



# Anatomo-Embryologic Basis of Pathogenesis and surgical Treatment of **Haemorrhoids**

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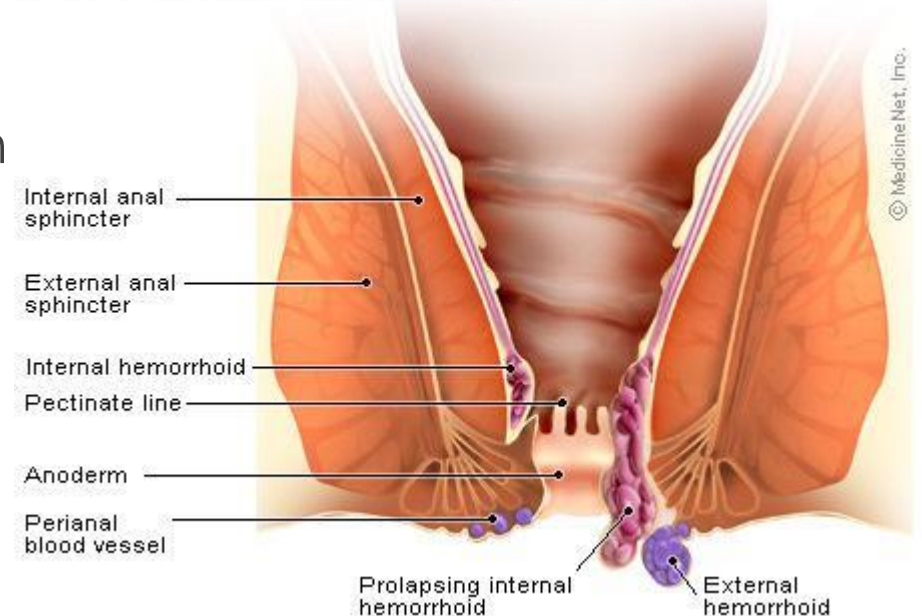
# Anatomical and Embryological backgrounds



- ▶ Hemorrhoids are swollen blood vessels in the lower rectum. They are among the most common causes of anal pathology.
- ▶ Hemorrhoidal venous cushions are **normal structures** of the anorectum and are universally present unless a previous intervention has taken place.
- ▶ Hemorrhoids are not varicosities; they are **clusters of vascular tissue** (eg, arterioles, venules, arteriolar-venular connections), smooth muscle (eg, Treitz muscle), and connective tissue lined by the normal epithelium of the anal canal.

- ▶ Evidence indicates that hemorrhoidal bleeding is arterial and not venous. This evidence is supported by the bright red color and arterial pH of the blood. So it is different from ano-rectal varices.
- ▶ Hemorrhoids are classified by their anatomic origin within the anal canal and by their position relative to the dentate line; thus, they are categorized into internal and external hemorrhoids.

### Formation of hemorrhoids





- ▶ **External hemorrhoids** develop from **ectoderm** and are covered by squamous epithelium, whereas **internal hemorrhoids** are derived from embryonic **endoderm** and lined with the columnar epithelium of anal mucosa.
- ▶ Similarly, external hemorrhoids are innervated by cutaneous nerves that supply the perianal area. These nerves include the pudendal nerve and the sacral plexus. Internal hemorrhoids are not supplied by somatic sensory nerves and therefore **cannot cause pain**.
- ▶ At the level of the dentate line, internal hemorrhoids are anchored to the underlying muscle by the mucosal suspensory ligament.



- ▶ Hemorrhoidal venous cushions are a normal part of the human anorectum and arise from subepithelial connective tissue within the anal canal. Internal hemorrhoids have **3 main cushions**, which are situated in the left lateral, right posterior (most common), and right anterior areas of the anal canal. However, this combination is found in only **19%** of patients; hemorrhoids can be found at any position within the rectum. **Minor tufts** can be found between the major cushions.
- ▶ External hemorrhoidal veins are found circumferentially under the anoderm; they can cause trouble anywhere around the circumference of the anus.



- ▶ Normal hemorrhoidal tissue accounts for approximately **15-20%** of resting anal pressure and provides important **sensory** information, enabling the **differentiation between solid, liquid, and gas.**
- ▶ Venous drainage of hemorrhoidal tissue mirrors embryologic origin. Internal hemorrhoids drain through the superior rectal vein into the portal system. External hemorrhoids drain through the inferior rectal vein into the inferior vena cava. Rich anastomoses exist between these 2 and the middle rectal vein, connecting the portal and systemic circulations.
- ▶ Mixed hemorrhoids are confluent internal and external hemorrhoids.



- ▶ Hemorrhoids are present in healthy individuals. When these vascular cushions produce symptoms, they are referred to as hemorrhoids. Hemorrhoids generally cause symptoms when they become enlarged, inflamed, thrombosed, or prolapsed.

# Etiology



- ▶ Although many patients and clinicians believe that hemorrhoids are caused by chronic constipation, prolonged sitting, and vigorous straining, little evidence to support a causative link exists. Some of these potential etiologies are briefly discussed below.

## 1. Decreased venous return

- ▶ Most authors agree that low-fiber diets cause small-caliber stools, which result in straining during defecation. This increased pressure causes engorgement of the hemorrhoids, possibly by interfering with venous return.





## ► 2- Straining and constipation

Straining and constipation have long been thought of as culprits in the formation of hemorrhoids.

## ► 3- Pregnancy

Pregnancy clearly predisposes women to symptoms from hemorrhoids, although the etiology is unknown. The relationship between pregnancy and hemorrhoids lends credence to hormonal changes or direct pressure as the culprit.



#### ► 4- Portal hypertension and anorectal varices

Portal hypertension has often been mentioned in conjunction with hemorrhoids. However, hemorrhoidal symptoms do not occur more frequently in patients with portal hypertension than in those without it, and massive bleeding from hemorrhoids in these patients is unusual. Bleeding is very often complicated by coagulopathy. Anorectal varices are common in patients with portal hypertension. Varices occur in the midrectum, at connections between the portal system and the middle and inferior rectal veins.



▶ **5- Other risk factors include:**

- ▶ Familial tendency, Higher socioeconomic status, Chronic diarrhea, Colon malignancy, Obesity, Elevated anal resting pressure, Spinal cord injury, Loss of rectal muscle tone, Rectal surgery, Episiotomy, Anal intercourse, Inflammatory bowel disease, including ulcerative colitis, and Crohn disease.

# Pathophysiology of symptoms of internal hemorrhoids



- ▶ Internal hemorrhoids cannot cause cutaneous pain, because they are above the dentate line and are not innervated by cutaneous nerves. However, they can bleed, prolapse, and, as a result of the deposition of an irritant onto the sensitive perianal skin, cause perianal itching and irritation. Internal hemorrhoids can produce perianal pain by prolapsing and causing spasm of the sphincter complex around the hemorrhoids. This spasm results in discomfort while the prolapsed hemorrhoids are exposed. This muscle discomfort is relieved with reduction.



- ▶ Internal hemorrhoids can also cause acute pain when incarcerated and strangulated. Again, the pain is related to the sphincter complex spasm. Strangulation with necrosis may cause more deep discomfort. When these catastrophic events occur, the sphincter spasm often causes concomitant external thrombosis. External thrombosis causes acute cutaneous pain. This constellation of symptoms is referred to as **acute hemorrhoidal crisis** and usually requires emergent treatment.
- ▶ Internal hemorrhoids **most commonly** cause painless bleeding with bowel movements. The covering epithelium is damaged by the hard bowel movement, and the underlying veins bleed.



- ▶ Internal hemorrhoids can deposit mucus onto the perianal tissue with prolapse. This mucus with microscopic stool contents can cause a localized dermatitis, which is called **pruritus ani**. Generally, hemorrhoids are merely the vehicle by which the offending elements reach the perianal tissue. Hemorrhoids are not the primary offenders

# Pathophysiology of symptoms of external hemorrhoids



- ▶ External hemorrhoids cause symptoms in **2 ways**. **First**, acute thrombosis of the underlying external hemorrhoidal vein can occur. Acute thrombosis is usually related to a specific event, such as physical exertion, straining with constipation, a bout of diarrhea, or a change in diet. These are acute, painful events. Pain results from rapid distention of innervated skin by the clot and surrounding edema. The pain lasts 7-14 days and resolves with resolution of the thrombosis. With this resolution, the stretched anoderm persists as excess skin or skin tags. External thromboses occasionally erode the overlying skin and cause bleeding.
- ▶ **Second** cause of pain is the fact that the external hemorrhoids are supplied by cutaneous nerves as discussed before.

# Presentation



- ▶ The most common presentation of hemorrhoids is rectal bleeding, pain, pruritus, or prolapse.
- ▶ Most clinicians use the grading system proposed by Banov et al in 1985, which classifies internal hemorrhoids by their degree of prolapse into the anal canal as follows:
  - A- Grade I hemorrhoids project into the anal canal and often bleed but do not prolapse
  - B- Grade II hemorrhoids may protrude beyond the anal verge with straining or defecating but reduce spontaneously when straining ceases.
  - C- Grade III hemorrhoids protrude spontaneously or with straining and require manual reduction (ie, require manual effort for replacement into the anal canal)
  - D- Grade IV hemorrhoids chronically prolapse and cannot be reduced; these lesions usually contain both internal and external components and may present with acute thrombosis or strangulation



# Management of haemorrhoids



- ▶ Treatment of hemorrhoids is divided by the cause of symptoms, into internal and external treatments. Accurately classifying a patient's symptoms and the relation of the symptoms to internal and external hemorrhoids is important.
- ▶ Treatment guidelines are available from the American Gastroenterological Association, the American Society of Colon and Rectal Surgeons, and the American College of Gastroenterology (ACG).
- ▶ The ACG guidelines recommend that patients with symptomatic hemorrhoids initially be treated with **increased fiber and adequate fluid intake**. The guidelines also recommend that if dietary modifications do not eliminate symptoms in patients with first- to third-degree hemorrhoids, various office procedures, including banding, sclerotherapy, and infrared coagulation, should be considered, **with ligation probably being the most effective treatment**.



- ▶ The ACG further states that patients should be referred for surgery if they are refractory to or unable to tolerate office procedures, if their hemorrhoids are accompanied by large symptomatic external tags, or if they have either fourth-degree or large third-degree hemorrhoids.
- ▶ The following is a quick summary of treatment for **internal hemorrhoids** by grade:
  - A- Grade I hemorrhoids are treated with conservative medical therapy and avoidance of nonsteroidal anti-inflammatory drugs (NSAIDs) and spicy or fatty foods.
  - B- Grade II or III hemorrhoids are initially treated with nonsurgical procedures
  - C- Very symptomatic grade III and grade IV hemorrhoids are best treated with surgical hemorrhoidectomy
  - D- Treatment of grade IV internal hemorrhoids or any incarcerated or gangrenous tissue requires prompt surgical consultation



- ▶ External hemorrhoid symptoms are generally divided into problems with acute thrombosis and hygiene/skin tag complaints. The former respond well to office excision (not enucleation) within 48-72 hours of thrombosis, whereas operative resection is reserved for the latter. Remember that therapy is directed solely at the symptoms, not at aesthetics.
- ▶ When performed well, operative hemorrhoidectomy should have a **2-5%** recurrence rate. Nonoperative techniques, such as rubber band ligation, produce recurrence rates of **30-50% within 5-10 years**. However, these recurrences can usually be addressed with further nonoperative treatments.



## ► Controversies

The major controversies regarding the treatment of hemorrhoids center on the indications for treatment and the choice of operative versus nonoperative therapy. Most experienced surgeons are using office-based nonoperative therapies and are relying less on operative hemorrhoidectomy than they previously were. In the United States, rubber band ligation (compared with injection sclerotherapy) is the mainstay of conservative treatment. Procedure for prolapsing hemorrhoids (PPH), which has been gaining increasing favor in the United States, provides an excellent alternative to operative hemorrhoidectomy for patients with minimal external disease and large internal hemorrhoids



*Thank you*