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# Pathology

## Gastroesophageal Reflux Disease “GERD”



439

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### Color index

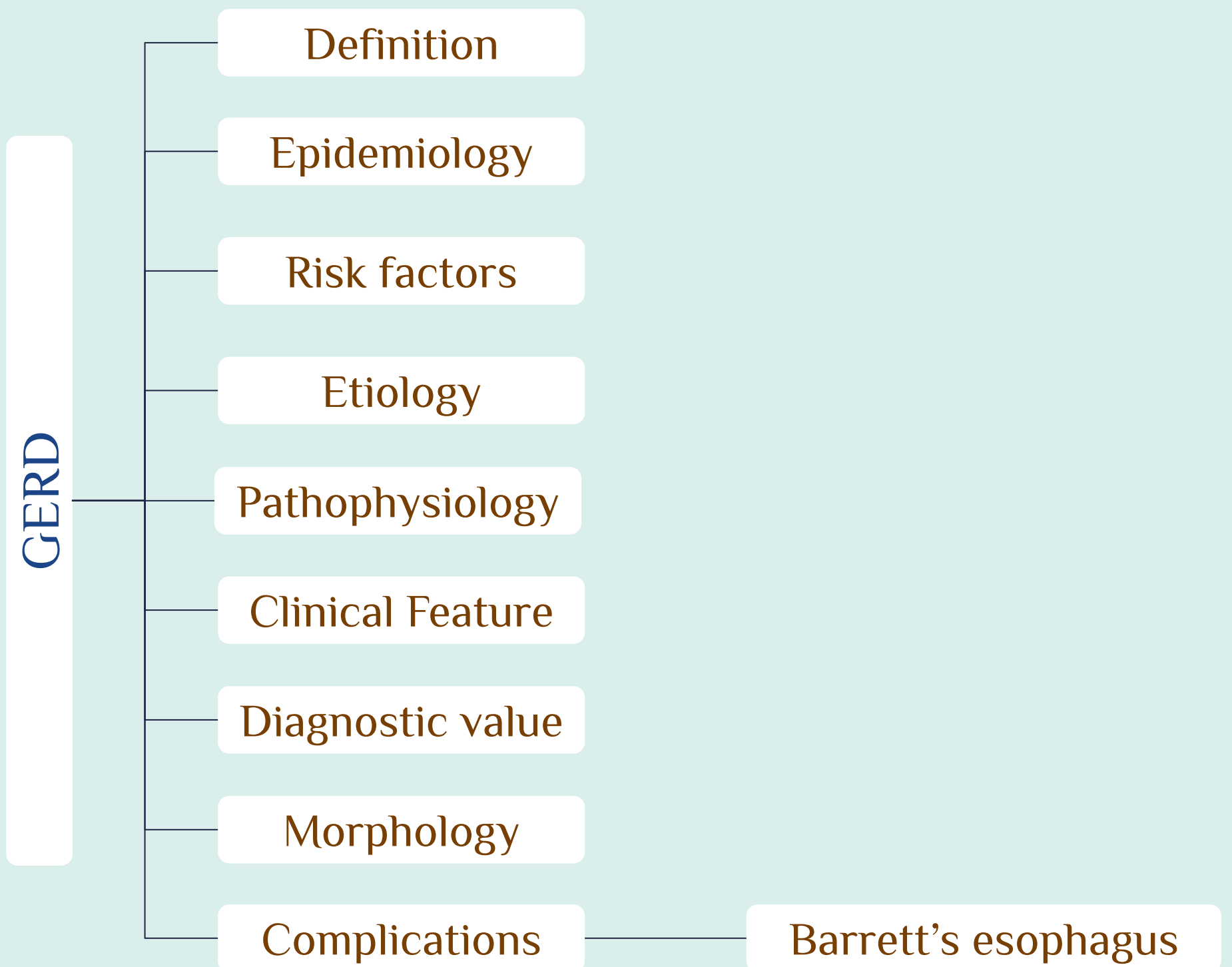
- Important
- Doctor's note
- Extra info
- Main text
- ★ Male's slide
- ★ Female's slide



# Objective

- 01 Describe the definition, pathogenesis, clinical features, pathology (gross and microscopic features) and complications of reflux esophagitis
- 02 Describe the definition, main cause, pathology (gross and microscopic features) and complications (dysplasia and adenocarcinoma) of Barrett esophagus.

# Overview



# Reflux Esophagitis

## Gastroesophageal reflux

- ❖ Reflux is a normal physiologic phenomenon experienced intermittently by most people, particularly after a meal **without having a major complication or disease.**

## Gastroesophageal reflux disease (GERD)

- ❖ Occurs when the amount of gastric juice that refluxes into the esophagus exceeds the normal limit, causing **symptoms** with or without associated esophageal **mucosal injury.**

American College of Gastroenterology (ACG)

- ❖ **Symptoms OR mucosal damage** produced by the abnormal reflux of gastric contents into the esophagus. Often chronic and relapsing, may see complications of GERD in patients who lack typical symptoms.

## Epidemiology

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About 44% of the US adult population have heartburn at least once a month. 14% of Americans have symptoms weekly, while 7% have symptoms daily. Furthermore, approximately 80% of **pregnant women** have GERD. Hiatal hernia present in ~70% of people with GERD.

## Risk Factor

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1. Smoking, alcohol
2. Caffeine, fatty foods
3. Chocolate
4. Pregnancy
5. obesity
6. **Hiatal hernia**<sup>1</sup>

## Physiologic vs Pathologic

### Physiologic Gastroesophageal reflux

- Postprandial (After a meal)
- Short lived
- Asymptomatic **just feeling the acidity in the mouth & little irritability**
- No nocturnal symptoms

### Pathologic GERD

- Symptoms (**heartburn**)
- Mucosal injury
- Nocturnal symptoms (**pain at night & cough**)

1: Hiatal hernia: Herniation of a portion of the stomach into the lower thorax



❖ Acute esophagitis may be caused by:

**Physical agents:**

•Irradiation and by ingestion of caustic agent ( **acidic or alkaline substances** )

**Infective agents:**

•Bacterial infection is very rare, but fungal, infection (mainly by *Candida albicans*) is common  
 •Viral infections of the esophagus (particularly by herpes simplex and cytomegalovirus) are seen in AIDS patient , **elderly & chemotherapy** .

## Etiology

### A. Abnormal lower esophageal sphincter

MOST COMMON CAUSES OF GERD

1- Functional (frequent transient LES relaxation)

2- Mechanical (hypotensive LES)

3- Foods (eg, coffee, alcohol),

DECREASE THE PRESSURE OF THE LES

4- Medications (eg, calcium channel blockers)

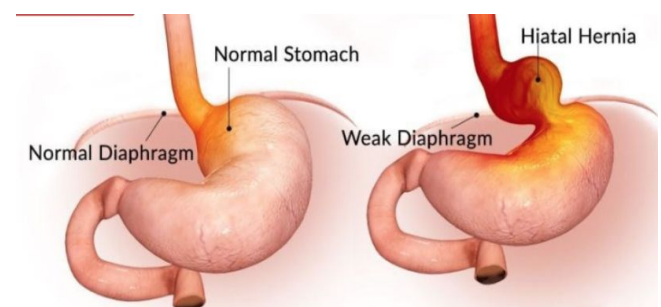
5- Location : **Hiatal hernia** (x-ray show gas behind the heart)

### B. Increase abdominal pressure

1- **Obesity**

2- **Pregnancy (3rd trimester)**

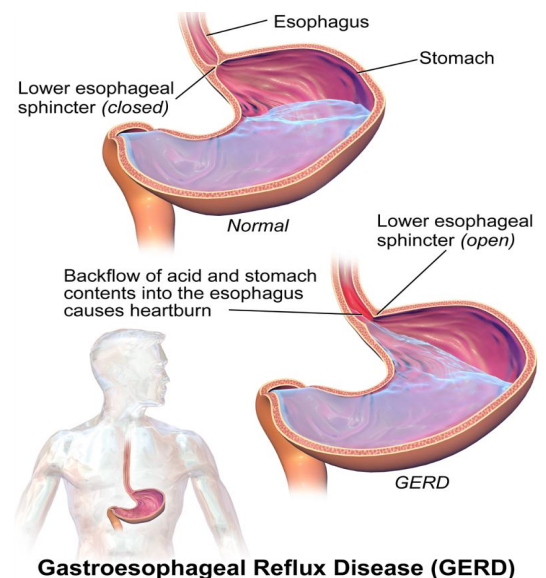
3- **Increased abdominal pressure**



## Pathophysiology

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- ❖ Primary barrier to gastroesophageal reflux is the lower esophageal sphincter
- ❖ LES normally works in conjunction with the diaphragm
- ❖ If barrier disrupted, acid goes from stomach to esophagus



## Clinical features

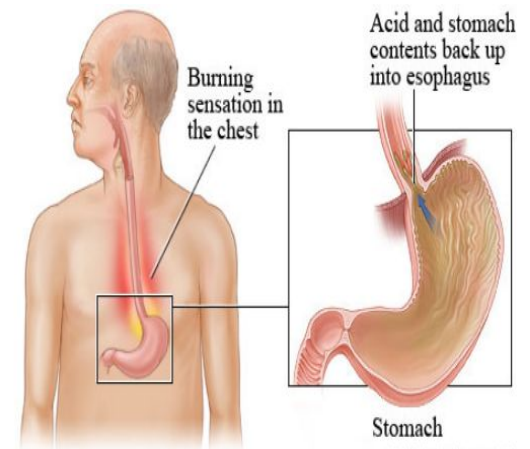
*Typical (Most common) symptoms:*

- ❖ Heartburn—retrosternal burning discomfort and chest pain
- ❖ Regurgitation—effortless return of gastric contents into the pharynx without nausea, **retching, or abdominal contractions**

*Atypical symptoms:*

- ❖ Coughing (Nocturnal) **because fluids go back to pharynx → irritation of cough center**
- ❖ Chest pain
- ❖ Wheezing (asthma) **due to aspiration of gastric content → irritation of bronchial tree → bronchospasm → asthma & wheezing**

**Age: older than 40 years but also occurs in infants and children.**



The hiatus is an opening in the diaphragm (the muscular wall separating the chest cavity from the abdomen). Normally, the esophagus (food pipe) goes through the hiatus and attaches to the stomach. In a hiatal hernia the stomach bulges up into the chest through that opening

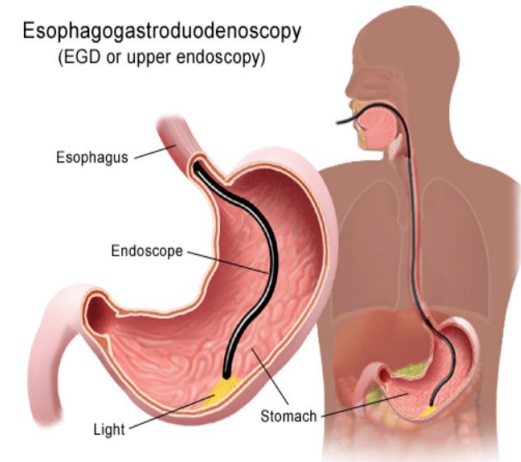


# Diagnostic Evaluation

- ❖ If classic symptoms of heartburn and regurgitation exist in the absence of “alarm symptoms”<sup>1</sup> the diagnosis of GERD can be made clinically and treatment can be initiated. But if there was non-specific pain/symptoms for Reflux esophagitis we do :

## 1- Esophagogastroduodenoscopy

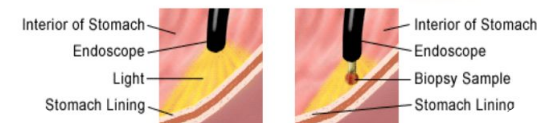
- ❖ Endoscopy (with biopsy if needed)
  - In patients with alarm signs/symptoms
  - Those who fail a medication trial
  - Those who require long-term treatment



## 2- PH

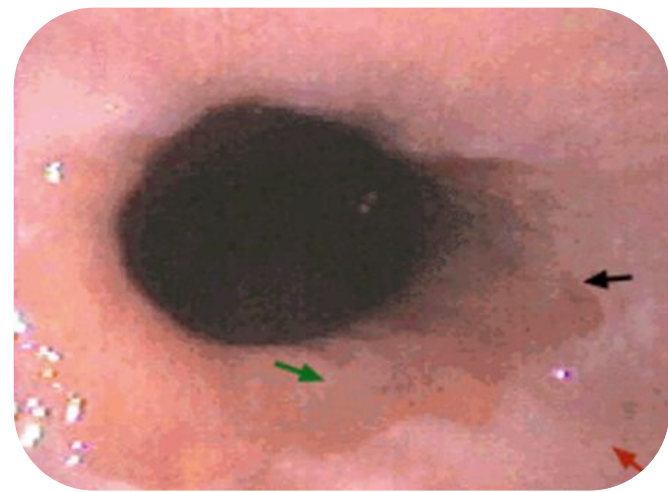
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- ❖ 24-hour pH monitoring
  - Accepted standard for establishing or excluding presence of GERD for those patients who do not have mucosal changes
  - Trans-nasal catheter or a wireless capsule shaped device

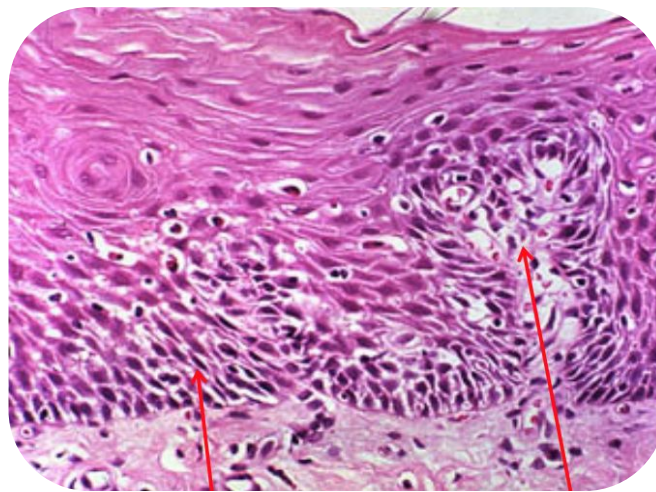


# Morphology

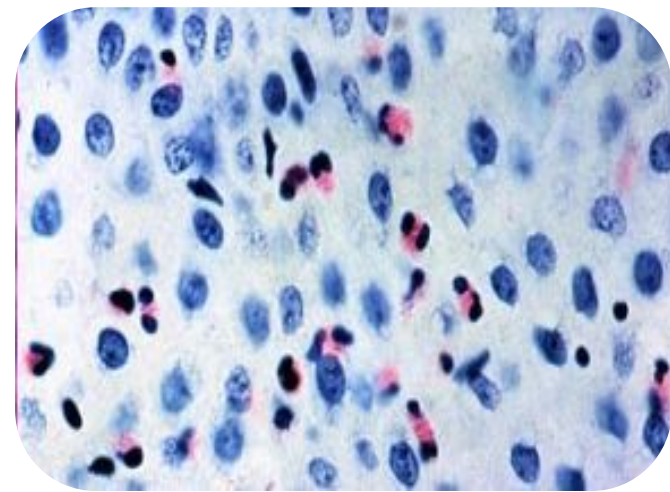
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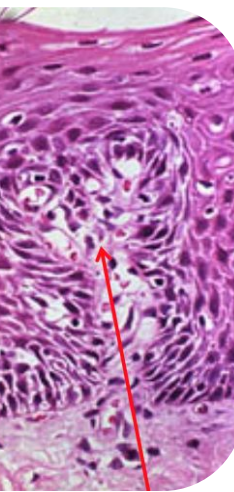
Simple hyperemia: redness



1- Basal zone hyperplasia



3- Eosinophils and neutrophils



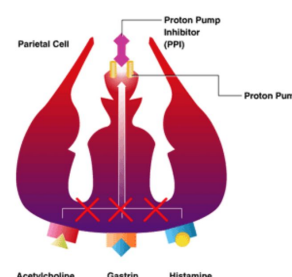
2- Elongation of lamina propria papillae

- ❖ Changes increase with disease duration

# Treatment

Boys Dr : Treatment is NOT REQUIRED IN THE EXAM

- ❖ H2 Blockers
- ❖ Proton pump inhibitors
- ❖ If treatment is not working → Antireflux Surgery



1: ALARM SYMPTOMS : dysphagia, odynophagia, persistent vomiting, hematemesis, unintentional weight loss

# Complication Of Reflux Esophagitis

- ❖ Erosive esophagitis and ulceration (loss of lining epithelium)
- ❖ Hematemesis (vomiting blood)
- ❖ Melena (passing black stool)
- ❖ Stricture (narrowing of the wall of esophagus)
- ❖ Barrett's esophagus

1

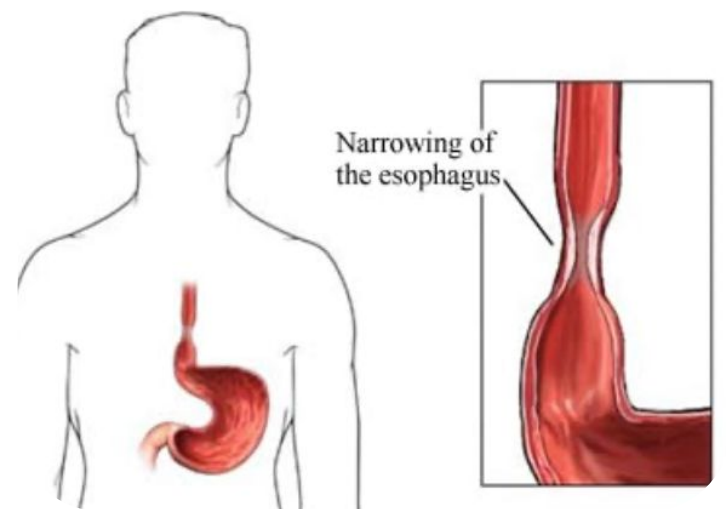
## Erosive esophagitis and ulceration

- ❖ Responsible for 40-60% of GERD symptoms
- ❖ Severity of symptoms often fail to match severity of erosive esophagitis
- ❖ Red mucosa with erosions and ulceration in severe cases with hematemesis and melena

2

## Esophageal stricture

- ❖ Result of healing of erosive esophagitis
- ❖ May need dilation
- ❖ Dysphagia (difficulty in swallowing)



3

## ★ Barrett's esophagus MOST IMPORTANT COMPLICATION

- ❖ Occurrence 8-15%
- ❖ Definition: Intestinal metaplasia of the esophagus due to long term ulceration & erosion of lower esophagus
- ❖ Is a complication of chronic GERD that is characterized by intestinal metaplasia within the esophageal squamous mucosa
  
- ❖ Occur In 10% of individuals with symptomatic GERD
- ❖ Most common in white males and Typically Presents between 40 and 60 years
- ❖ Barrett Esophagus can only be identified through endoscopy and biopsy, due to GERD symptoms
- ❖ Change into glandular epithelium

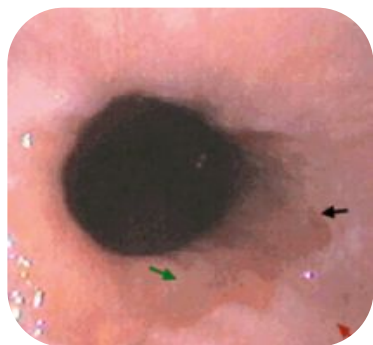


# Pathophysiology of Barrett's syndrome :

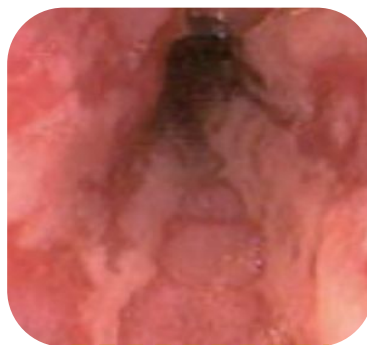
1. Acid damages lining of esophagus and causes chronic esophagitis
2. Damaged area heals in a metaplastic process and abnormal columnar cells replace squamous cells
3. **This specialized intestinal metaplasia can progress to dysplasia and adenocarcinoma** (Barrett esophagus is a precursor lesion to cancer). The presence of dysplasia, a preinvasive change, is associated with prolonged symptoms, longer segment length, increased patient age, and Caucasian race.

**Low-grade dysplasia:** cytological changes e.g. nuclear stratification, hyperchromasia and increased nuclear-to-cytoplasmic ratio

**High-grade dysplasia:** Architectural irregularities, including gland-within-gland, or cribriform pattern in addition to cytological changes



Hyperemia



Erosion

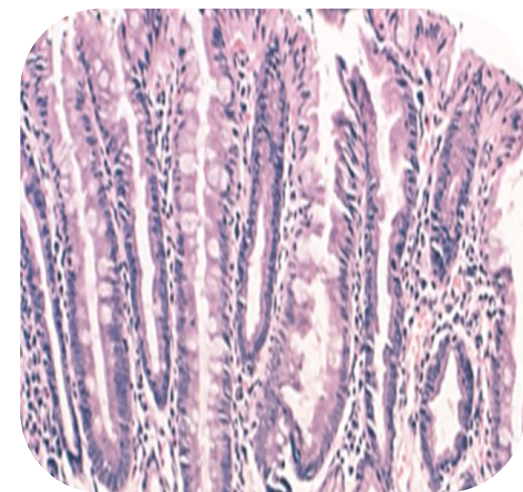
Endoscopic image of Barrett's esophagus: An area of red mucosa



Adenocarcinoma



Metaplasia



Barrett's esophagus is marked by the presence of columnar epithelium with goblet cells in the lower esophagus, replacing the normal squamous epithelium

- ❖ The most common malignant tumors of the esophagus are squamous carcinomas and adenocarcinomas
- ❖ The prognosis for both types of carcinoma is poor

Adenocarcinoma	Esophageal squamous cell carcinoma (not related to GERD)
<ul style="list-style-type: none"> <li>❖ Most esophageal adenocarcinomas arise from Barrett esophagus</li> <li>❖ Other risk factors: tobacco use and exposure to radiation.</li> <li>❖ The risk is reduced by diets rich in fresh fruits and vegetables</li> <li>❖ <b>Morphology:</b> Occurs in the distal third of the esophagus and may invade the adjacent gastric cardia</li> <li>❖ <b>Microscopically:</b> well to poorly differentiated adenocarcinoma</li> <li>❖ Present with pain or difficulty in swallowing, progressive weight loss, hematemesis, chest pain, or vomiting</li> </ul>	<ul style="list-style-type: none"> <li>❖ Most common in the middle and lower esophagus.</li> <li>❖ They mostly develop in men who are <b>heavy alcohol drinkers or heavy smokers</b>, and may be preceded by epithelial dysplastic change.</li> <li>❖ <b>Benign → dysplasia → cancer</b></li> <li>❖ <b>May occur due to vitamin deficiency</b></li> </ul>



# Summary

## GERD

<b>GERD</b>			
<b>Definition</b>	<p>limit, causing symptoms with or without associated esophageal mucosal injury Occurs when the amount of gastric juice (The acids) that refluxes into the esophagus exceeds the normal-</p> <p>-symptoms, mucosal damage OR both produced by the abnormal reflux of gastric content into the esophagus ‘ Often chronic and relapsing. Patients who lack typical symptoms may develop complications</p>		
<b>Etiology</b>	<p>A. Abnormal lower esophageal sphincter B. Increase abdominal pressure</p>		
<b>Pathophysiology</b>	<p>Gastric acid refluxes into esophagus because of incompetent LES (decreased muscular tone); untreated GERD can lead to Barrett esophagus</p>		
<b>Clinical Manifestations</b>	<p>Typical symptoms: Characterized by heartburn, which worsens after meals, when lying down, and when bending , Regurgitation , or abdominal contractions Atypical symptom : Coughing , Chest pain , Wheezing</p>		
<b>Complications of GERD</b>	Reflux esophagitis	<b>Definition</b>	Reflex of the gastric juice is the commonest cause of esophagitis
		<b>Morphology</b>	<ul style="list-style-type: none"> <li>- Eosinophils (Most commonly) and neutrophils</li> <li>- Elongation of lamina propria papillae</li> <li>- Basal zone hyperplasia</li> </ul>
		<b>Complication of RE</b>	<ul style="list-style-type: none"> <li>- Erosive esophagitis</li> <li>- Stricture</li> <li>- Barrett’s Esophagus Associated with the development of adenocarcinoma</li> </ul>





# QUIZ!

## MCQs

<b>01   Which of the following is a symptom of pathological GERD?</b>			
A) short lived	B) Asymptomatic	C) Postprandial	D) Nocturnal symptoms
<b>02   Which of the following explains GERD?</b>			
A) Abnormal upper esophageal sphincter	B) Abnormal duodenal sphincter	C) Increased abdominal pressure	D) Decreased abdominal pressure
<b>03   One of the most common symptom of GERD is</b>			
A) Coughing	B) Chest pain	C) Wheezing	D) Dysphagia
<b>04   Which of the following complication of chronic GERD that is characterized by intestinal metaplasia within the esophageal squamous mucosa</b>			
A) Erosive esophagitis and ulceration	B) Hematemesis	C) Melena	D) Barrett's esophagus
<b>05   In Barrett's syndrome, specialized intestinal metaplasia can progress to</b>			
A) Squamous carcinoma	B) Melanoma	C) Adenocarcinoma	D) Meningioma
<b>06   What are the two morphologic variants account for a majority of esophageal cancers</b>			
A) Squamous carcinoma	B) Melanoma	C) Adenocarcinoma	D) Both A & C

MCQs Answer key	01	02	03	04	05	06
	D	C	D NOT IN THE SLIDES BUT FROM ROBBINS	D	C	D

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Nada Bin Obied



Ghaida  
Almarshoud



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Shayma  
Alghanoum



Raghad  
Alassiry



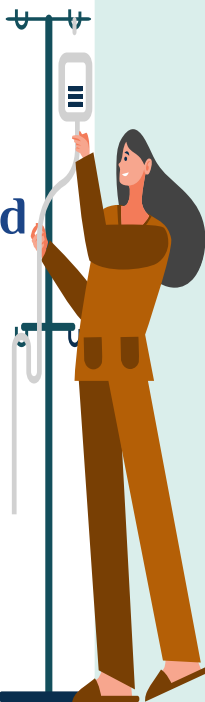
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