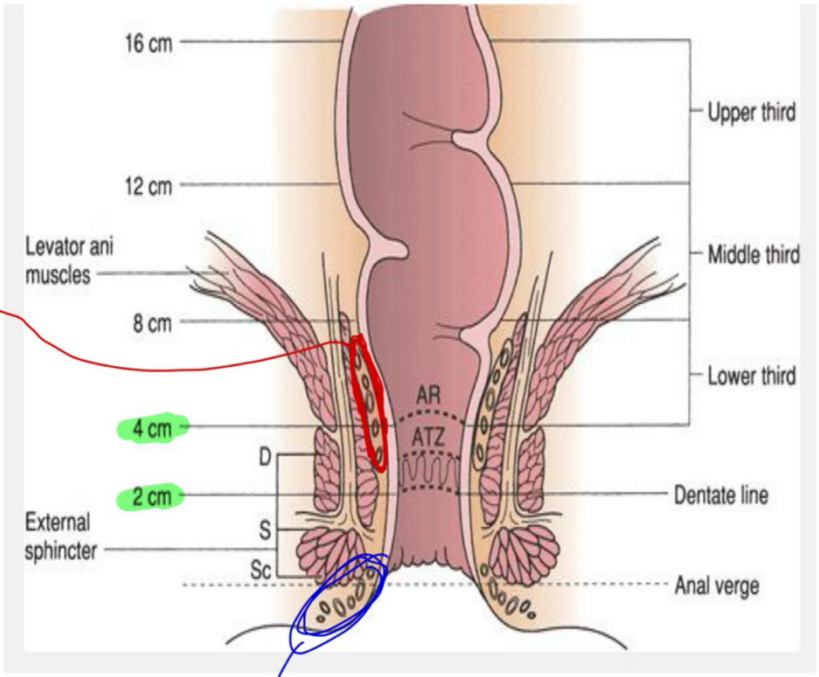
Anatomy of anal canal.

Anal canal surgically extended from **anal verg** to **anal ring (AR)** .

Lower part of anal canal (from dentate line to anal verg) **covered** by **endoderm** and this called **anatomical anal canal**

In red circle is the **internal hemorrhoid plexus** which included in hemorrhoid diseases , it extend from **dentate line** to **anorectal junction** and covered by **columnar type of colonic mucosa .**



External hemorrhoid plexus normally present underneath the endoderm & peri anal skin .

note that above dentate line is columnar epithelium that is innervated by visceral innervation (painless) vs below: squamous innervated by somatic (painful)

General characteristics of hemorrhoids:

- **NOT varicose veins.** They're normal structures present in all humans.
- Called **anal cushions**, made up of:
  - **Erectile blood vessels**
  - **Treitz's muscle** (a smooth muscle helping anchor the cushions)
  - **Elastic connective tissue**
- **Location:** From the dentate line up to the **anorectal ring** in the **submucosa**.
- **Three main cushions** located at:
  - Left lateral (3 o'clock)
  - Right anterolateral (11 o'clock)
  - Right posterolateral (7 o'clock)

  (classic locations of hemorrhoids)

- Blood inside them is **highly oxygenated** and **low-pressure**.(→ so bright red bleeding + minimal)
- **Important differentiation:**
  - Hemorrhoids ≠ rectal varices. → (Anal canal ≠ Rectum)
  - Rectal varices are due to portal hypertension and involve the rectum, not the anal canal.

Occurs in **4.4%** of the general population.
Peak incidence: 45–65 years
Men undergo hemorrhoidectomy **1.3x more** than women.

Etiology and pathogenesis:

- **NOT** more common in people with portal hypertension.
- **Main mechanism:**
  - **Sliding down** of anal cushions due to shearing forces.
  - Loss of support from **Treitz's muscle and elastic fibers** causes prolapse and congestion.
  - **Higher anal resting pressures** seen in affected patients (likely due to internal sphincter involvement).

(→ Shearing forces and RF:)

- Constipation
- Straining
- Diarrhea
- Pregnancy
- Heredity
- Prolonged standing (erect posture)
- Increased intra-abdominal pressure
- Aging (weakens support structures)
- Internal sphincter dysfunction
- No valves in hemorrhoidal sinusoids (so blood can pool)

Function of anal cushions:

1. **Compliant, conformable plug:**
   - Cushions help **seal** the anal canal at rest.
   - They create a soft, adjustable closure — not a rigid one.
   - Removing them (e.g. via hemorrhoidectomy) **reduces continence** to liquids.
2. **Anal resting pressure:**
   - Cushions account for **15–20%** of total resting pressure in the anal canal.
3. **Sensory role — "Anal Sampling":**
   - Help distinguish between **solid, liquid, and gas** so you know when it's safe to pass gas!

Definitions:

- **External skin tags:**
  - These are **flaps or folds of skin** at the anal verge (outer rim of anus).
  - May be leftover from previous inflammation or thrombosed external hemorrhoids.
  - 🔶 **Important:** They are **not hemorrhoids** and occur **independently** of any hemorrhoidal disease.

External hemorrhoids

- Located **below the dentate line**.
- Made up of the **dilated vascular plexus** in this region.
- Covered by **squamous epithelium**, which is richly innervated by somatic nerves → **painful** if thrombosed or inflamed.

Internal hemorrhoids

- Located **above the dentate line**.
- Made up of **submucosal vascular tissue**.
- Covered by **columnar and transitional epithelium → visceral innervation**, so:
    - They are **usually painless**, even if they bleed or prolapse.

Grades:

Grade	Description	Symptoms
Grade 1	Hemorrhoids bulge into the lumen but **do not prolapse** outside.	Painless bleeding, typically during defecation.
Grade 2	Prolapse **during defecation**, but **reduce spontaneously**.	Bleeding + occasional protrusion.
Grade 3	Prolapse **during defecation or spontaneously**, and need **manual reduction**.	Discomfort, frequent prolapse.
Grade 4	**Permanently prolapsed, irreducible** even with manual attempt.	May become strangulated, ulcerated, or thrombosed.

DDX:

- **Rectal mucosal prolapse** → from rectal lining
- **Hypertrophied anal papillae**
- **Rectal polyps** → especially if painless bleeding
- **melanoma**
- **carcinoma**
- **rectal prolapse** → involves all layers
- **Fissure** → pain during defecation

Clinical presentation:

❶ Bleeding MC

- **Bright red**, painless bleeding during or just **after defecation**.
- Often described as:
    - Blood dripping or squirting into the toilet bowl.
    - Seen on toilet paper or surface of stool.
- Rarely massive — though chronic bleeding may lead to **anemia** or **positive stool occult blood test (guaiac-positive)**.

Prolapse
Pruritus → due to mucus leakage
Pain when complicated → like thrombosis or strangulation
Mucous and fecal leakage
Excoriation of the perianal skin → from chronic irritation

Examination:

- **Inspection**; Straining
- **Digital examination**; **SOFT IMPALPABLE**
  → If you feel it, this is not hemorrhoids.
- **Anoscopy**
- **Proctoscopy or flexible sigmoidoscopy**
  → Especially in older patients to exclude neoplasia (not commonly done)
- **Colonoscopy**
  → If bleeding origin is uncertain or >50 or red flags.

Tx:

Degree	Treatment
1st & 2nd	**Medical** (conservative)
Failed 1st & 2nd or mild 3rd	**Office procedures**
3rd & 4th degree	**Surgery**

❶ Medical:

- **Warm Sitz baths** – relieves pain, reduces inflammation.
- **High-fiber diet + bulk-forming agents** – to soften stool and reduce straining.
- **Topical agents** (ointments, creams, suppositories):
  - **Vasoconstrictors**
  - **Protectants** (form barrier)
  - **Astringents** (shrink tissue)
  - **Analgesics, corticosteroids** (reduce pain and inflammation)

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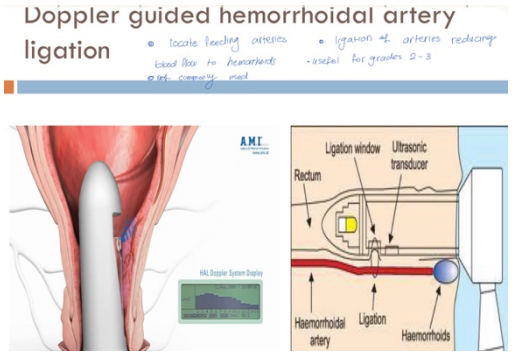
❷ Office procedures:

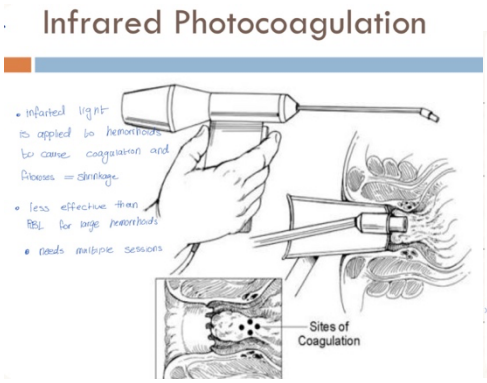
Office procedures

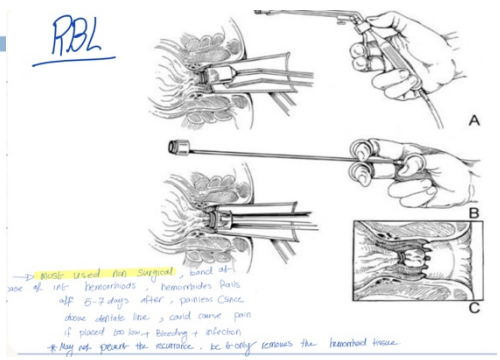
- Rubber band ligation
- Sclerotherapy → fibrosis and obliteration of vessels, less effective than RBL, done for small hemorrhoids
- Cryotherapy??? → Freezes hemorrhoids but not usually used
- Infrared coagulation

Other Operative Procedures

- Doppler guided hemorrhoidal artery ligation
- Anal Stretch; ??? obsolete
  → used previously now not anymore due to complications like fecal incontinence + severe pain.

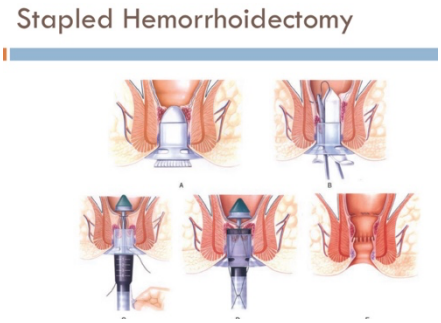






3 Surgery 🌀

Hemorrhoidectomy (For grade 3/4)



❶ Closed hemorrhoidectomy → removed the closed
❷ Open hemorrhoidectomy = Excision and Ligation

→ removed then left open

❸ Laser Hemorrhoidectomy
→ cuts it off not just thrombosis
❹ Stapled hemorrhoidectomy
→ circular stapler removes a ring of mucosa and submucosa from the rectum, this prolapsed hemorrhoids back off then cuts off blood supply, less pain + fast recovery
*** high recurrence rate ***

Complications of grade 4, external hemorrhoids:

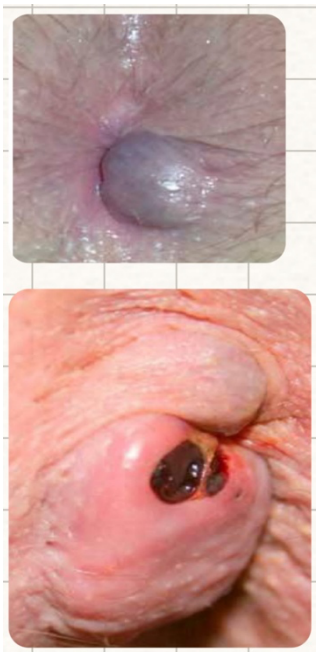
● Thrombosis ● Strangulation ● Ulceration
→ it's tender, swollen, bluish lump

These occur when a **clot forms** in an external hemorrhoid → sudden **painful lump** at the anal verge.

🔶 **Presentation:**

- Sudden **severe pain**, peaks within **48 hours**.
- Tender, swollen **bluish lump** near the anus.
- Pain subsides after a few days; clot resolves on its own over weeks.

🔶 **Complications:**



- Overlying skin can **break down**, leading to:
  - Bleeding
  - Discharge
  - Secondary infection
- May leave behind a **skin tag** after resolution.

🔶 **Management:**

- **If early (within 48 hours):** incision and drainage (I&D) under local anesthesia.
- **If late:** conservative
  - Local anesthetic creams
  - Warm Sitz baths
  - Anti-inflammatory medications

🔴 **Anal fissures:**

🔶 **What is an Anal Fissure?**

- A tear or crack in the **skin of the anal canal**, usually at the **posterior midline**.
    - Extremely painful, especially during and after defecation.

🔶 **Who gets it?**

- Can occur in any age group — including **infants, children, adults, and elderly**.
- **Anterior fissures** are more common in **women**, especially postpartum.
- **Posterior fissures** are more common overall, in **both sexes**.

✔️ **Acute vs Chronic**

✅ **Acute fissure:**

- A fresh tear, usually smooth-edged.
- Symptoms are recent (within days or a few weeks).

✅ **Chronic fissure:**

- Lasts more than **1 month**.
- Shows signs of chronicity:
    1. **Sentinel pile** (skin tag at outer edge)
    2. **Hypertrophied anal papilla** (internal lump at the dentate line)
    3. **Fibrosis** around the edges
    4. **Submucous fistula** (small tract)

criteria of chronic

✴️ **Symptoms**

- **Severe pain** during defecation (described as cutting, tearing, or burning)
- **Pain persists** after defecation for minutes to hours.
- **Bright red bleeding**, often seen as **streaks** on the stool or toilet paper.
- **Constipation** – can be both a cause and a result (fear of pain causes stool withholding).
- **Discharge**
- **Large sentinel pile** if chronic

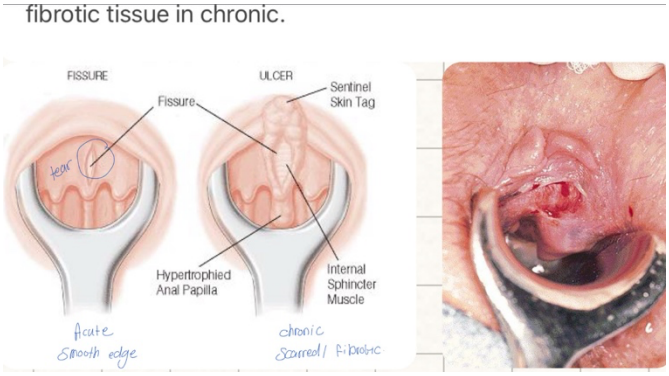
📍 **Location:**

- Most fissures occur at the **posterior midline**.
- Less common anteriorly (more often in women).

👁️ **Gross appearance:**

This slide visually shows the differences — smoother edges in acute vs. scarred and fibrotic tissue in chronic.

✏️ Note: → "some fibrosis"



🧬 **Predisposing Factors:**

🔷 **Primary fissures:**

- Caused by **high resting pressure** in the **internal anal sphincter (IAS)**
  → causes tightness and reduced blood flow → delayed healing.

🔶 **Secondary fissures:**

- Occur with **normal or low pressure**, often due to:
  - Anatomic issues (e.g. postpartum trauma)
  - **Inflammatory bowel disease** (Crohn's, ulcerative colitis)
  - **HIV**
  - **Chronic infections**
  - **Leukemia**

✅ **Tx:**

✅ **Conservative (first line):**

- **High-fiber diet + bulk-forming agents**
- **Warm Sitz baths** (3–4 times daily)
- **Topical treatments**:
  - Local anesthetics for pain
  - Soothing ointments

✅ **Pharmacologic sphincter relaxation:**

- Use if conservative fails.
- Options:
  - **Glyceryl trinitrate (GTN)** ointment
  - **Calcium channel blockers** (e.g. diltiazem cream)
  - **Botulinum toxin injection** into internal sphincter

If conservative/pharmacologic fails, move to surgery:

🔶 **Partial Lateral Internal Sphincterotomy (LIS) – gold standard:**

- Cuts a portion of the **internal anal sphincter** → reduces pressure → improves blood flow and healing.
- High success rate; minimal incontinence risk if done correctly.

🔶 **Other surgical options:**

- **Classic excision** of the fissure
- **V–Y Anoplasty** (advancement flap to cover defect)
- **Controlled intermittent anal dilatation** – rare
- **Finger anal sphincter stretch** – ❌ **obsolete**