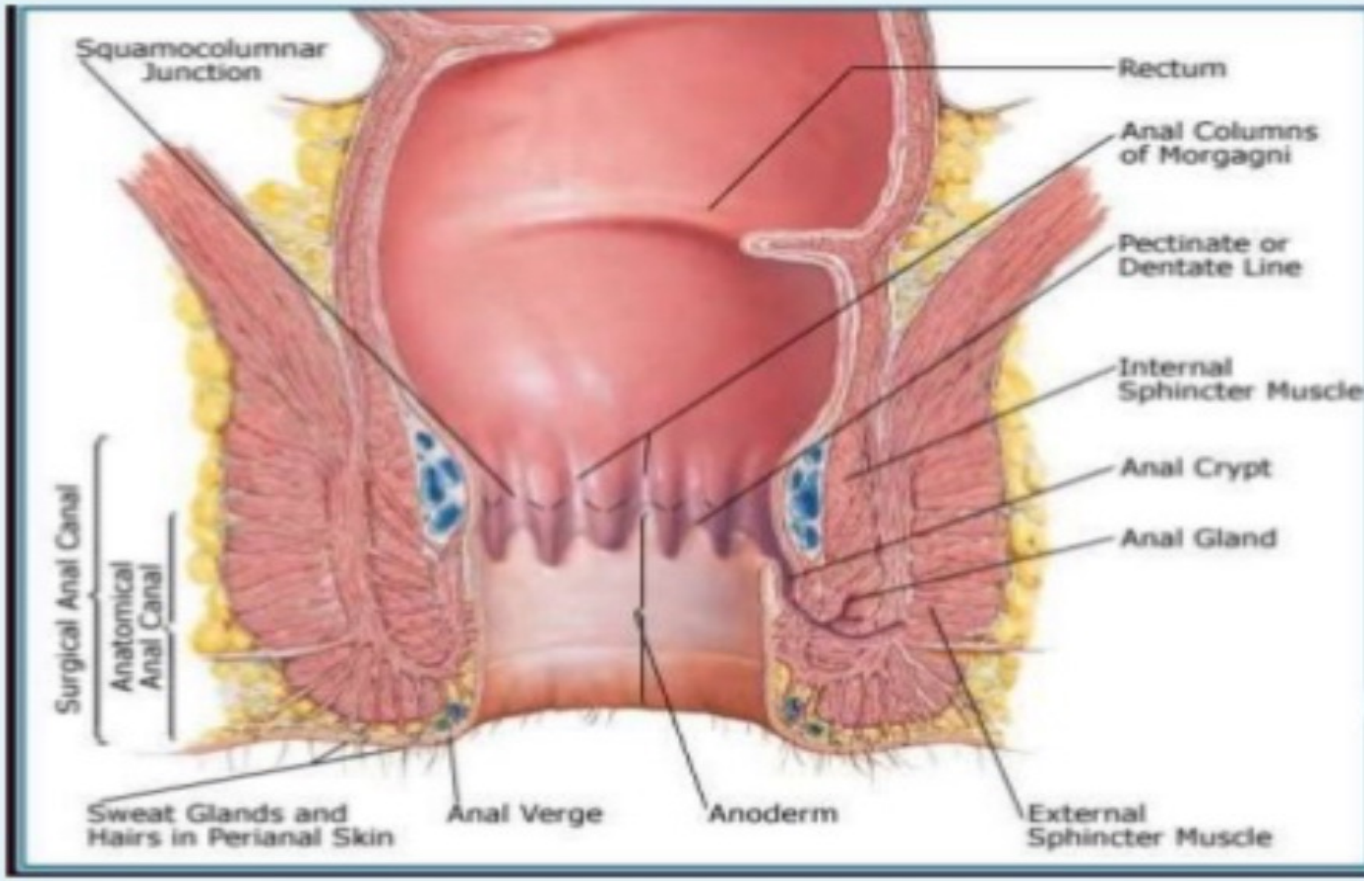
➢ Anatomic anal canal

- The surgical anal canal is approximately 4 cm long and extends from the anal verge or intersphincteric groove distally to the anorectal ring, proximally.
- The anatomic anal canal is only approximately 2 cm long and extends from the anal verge distally to the dentate line proximally.

- The dentate line is the junction of the ectoderm and endoderm in the anal canal. The anal verge is an anocutaneous line approximately 2 cm distal to the dentate line. The anal verge marks the beginning of the anal canal.
- The internal anal sphincter is a smooth muscle that is the most distal extension of the inner circular smooth muscle of the colon and the rectum. It is 2.5-4 cm long and is normally 2-3 mm thick. The internal sphincter is not under voluntary control and is continuously contracted to prevent unplanned loss of stool.
- The external anal sphincter is striated muscle that forms a circular tube around the anal canal. Proximally, it merges with the puborectalis and the levator ani to form a single complex. Control of the external anal sphincter is voluntary.

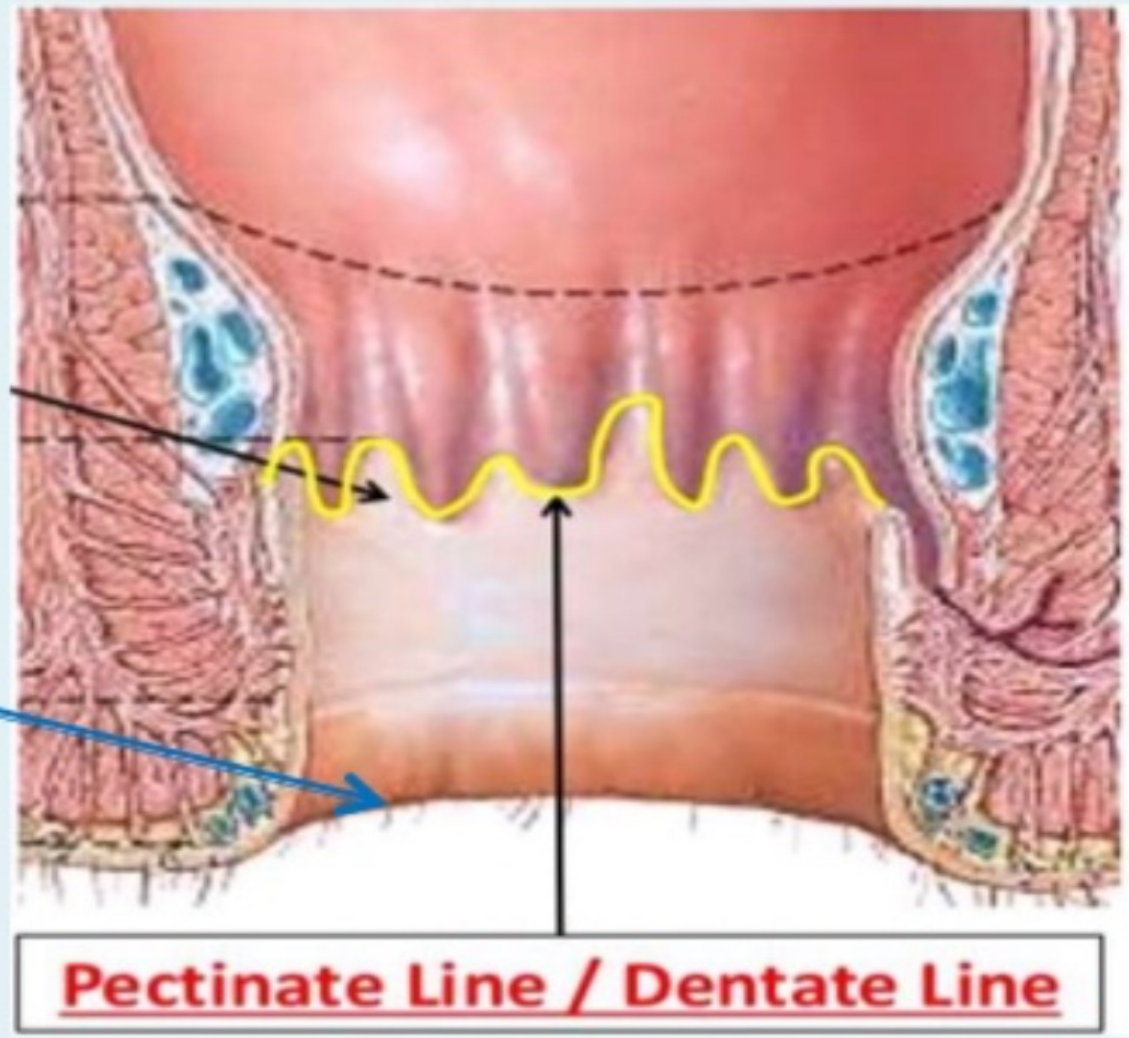
The surgical anal canal

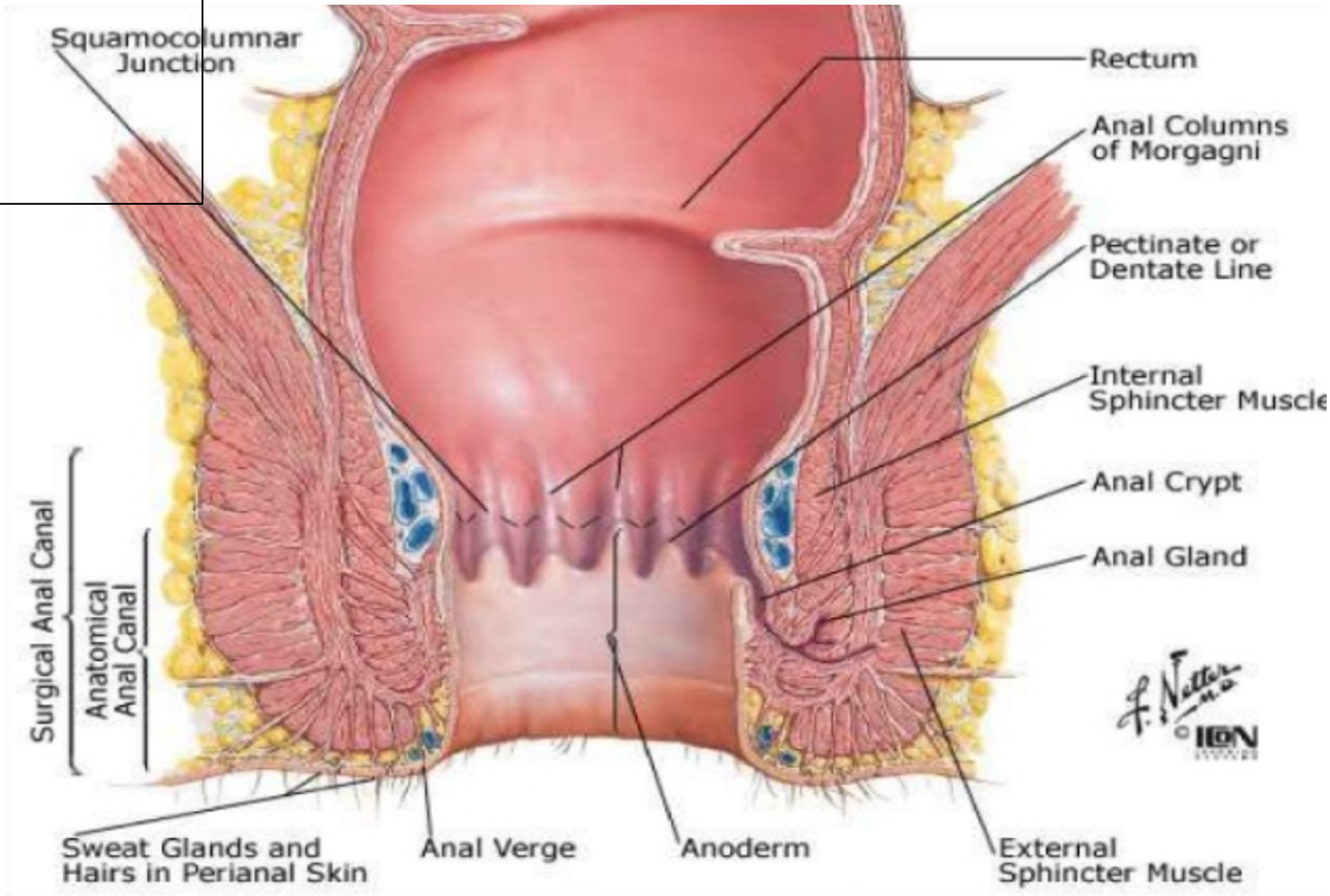
- **The surgical anal canal:**
  - It begins at the **anorectal junction**
  - terminates at **the anal verge.**



The anatomic anal canal

- The *anatomic anal canal extends from* ***the dentate*** **or** **pectinate line** to **the anal verge.**

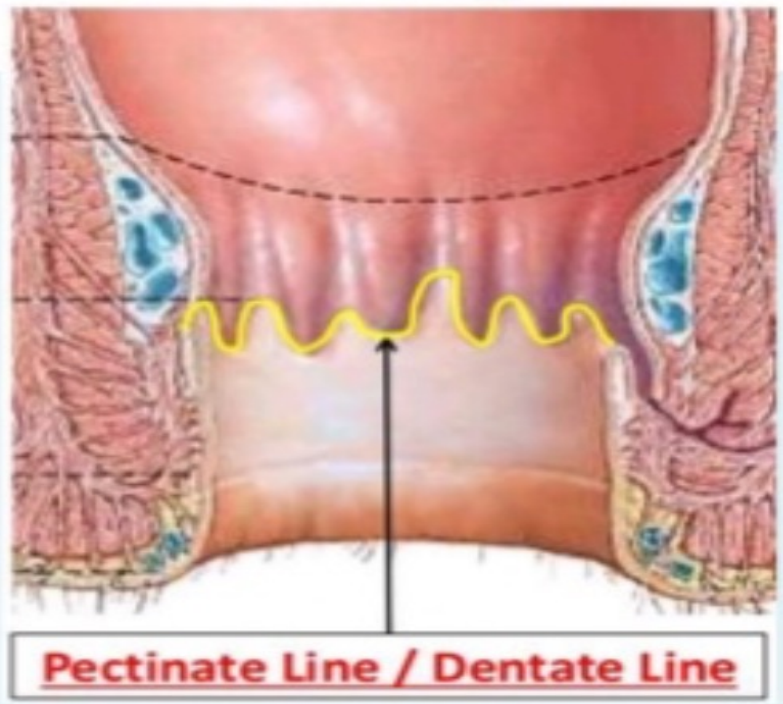



Squamocolumnar Junction
Rectum
Anal Columns of Morgagni
Pectinate or Dentate Line
Internal Sphincter Muscle
Anal Crypt
Anal Gland
Surgical Anal Canal
Anatomical Anal Canal
Sweat Glands and Hairs in Perianal Skin
Anal Verge
Anoderm
External Sphincter Muscle

EMBRYOLOGY

The gut starts off as an endoderm tube. The ectoderm invaginates and meets the endoderm to form the anal canal. Hence, the **distal half** of the anal canal is **ectoderm** (proctodeum) derived and the **proximal half** is **endoderm** derived. This is important in understanding the differences in characteristics of the two parts.

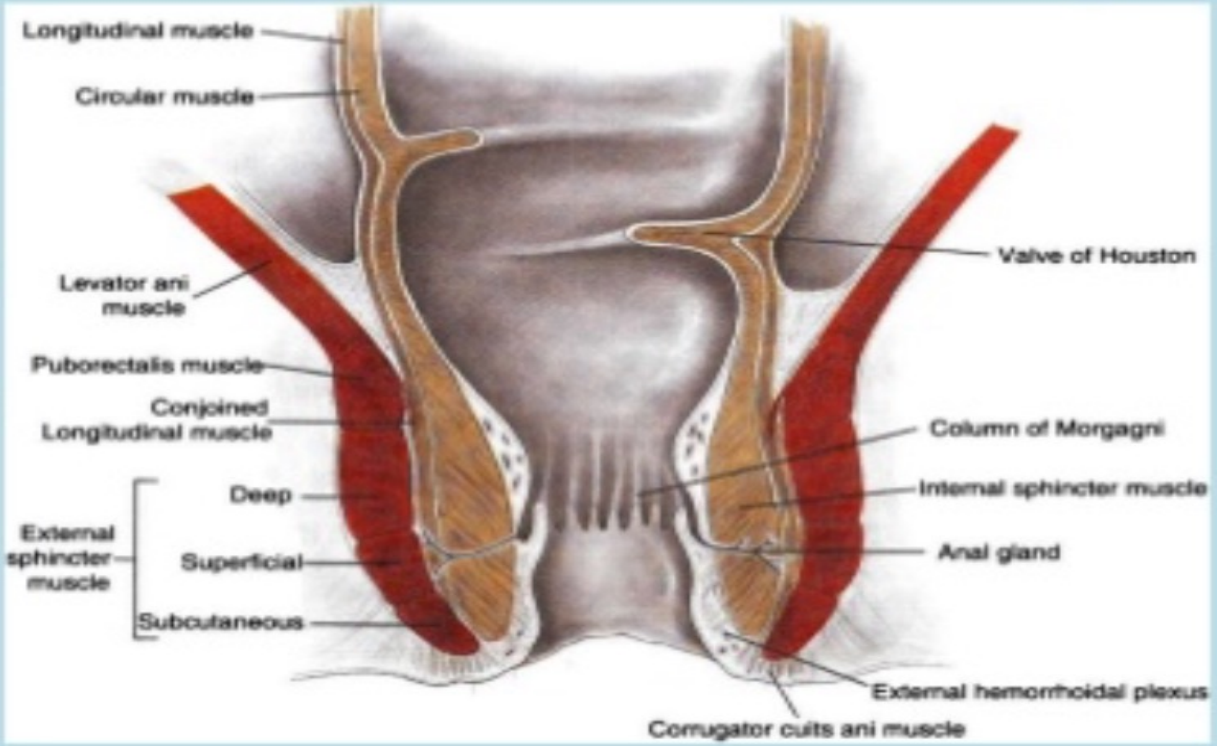
The anal canal **below** the pectinate line develops from **the proctodeum (ectoderm),** while that **above** the pectinate line develops from **the endoderm of the hindgut.**



Anal sphincters

The internal sphincter

external sphincter



The external sphincter

- **Voluntary** sphincter
- Composed of skeletal muscle. Surrounds entire length of anal canal
- Consists of 3 parts – Subcuatneous Superficial & Deep
- Nerve supply:
  - Inf. Rectal br. Of pudendal n.
  - Perineal br. of 4th sacral n.

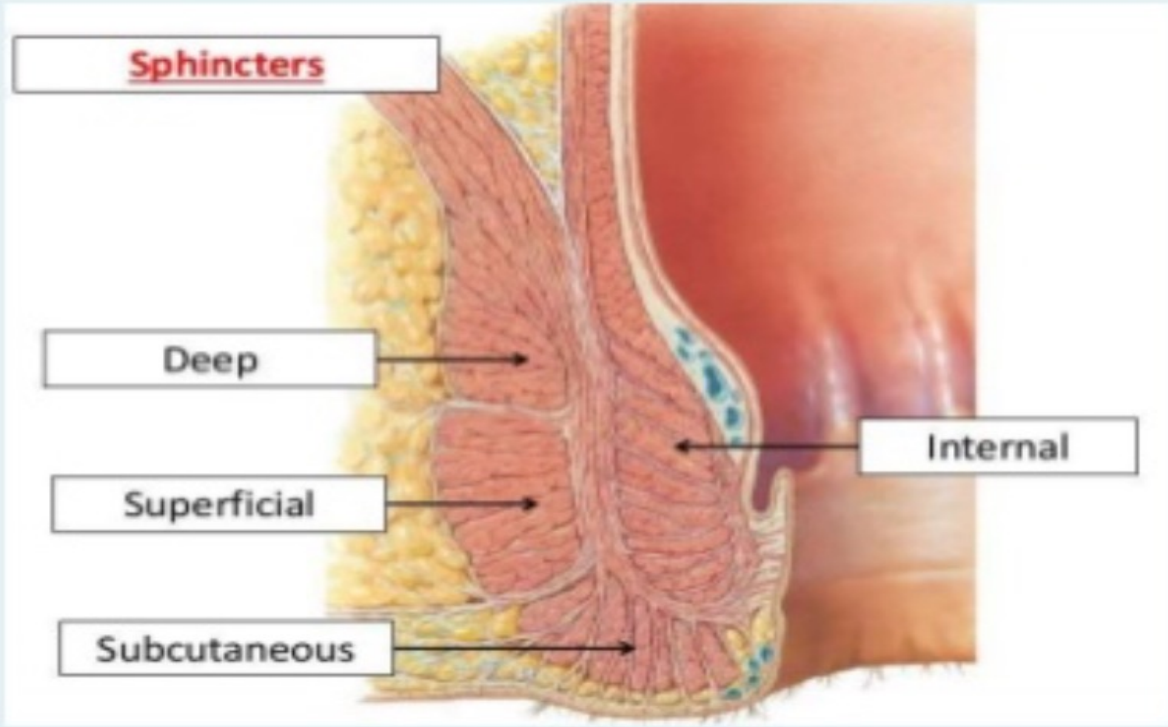
The external sphincter

- Consists of 3 parts

deep

superficial

subcutaneous



The parts blend with one other to form a continuous tube.

Blood Supply & Lymphatics of Anal Canal

Arteries:

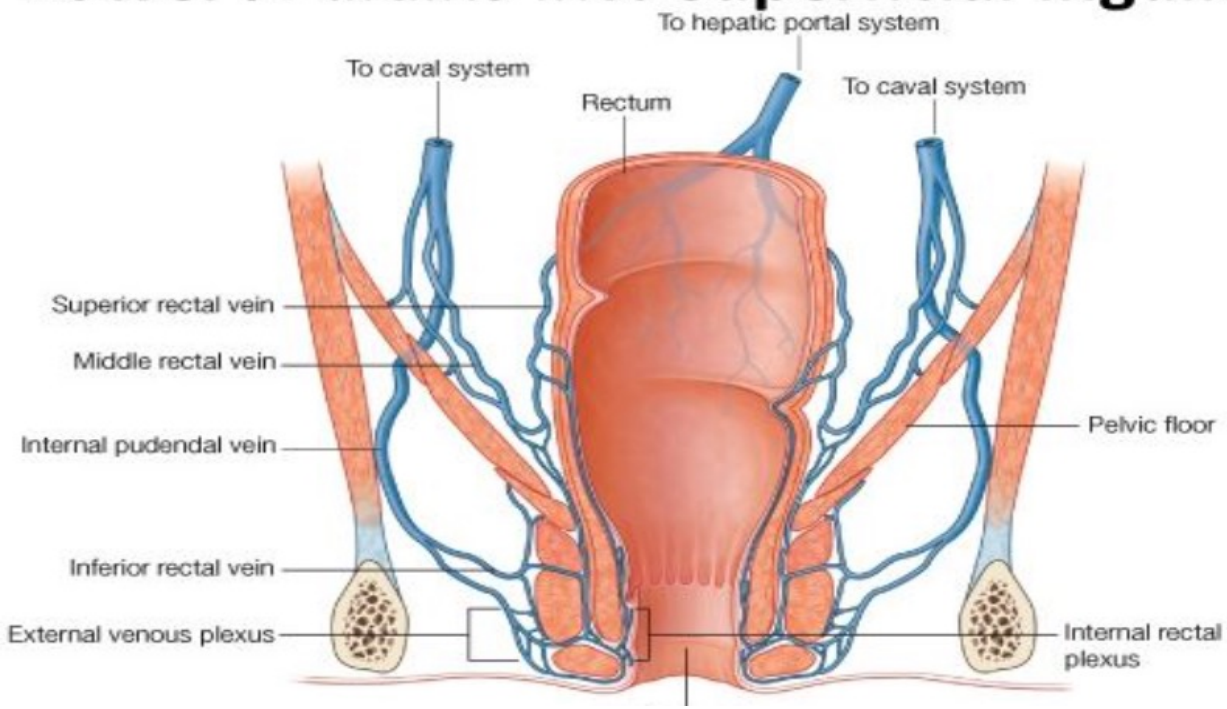
upper ½ by **Superior rectal artery** (branch of IMA)
lower ½ by **inferior rectal artery** (branch of Internal pudendal artery)

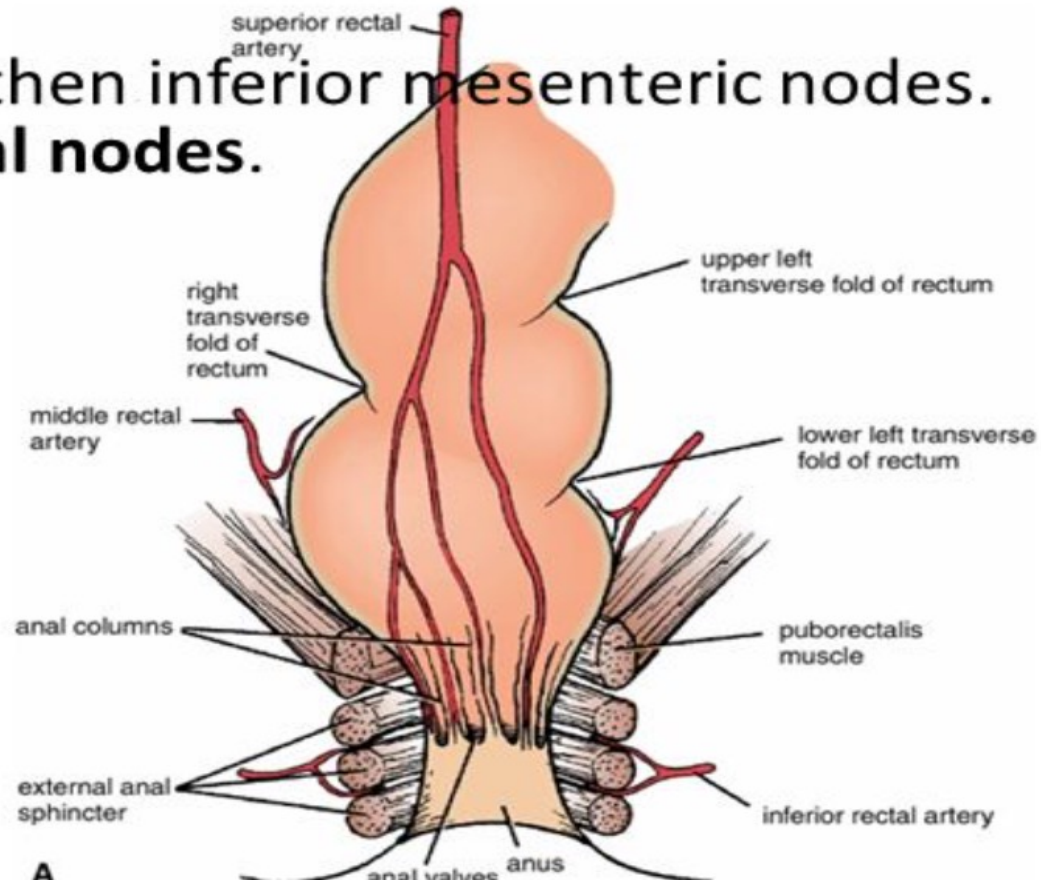
Veins:

Upper ½ is drained by **superior rectal vein** into inferior mesenteric vein
Lower ½ is drained by **inferior rectal vein** into internal pudendal vein.

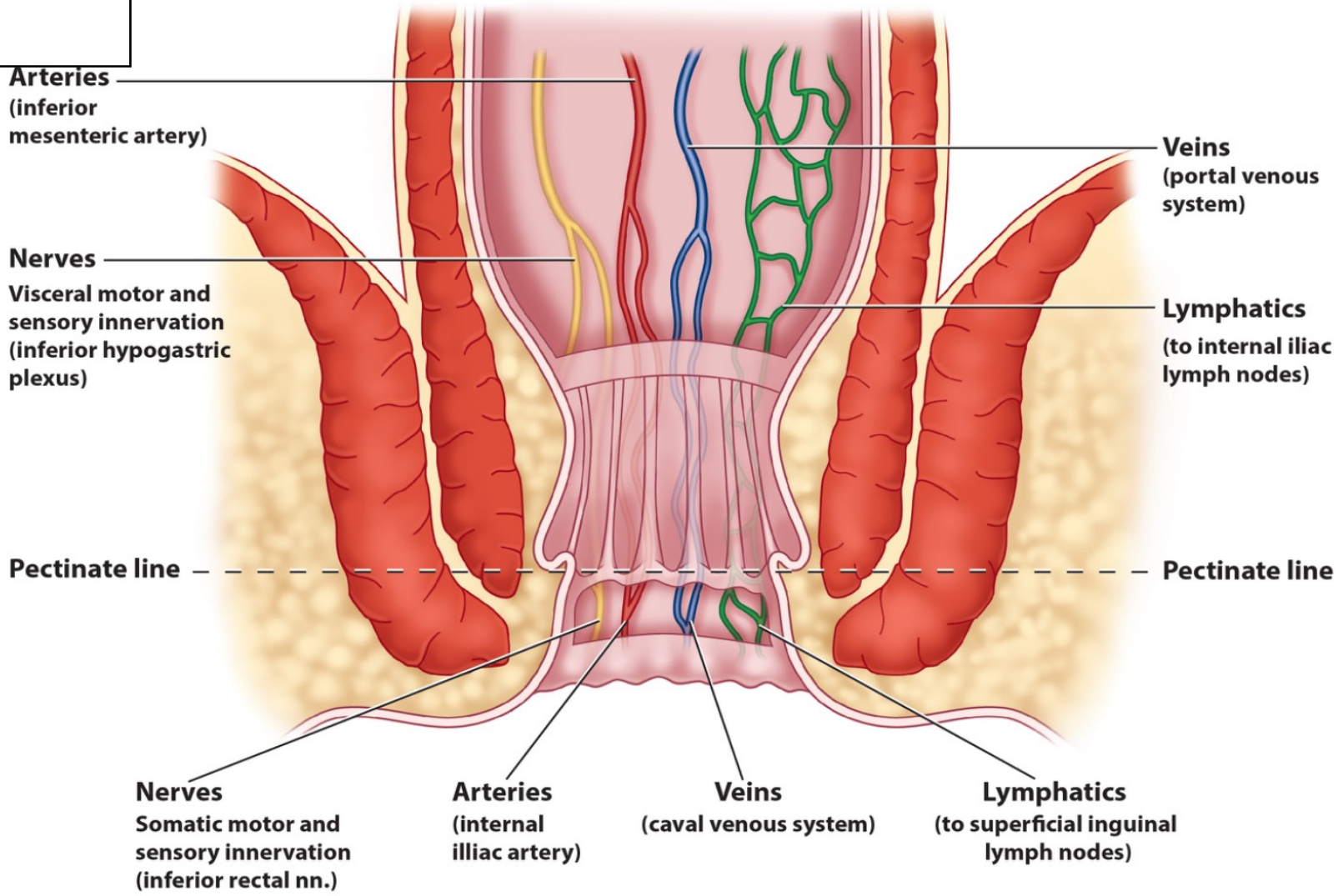
Lymph Drainage:

Upper ½ drains into **pararectal nodes** then inferior mesenteric nodes.
Lower ½ drains into **superficial inguinal nodes**.





Differences between upper and lower anal canal



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

Haemorrhoids (piles)

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Haemorrhoids (piles) : it is abnormal downward sliding of anal cushions due to straining or other causes.

- **Types of haemorrhoids:**

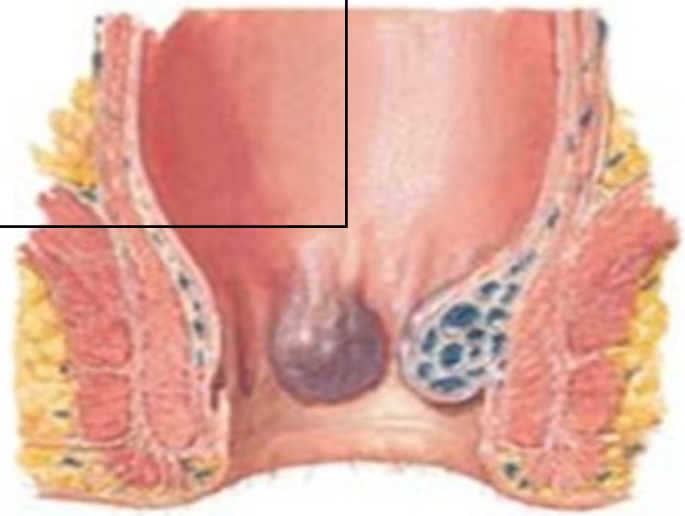
➢ Internal : above the dentate line, covered with mucous membrane.

➢ External: below the dentate line , covered with skin.

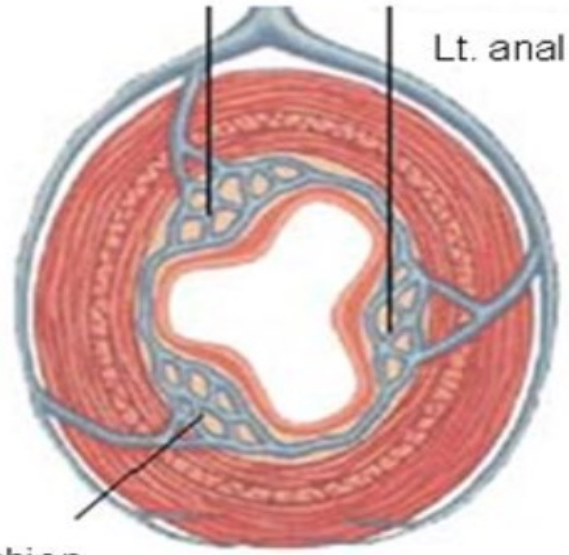
➢ Inferno-External: mixed.

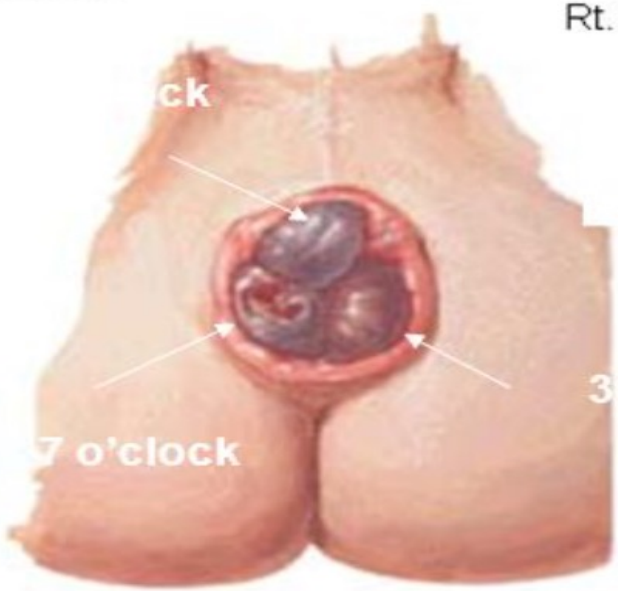
Internal haemorrhoids

- Internal haemorrhoids are dilated veins that occur in prolapsing anal cushions that characteristically lie in the 3, 7 and 11 o'clock positions
- Haemorrhoids generally cause symptoms when they become enlarged, inflamed, thrombosed or prolapsed



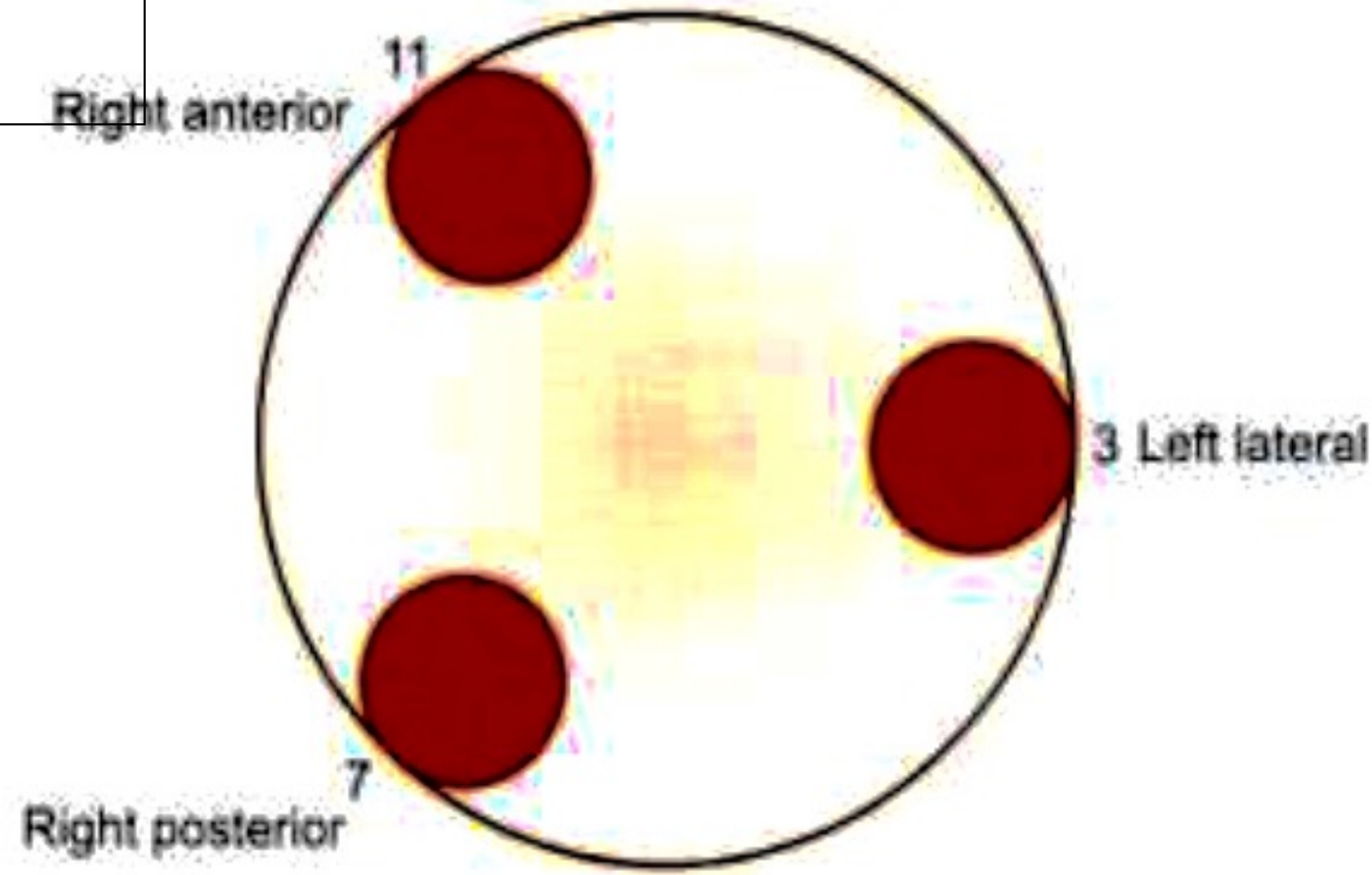
Enlarged anal cushions





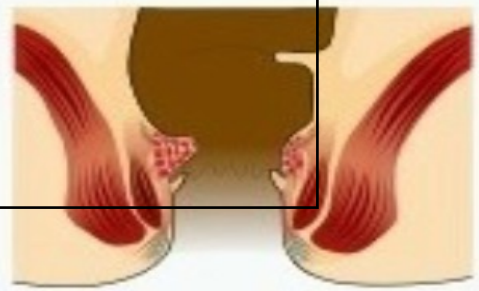
Prolapsed "rosette" of internal hemorrhoids

Usual position of anal cushions and sites of prolapse for internal hemorrhoids


11
Right anterior
3 Left lateral
7
Right posterior

Classifications of piles

- **First degree haemorrhoids:** piles within the anal canal that may bleed but don't come out.
- **Second degree haemorrhoids:** piles that prolapse during defecation, but return back spontaneously.
- **Third degree Haemorrhoids:** piles prolapsed during defecation, can be replaced back only by manual help.
- **Fourth degree haemorrhoids**: piles that are permanently prolapsed.

Grade	Diagram	Picture
1		
2		
3		
4		

- No prolapse, just prominent blood vessels
- Prolapse upon bearing down, but spontaneous reduction
- Prolapse upon bearing down requiring manual reduction
- Prolapse with inability to be manually reduced

Etiology:

- **Hereditary and familial.**
- **Straining , diarrhea, constipation, pregnancy.**
- **Carcinoma of rectum and portal hypertension (rare causes)**

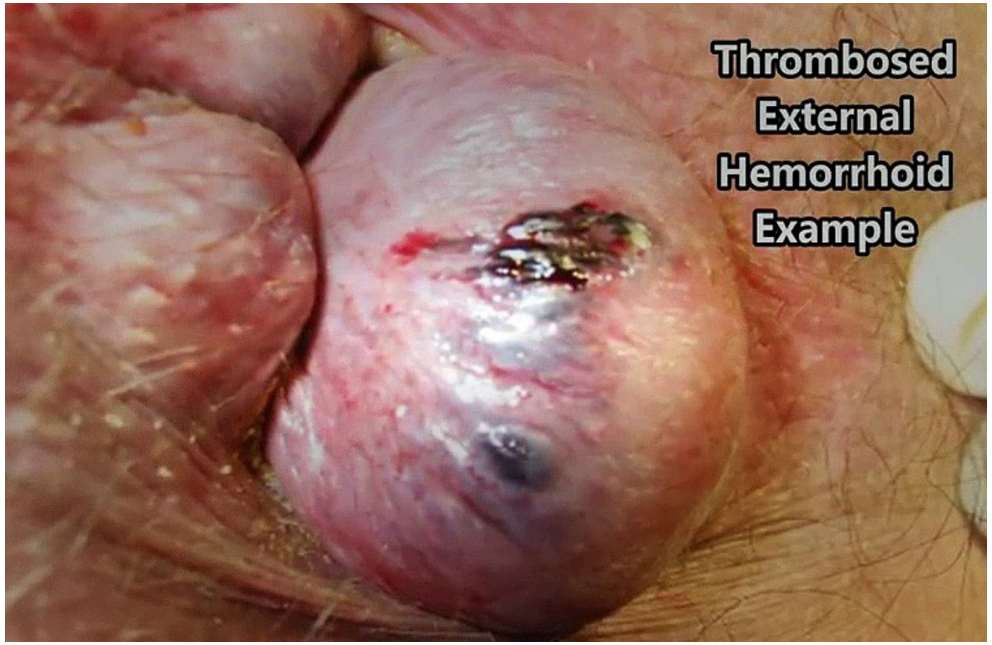
Clinical features

- **Bleeding – first symptom- splash in the pan- bright red and fresh- occurs during defecation.**
- **Mass per rectum**
- **Discharge – mucus disharge.**
- **Pruritus**
- **Pain – may be due to prolapse, infection or spasm.**
- **Aneamia.**
- **On inspection, prolapsed piles will be visualized.**
- **On DRE , only thrombosed piles can be felt.**
- **By proctoscopy, exact position can be made out as a bulge into the proctoscope.**

Complications of piles

- **Profuse hemorrhage which may require blood transfusion.**
- **Strangulation- piles is being gripped by anal sphincter.**
- **Thrombosis. – piles appear dark purple / black, feels solid and tender.**
- **Ulceration .**
- **Gangrene.**
- **Fibrosis.**
- **Stenosis.**
- **Suppuration leads to perianal or submucosal abscess.**
- **Pylephebitis (portal pyaemia) is rare.**


Prolapsed Hemorrhoid


Thrombosed
External
Hemorrhoid
Example

Treatment

- 1- Non-operative treatment:

➢ Sitz path – means the patient has to sit in warm water with anal region dipped in water for 20 minutes, 2-3 times a day. This reduce the edema, pain, and promotes healing.

➢ Local applications to reduce pain and edema can be used.

➢ Antibiotics, laxatives, anti-inflammatory drugs are benificial.

➢ Fiber diet 35 gram/ day, plenty of water.

- 2- Lord dilatation: In case of inflamed Permanently prolapsed , edematous piles, initially stretching of the anal canal is tried.This prevents congestion of anal cushions and relaxed the anal sphincter, as a result of which the prolapsed piles get reduce. Once edema subsides , in 1-2 weeks formal procedure is done.
- 3- Injection- Sclerosant therapy: it is used in 1st and 2nd degree piles. Using proctoscope and Gabriel syringe, 3-5 ml of 5% phenol in almond oilis injected into the submucosal plane just above ano-rectalring to the pedicle. All three piles can be injected seperately.
- 4- Barron‘s banding: it is done for 2nd degree piles . It cause ischemic necrosis and piles fall off. At one time only two piles can be banded.Repeat banding can be done only after 3 weeks.

- **5- Cryosurgery: Using nitrous oxide (- 98 degree) or liquid nitrogen (- 196 degree) , extreme cold temperature is used to coagulate and cause necrosis of piles which gets separated and fails off subsequently.**
- **6- Infra-red coagulation: heat is used toburn the piles so as to allow it to fall off.**
- **7- Laser therapy for 3rd degree piles.**
- **8- Stapeled haemorrhoidopexy: it is circumferential excision of the mucosa and submucosa above the dentate line using circular haemorrhoidal stapler passed per anally**

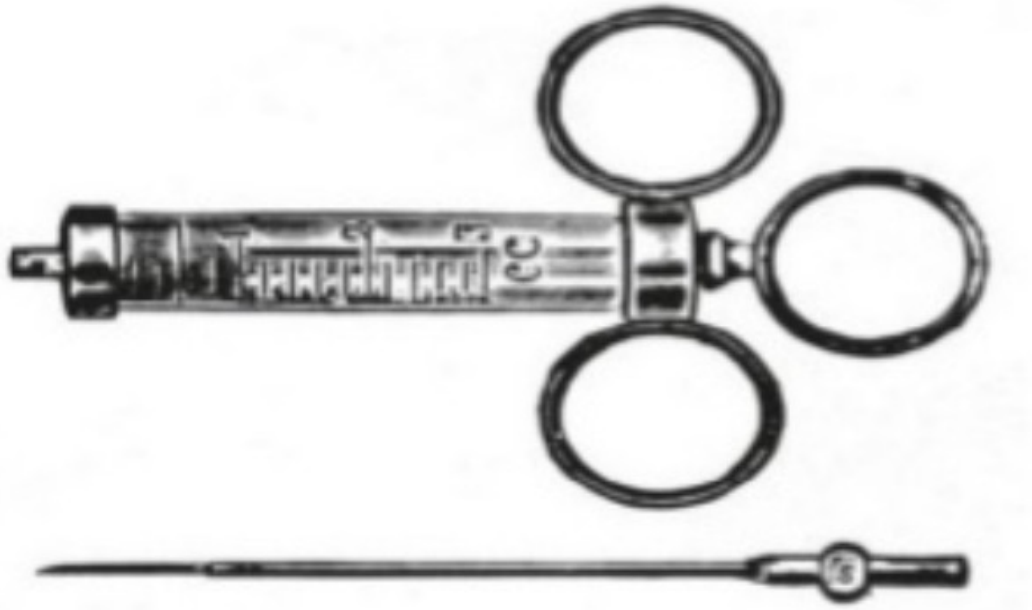
- 9- Open operative methods: for 3rd and 4th degree piles, failure of non-operative methods and fibrosed piles. Methods include:

  - Open haemorrhoidectomy (Milligan –Morgan procedure)
  - Closed Haemorrhiodectomy (Ferguson procedure)

- 10- Management of strangulated /thrombosed / gangrenous piles: initially conservative treatment is done using warm water sitz path, antibiotics,elevation, bed rest, saline compression dressing, and analgesics. This reduces the edema and piles shrink. Later after 4-5 days haemorroidectomy is done

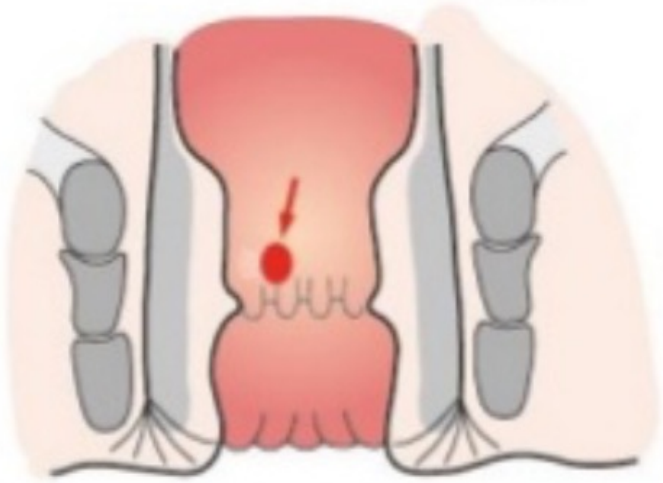
Sitz path

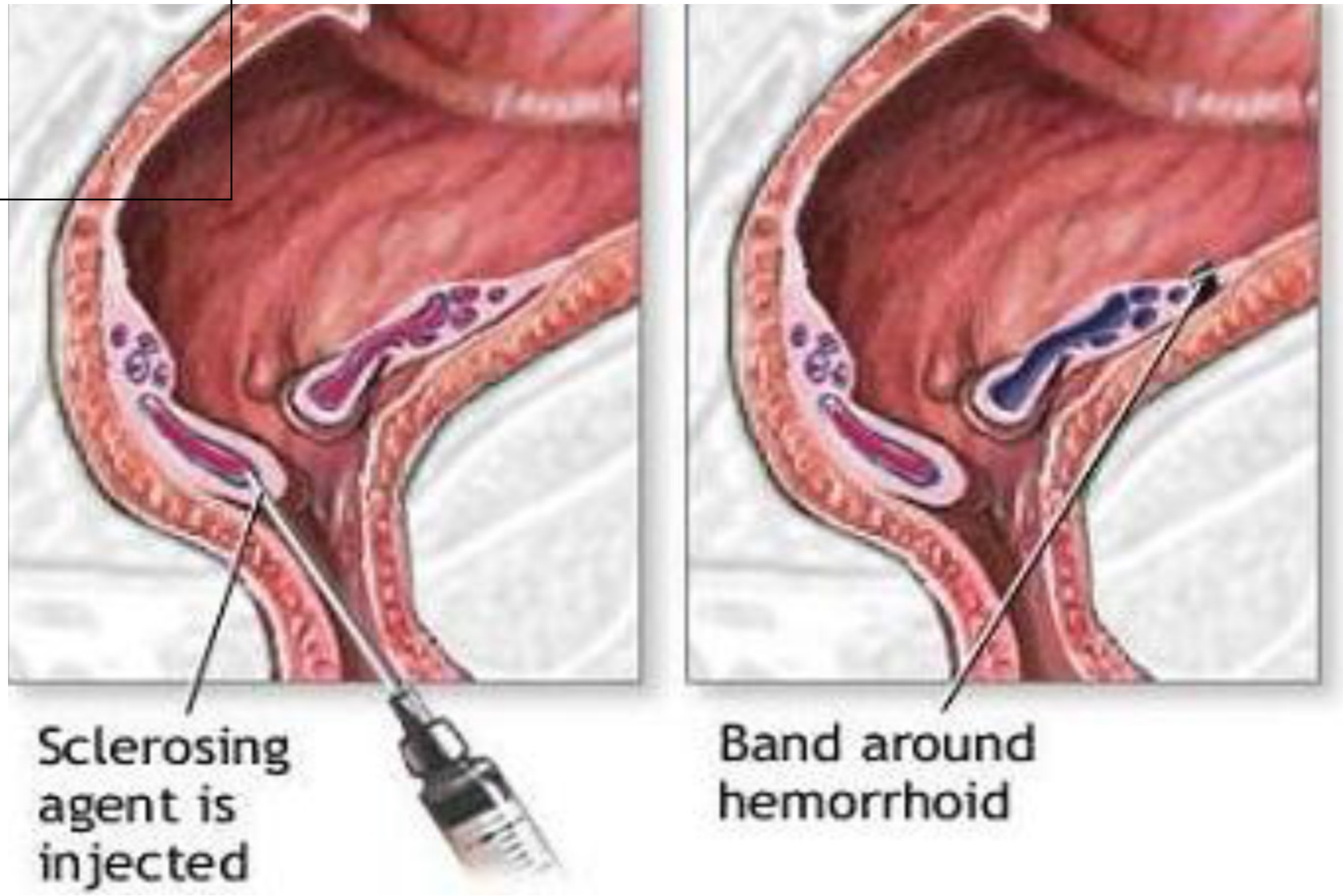
Injection sclerotherapy



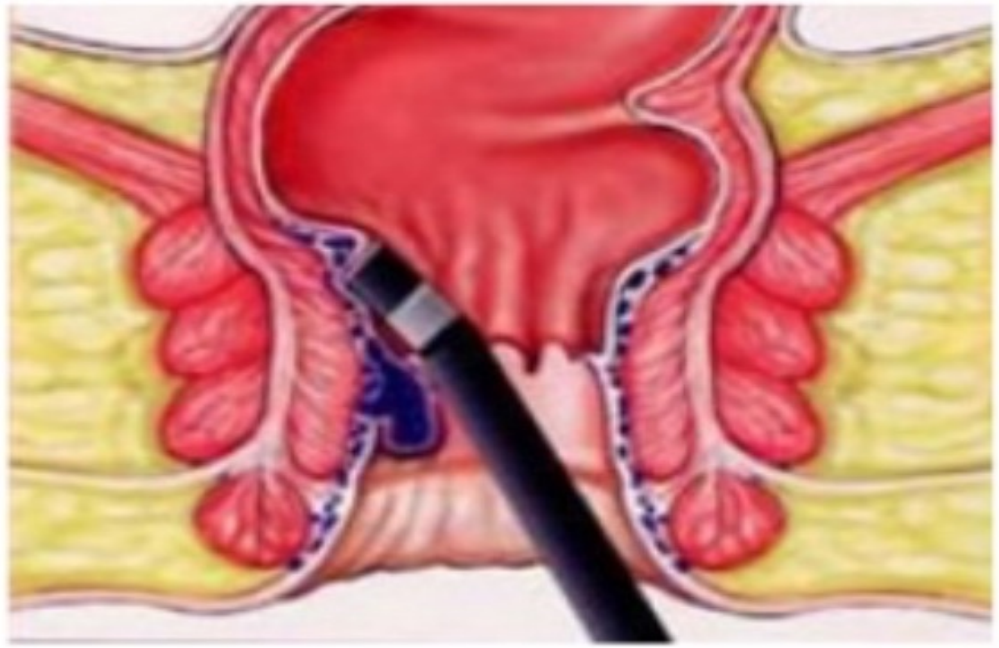
Gabriel's syringe

Barron's rubber band

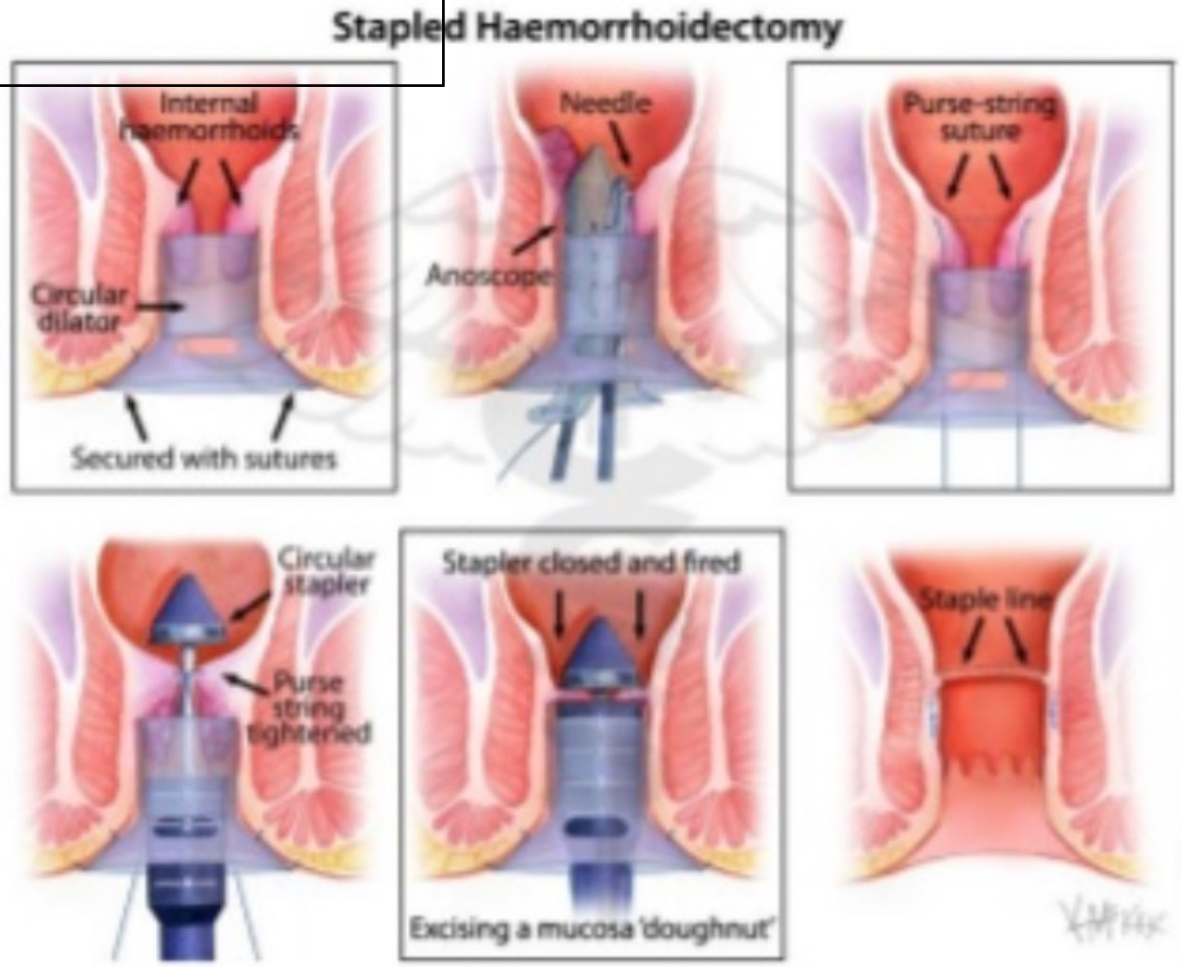


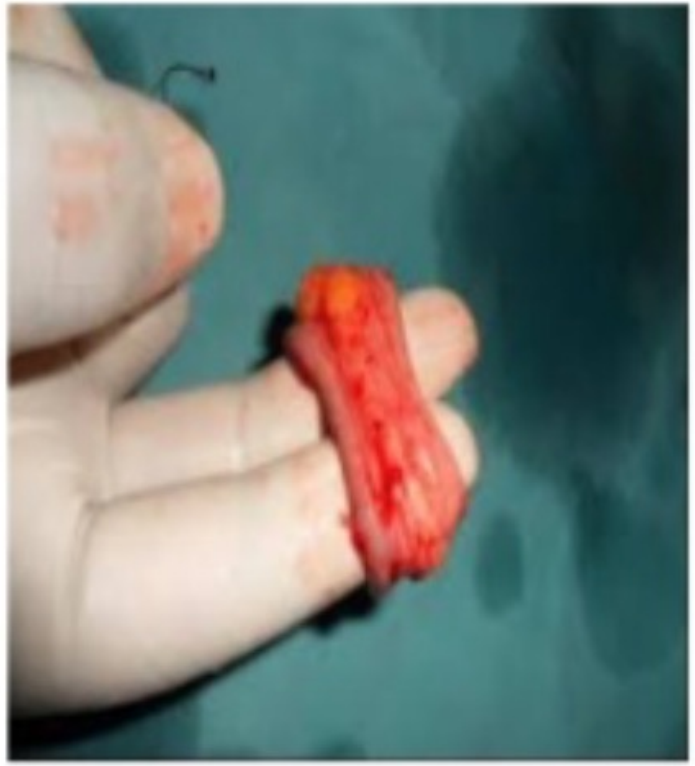

Sclerosing agent is injected
Band around hemorrhoid

Infrared coagulation

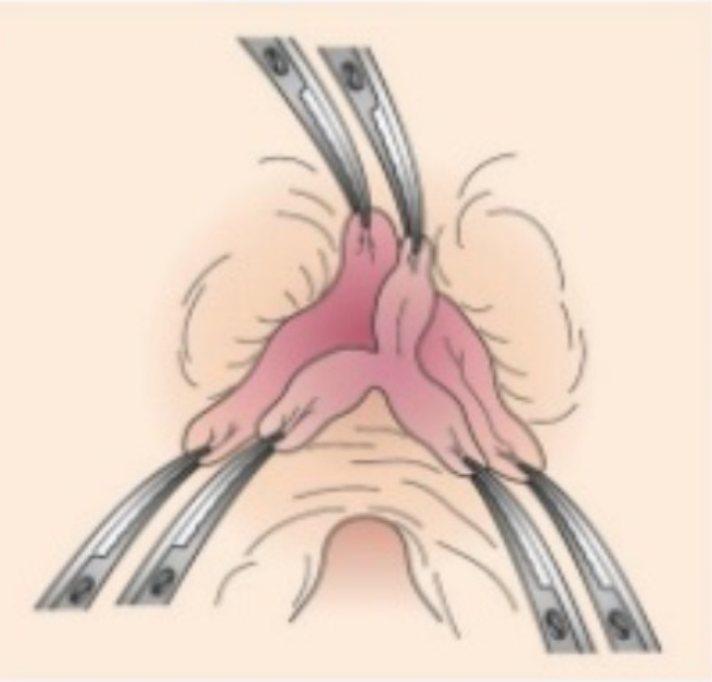


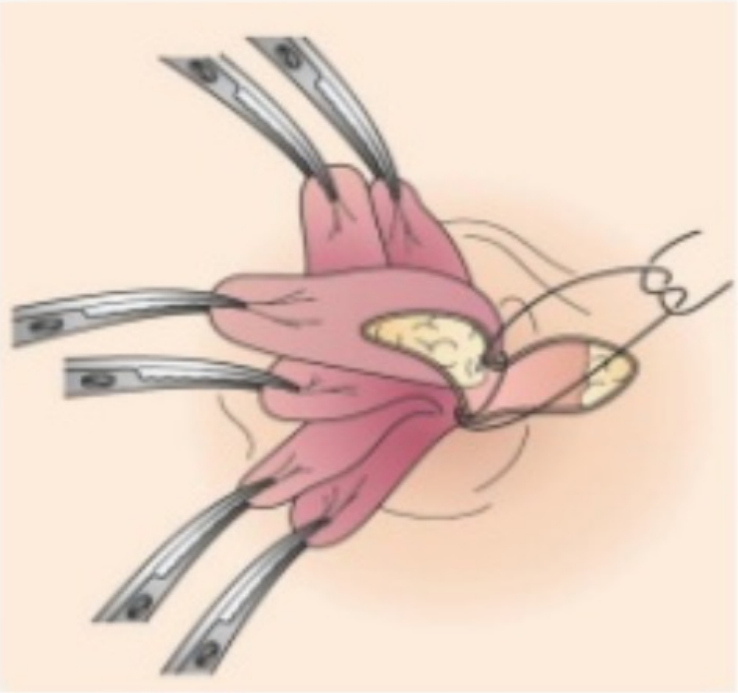
Stapled haemorrhoidopexy

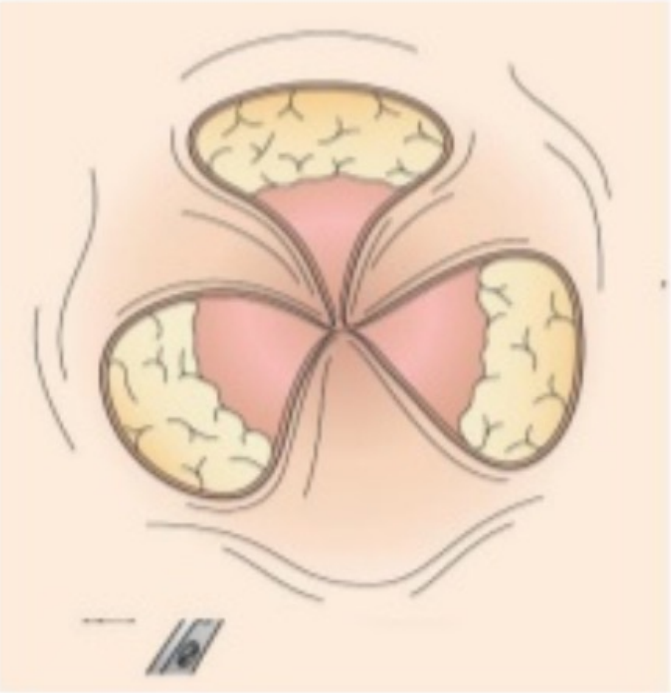




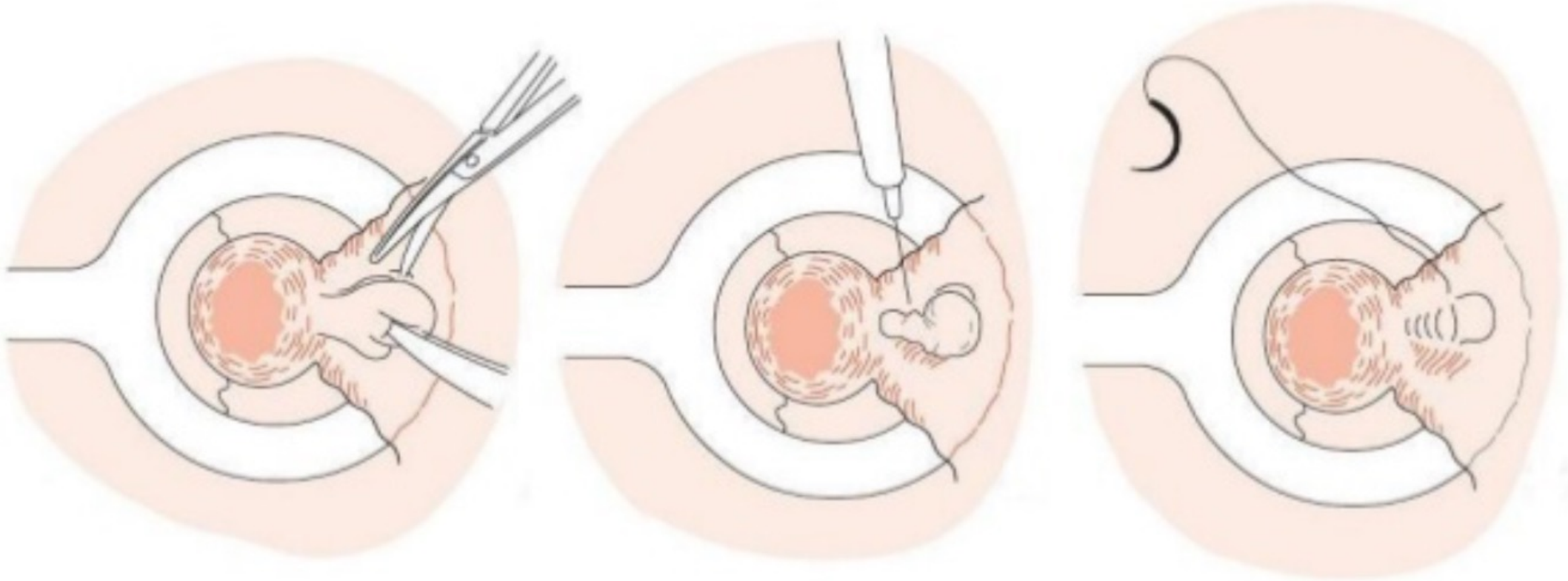
Open haemrrhoidectomy







Closed haemrrhoidectomy



External haemorrhoids

- Thrombosed external haemorrhoid
- Internoexternal haemorrhoid
- Sentinel pile
- Dilatation of the veins at the anal verge

Complications of haemorrihoidectomy

- Pain
- Retention of urine (common)
- Reactionary or secondary haemorrhage.
- Anal stricture
- Anal fissure.
- Recurrence.

Anal Fissure

ANAL FISSURE (FISSURE IN ANO)

- It is an ulcer in the longitudinal axis of the lower anal canal.

- Commonly it occurs in the *midline, posteriorly (more common in males),* but can also occur in the midline anteriorly (more common in females).
- 95% of anal fissures in men are posterior; 5% are anterior. 80% of anal fissures in females are posterior; 20% are anterior. Anterior anal fissure is common in females.
- It is superficial, small but distressing lesion.
- Fissure ends above at the *dentate line*.

Types

- Anal fissure can be *acute or chronic*.

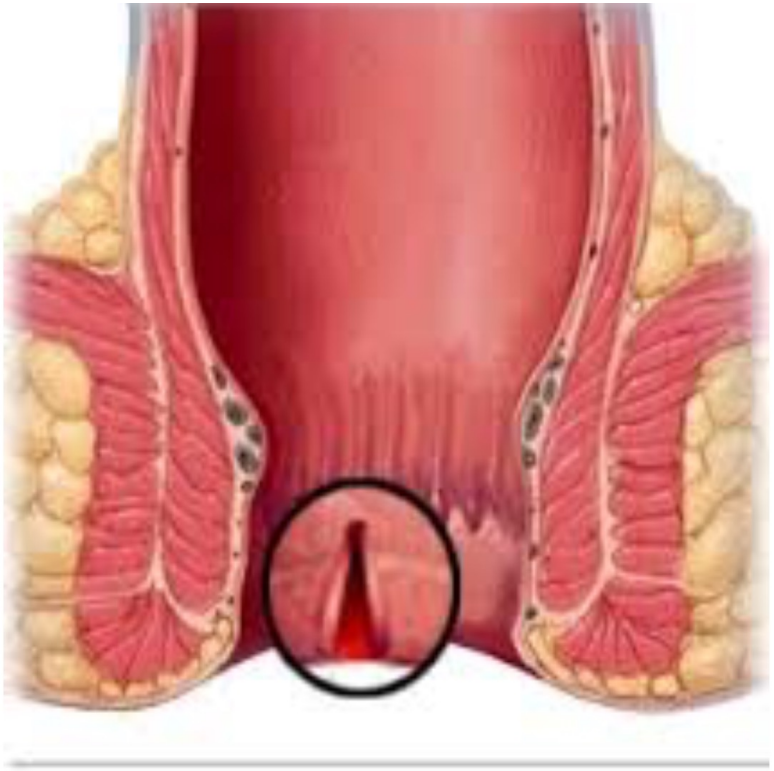
Acute Anal Fissure

- It is a deep tear in the lower anal skin with severe sphincter spasm without oedema or inflammation.
- It presents with *severe pain and constipation*.

Chronic Anal Fissure

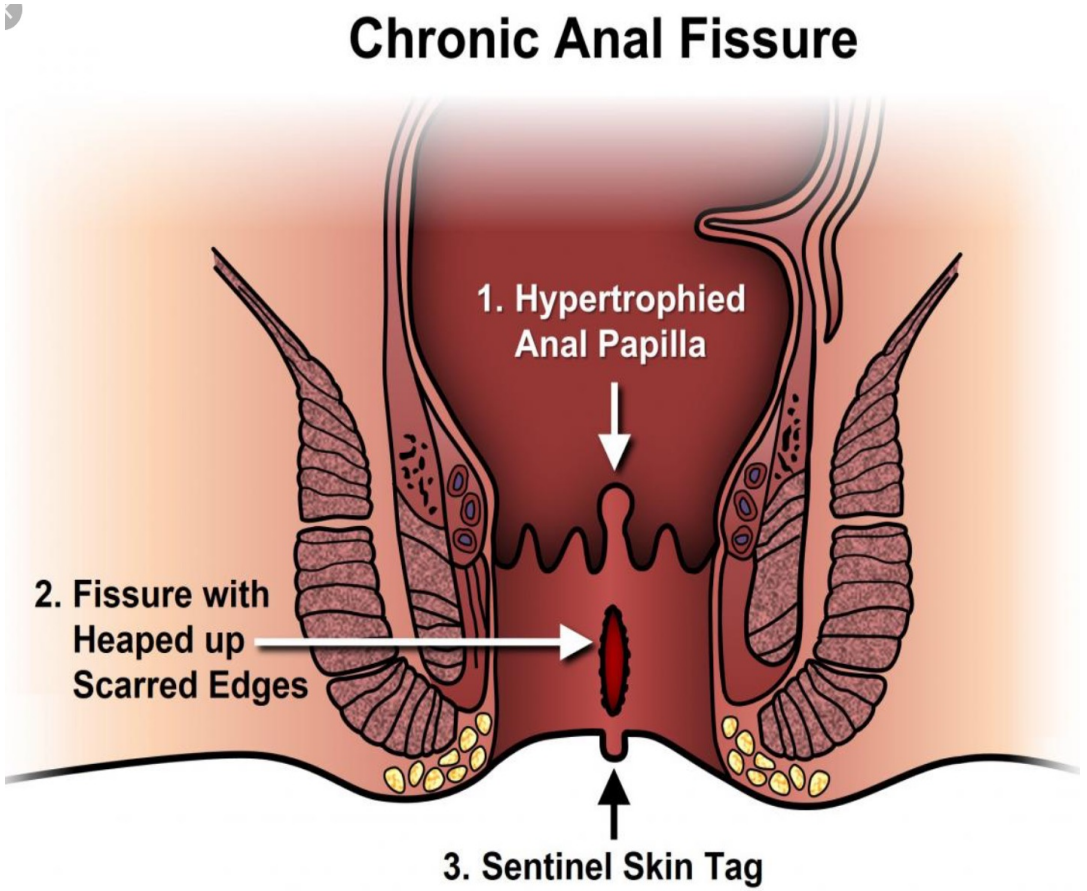
- It has got inflamed, indurated margin with scar tissue,
- Ulcer at its inferior margin is having a skin tag which is oedematous, acts like a guard—*Sentinel pile*.
- Proximally *hypertrophied anal papilla* is observed.
- It can cause repeated infection—fibrosis—abscess formation—fistula formation.
- Chronic fissure is less painful than acute one.

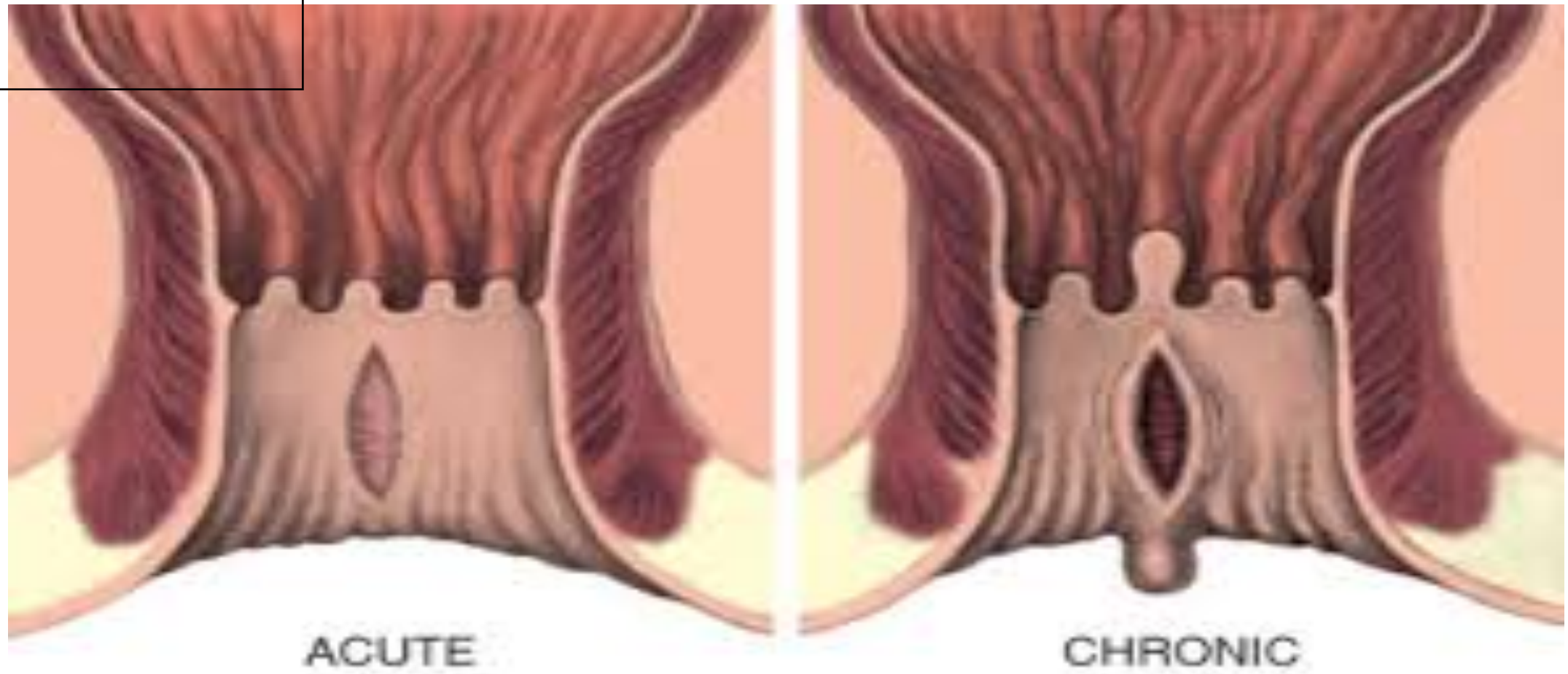
Acute fissure in ano



Anal Fissure

Chronic fissure in ano




ACUTE
CHRONIC

Clinical Features

- Common in middle aged women, not in elderly.
- Pain is severe in nature in acute type, whereas less severe in chronic.
- Constipation, bleeding and discharge.
- P/R examination and proctoscopy is not possible in acute fissure in ano. General anaesthesia is required for examination.
- In chronic fissure, ulcer is felt with button like depression, induration and often sentinel pile.

Etiology

- The exact etiology of anal fissures is unknown, but the initiating factor is thought to be trauma from the passage of a particularly hard or painful bowel movement.
- Low-fiber diets (eg, those lacking in raw fruits and vegetables) are associated with the development of anal fissures.
- Prior anal surgery is a predisposing factor because scarring from the surgery may cause either stenosis or tethering of the anal canal, which makes it more susceptible to trauma from hard stool.

- The most commonly observed abnormalities are hypertonicityand hypertrophy of the internal anal sphincter, leading to elevated anal canal and sphincter resting pressures.
- The posterior anal commissure is the most poorly perfused part of the anal canal. In patients with hypertrophied internal anal sphincters, this delicate blood supply is further compromised, thus rendering the posterior midline of the anal canal relatively ischemic. This relative ischemia is thought to account for why many fissures do not heal spontaneously and may last for several months.

Posterior and anterior anal fissures

Diagnosis of anal fissure

- The diagnosis of anal fissure can usually be made on the basis of findings from a gentle perianal examination with inspection of the anal mucosa, in conjunction with a good history.
- In this case, no diagnostic procedures are required.

- A digital rectal examination (DRE) is painful and often can be deferred.

Treatment

• 1- Conservative treatment

- Initial therapy for an anal fissure is medical in nature, and more than 80% of acute anal fissures resolve without further therapy.
- The goals of treatment are to relieve the constipation and to break the cycle of hard bowel movement, associated pain, and worsening constipation
- First-line medical therapy consists of therapy with stool-bulking agents, such as fiber supplementation and stool softeners. Laxatives are used as needed to maintain regular bowel movements
- Sitz baths after bowel movements and as needed provide significant symptomatic relief because they relieve some of the painful internal sphincter muscle spasm.

- Second-line medical therapy consists of intra-anal application of 0.4% nitroglycerin (NTG; also called glycerol trinitrate) ointment directly to the internal sphincter
- Analogous to the use of NTG intra-anal ointment, nifedipine ointment is also available for use in clinical trials. It is thought to have similar efficacy to NTG ointment but with fewer adverse effects.
- Botulinum toxin (eg, onabotulinumtoxinA [BOTOX®]) has been used to treat acute and chronic anal fissures. It is injected directly into the internal anal sphincter, in effect performing a chemical sphincterotomy. The effect lasts about 3 months, until nerve endings regenerate. This 3-month period may allow acute fissures (and sometimes chronic fissures) to heal and symptoms to resolve.

Treatment

- 2- surgical procedures

➢ Sphincter dilatation :This procedure is a controlled anal stretch or dilatation under general anesthetic. It is performed because one of the causative factors for anal fissure is thought to be a tight internal anal sphincter.

➢ Lateral internal sphincterotomy is the current surgical procedure of choice for anal fissure. The procedure can be performed with the patient under general or spinal anesthesia. The purpose of the operation is to cut the hypertrophied internal sphincter, thereby releasing tension and allowing the fissure to heal