



## Lecture 1

# Gastroesophageal Reflux Disease (GERD)



PATHOLOGY TEAM 435

{ ومن لم يذق مرّ التعلّم ساعةً.. تجرع ذلّ الجهل طوال حياته }

Revised by

خولة العماري & هشام الغفيلي

Red: Important.

Grey: Extra Notes

Doctors Notes will be in text boxes

## **Objectives:**

The student should:

### **❖ Define gastroesophageal reflux disease**

- Symptoms of mucosal damage produced by the abnormal reflux of gastric contents into the esophagus.
- Physiologic vs. pathologic.

### **❖ Understand the Pathophysiology of reflux esophagitis.**

- Abnormal lower esophageal sphincter or increased abdominal pressure

### **❖ Know clinical features of reflux esophagitis**

- Heartburn, Regurgitation.
- Atypical symptoms (coughing, chest pain, and wheezing).

### **❖ Describe the pathological features of reflux esophagitis**

- Eosinophils and neutrophils.
- Elongation of lamina propria papillae.
- Basal zone hyperplasia.

### **❖ Know the complications of reflux esophagitis**

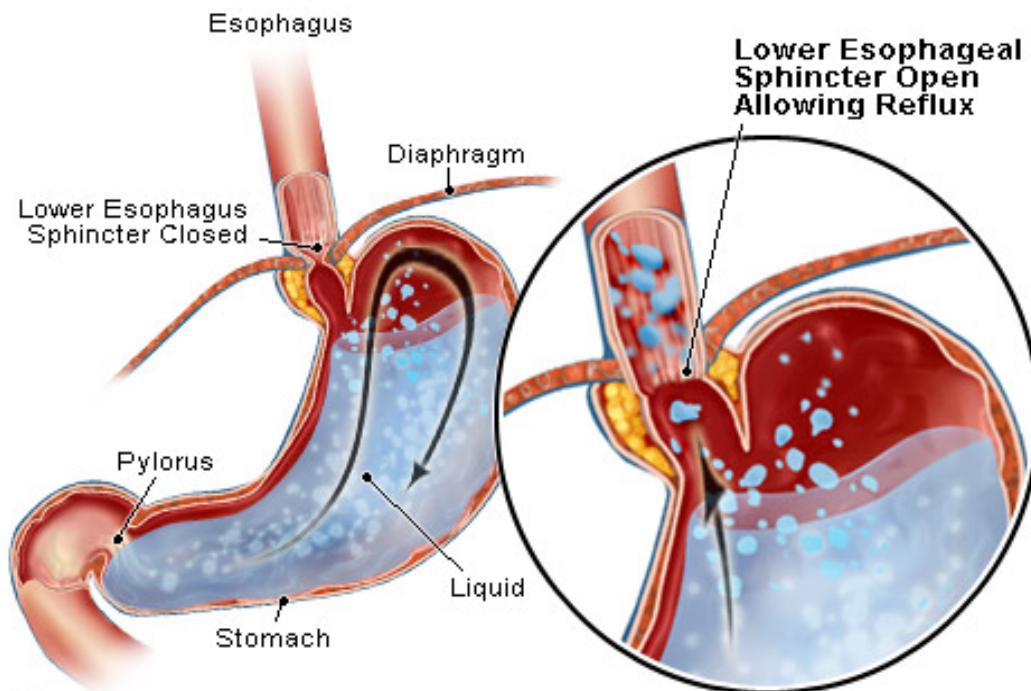
- Erosive esophagitis.
- Stricture.
- Barrett's esophagus, dysplasia and adenocarcinoma.

## **References:**

**Lecture slides & Robbins.**

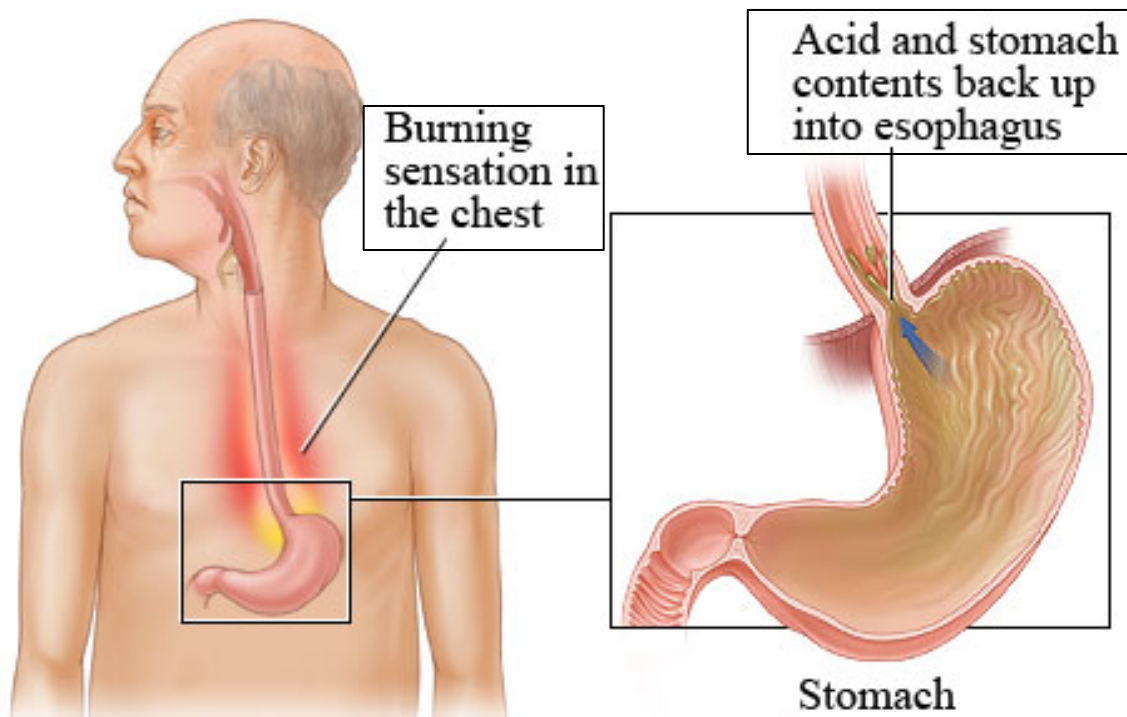
## Reflux Esophagitis:

- Symptoms of 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.



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## Gastroesophageal Reflux



## Gastroesophageal Reflux Disease (GERD):

- **Gastroesophageal reflux** is a normal physiologic phenomenon experienced intermittently by most people, particularly after a meal.
- **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**.

## Physiologic vs. Pathologic:

Distinction between normal and GERD is blurred because some degree of reflux is physiologic in all folks.

Physiologic GER	Pathological GER
<ul style="list-style-type: none"> <li>– Postprandial<sup>1</sup></li> <li>– Short lived<sup>2</sup></li> <li>– Asymptomatic</li> <li>– No nocturnal symptoms</li> </ul>	<ul style="list-style-type: none"> <li>– Symptoms (eg. Heart pain).</li> <li>– Mucosal injury.</li> <li>– Nocturnal symptoms<sup>3</sup>.</li> </ul>

## Causes of Reflux Esophagitis:

- Esophagitis is **rarely** caused by agents other than reflux.
- Acute esophagitis may be caused by:

Infective agents	Physical agents
<ul style="list-style-type: none"> <li>○ <b>Fungal infection</b> (mainly by <i>Candida albicans</i>) is common.</li> <li>○ Viral infections of the esophagus (particularly by herpes simplex and cytomegalovirus) are seen in AIDS patient</li> <li>○ Bacterial infection is very rare.</li> </ul>	<ul style="list-style-type: none"> <li>○ Irradiation</li> <li>○ Chemical: Ingestion of caustic agent</li> </ul>

Fungal and viral usually affect the Immunocompromised.

Irradiation: for example: Hodgkin's disease or lymphoma and they give him radiation which is called radiation injury

Chemical: Incidental or on suicidal attempts lead to severe injury

<sup>1</sup> After eating.

<sup>2</sup> Seconds to a couple of minutes only.

<sup>3</sup> Symptoms during sleep.

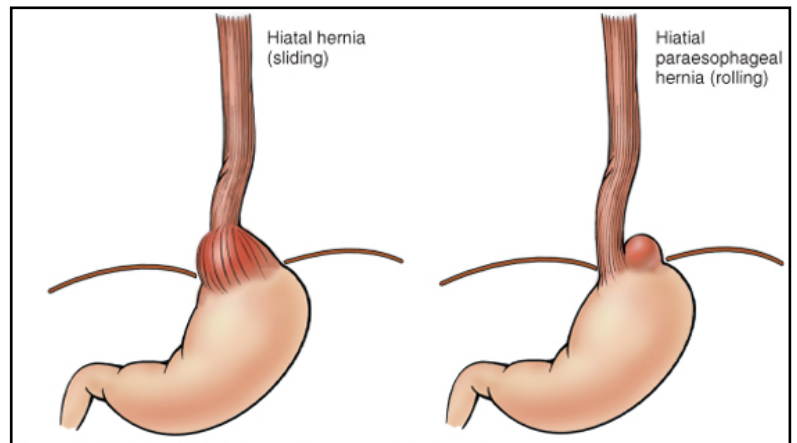
## Pathophysiology:

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

Abnormal lower esophageal sphincter	Increased Abdominal Pressure
<p><b>The most common cause of GERD:</b></p> <ul style="list-style-type: none"> <li>▪ <b>Functional</b> (frequent transient LES relaxation).</li> <li>▪ <b>Mechanical</b> (hypotensive LES).</li> </ul> <p><b>Decrease the pressure of the LES:</b></p> <ul style="list-style-type: none"> <li>▪ Foods (eg, coffee, alcohol).</li> <li>▪ Medications (eg, calcium channel blockers).</li> <li>▪ <b>Location (hiatal hernia).</b> <ul style="list-style-type: none"> <li>○ Hiatal hernia present in ~70% of people with GERD</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Obesity.</li> <li>▪ Pregnancy.</li> <li>▪ Increased gastric volume.</li> </ul> <p>Even with normal Sphincter</p>

X-ray shows gas behind the heart

- Location (hiatal hernia): sometimes it's herniated that means the stomach is bulging into the esophagus.
- Sometimes it bulges on one part so it's called para-esophageal hernia.
- Some congenital & some acquired.



- The severity of symptoms is **not** closely related to the degree of histologic damage.
- The degree of histologic damage tends to increase with disease duration.
- GERD is most common in adults older than 40 years of age but also occurs in infants and children.

- **Most common symptoms:**

- **Heartburn:** retrosternal burning discomfort.
- **Dysphagia.**
- **Regurgitation:** effortless return of gastric contents into the pharynx without nausea, retching, or abdominal contractions.

Most common is heartburn sometimes it's so severe they think it's a myocardial infarction.

- **Atypical symptoms:**

- **Coughing.**
- **Chest pain** (Rarely, chronic GERD is punctuated by attacks of **severe chest pain** that may be mistaken for heart disease).

When a patient comes to the ENT complaining about chest pain and his ECG is normal, think about **GERD**

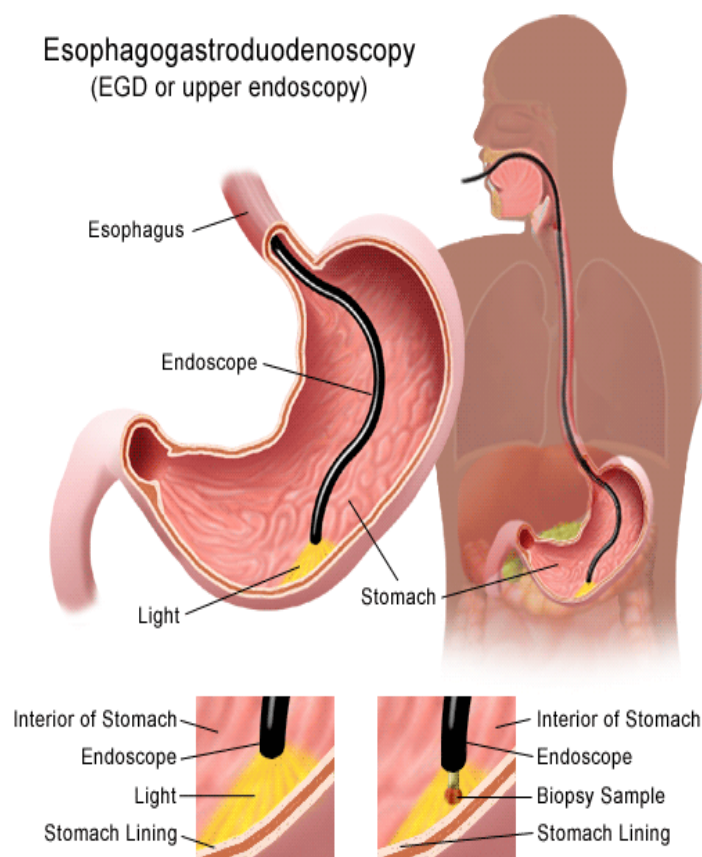
- **Wheezing.**

- Other symptoms could be cough and so on, some of the asthma's underlying cause is GERD.
- Clinically if symptoms are obvious we directly diagnose it and give the proper treatment.
- Sometimes we need to do more investigations.

### Esophagogastroduodenoscopy:

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

We do this when patient has severe symptoms, to exclude complications





## pH:

- 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

## Complications:

### ▪ Erosive esophagitis:

- Responsible for 40-60% of GERD symptoms.
- Severity of symptoms often fail to match severity of erosive esophagitis.
- Red mucosa with erosions leading to hematemesis and melena.

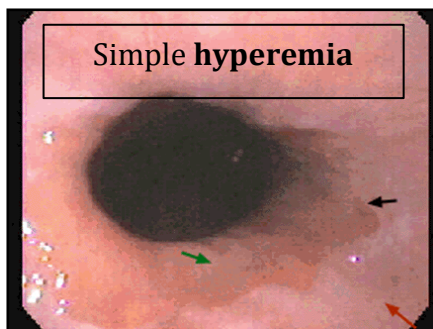
Loss of **part** of the mucosal lining



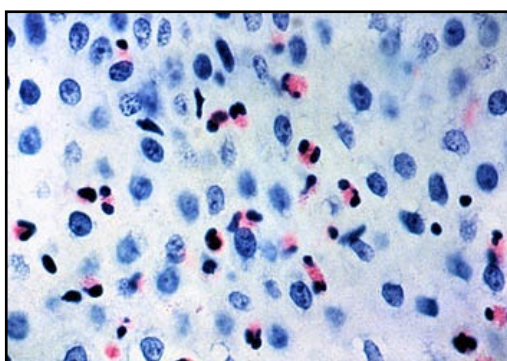
Hematemesis: vomits blood  
 Melena: passing black stool due to hemorrhage in the upper GIT (if lower it will appear red)

## Morphology of esophagitis:

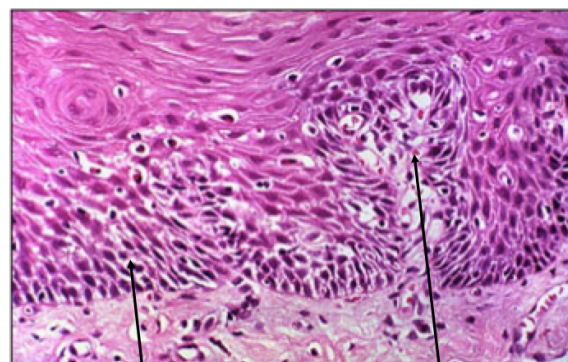
Mild	The mucosal histology is often unremarkable.
Progressing (Severe injury)	<ul style="list-style-type: none"> <li>▪ <b>Eosinophils</b> are recruited into the squamous mucosa, followed by neutrophils.</li> <li>▪ <b>Basal zone hyperplasia</b> exceeding 20% of the total epithelial thickness.</li> <li>▪ <b>Elongation of lamina propria papillae</b>, such that they extend into the upper third of the epithelium.</li> </ul>



- Edematous, red (hyperemia), inflamed and sometimes normal.
- Superficial erosion.
- At the beginning there are no symptoms.
- Usually it's not deep.
- When its progressing and stays for longer time we see fibrosis & stricture meaning it heals by fibrosis



Eosinophils and neutrophils



basal zone hyperplasia >20% of total epithelial thickness

Elongation of lamina propria papillae

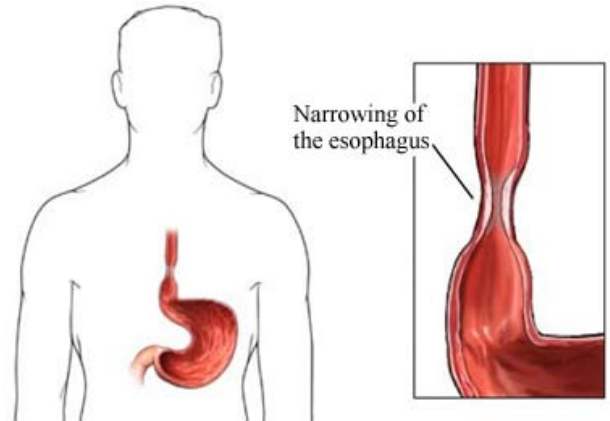
- Inflammation (eosinophils & neutrophils) in squamous epithelium.
- Papillae are elongated usually it only occupies 1/4 but in GERD those are elongated and reach 70%
- Basal zone hyperplasia usually we have one cell layer but here they become multiple layers and occupy 20%.
- When I see those three changes they are diagnostic features of GERD only in lower esophagus.

### Stricture:

Stenosis secondary to fibrosis

- Result of healing of erosive esophagitis.
- May need dilation.
- 4-20% of patients.

Dilation by a balloon and if it doesn't respond we do surgery.



### Barrett's esophagus:

Intestinal metaplasia of the esophagus, Associated with the development of **adenocarcinoma**.

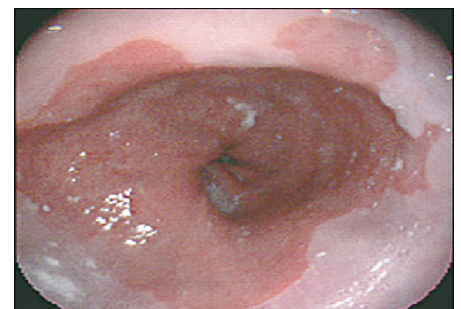
- 8-15%

Replacement of normal stratified squamous epithelium into **columnar epithelium with goblet cells**.

Stomach doesn't have goblet cells and that's how you know it's esophageal.

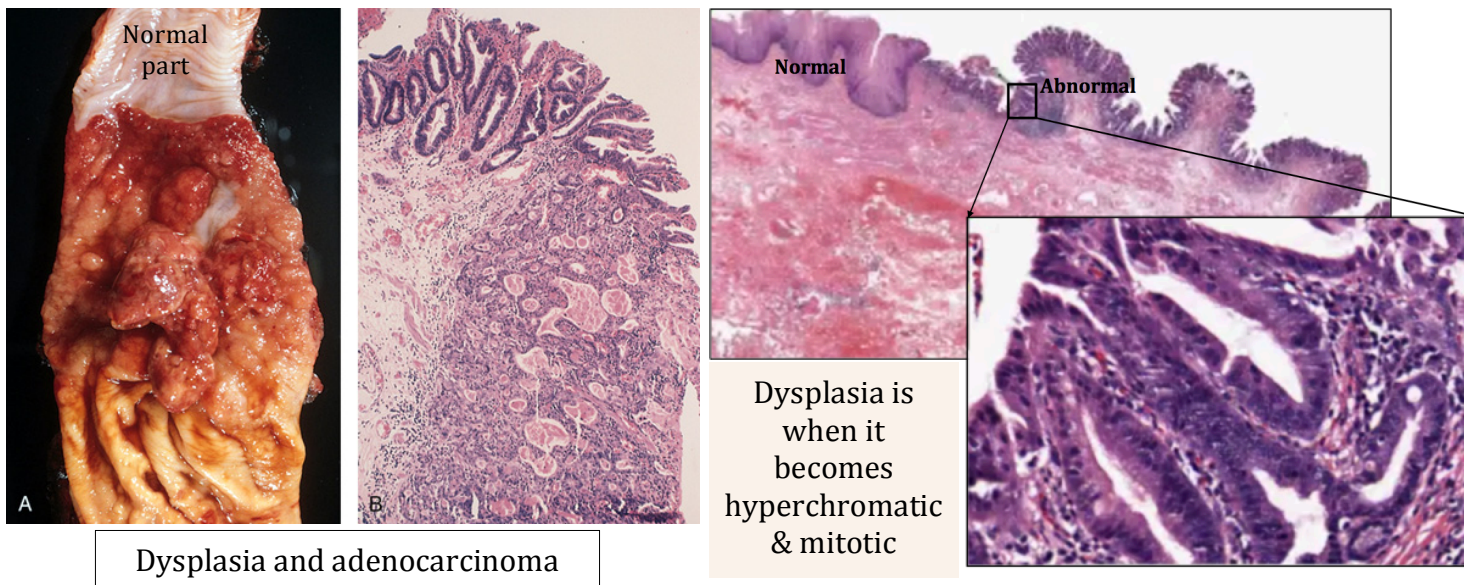
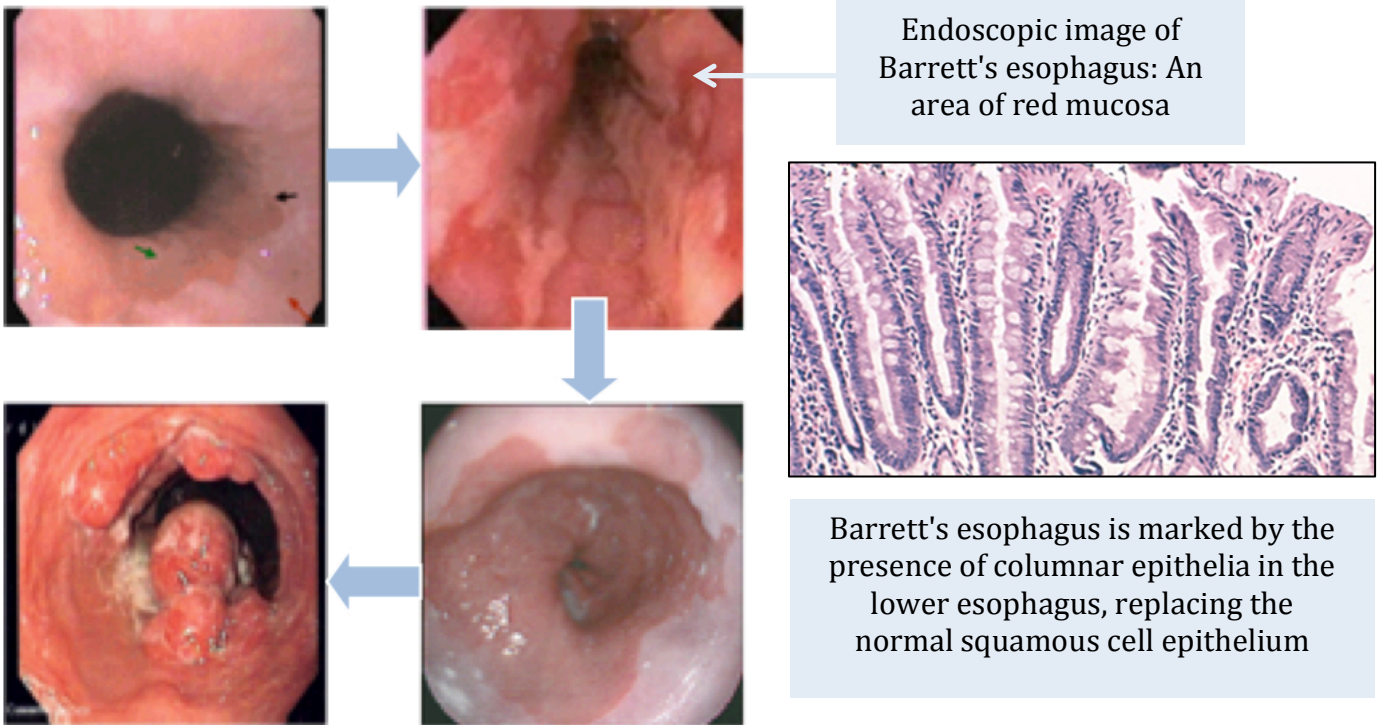
### Pathophysiology:

- Acid damages lining of esophagus and causes chronic esophagitis.
- Damaged area heals in a metaplastic process and **abnormal columnar cells** replace squamous cells.
- Many patients with Barrett's are asymptomatic.



Those are abnormal cells; the progression may lead to dysplasia → cancer precursor





## Summary:



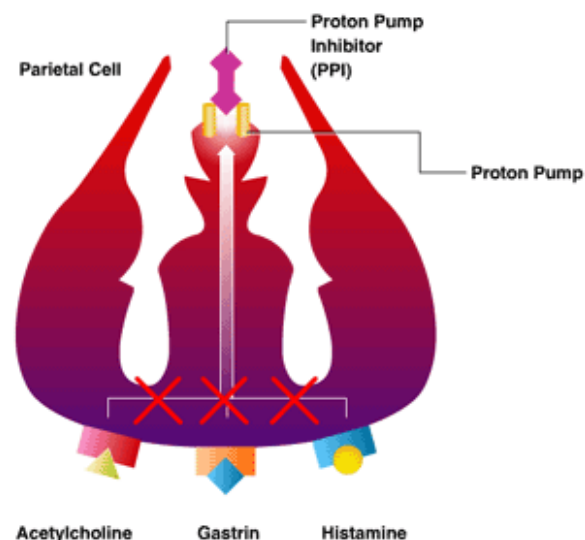
- Associated with prolonged symptoms, longer segment length, increased patient age, and Caucasian race.
- The vast majority of **esophageal adenocarcinomas** are associated with **Barrett esophagus**.
- Most individuals with Barrett esophagus **do not** develop esophageal tumors.

## Further reading:

### Treatment:

- H<sub>2</sub> receptor Blockers
- Proton pump inhibitors (reduces gastric acidity and typically provides symptomatic relief.)
- Antireflux surgery
- Once established h&p dx and no alarm symptoms can proceed with dx/therapeutic trial of tx.

If the patient is not improving we go for antireflux surgery



### Epidemiology:

- About 44% of the US adult population have heartburn at least once a month.
- 14% of Americans have symptoms weekly, 7% have symptoms daily.
- Prevalence of Symptoms of Gastroesophageal Reflux in a Cohort of Saudi Arabians: A Study of 1265 Subjects.
- The mean age was  $29.97 \pm 11.58$  years. Females formed 67.81% of the respondents and 62.73% had one or more episodes of heartburn per week.
- The prevalence of GERD in the surveyed population was 45.4%. GERD was more prevalent in older individuals (mean age 31.9 vs. 30.0 years) and in those with a higher BMI. - Saudi J Gastroenterol. 2014 Jul-Aug; 20(4): 248–254.

# Check Your Understanding

## MCQs:

- 1. Abnormal lower esophageal sphincter or increased abdominal pressure are characteristics of?**
  - A. Reflux Esophagitis
  - B. Peptic ulcers
  - C. Pancreatitis
  - D. None of the above
- 2. Which of the following is an atypical clinical feature of reflux esophagitis?**
  - A. Heartburn
  - B. Regurgitation
  - C. Coughing
  - D. All of the above
- 3. Which of the following is one of the characteristic features of dysplasia?**
  - A. Eosinophils
  - B. Neutrophils
  - C. Macrophages
  - D. Hyperchromatic cells
- 4. Which of the following is NOT a complication of reflux esophagitis?**
  - A. Erosive esophagitis
  - B. Hemorrhage
  - C. Stricture
  - D. Barrett's esophagus
- 5. What can we see in a severe progressing esophagitis?**
  - A. Eosinophils
  - B. Basal zone hyperplasia
  - C. Macrophages
  - D. A+B
- 6. Replacement of normal stratified squamous epithelium into columnar epithelium with goblet cells, is:**
  - A. Barrett's esophagus
  - B. Adenocarcinoma
  - C. Strictures

1:A 2:C 3:D 4:B 5:D 6:A

Team Members:

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فهد عبداللطيف      نوف التويجري

فاطمة الدين  
فتون الصالح  
كوثر موسى  
لميس آل تميم  
لولوه الصغير  
مريم سعيدان  
منيرة العيوني  
مي العقيل  
نورة الخراز  
نورة الطويل  
نوف الرشيد  
نوف عبدالكريم

أثير النشوان  
الجوهرة المزروع  
إلهام الزهراني  
بدور جليدان  
خولة العماري  
دانيا الهنداوي  
دانة عمله  
ديما الفارس  
رزان السبتي  
رغد المنصور  
سارة القحطاني  
شما السهيلي

محمد الدغيث  
معاذ باعشن  
عبدالناصر الوايل  
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محمد الزاحم  
عبدالعزيز الزيدان  
عبدالله الفريح  
ماجد العسبلي  
عبدالله العليوي  
عبدالرحمن الناصر  
محمد الفضل

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قال صلى الله عليه وسلم: {من سلك طريقاً يلتمس فيه علماً سهل الله له به

طريقاً إلى الجنة}

دعواتنا لكم بالتوفيق

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