Approach to patient with reflux symptoms

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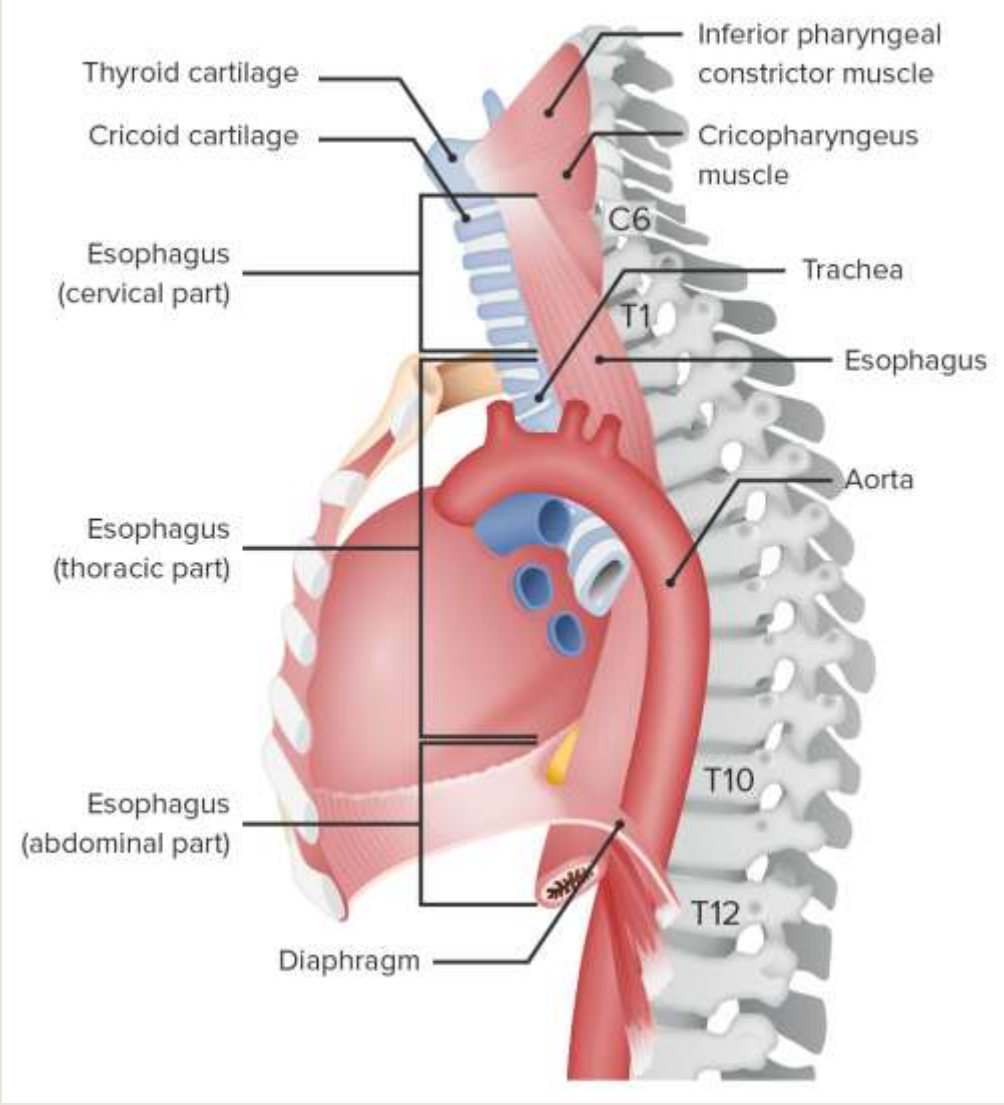
Anatomy:

Esophagus anatomy

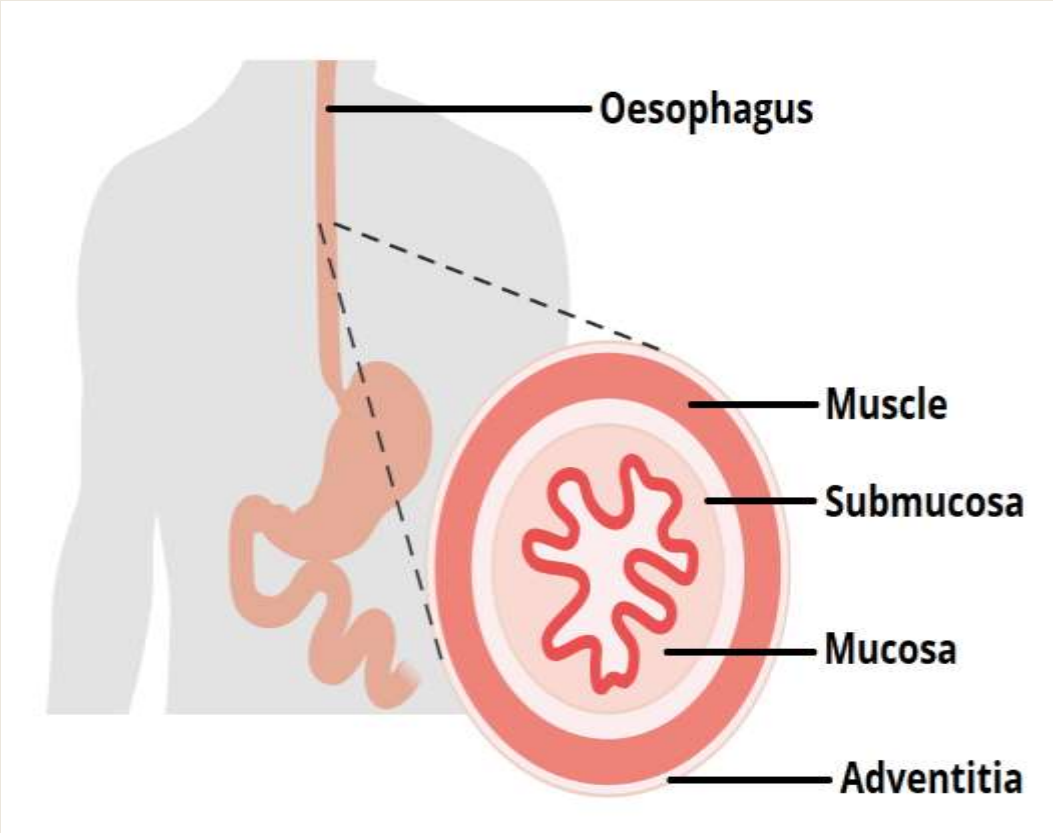
-Esophagus is 18-20 cm long flexible muscular tube
passing between pharynx in the neck and stomach.
-It begins at inferior border of cricoid cartilage Opposite C6 vertebrae, and ends at the cardiac opening of
Of Stomach opposite T11 vertebrae.
-It crosses the diaphragm at level of T10 vertebrae.



Histology:

1-Adventitia – outer layer of connective tissue.
The very distal and intraperitoneal portion of the esophagus has an outer covering of serosa, instead of adventitia.

2-Muscular layer of esophagus is composed of :
- External layer of longitudinal muscle and inner layer of circular muscle
Food is transported through the esophagus by peristalsis.



The wall of the Esophagus divided into three parts depending on the muscle type :

1- upper third: Striated muscles.

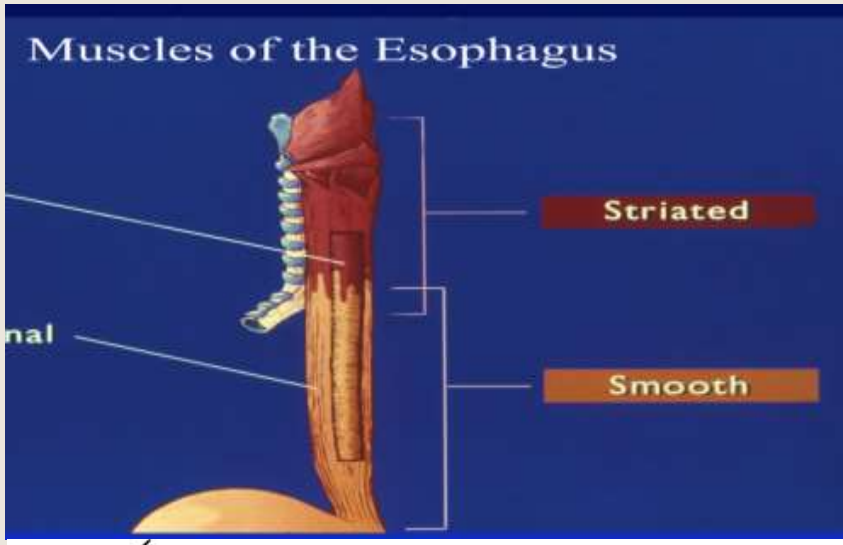
2- middle third: mixed striated and smooth muscles.

3- lower third : smooth muscles.

And It has two muscular rings “sphincters” in its wall :

one at the top (Upper esophageal sphincter).

and one at the bottom (Lower esophageal sphincter).

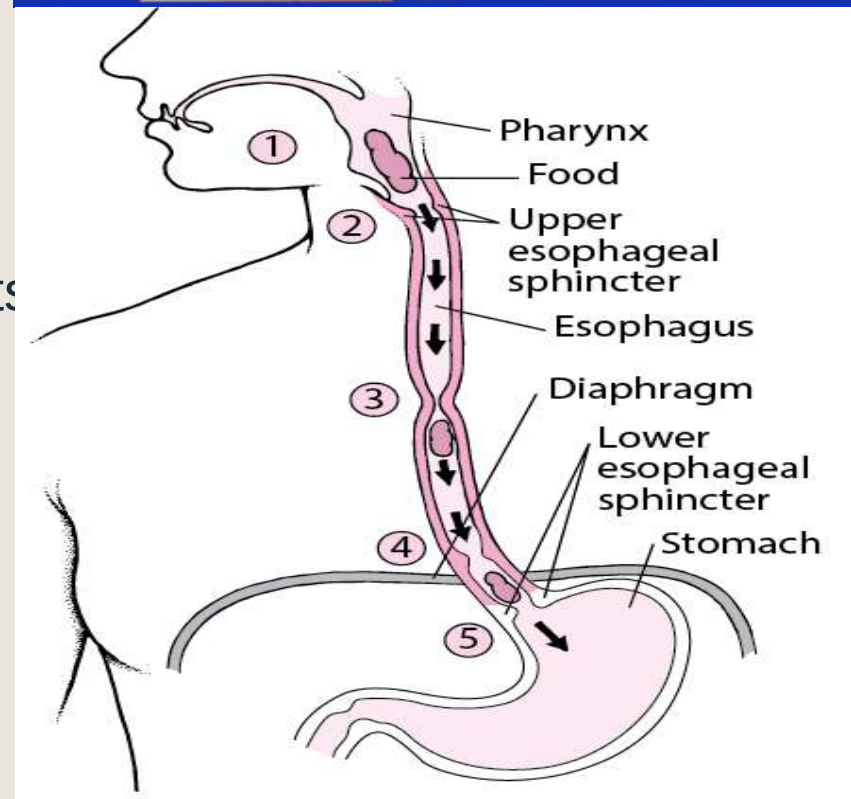


A) The muscles of the UES are under conscious control, used when breathing eating, belching, and vomiting.

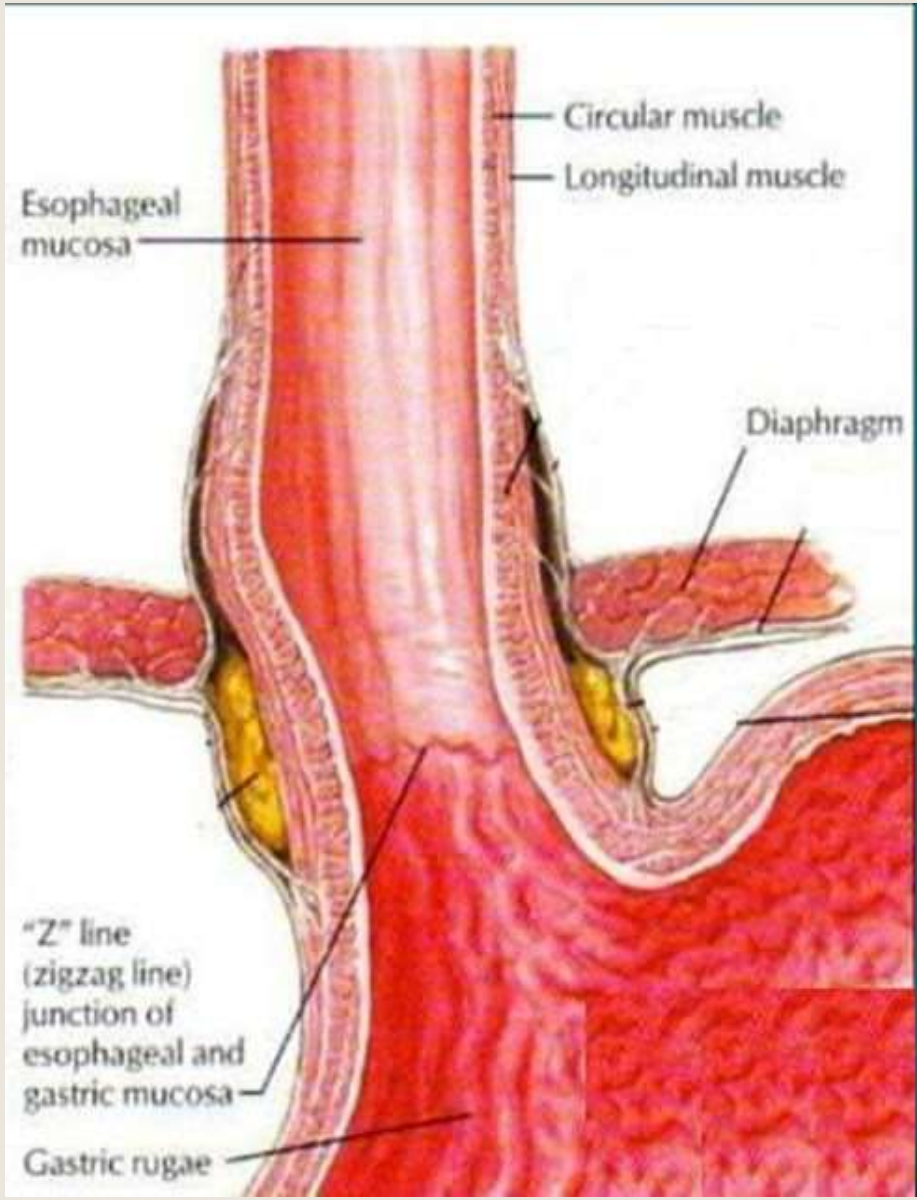
they keep food and secretions from going down the windpipe.

B) The muscles of the LES are under unconscious control,

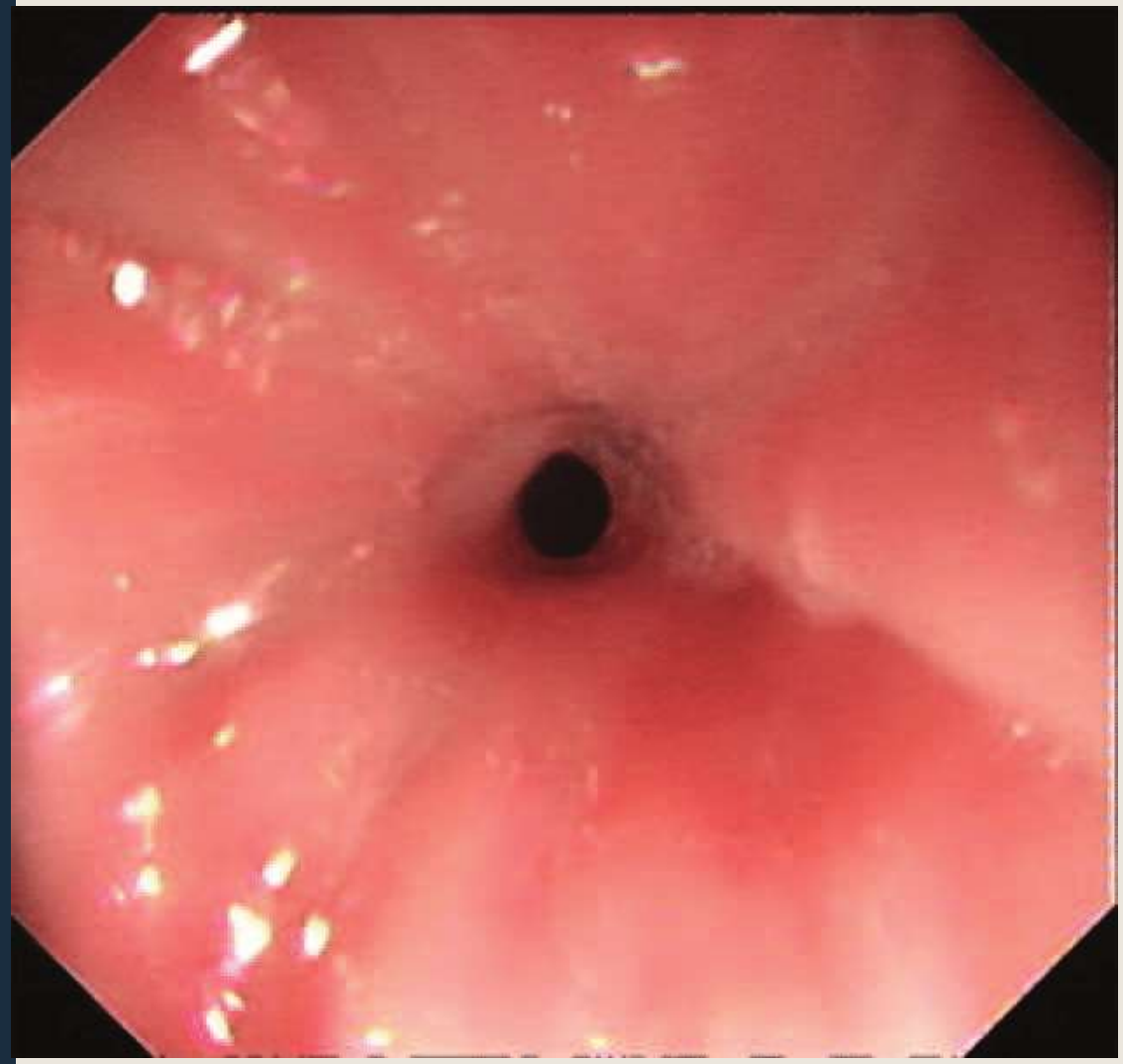
When the LES is closed, it prevents acid and stomach contents from traveling backwards from the stomach.



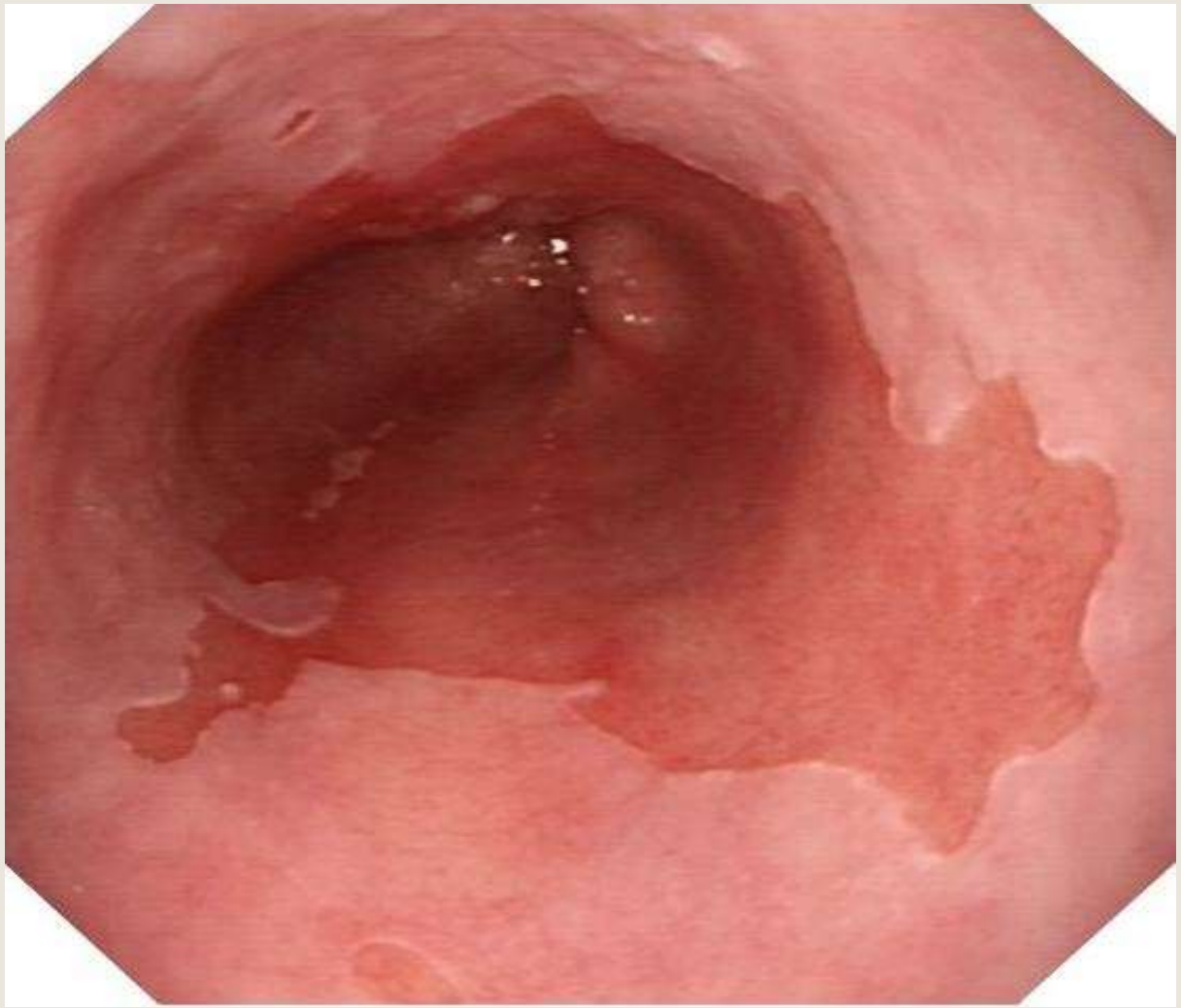
3-The submucosa: contains blood vessels, nerves, and glands.
4-Mucosa : Lined by non-keratinized stratified squamous epithelium until Zigzag line which represents Gastroesophageal junction also known as squamocolumnar junction.
The mucous coat :
Pink, smooth , protective esophageal mucosa
Then becomes red mamillated secretory gastric mucosa across zigzag line.
Higher Zigzag line indicates Barret's esophagus, which is a precancerous condition and increases esophageal cancer risk.



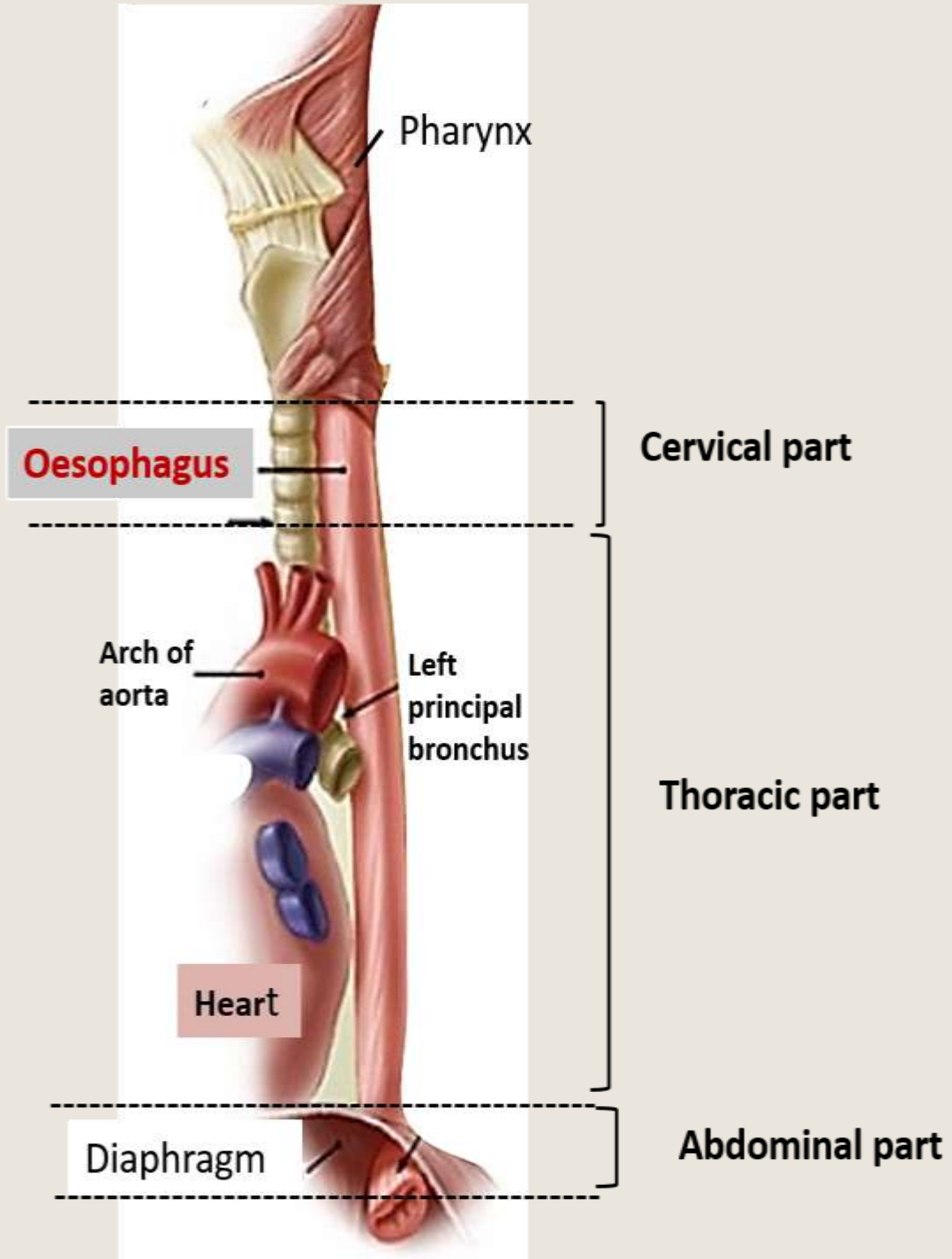
Normal



Barrett’s esophagus



Esophagus anatomical parts:

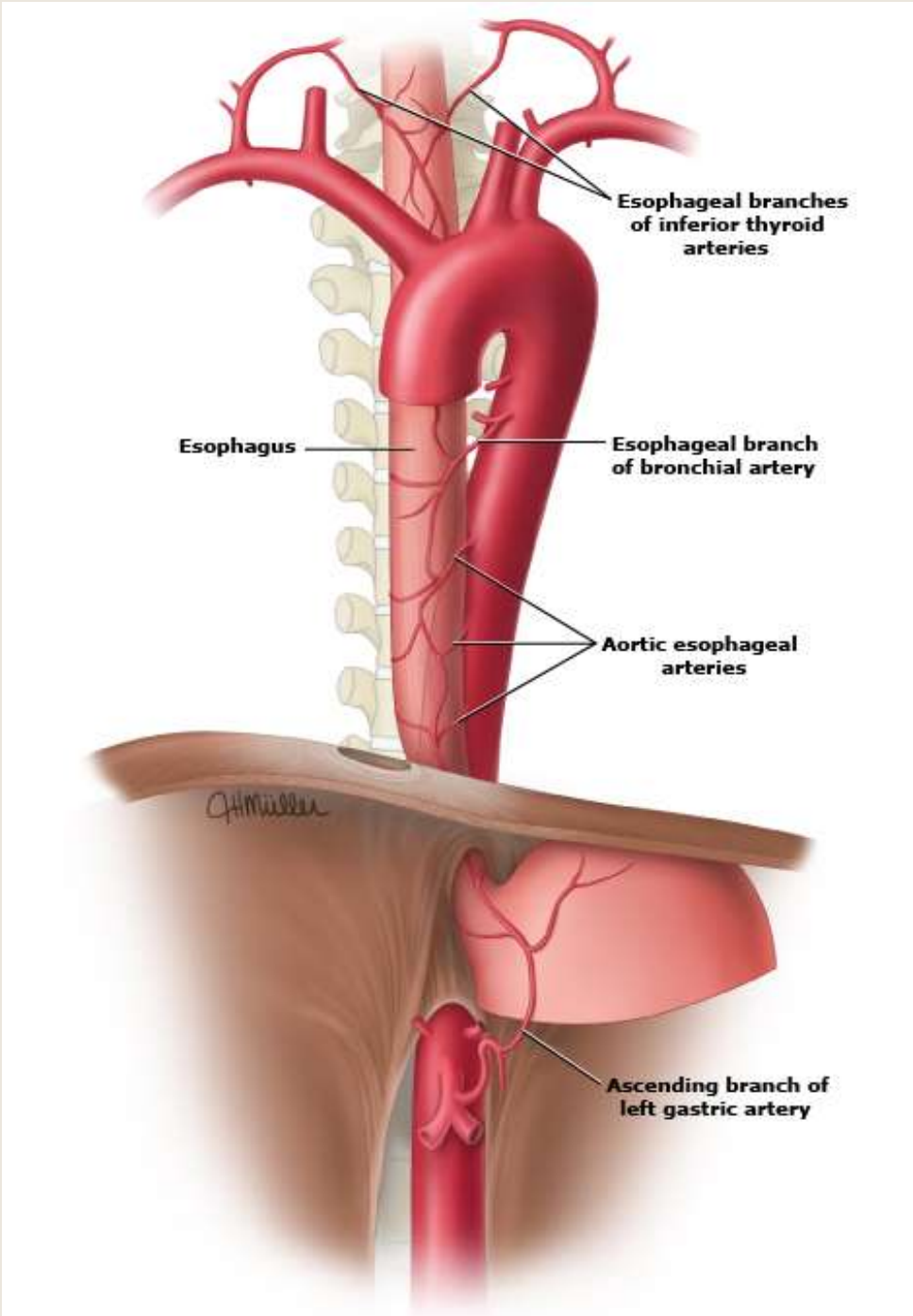


Blood supply :

1- cervical part: by branches from inferior thyroid artery .

2-thoracic part: by branches from bronchial arteries and branches directly from thoracic aorta.

3-abdominal part and LES : by branches from left gastric artery and left inferior phrenic artery.

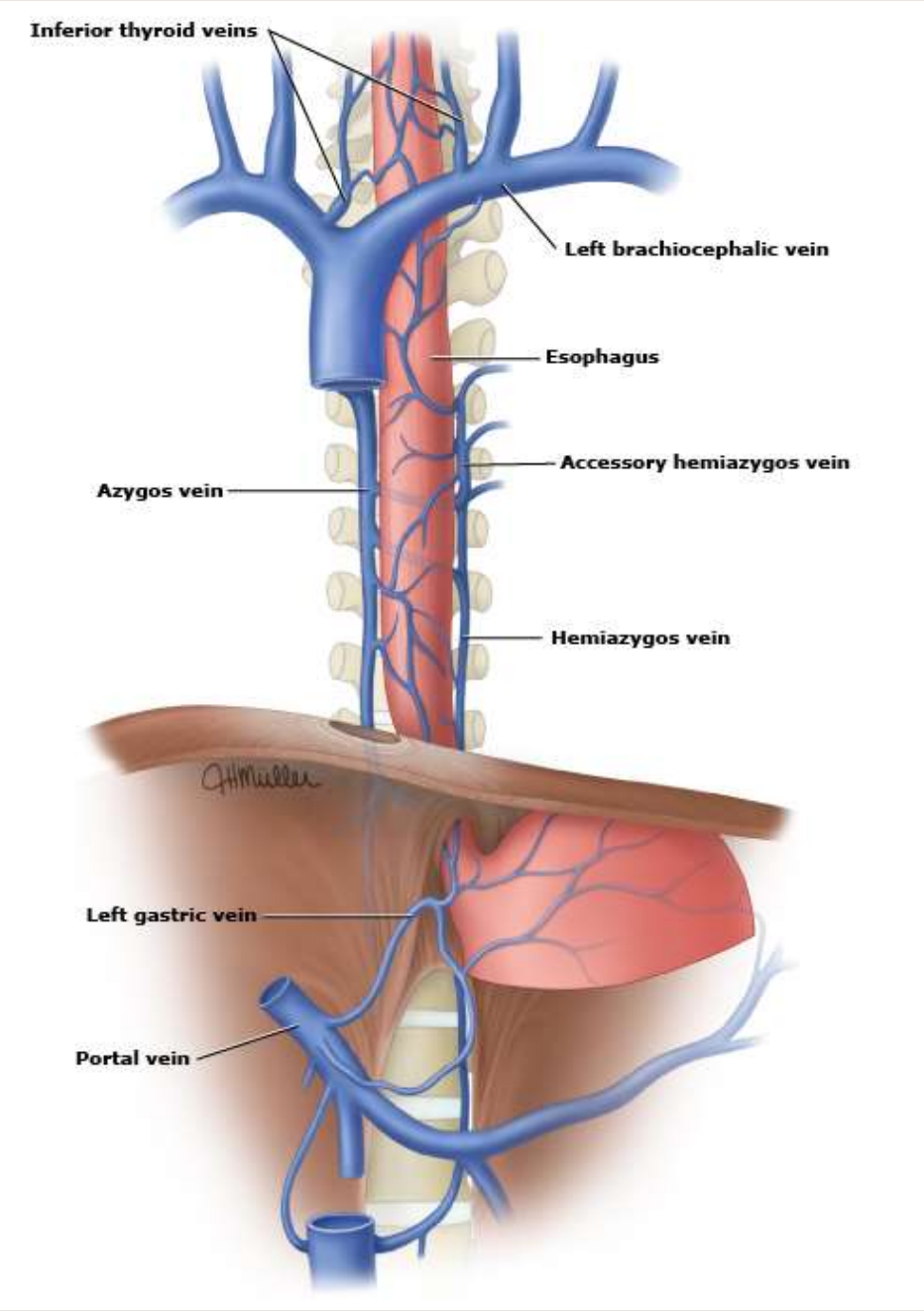


Venous drainage

I. Cervical: Inferior thyroid vein.

II. Thoracic: Azygous vein, Hemiazygous vein.

III. Abdominal: Left gastric vein & Azygous vein.



Lymphatic drainage:

The lymphatic drainage of the esophagus is divided into thirds:

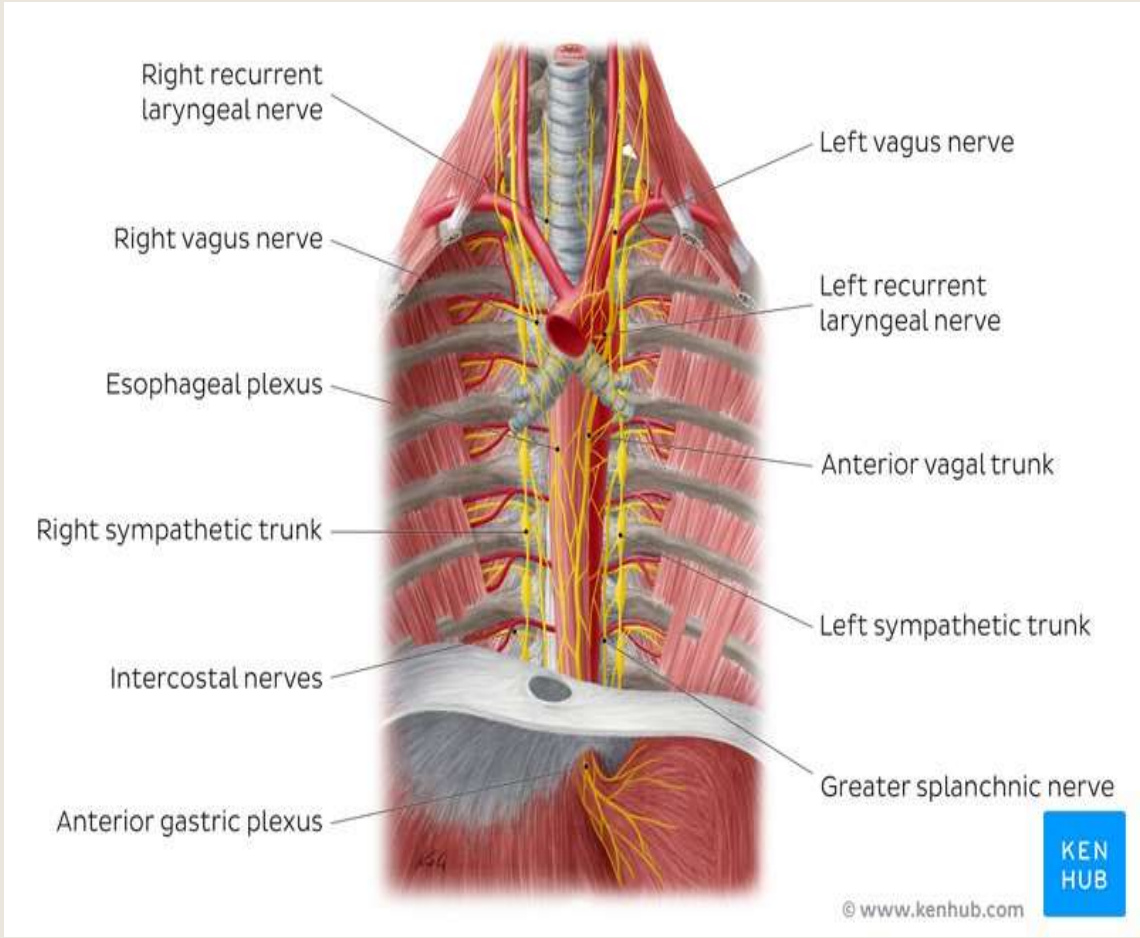
-Superior third – deep cervical lymph nodes.

-Middle third – superior and posterior mediastinal nodes.

- Lower third – left gastric and celiac nodes.

Nerve supply :

The esophagus is innervated by the esophageal plexus, which is formed by a combination of:
A)Parasympathetic vagal trunks
B)Sympathetic fibers from the cervical and thoracic sympathetic trunks.

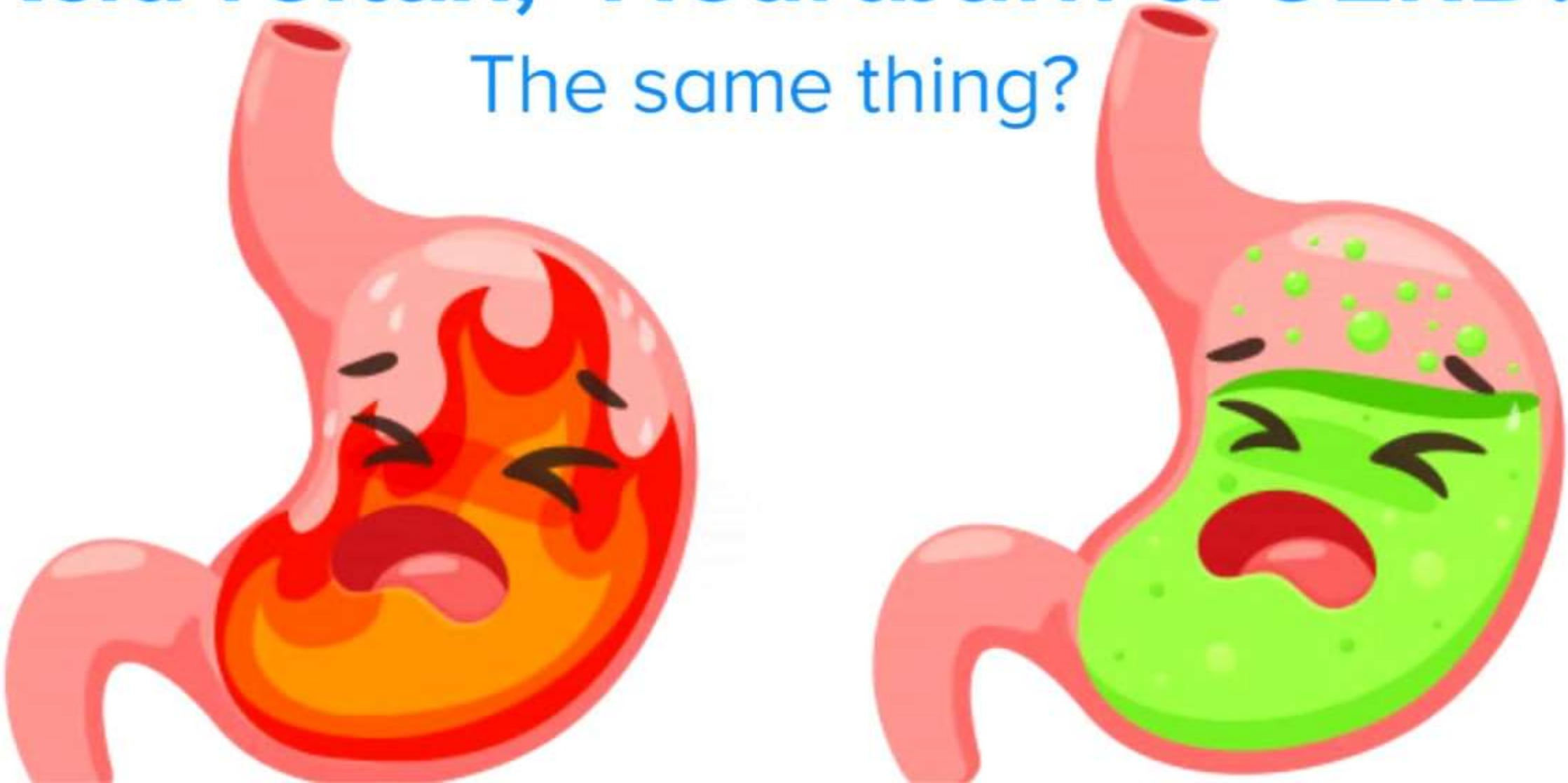


Gastroesophageal reflux disease (GERD)

Doctors' Circle

Acid reflux, Heartburn & GERD:

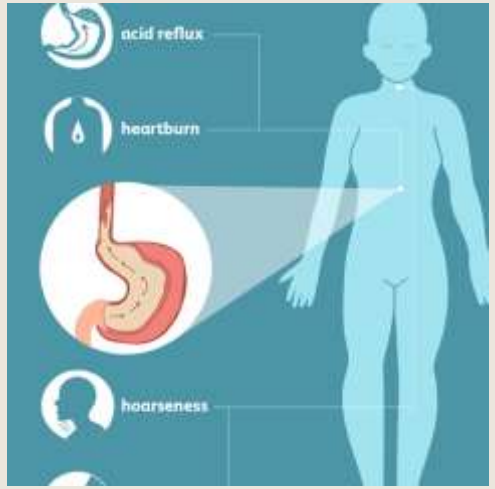
The same thing?



Gastroesophageal reflux disease (GERD)

- **Gastroesophageal reflux**: regurgitation of stomach contents into the esophagus, can also occur in healthy individuals, e.g., after consuming greasy foods or wine.
- **Gastroesophageal reflux disease (GERD):** A condition in which reflux causes symptoms (typically including heartburn or regurgitation) and/or esophageal injury/complications.
- **Heartburn**: burning feeling in the chest caused by stomach acid travelling up towards the throat (acid reflux).
- The most common endoscopic finding associated with esophageal mucosal injury is reflux esophagitis .

Types of GERD

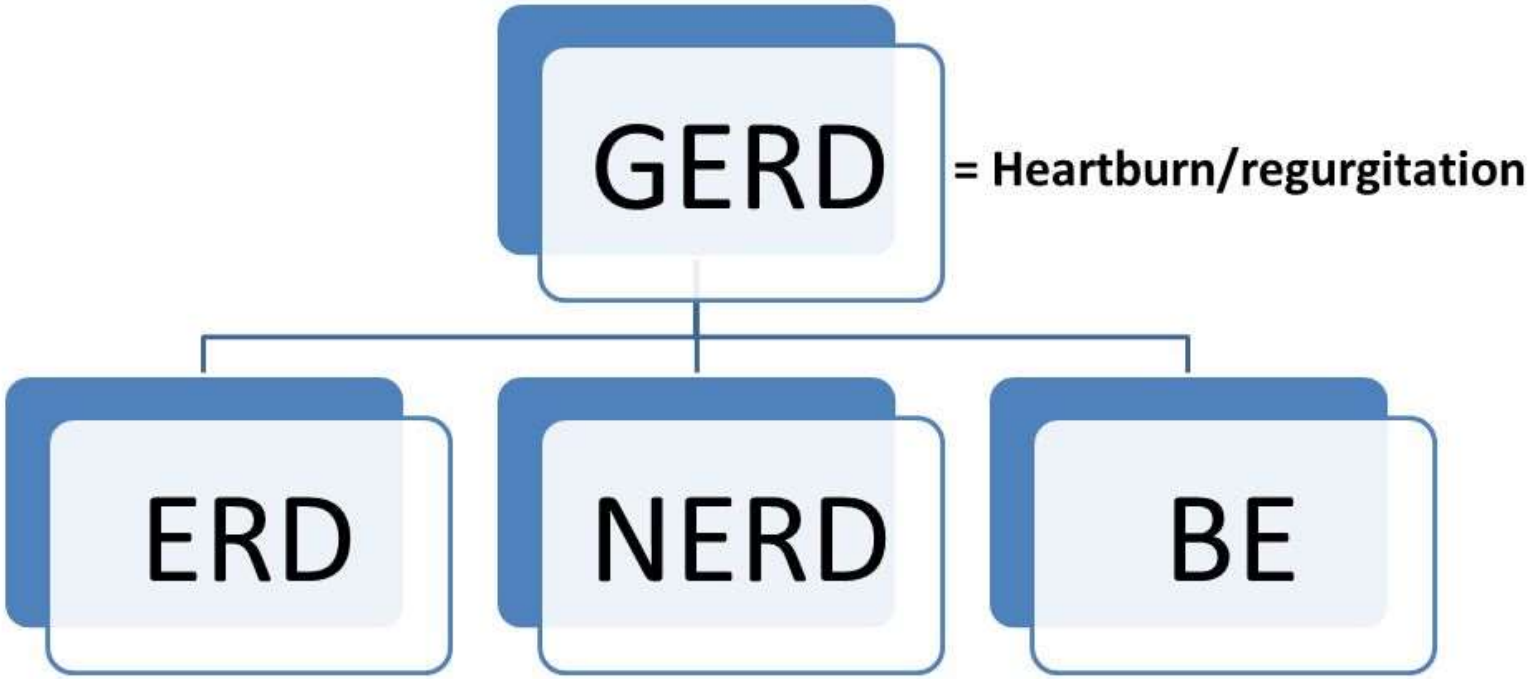


GERD has 3 subtypes:

1- NERD (non-erosive reflux disease): characteristic symptoms of gastroesophageal reflux disease in the absence of esophageal injury on endoscopy (50–70% of GERD patients)

2- ERD (erosive reflux disease): gastroesophageal reflux with evidence of esophageal injury on endoscopy (30–50% of GERD patients)

3- Barret's esophagus: Endoscopic and histologic evidence of intestinal metaplasia/dysplasia



- **Erosive reflux disease (ERD)**: Erosions in the distal esophagus
- **Non-erosive reflux disease (NERD)**: Normal esophagus and abnormal pH
- **Barrett's esophagus**: Endoscopic and histologic evidence of intestinal metaplasia/dysplasia

Epidemiology

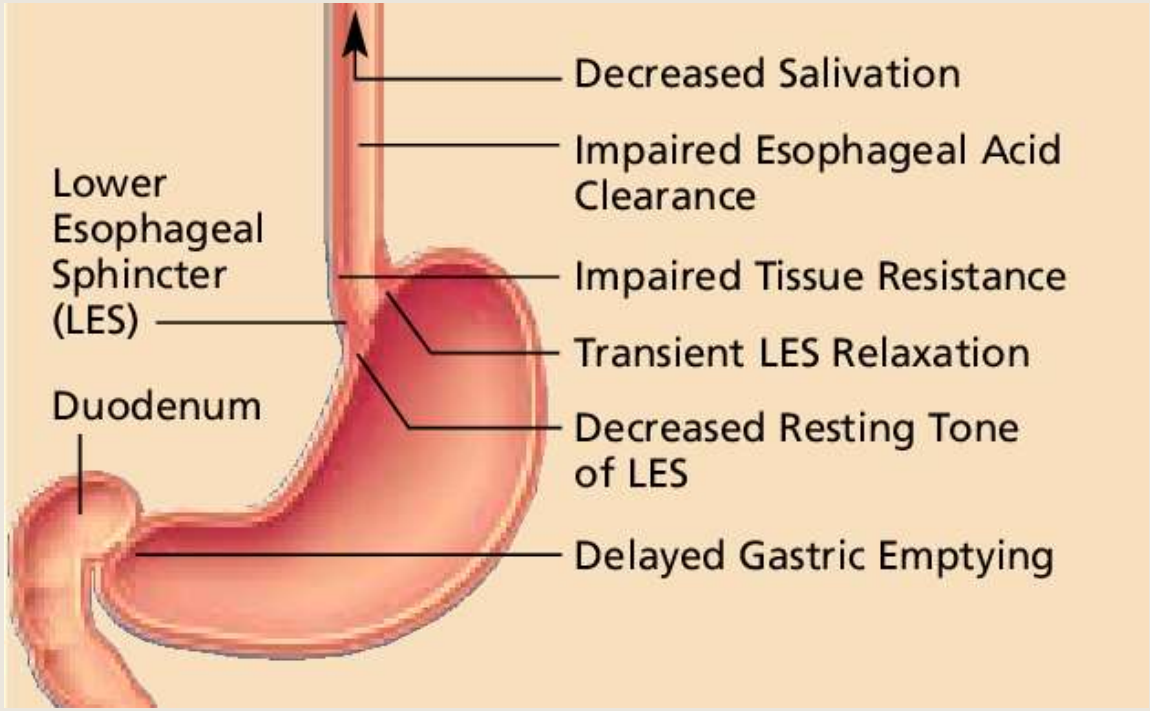
Prevalence: The global pooled prevalence of GERD was ~14% and varied greatly according to region (increases with age).
Sex: ♀ = ♂

In western societies, GERD is the most common condition affecting the upper GI tract. This is partly due to the declining incidence of peptic ulcer as the incidence of infection with Helicobacter pylori has reduced as a result of improved socioeconomic conditions, along with a rising incidence of GERD in the last 30 years.

The cause of the increase is unclear, but may be due in part to increasing obesity

Incidence	Region
High	North America
	Australia/Oceania
	Northern Europe
Medium	Western Asia
	Southern Asia
	South America
Low	Eastern Asia
	Southern Europe
Insufficient data	Africa

GERD varies greatly according to region


Decreased Salivation
Impaired Esophageal Acid Clearance
Lower Esophageal Sphincter (LES)
Impaired Tissue Resistance
Transient LES Relaxation
Duodenum
Decreased Resting Tone of LES
Delayed Gastric Emptying

Etiology

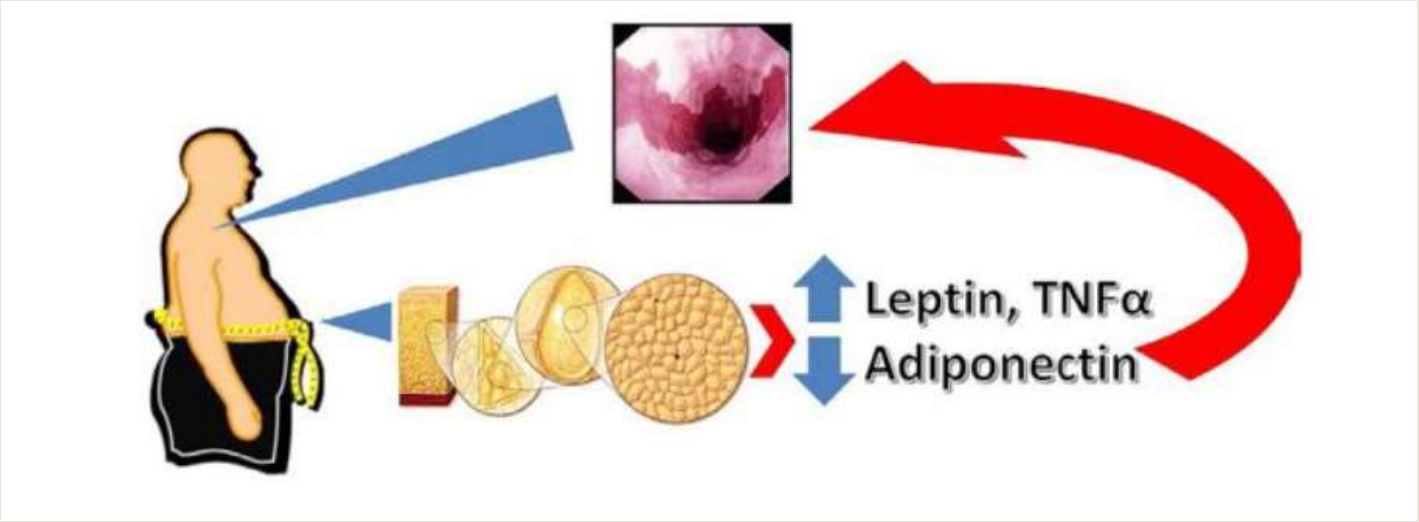
Mechanisms

1. Impaired lower esophageal sphincter (LES) resting tone
2. Transient LES relaxations (TLESR)
3. Impaired esophageal acid clearance
4. Delayed gastric emptying (gastroparesis)
5. Disruption in anatomical barrier (hiatal hernia)
6. Impaired mucosal resistance
7. Pyloric incompetence (Biliary Dudeno-gastric reflux)

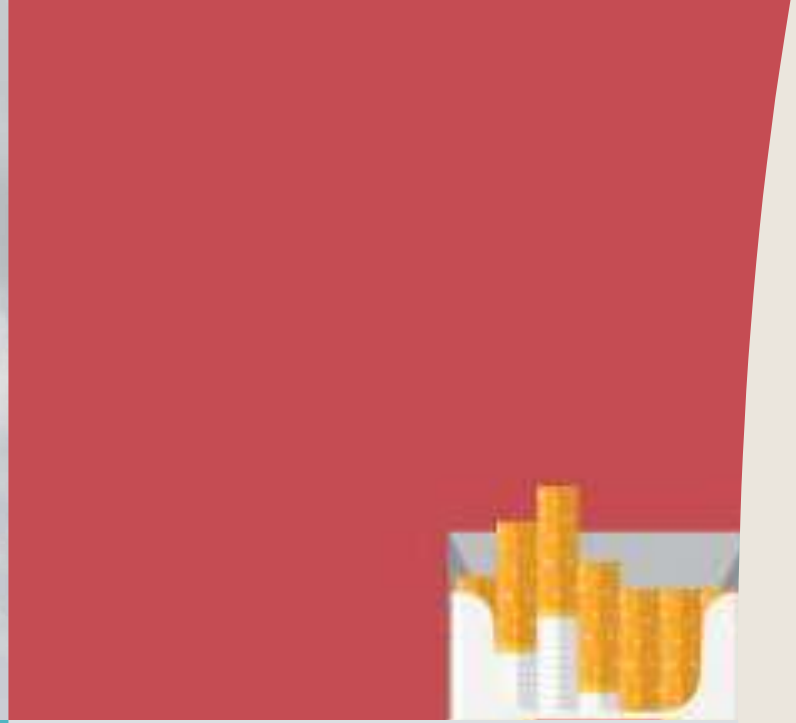
Risk factors

- Scleroderma
- Zollinger-Ellison syndrome
- Visceroptosis or Glenard syndrome

Obesity



Fatty and heavy foods

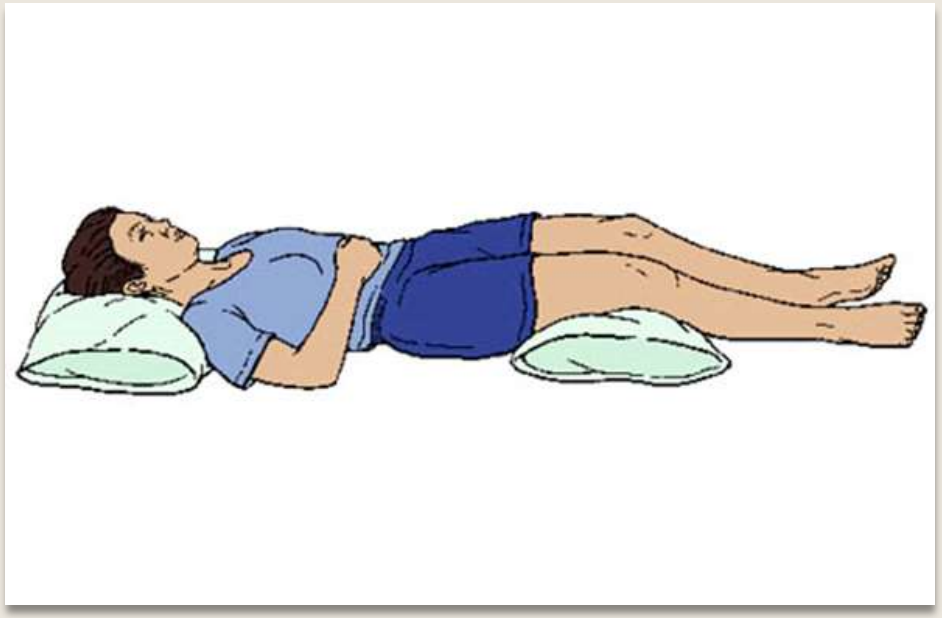


Smoking

Tight- fitting clothes

Caffeine

Pregnancy



Lying down after eating

Hypercalcemia

Increased calcium ➔ increased gastrin ➔ increased gastric acidity

Medications

Anticholinergics

Oral contraceptives

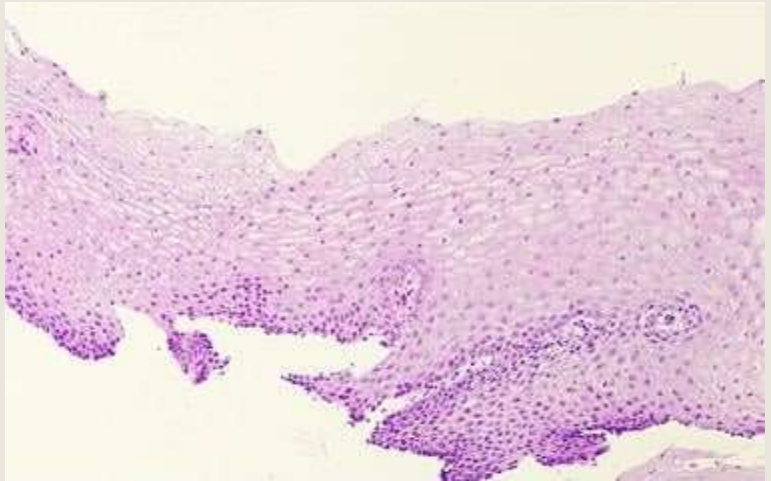
Calcium channel blockers, statins, angiotensin-converting enzyme (ACE) inhibitors and nitrates

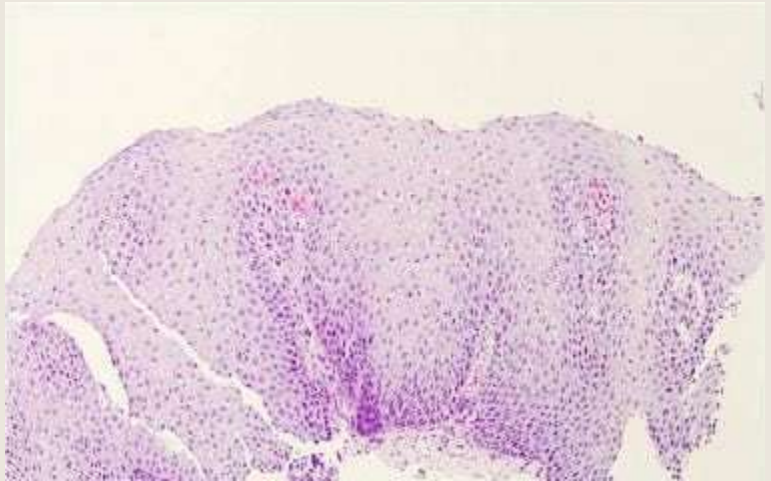
Complications

Reflux esophagitis

Reflux esophagitis is an esophageal mucosal injury that occurs secondary to (GERD). Typically, the reflux disease involves the distal 8-10 cm of the esophagus and the gastroesophageal junction. The disease is patchy in distribution.

The morphologic features of reflux esophagitis in the distal esophagus are variable and nonspecific, and they include basal cell hyperplasia, elongation of vascular papillae, intercellular edema, presence of intraepithelial eosinophils, intraepithelial lymphocytosis, ballooning degeneration of squamous cells and ulceration/erosions. The histologic features include multilayered epithelium and inflammation of gastric cardiac mucosa (carditis).



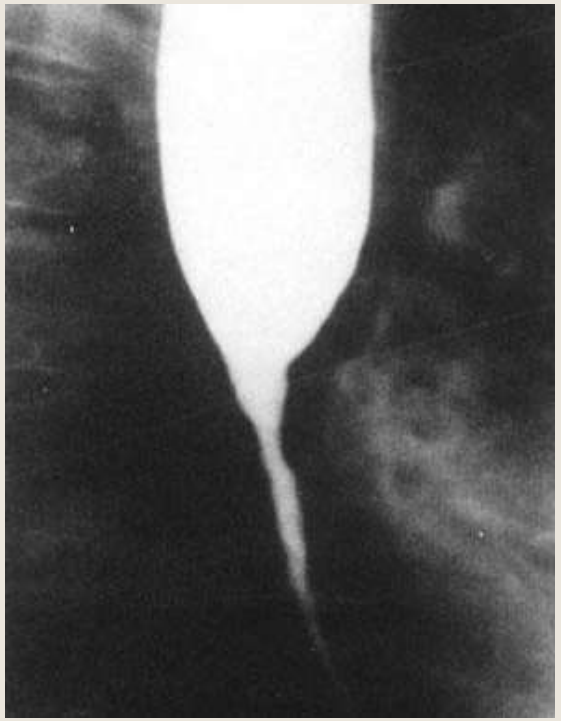


Strictures

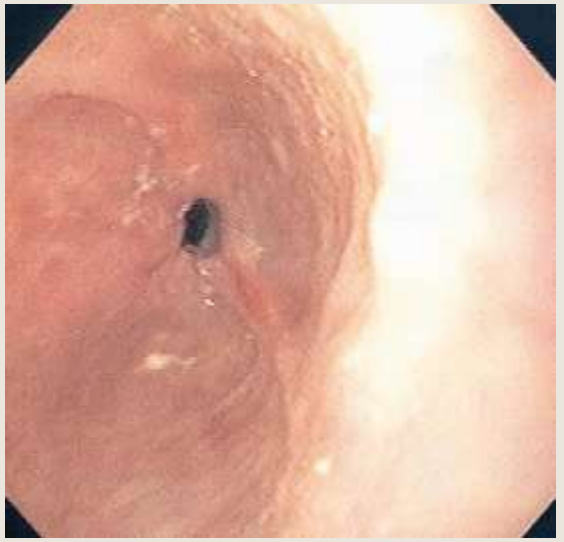
■**narrowing** of the esophageal lumen.

■Strictures are usually associated with structurally defective sphincter and loss of esophageal motility.

■The most common cause of an esophageal stricture is long-standing gastroesophageal reflux disease (GERD), where stomach acid backs up from the stomach into the esophagus and causes esophageal inflammation, which can lead to scarring and narrowing over time.



■Causes Dysphagia: ➢ Constant, slowly progressive. ➢ For solids then liquids



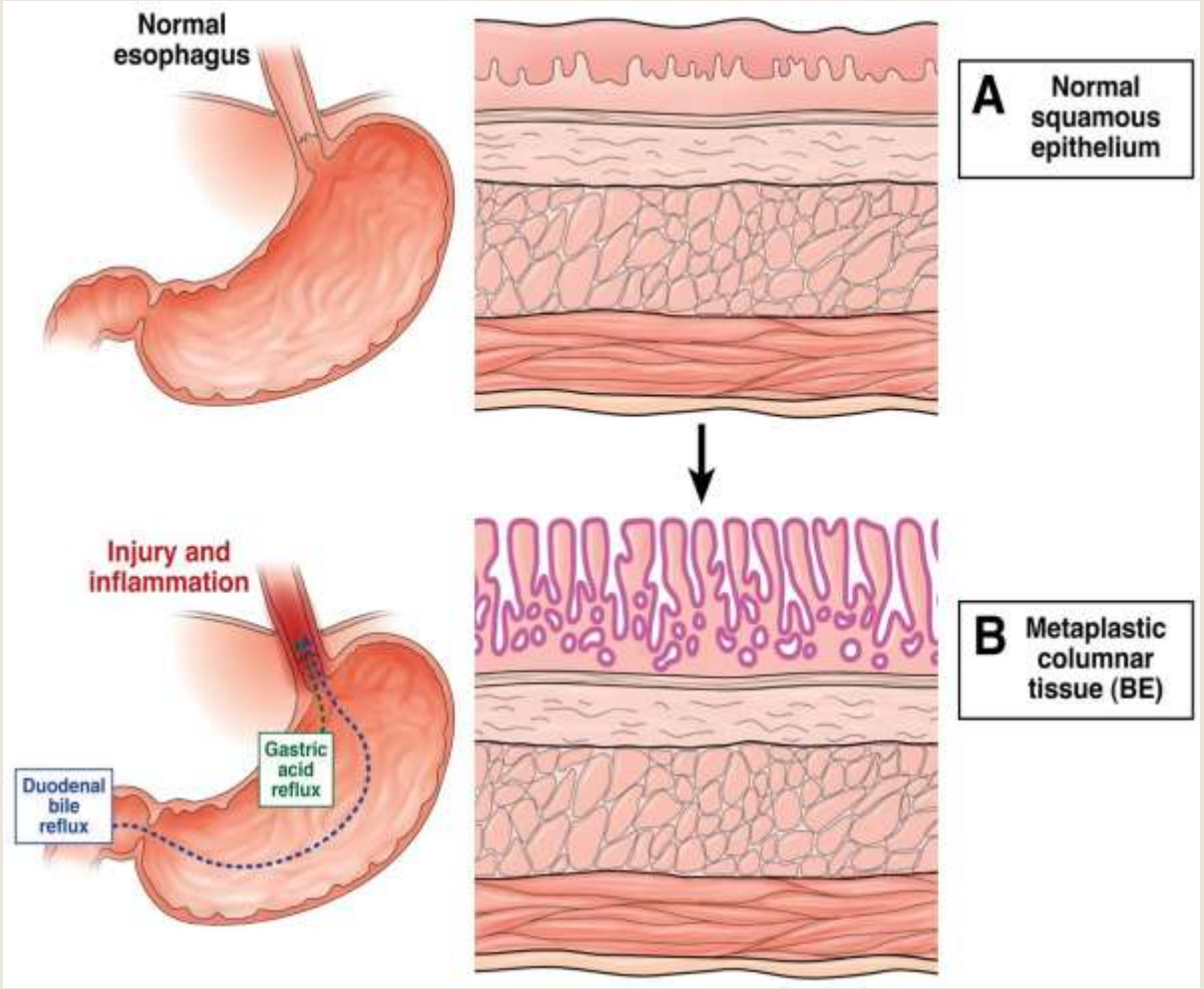
■ **Evaluation:**

Rule out malignancy and rule out drug induced strictures.

Absence of esophagitis above a stricture suggests a drug induced injury or a neoplasm as a cause for the stricture.

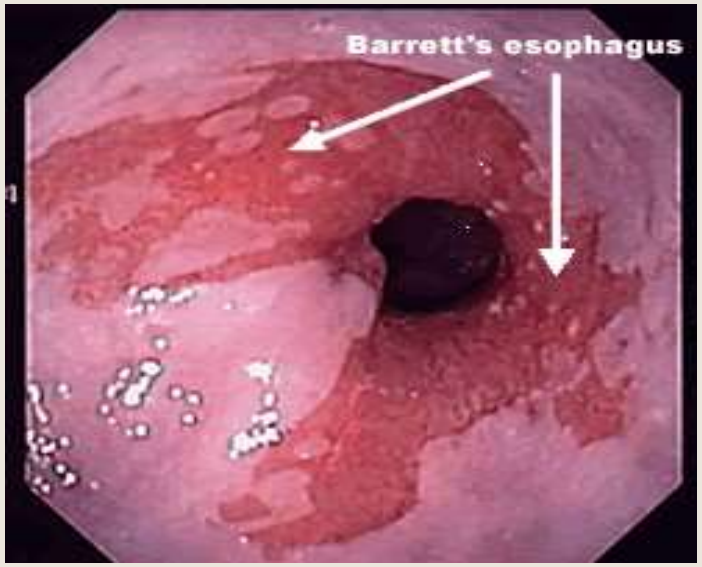
smooth stricture in the mid esophagus

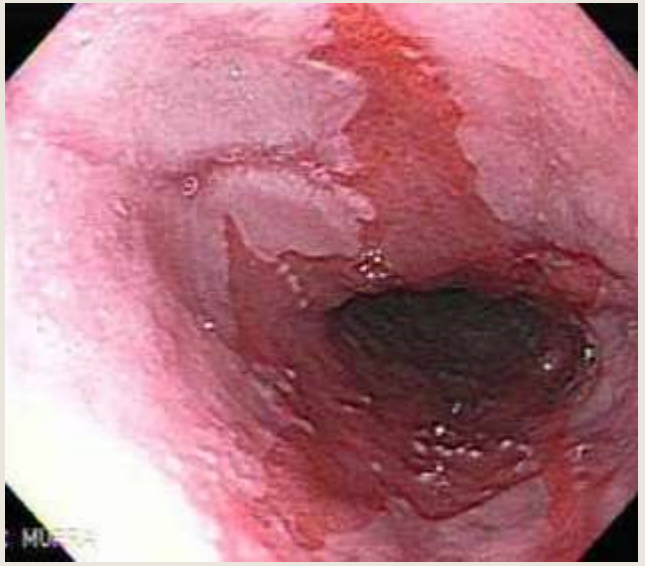
Barrett's esophagus



Barrett’s esophagus

Barrett's esophagus is the condition in which a metaplastic columnar epithelium that has both gastric and intestinal features **replaces** the stratified squamous epithelium that normally lines the distal esophagus. The condition develops as a consequence of chronic gastroesophageal reflux disease (GERD) and **predisposes** to the development **of adenocarcinoma of the esophagus.**





Clinical features

GERD usually presents with the typical symptoms of :

- Retrosternal and epigastric burning sensation (heartburn)
- Regurgitation

Other atypical symptoms :

- dysphagia, hypersalivation, globus sensation, nausea, odynophagia, chest pain
- extraesophageal symptoms (eg, chronic cough, hoarseness, wheezing).

- are mostly brought on after meals and when the patient is lying supine

GERD-related chest pain	Ischemic cardiac pain
Burning, exacerbated by lying down	Crushing or heaviness or gripping
Rarely radiates to the arms	Radiates to the neck and left arm
Worse with fatty foods or alcohol	Worse with exersion
Relieved spontaneously by antacids	Accompanied by dyspnea and sweating

Diagnosis

Is based on:

- ❑ Clinical History and Invasive testing
- ➢ Patient's presentation with typical GERD symptoms(heartburn,regurgitation) , is often sufficient enough to consider GERD as an initial diagnosis
- ➢ We can then start an Empiric trial of proton pump inhibitors (PPI)
- If the patient doesn't respond to PPI or presents with atypical or alarm symptoms then further investigations are required to confirm GERD or rule out other causes!
- ➢ **The alarm features are** :

● New onset of dyspepsia in patient ≥60 years
●Evidence of gastrointestinal bleeding (hematemesis, melena, hematochezia, occult blood in stool)
●Iron deficiency anemia
●Anorexia
●Unexplained weight loss
●Dysphagia
●Odynophagia
●Persistent vomiting
●Family history of Barret's esophagus or adenocarcinoma

Diagnostic testing for GERD

- Upper GI endoscopy
- 24H-Esophageal pH monitoring
- Barium esophagogram
- Esophageal manometry

Upper GI endoscopy

•upper endoscopy can detect esophageal manifestations of GERD (eg, Barrett's esophagus, erosive esophagitis) and can rule out an upper gastrointestinal tract malignancy.

• **Indications for endoscopy:**

•**1-Alarm symptoms:** dysphagia (stricture), odynophagia(esophagitis) gastrointestinal bleeding , anemia, weight loss, chest pain .

•**2- Empiric therapy failure.**

•**3- Preoperative evaluation.**

•**4- Detection of Barrett's esophagus in high risk patients** (obese ,long-standing GERD,family history,smoking etc..)

Supportive findings of GERD on **endoscopy**

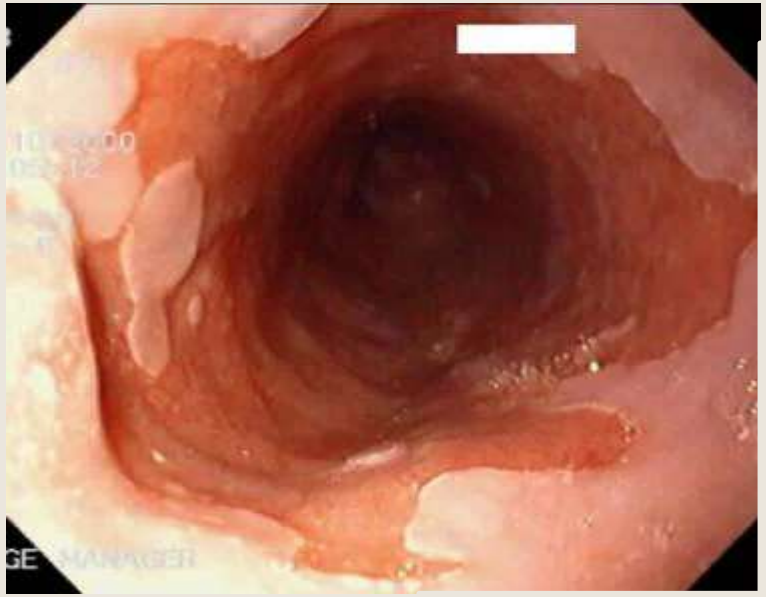
Erythema, edema, erosions, mucosal breaks, ulcerations.

Salmon pink mucosa (suggestive of Barrett's esophagus).

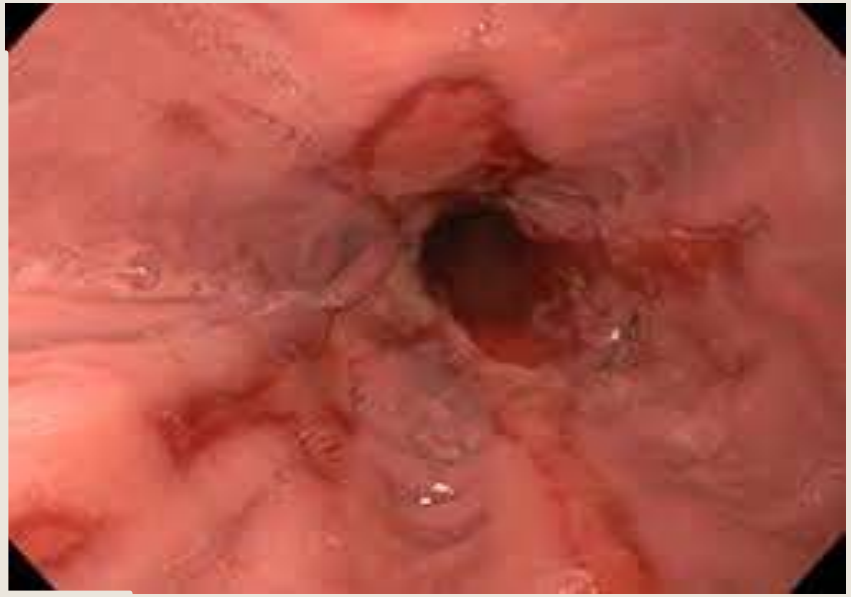
Peptic strictures and rings.

Proximal migration of the gastroesophageal junction (Z-line), e.g. in hiatal hernia.

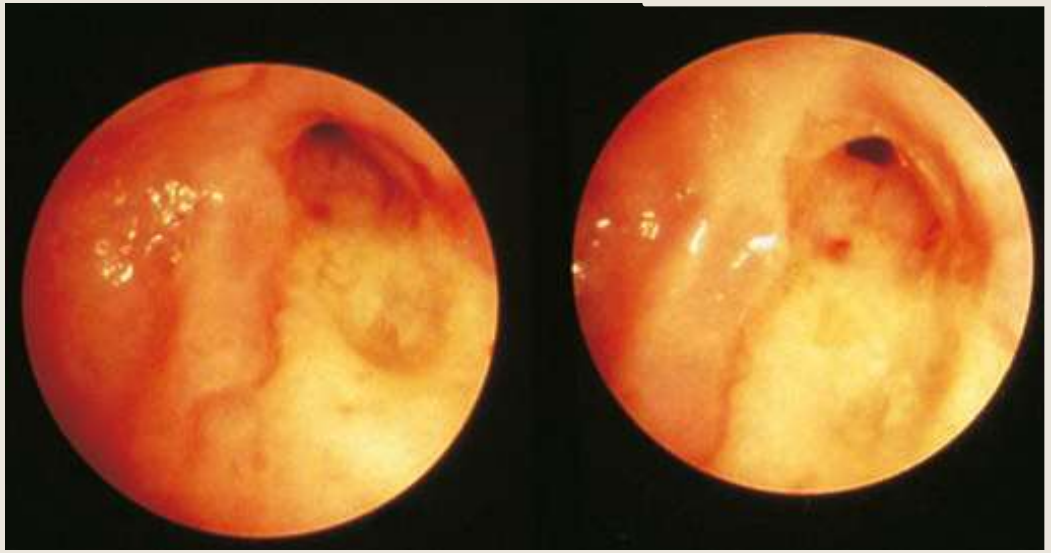
- most patients with typical symptoms of GERD will have no endoscopic evidence , normal endoscopy does not refute the diagnosis but rules out other etiologies!



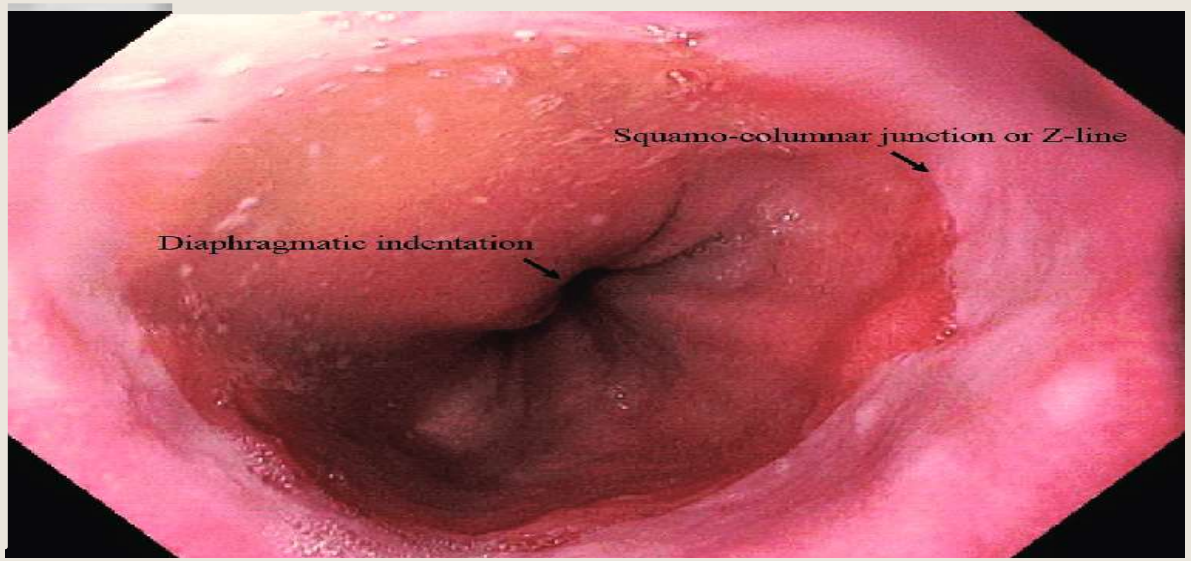
Barret’s esophagus



Reflux Esophagitis



Peptic stricture with ulceration



Sliding hiatal hernia

24H-esophageal PH monitoring

❖ *This is the gold standard definitive test for confirmation of GERD*

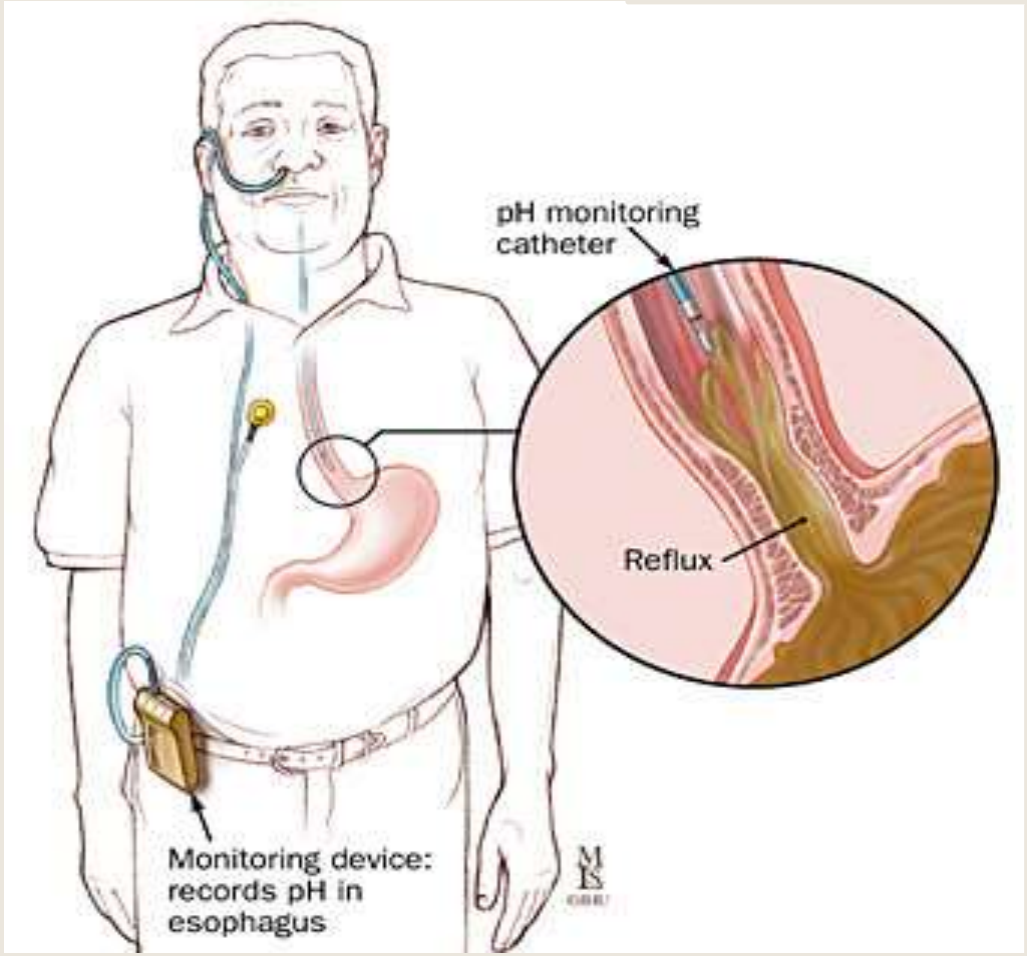
- It provides a quantitative determination of the amount of time the esophageal pH is low, indicating persistent acid presence above the sphincter.

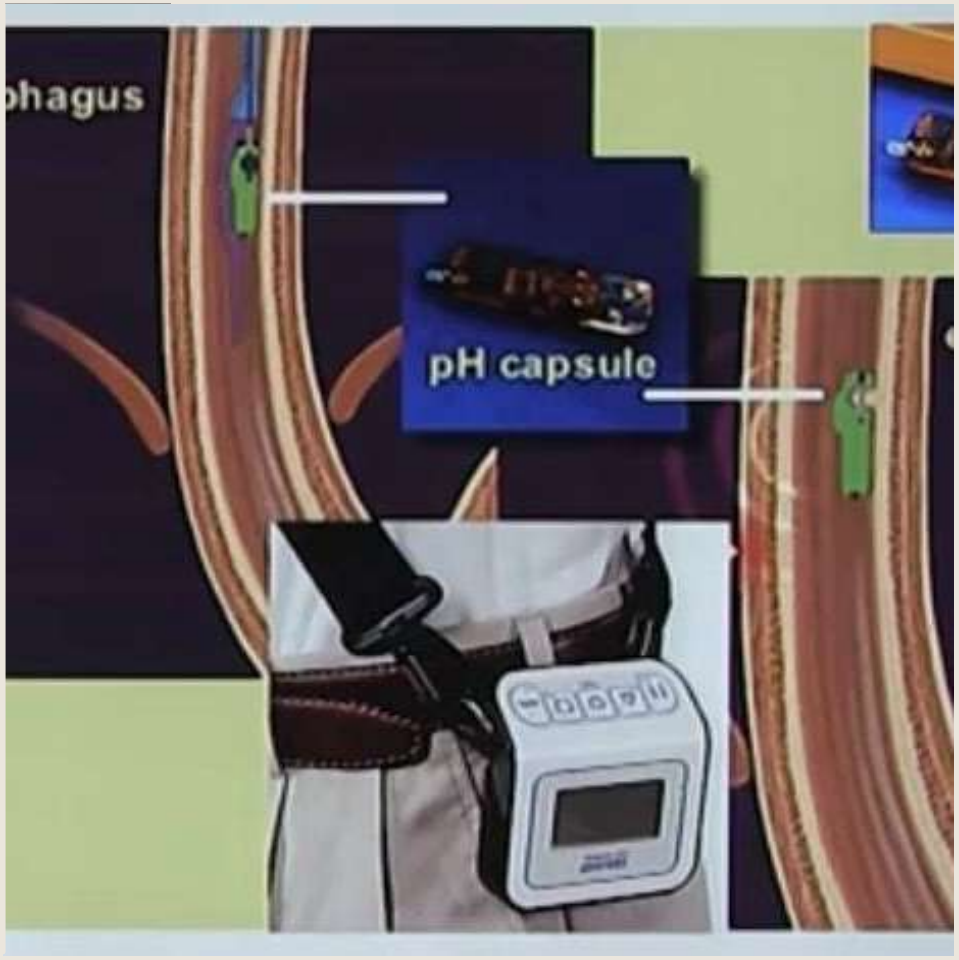
Indications:

- For symptomatic patients with normal endoscopic findings
- In patients who are unresponsive for PPI therapy

➢ Prior to the pH monitoring study, patients need to discontinue antisecretory medications for 1 week.

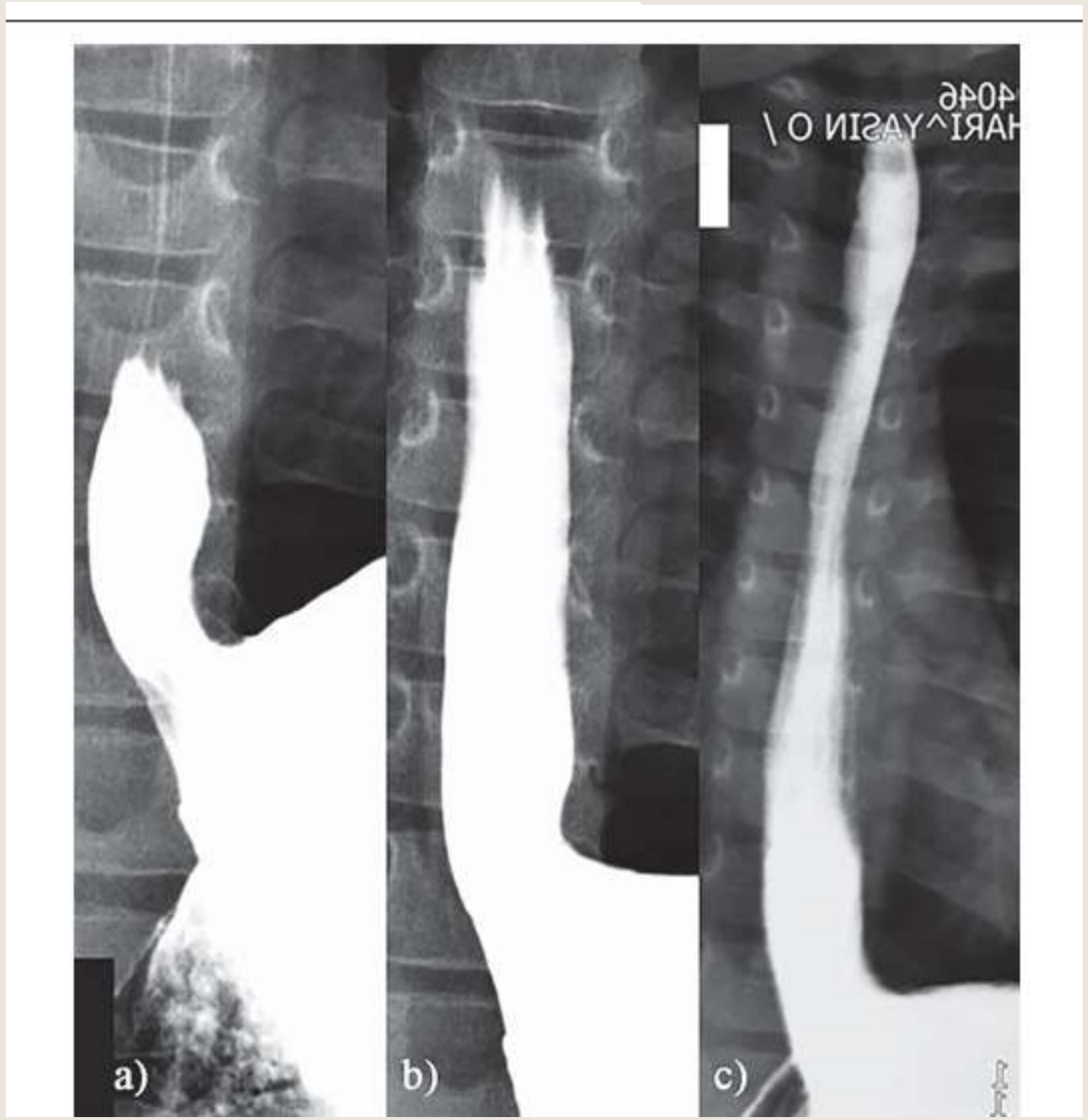
pH electrode is positioned 5 cm above LES
A positive association between symptoms combined with abnormal esophageal acid exposure provides evidence that symptoms are being caused by GERD.

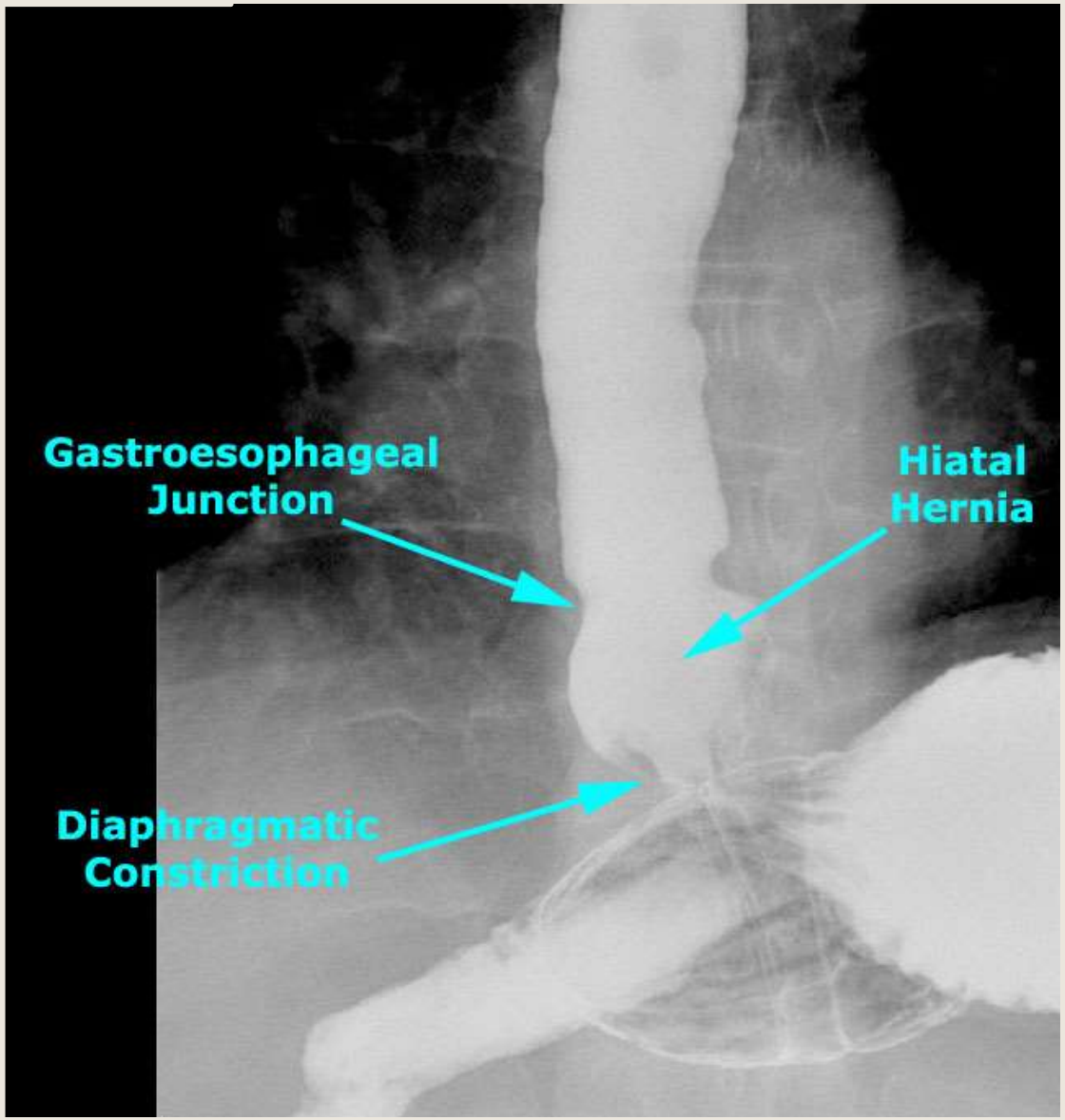




barium esophagogram

- Demonstrates spontaneous reflux in only approximately 40% of patients
- It's mostly used in patients complaining of dysphagia thus it's rarely used for GERD
- Demonstrates **esophageal length**, presence and size of any **hiatal hernia**, presence of any esophageal **diverticulum** or **stricture**, and the extent of **reflux**


a)
b)
c)

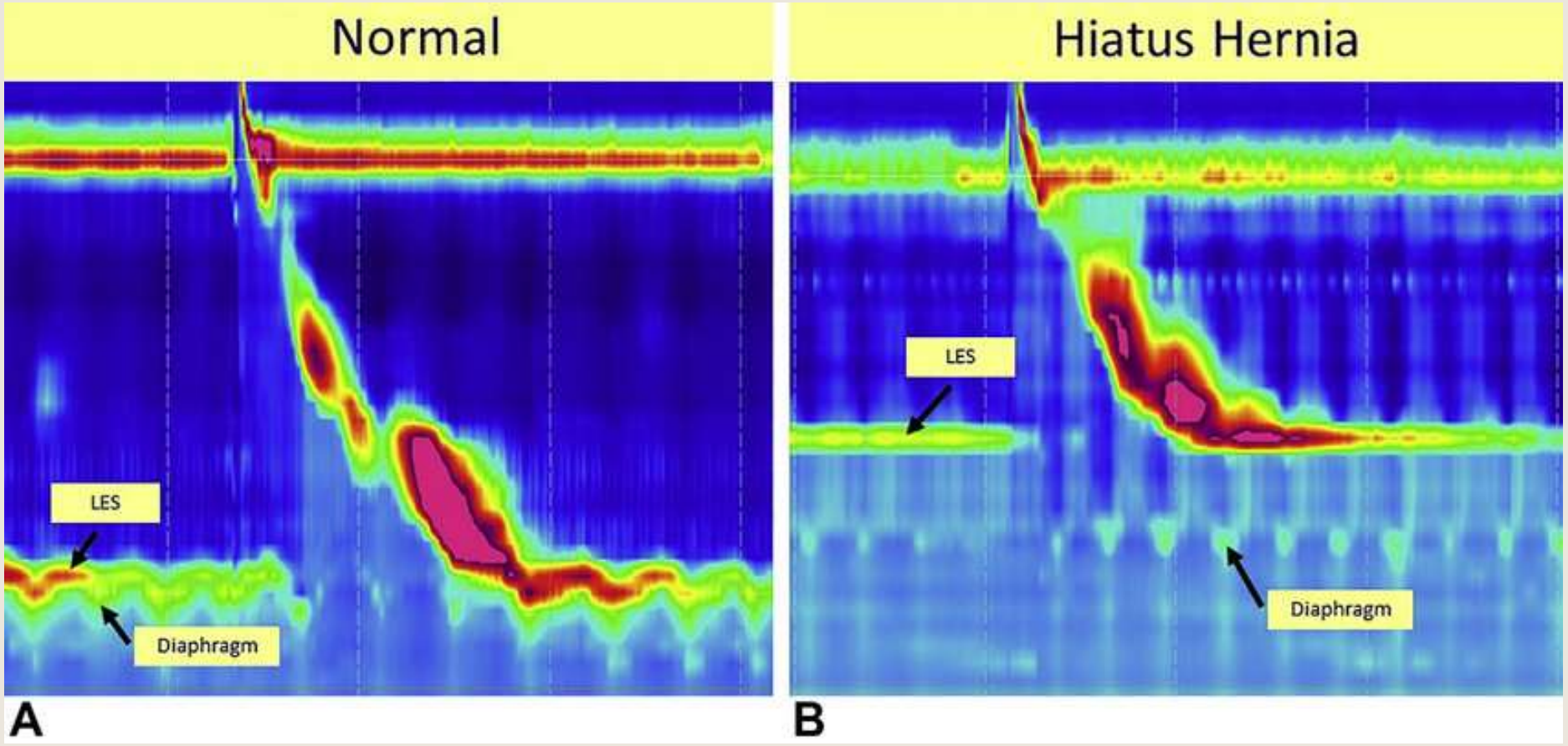

Gastroesophageal Junction
Hiatal Hernia
Diaphragmatic Constriction

Esophageal Manometry

the role of manometry in the evaluation of **GERD** is limited to:

- preoperative testing for exclusion of significant motility disorders such as achalasia or scleroderma (clear contraindications to anti-reflux surgery)
- for assisting in proper positioning of pH probes (5cm above LES)

Abnormal findings such as *hiatal hernia , *hypotensive LES
Are only supportive but are not definitive for GERD
Otherwise, this test is not recommended for the sole diagnosis of GERD.


Normal
LES
Diaphragm
A
Hiatus Hernia
LES
Diaphragm
B

Treatment

1. Lifestyle and dietary modification.
2. Medical therapy
3. Surgical therapy

- Management approach to patients with gastroesophageal reflux disease (GERD) is based on the frequency and severity of symptoms and the presence of erosive esophagitis or Barrett’s esophagus on upper endoscopy, if previously performed.

Lifestyle and dietary modification

I. **Weight loss** for patients with GERD who are overweight or have had recent weight gain.
II. **Elevation of the head of the bed** in individuals with nocturnal or laryngeal symptoms (eg, cough, hoarseness, throat clearing). (10-20 cm).
III. selective **elimination of dietary triggers** (caffeine, chocolate, spicy foods, food with high fat content, carbonated beverages, and peppermint) in patients who note correlation with GERD symptoms and an improvement in symptoms with elimination.
IV. **Avoid eating at least 2-3 hours before bedtime.**
V. **Avoidance of tobacco** and alcohol, as both reduce lower esophageal sphincter pressure and smoking also diminishes salivation.
VI. **Avoid medications that may worsen symptoms**, e.g., calcium channel blockers.
VII. **Small portions of food.**

Medical therapy

- Antacids:
  {Mg hydroxide / Aluminum hydroxide / Calcium carbonate}.

- Antacids do not prevent GERD, their role is limited to intermittent (on-demand) use for relief of mild GERD symptoms that occur less than once a week .

- Histamine 2 receptor antagonist:
  {Ranitidine / Famotidine}.

-Histamine 2 receptor antagonists (H2RAs) decrease the secretion of acid by inhibiting the histamine 2 receptor on the gastric parietal cell. However, the development of tachyphylaxis within two to six weeks of initiation of H2RAs limits their use in the management of GERD .

Medical therapy

- **Proton pump inhibitors:**

{Omeprazole / Lansoprazole / Rabeprazole / Pantoprazole}.
-PPIs should be used in patients who fail twice-daily H2RA therapy and in patients with erosive esophagitis and/or frequent (two or more episodes per week) or severe symptoms of GERD that impair quality of life.

- **Prokinetics:**

{Bethanechol / Domperidone }.
- Enhances gastrointestinal motility by increasing the frequency or strength of contractions.

Surgical therapy

INDICATIONS FOR OPERATION:

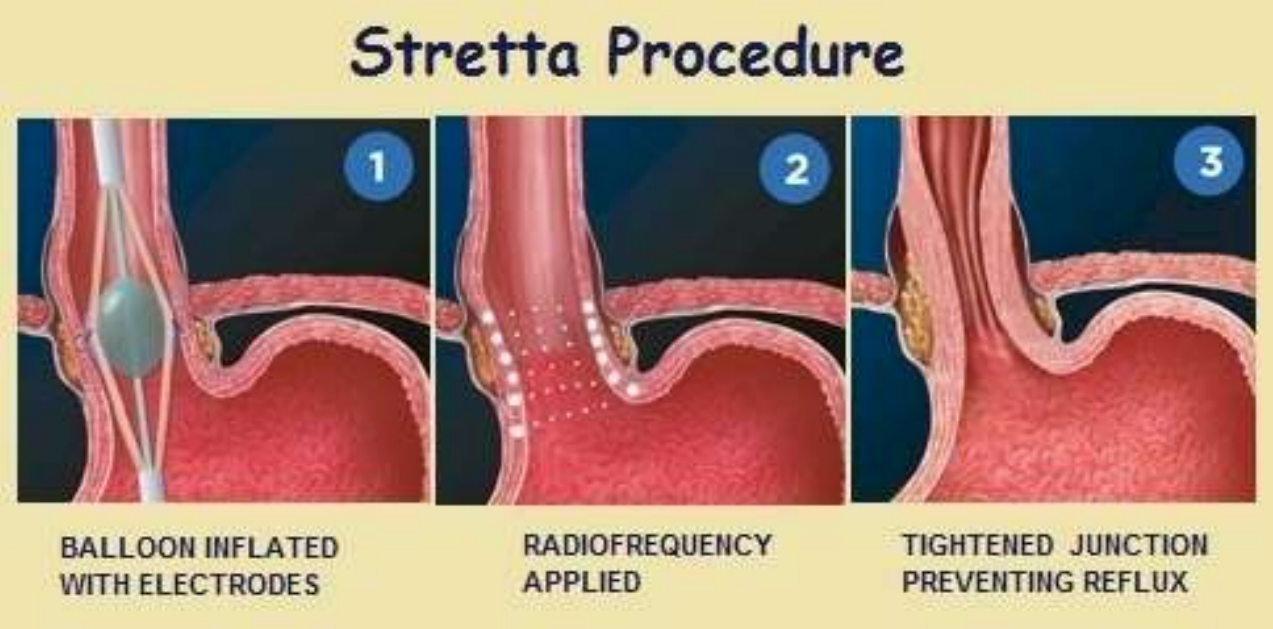
I. Failed medical management .
II. Intolerance of or noncompliance with medical therapy.
III. Complications of GERD.
    -such as severe esophagitis or benign peptic stricture.
IV. Volume regurgitation.

Surgical therapy

1. **Endoscopic methods:**

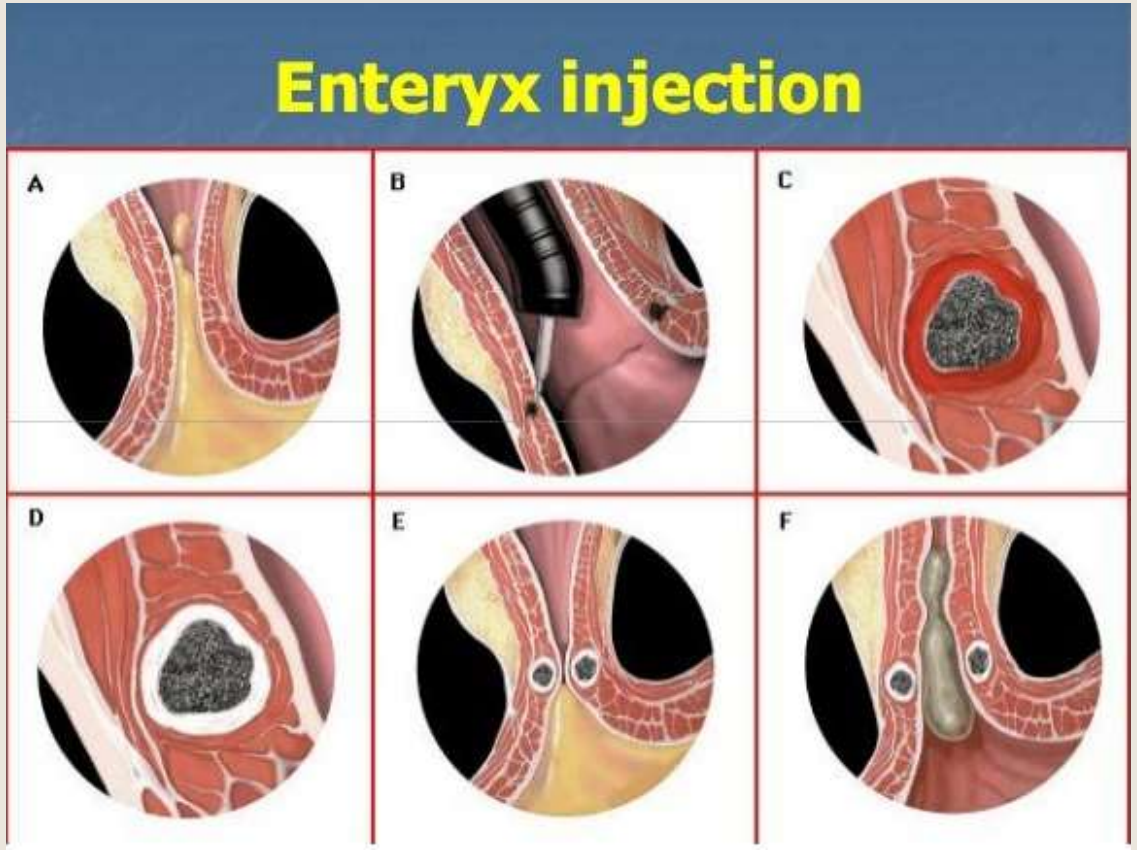
-Stretta :

The Stretta procedure is the most widely studied endoscopic antireflux procedure. The specialized catheter is placed with endoscopic assistance over a guidewire..



Surgical therapy

I. **Endoscopic methods:**
   -Enteryx (injectable biocompatible polymer).



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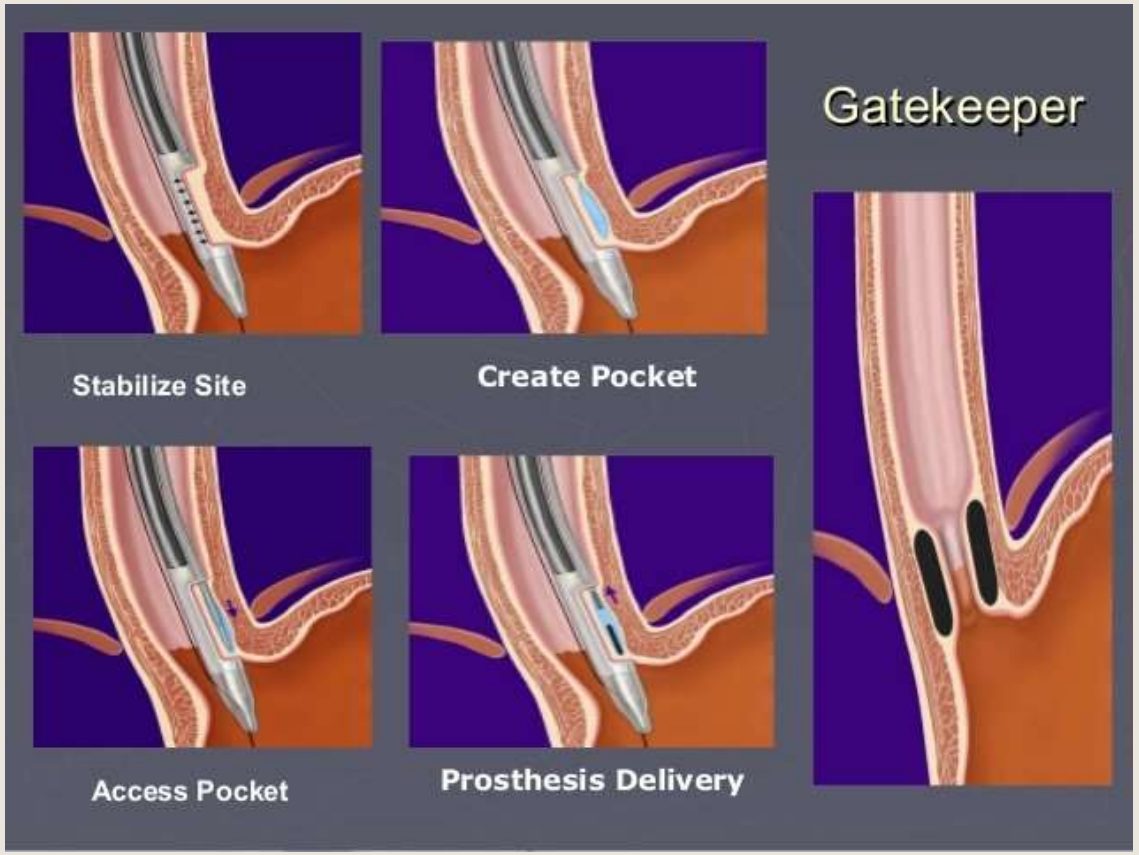
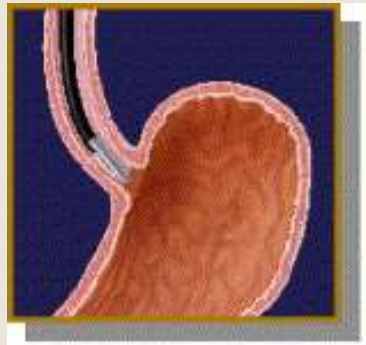


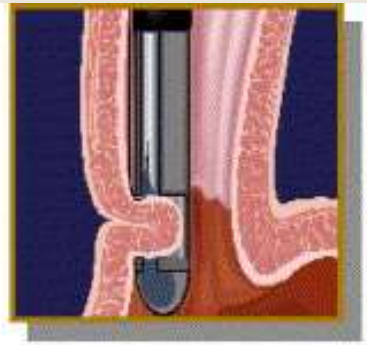
Surgical therapy

I. **Endoscopic methods:**

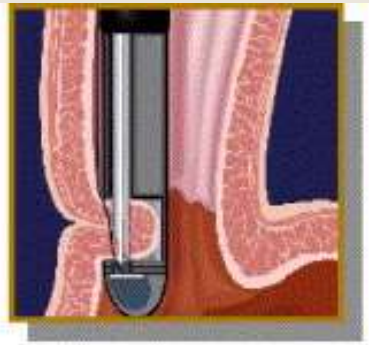
-Endoscopic gastric plication.



Introducing the System through an Overtube



Mucosal Tissue Suction



Needle Penetration and Suture Tag Development

Suture of Two Gastric Folds

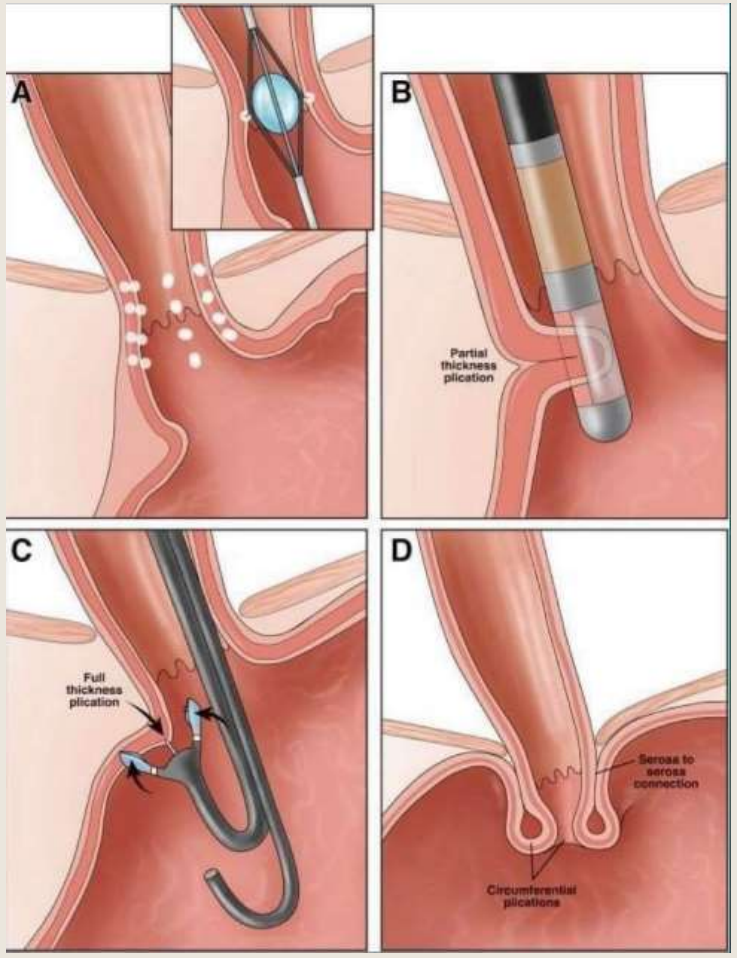
Securing Knots and Cutting Sutures

Bard's EndoCinch™ Endoscoping Suturing System

Surgical therapy

I. **Endoscopic methods:**

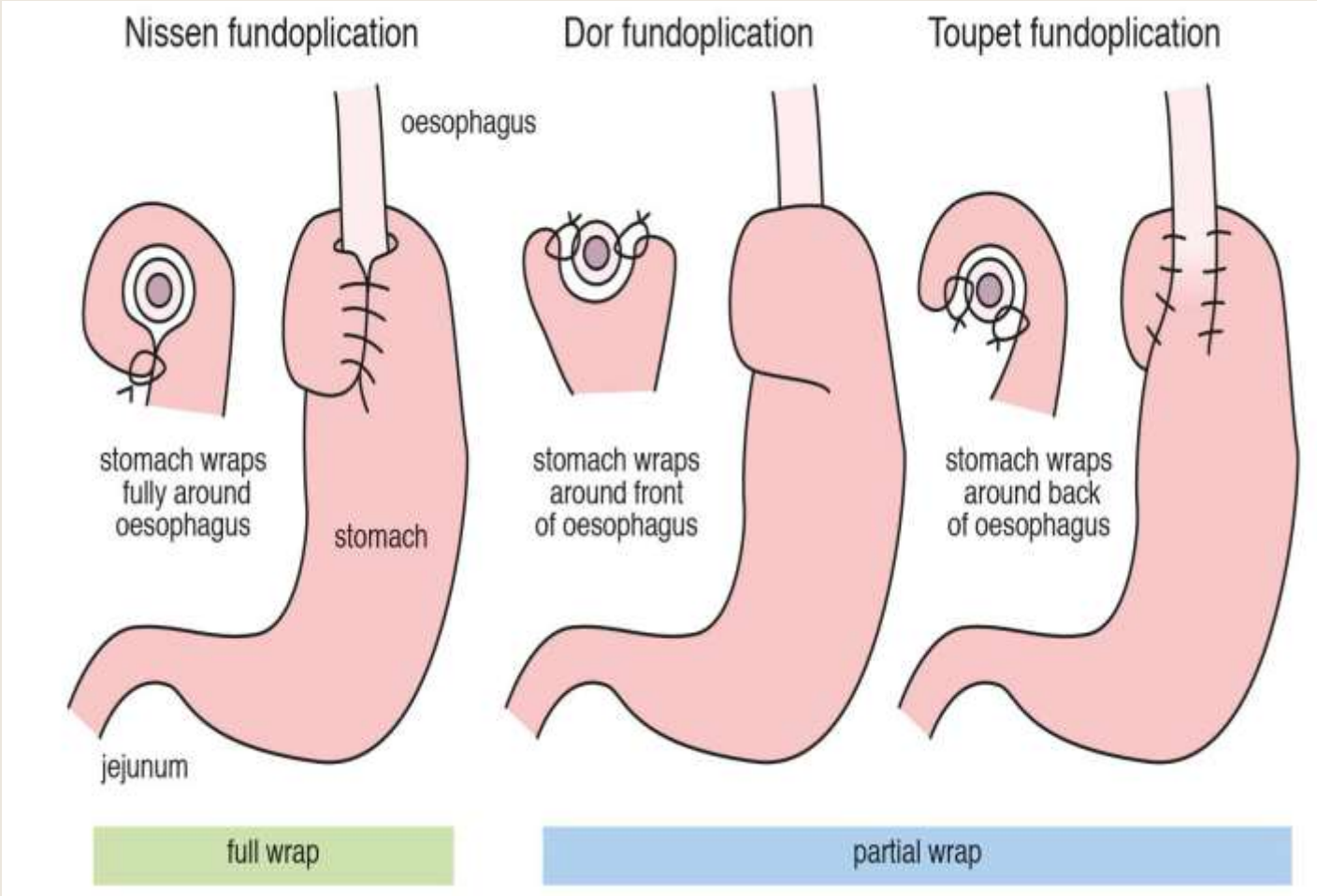
-Endoscopic gastric plication.



Surgical therapy

II. Laparoscopic Fundoplication:

- Nissen (360 degree or complete) fundoplication.
- Anterior partial fundoplication (Dor, Watson)
- Posterior partial fundoplication (Toupet)



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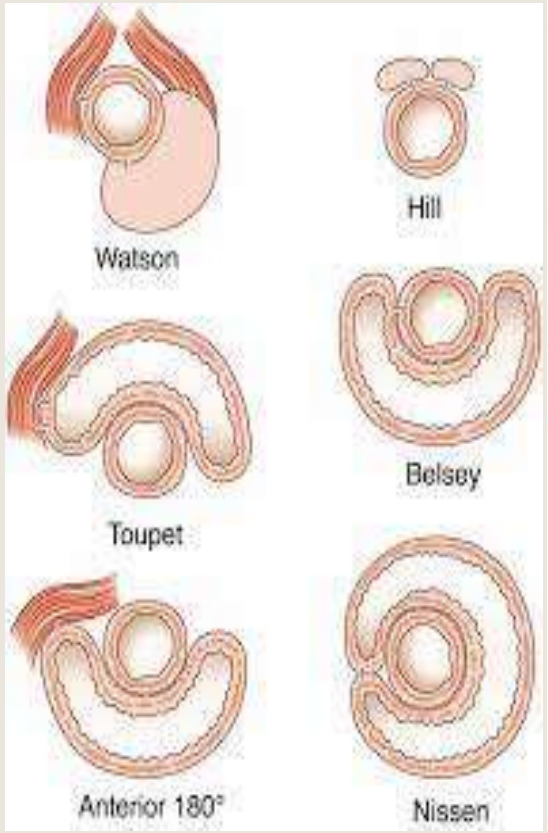
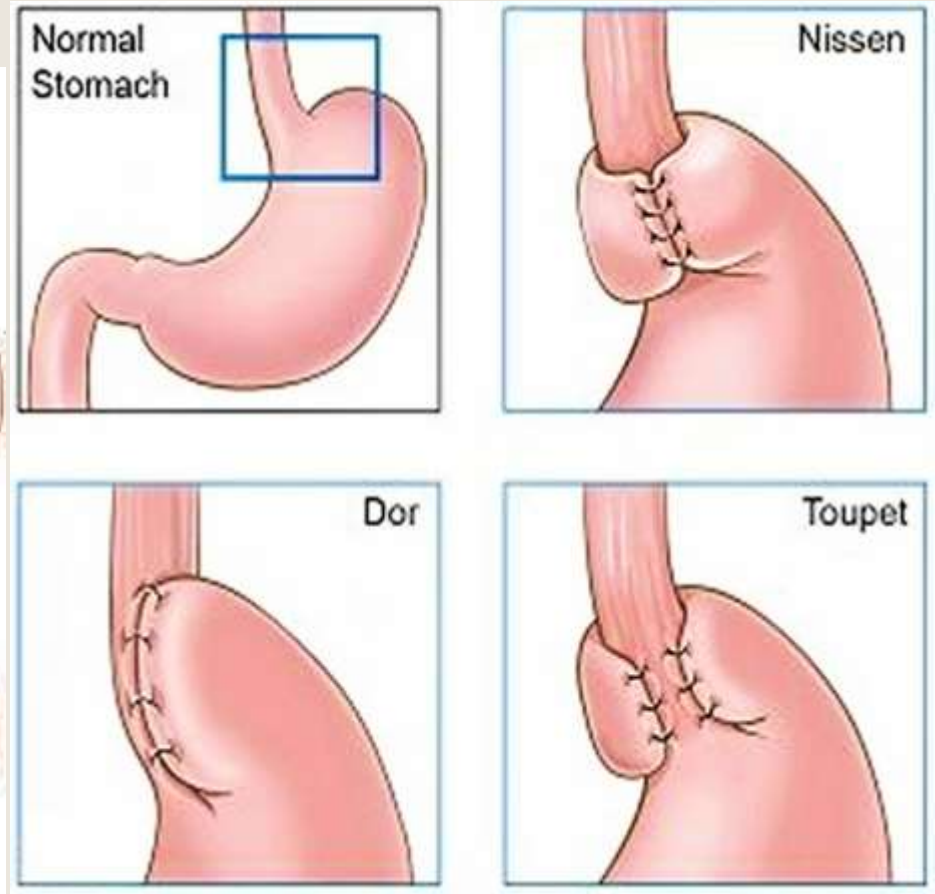




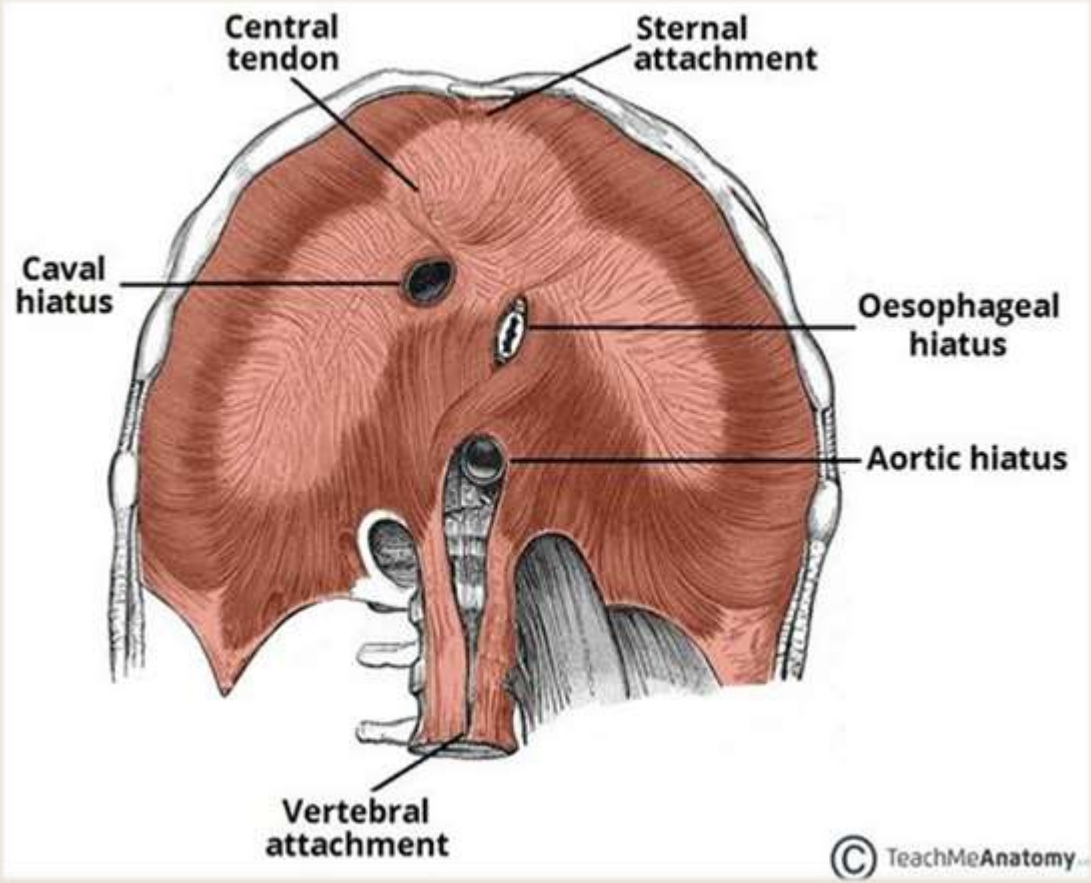
Complications of laparoscopic fundoplication:

1. **Gas bloat syndrome: inability to belch, leading to bloating and an increase in flatulence**
2. **Dysphagia**
3. **Spleen injury**
4. **Esophageal perforation**
5. **Pneumothorax**

Hiatal Hernia

Anatomy

- Esophageal Hiatus :
- Is a central opening of the diaphragm, which allows the esophagus to pass through into the peritoneal cavity; forms the upper part of the esophageal sphincter and the reflux barrier.
- Formed by:
- Left and right paravertebral tendinous crura and Median arcuate ligament.

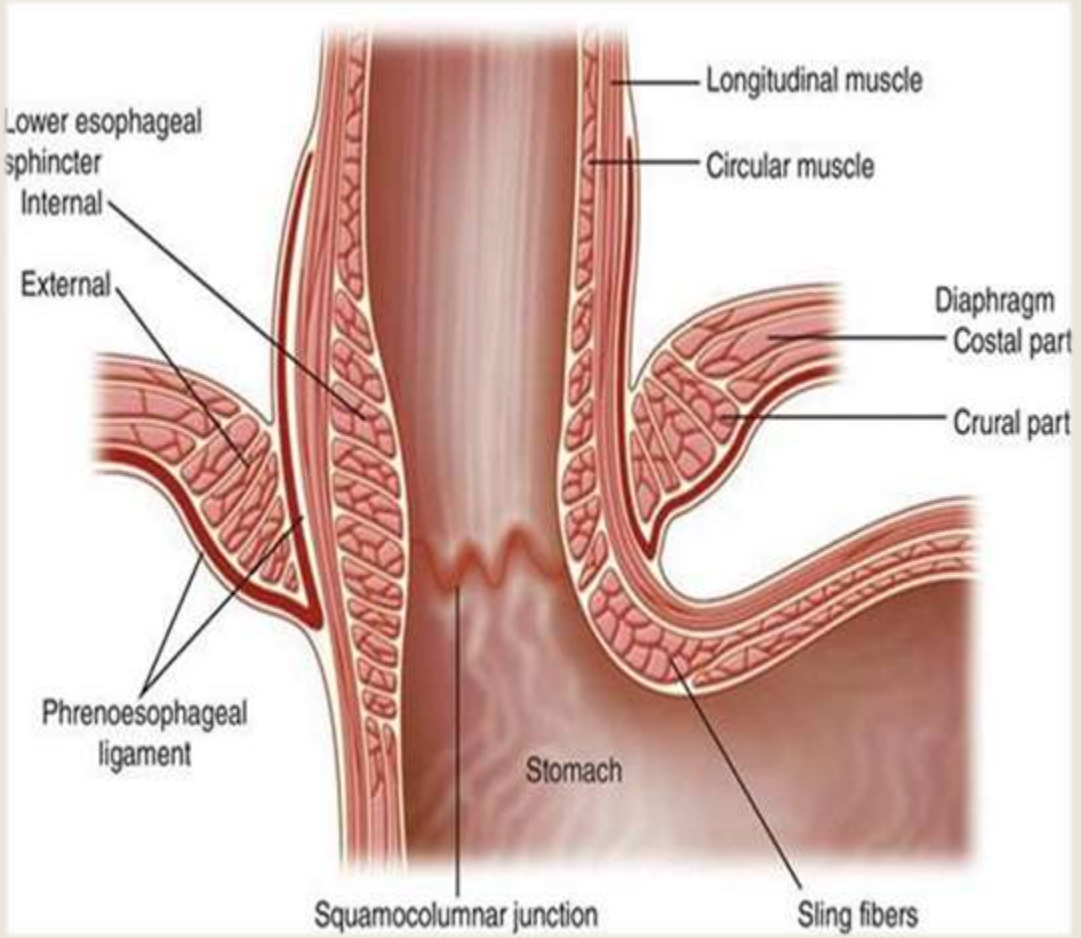


Anatomy

Gastroesophageal junction (GEJ) : Normally lies at the level of the esophageal hiatus.

Phrenoesophageal ligament (attaches to the esophagus at the GEJ) : Peritoneal fold that encircles the distal portion of the esophagus and gastroesophageal junction and connects them to the peritoneal surface of the diaphragm.

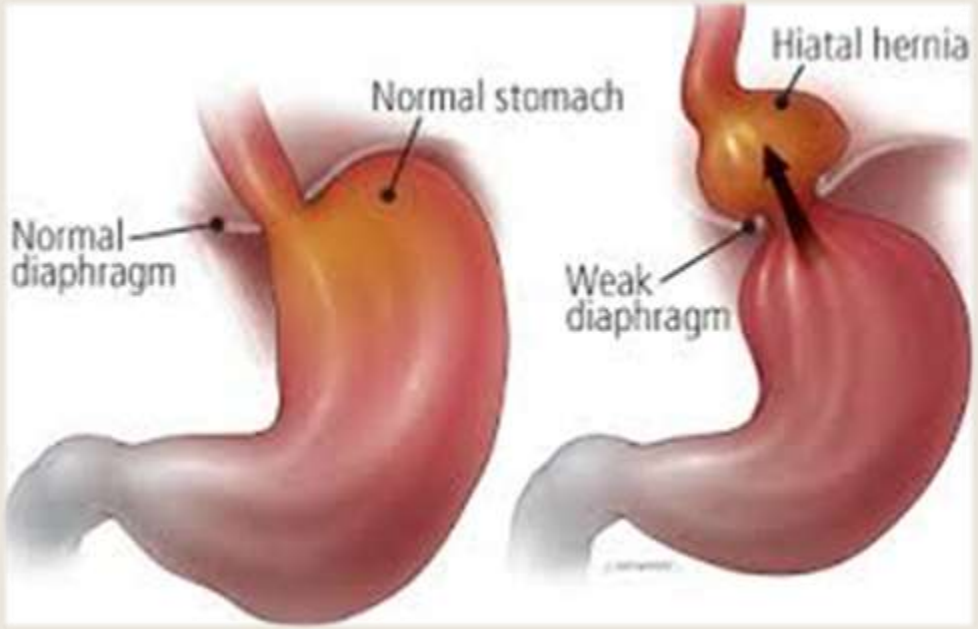
- It closes the esophageal hiatus and helps maintain the intra-abdominal position of the GEJ.



Introduction

Definition :
Hernia : in general hernia is the protrusion of any organ outside its containing cavity.

Hiatal Hernia : Protrusion of any abdominal structure into the thorax through a lax diaphragmatic esophageal hiatus.



Epidemiology

❖Incidence increases with:
Age: Older than 70 years of age.
Obesity .

❖ Prevalence: More prevalent in females and Western populations ,most commonly occur on the left side as the liver protects the right diaphragm.

Etiology

❖The etiology is multifactorial :

- Lax diaphragmatic esophageal hiatus due to :

➢ Advanced age.
➢ Smoking.
➢ Obesity.
➢ Rarely genetic predisposition.

- Prolonged periods of increased intra-abdominal pressure :

➢ Pregnancy
➢ Ascites
➢ Chronic cough
➢ Chronic constipation

- Defects of the pleuroperitoneal membrane
(“Congenital diaphragmatic hernias”)

Pathophysiology

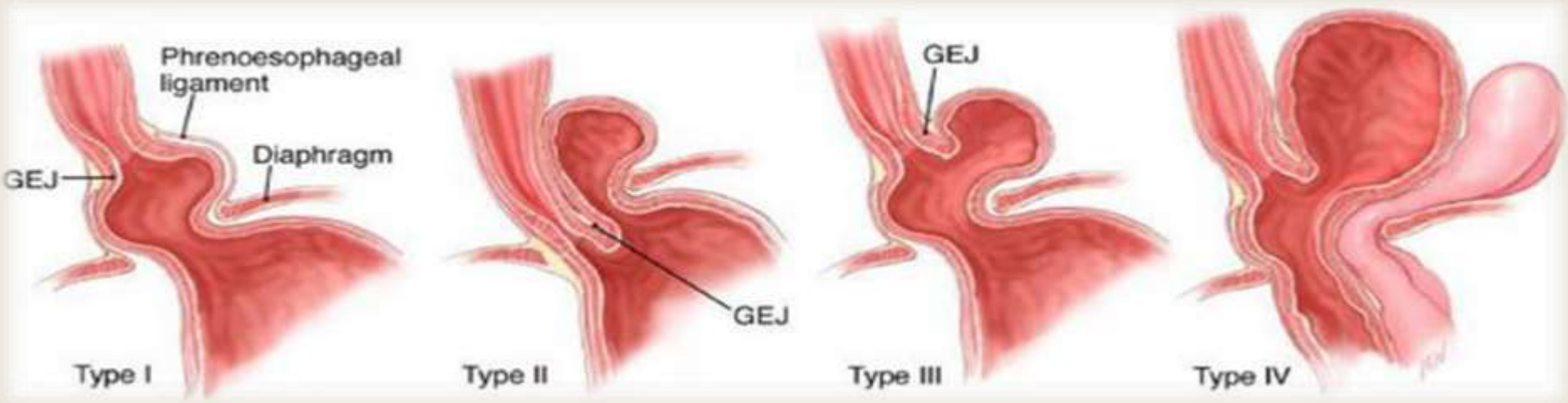
- Predisposing factors lead to laxity of the esophageal hiatus.
- Relative negative intrathoracic pressure compared to the intra-abdominal pressure.

➢ Relative negative intrathoracic pressure and the lax hiatus cause herniation of the abdominal contents into the thorax and subsequent loss of reflux barrier with compromised fluid emptying of distal esophagus which eventually lead to GERD.

Types of hiatal hernias

❖Type I: sliding hiatal hernia

- Most common type (95% of cases).
- The GEJ and the gastric cardia slide up into the posterior mediastinum. The gastric fundus remains below the diaphragm (hourglass stomach).



Types of hiatal hernias

❖Type II: paraesophageal hiatal hernia

- Part of the gastric fundus herniates into the thorax.
- The GEJ remains in its anatomical position below the diaphragm.

❖Type III: mixed hiatal hernia

- Mix of types I and II, The GEJ and a portion of the gastric fundus prolapse through the hiatus.

❖Type IV: complex hiatal hernia

- Herniation of any abdominal structure other than the stomach (e.g., spleen, omentum, or colon)
- Rarest type

Clinical Features

✓Most patients are asymptomatic.

- ❑Type I: symptoms of GERD. e.g. Heartburn ,Regurgitation ,Dysphagia ,odynophagia.
- ❑Type II, III, and IV
  - ➢Epigastric/substernal pain
  - ➢Early satiety
  - ➢Retching
  - ➢Symptoms of GERD can occur.

✓Saint triad: a combination of cholelithiasis, divertculosis, and hiatal hernia may occur in approximately 1.5% of patients.

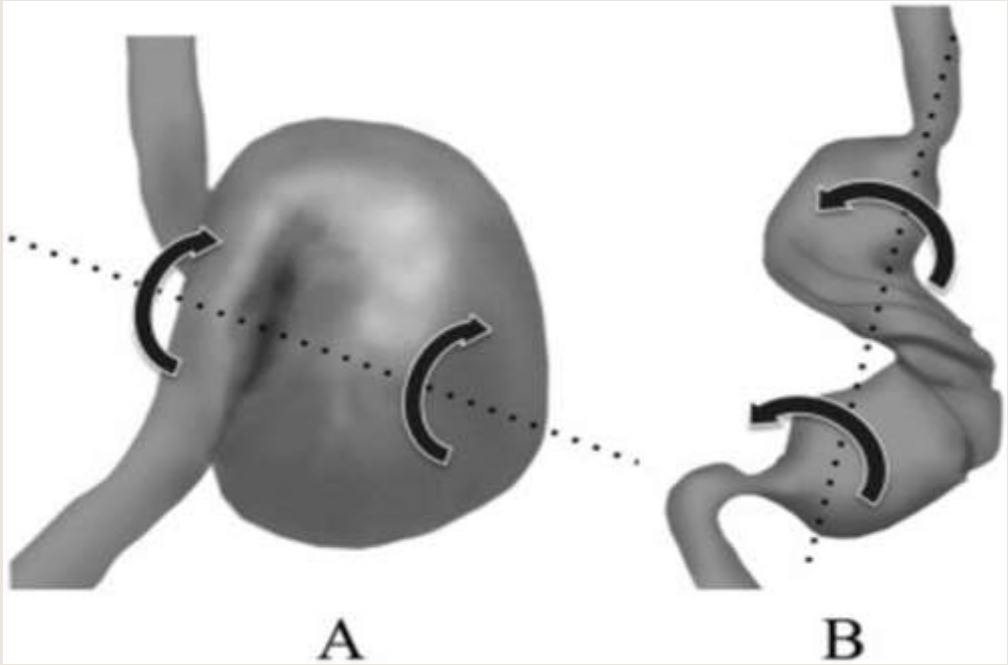
Complications

❖Complications of type I:

- Arise from long-standing gastroesophageal reflux.

❖Complications of type II, III, IV

- Upper gastrointestinal bleeding.
- Gastric ulcers.
- Gastric perforation.
- Gastric volvulus.
- Total gastric obstruction

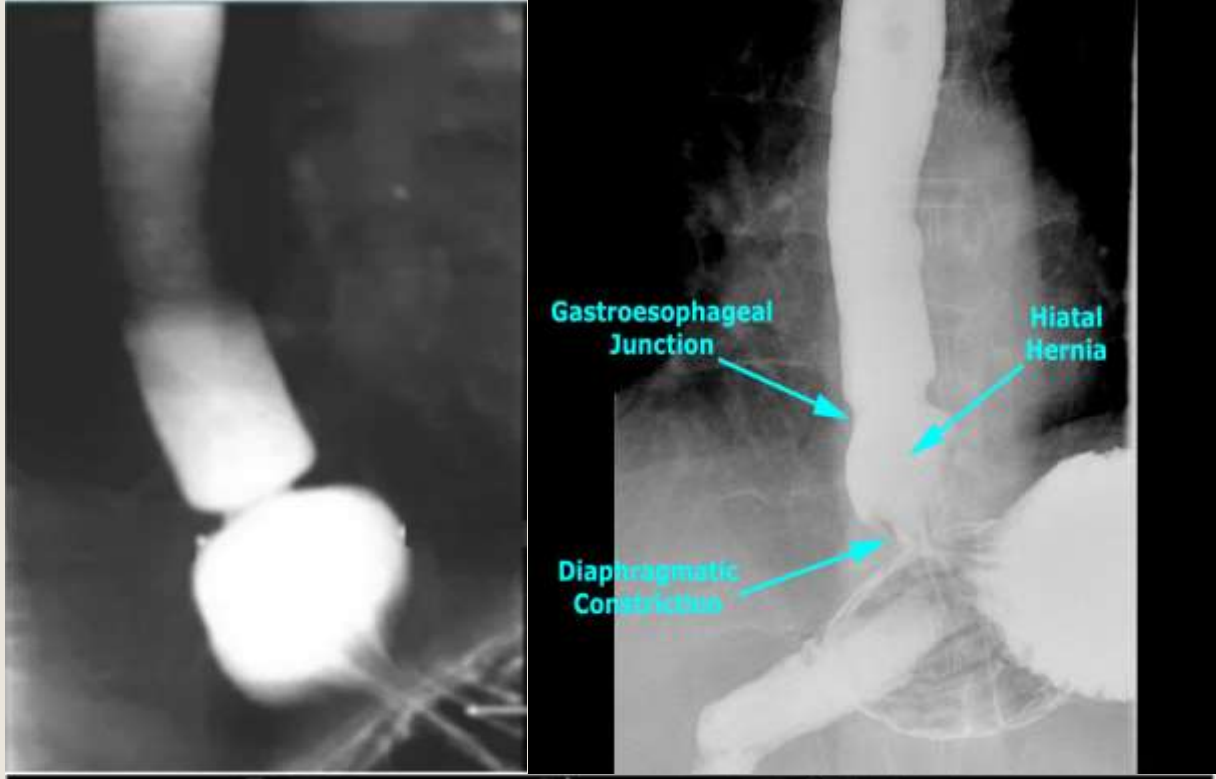


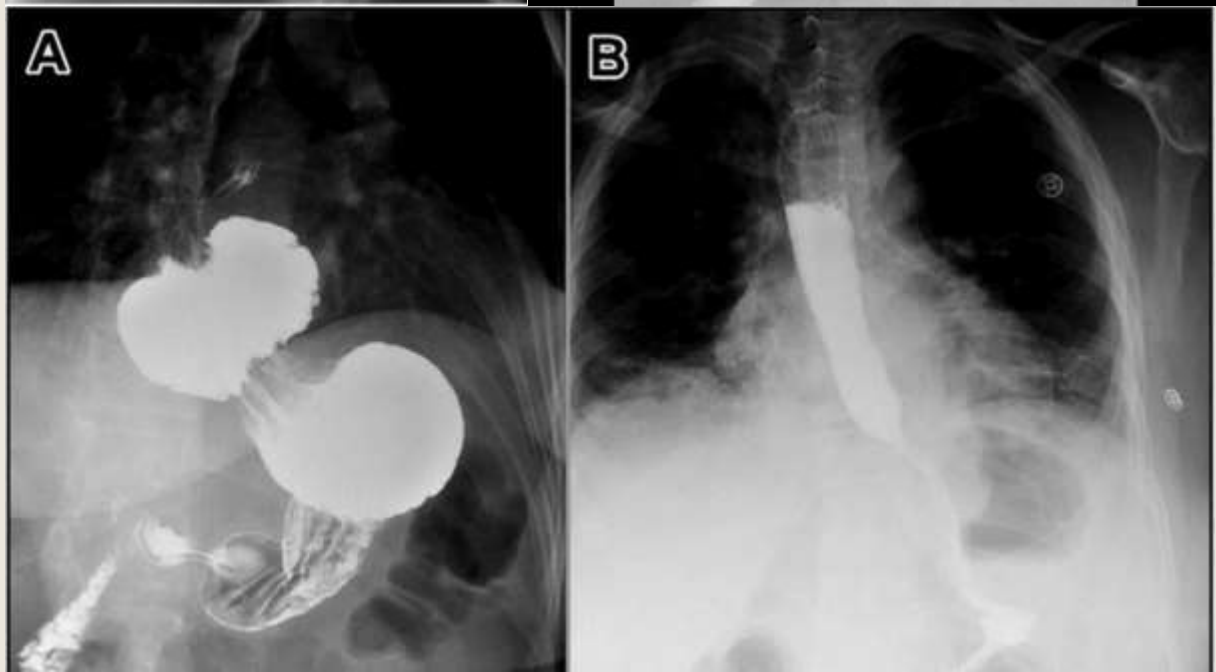
Gastric volvulus

Diagnostic

❖Barium swallow:

- A diagnostic test in which serial x - rays of the chest are taken while a patient swallows liquid barium which coats the walls of the esophagus and can be used to identify anatomical defects in the esophagus (e.g: strictures , rings , dilation).
- most sensitive test ,assesses type and size of a hernia (including location of the stomach and the GEJ).





Diagnostic

Endoscopy:

➢Z-line: squamocolumnar junction, which represents the transition from the squamous epithelium-lined esophageal mucosa to the columnar epithelium-lined gastric mucosa; corresponds to the GEJ.

- **Types I and III**: Z-line lies above the diaphragmatic hiatus
- **Types II and IV**: Z-line remains undisplaced (below the diaphragmatic hiatus)

Diagnostic

Other tests that can detect hiatal hernias include

- Chest x-ray :usually incidental finding

Types I, II, III: retrocardiac soft tissue opacity with/without an air-fluid level
Type IV: retrocardiac visceral gas (small bowel/colon) or soft tissue shadows (spleen/omentum)

- CT Thorax: recommended for urgent preoperative evaluation of complicated type II, III, and IV hernias

- Esophageal pH monitoring: not a diagnostic test; useful for determining the extent of gastroesophageal reflux

Treatment

Management of patients with sliding hiatal hernia:

➢Conservative management:

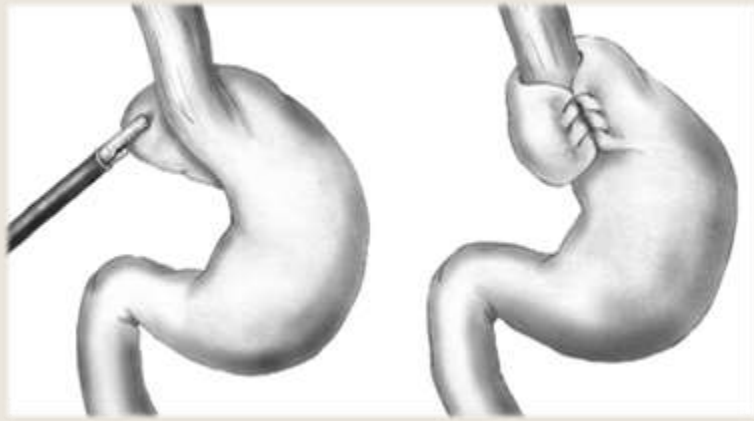
- Lifestyle modifications.
- Proton pump inhibitors (PPIs) or histamine H2-receptor antagonists if symptoms of GERD occur.

➢Surgery:

- laparoscopic/open fundoplication and hiatoplasty

Indications for surgery:

- ✓ persistence of symptoms despite conservative management
- ✓ Refusal or inability to take long-term PPIs
- ✓ Severe symptoms complications of GERD



Treatment

Management of patients with types II, III, IV hiatal hernias:

➢Conservative management:

- older patients or those with other comorbidities.

➢Surgery:

- laparoscopic/open herniotomy + fundoplication, hiatoplasty, and gastropexy/fundopexy

Indications for surgery :

- ✓ Asymptomatic, small hernias in patients under 50 years old.
- ✓ Symptomatic type II, III, IV hernias.

REFERANCES

- AMBOSS
- GENERAL SURGERY Lecture Notes
- UPTODATE
- PubMed
- Medscape

Thank YOU