Peptic ulcer disease

Objectives:

Upon completion of this lecture the students will :

1. Understand the Pathophysiology of acute and chronic peptic ulcer
2. Know the possible causes of gastric and duodenal ulcers with emphasis on most common causes (H pylori and drugs)
3. Recognize the gross and microscopic features of peptic ulcer
4. Recognize the clinical features and consequences of acute and chronic peptic ulcer

Important note: **Please check out this link before viewing the file to know if there are any additions or changes. The same link will be used for all or our work: Pathology Edit.**

Ulcer 

Definition: **a breach in the mucosa of the alimentary tract that may extend through** muscularis mucosa into submucosa or deeper.

The distinction of an erosion from an ulcer is based on the **depth** of the mucosal break.
Ulcer: penetrates the muscularis mucosae whereas an erosion does not.

Types:

1. Peptic Ulcer: Acute peptic ulcer and Chronic peptic ulcer.
2. Stress Ulcer: Acute gastric ulcers. (Ulcer during physiologic **stress** of serious illness, most commonly affecting critically ill patients with shock,sepsis,or severe trauma.)

Peptic Ulcer:

It is an ulcer in the lining of the *stomach* (gastric ulcer)or first part of the small intestine, the *duodenum (duodenal ulcer)*. It can be *Acute* or *Chronic*.

Clinical Features:

- Epigastric pain (the most common symptom).
- Gnawing[1] or burning sensation.
- Occurs 2-3 hours after meals
- Relieved by food or antacids (that's why mostly they are overweight)
- Patient awakens with pain at night.
- Some present with complications such as *iron deficiency anemia*, *frank*[2] *hemorrhage (bleeding ulcer)*, or *perforation*.

[1] dull, constant or hunger pain.
[2] Clear

Pathophysiology

Defensive Factors: are normally present in our GIT.

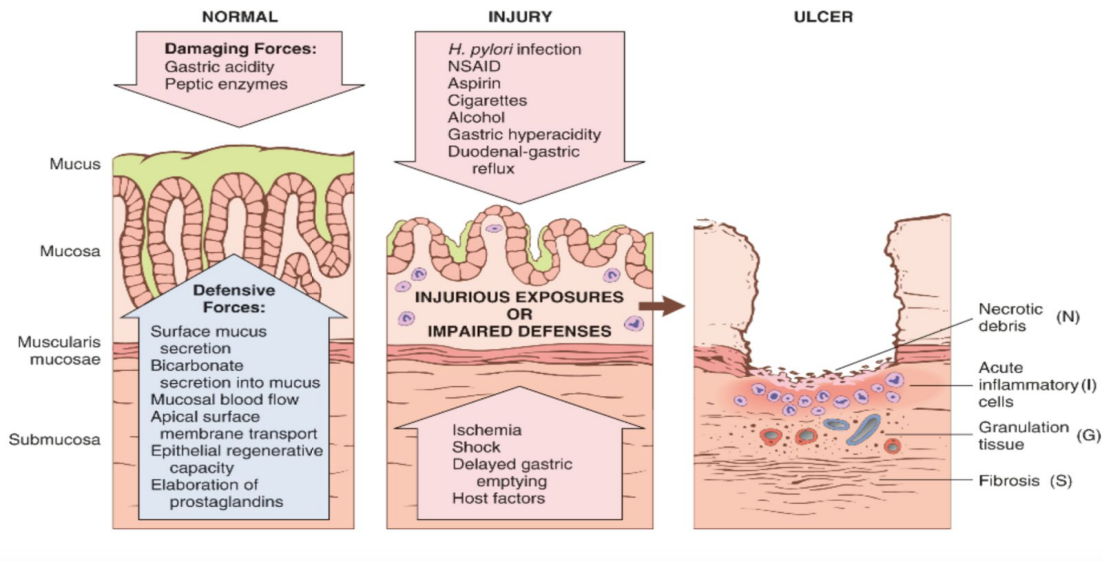
Aggressive Factors: some are normally present and some are acquired.

increase in aggressive factors or decrease in defensive factors → **Peptic ulcer.**

For example:

- Tumor cells → increase secretion of acid → peptic ulcer .
- Car accident patient → hemorrhage → decreased blood flow → ischemia → peptic ulcer .
- NSAIDs → inhibits prostaglandins and cyclooxygenase → decrease the bicarbonate + vascular perfusion

Aggressive Factors	Defensive Factors
H.Pylori[3] (Helicobacter pylori)	Mucus (lining in stomach to protect from acid)
Drugs e.g NSAIDs	Prostaglandins (normally synthesized by cell membrane)
Acid e.g:food	Blood Flow
Pepsin	Cell Renewal
Bile Salts	Bicarbonate
	Phospholipids



Mechanisms of gastric injury and protection. This diagram illustrates the progression from more mild forms of injury to ulceration that may occur with acute or chronic gastritis. Ulcers include layers of necrotic debris **(N)**, inflammation **(I)**, and granulation tissue **(G)**; a fibrotic scar **(S)**, which develops over time, is present only in chronic lesions.

[3] e.g: from contaminated food or water or close contact with infected person.

Complications:

- Hemorrhage.
- Penetration of the ulcer to the full thickness of the stomach or duodenal wall, progressing into adherent underlying tissue, particularly the pancreas or liver. Penetration of the pancreas often manifests clinically as severe back pain.
- Perforation[4], which leads to peritonitis[5].
- Fibrous stricture, seen in peptic ulcer of the esophagus and the stomach (pyloric stenosis) ulcer→ inflammation→ fibrosis→ shrinkage→ stricture.
- Malignant change, extremely uncommon.

Treatment: *Not in the objectives, yet it's mentioned

1. H. pylori eradication (Antibiotics)
2. Neutralization of gastric acid and acid suppression (proton pump inhibitors and H2 blockers)

Acute Peptic Ulcer

Pathophysiology:

As a part of an acute gastritis	As a complication of a severe stress response	As a result of extreme *hyperacidity*
Acute response to an irritant 'chemical' injury by drugs(NSAIDs) or alcohol. (NSAID-induced ulcers are caused by direct chemical irritation as well as cyclooxygenase inhibition, which prevents prostaglandin synthesis).	Severe burns (Curling's ulcer): loss of high amount of fluids → Hypovolemia → decreased blood flow to the stomach→ hypo-perfusion→ decrease protective mechanism ulceration.	Zollinger-Ellison syndrome: Which is multiple peptic ulcerations in the stomach, duodenum, and even jejunum, is caused by uncontrolled release of gastrin by a tumor and the resulting massive acid production.
	Major trauma (Stress ulcer): bleeding→ hypotension → hypo-perfusion → decrease protective mechanism (trauma anywhere in the body).	
	Cerebrovascular accident (Cushing ulcer): increase in intracranial pressure→ which causes direct stimulation of vagal nuclei→ gastric acid hyper-secretion. (trauma to the head).	

[4] ثقب

[5] Inflammation of the peritoneum (the serous membrane lining the cavity of the abdomen and covering the abdominal organs)

Chronic Peptic Ulcer "Peptic Ulcer Disease"

Location:

- May occur in any portion of the GI tract exposed to acidic gastric juices
- 98% located in first portion of duodenum or stomach, ratio = 4:1
- Esophagus, as a result of GERD or acid secretion by ectopic gastric mucosa.
- Gastric mucosa within a Meckel diverticulum[6] can result in peptic ulceration of adjacent mucosa.

Types

1- Gastric Ulcer 10% (peptic ulcers in the stomach)

Breakdown of mucosal defence is much more important than excessive acid production.

The mucosal defences against acid attack consist of either :

A. Mucus-bicarbonate barrier: Duodeno-gastric reflux[7] (bile reflux). less frequent
B. The surface epithelium.
   - NSAIDs (blocking the synthesis of the prostaglandins).(second major cause)
   - *H. pylori* infection (cytotoxins and ammonia). **75% of cases (major cause)**

H.pylori→ Increase gastrin release because of ammonia, (produced by bacteria urease) + vacuolating cytotoxin→ Ulcer formation.

2- Duodenal Ulcers

Usually arise **from Increased production of Acid** (More frequent in duodenal ulcer) due:
1- H.pylori 95 % infected individuals secrete 2-6 times as much acids as no infected persons.
2- Rarely Zollinger-Ellison syndrome.
Helicobacter Pylori does not colonise normal duodenal epithelium.
Excess acid → gastric metaplasia → H.pylori colonization→ duodenal ulceration.(gastric metaplasia paves[8] the way of H. pylori colonization)
*Means that H.pylori effect mostly stomach and duodenum after its epithelium is changed into gastric epithelial.
*Increased production of acid + H.pylori = duodenal ulcer
Present with **epigastric pain and that relives with meals.** (while gastric ulcer worsens with meals)

- *Biopsy is required of definitive diagnose.*

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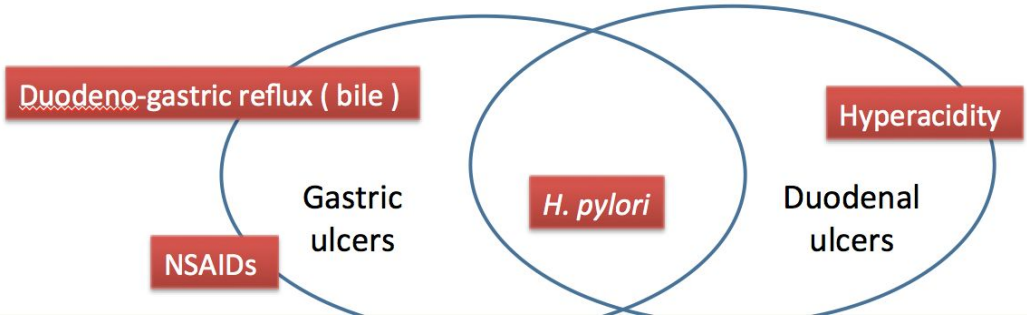
[6] Is a slight bulge in the small intestine present at birth and a vestigial remnant of the omphalomesenteric duct (also called the vitelline duct or yolk stalk).
[7] Is a condition that occurs when bile flows upward (refluxes) from the duodenum into the stomach and esophagus.
[8] يمهد الطريق

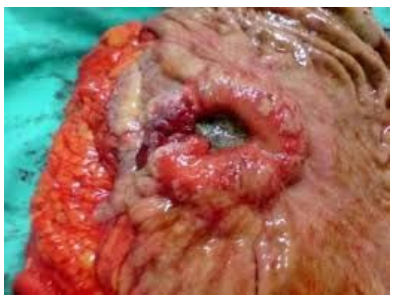
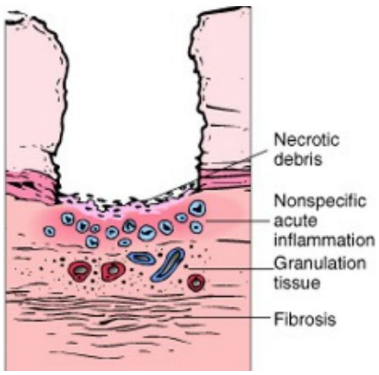
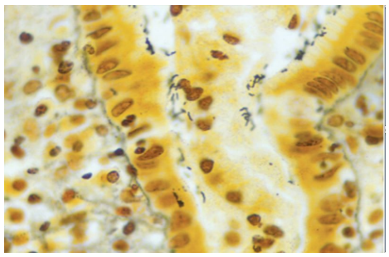
Pathophysiology of Chronic peptic ulcer:



- **H.pylori infection** of the pyloric antrum is present in nearly all patients with **chronic duodenal** ulcer and approximately 75% of patients with chronic gastric ulcer.
- Although more than 70% of individuals with Peptic Ulcer Disease are infected by *H. pylori*, fewer than 20% of *H. pylori*–infected individuals develop peptic ulcer.

بمعنى معظم الناس اللي عندهم PUD بسبب ← H.pylori.
PUD منهم ٢٠٪ فقط← عندهم H.pylori بس ليس كل المصابين

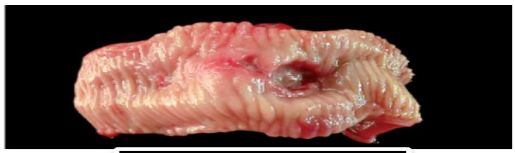
Morphology:

Gross	Microscopy	
		
- Usually less than 20 mm in diameter but they may > 100 mm in diameter. - The classic peptic ulcer is a round to oval, sharply punched-out defect. - In contrast, heaped-up margins are more characteristic of cancers.(see the pic above)	The base consists of *necrotic tissue* and *polymorph exudate* overlying *inflamed granulation tissue* which merges with mature *fibrous (scar) tissue*.	spiral shaped H.pylori bacilli are highlighted in Warthin-starry silver stain.

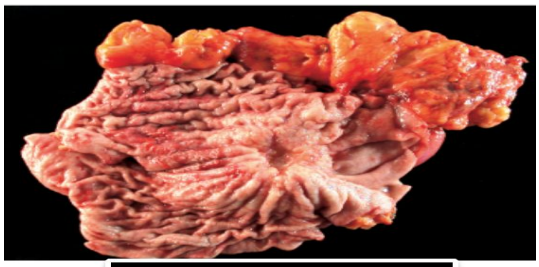
Differential Diagnoses:

Malignant Gastric Ulcer

Malignant ulcers are the complications of an untreated chronic gastric ulcers.



Benign peptic ulcer



Malignant peptic ulcer

Summary

Peptic Ulcers:

It is an ulcer in the lining of the *stomach* or first part of the small intestine, the *duodenum*.

	Chronic Peptic ulcer			Acute Peptic Ulcer
Location	Any portion of the GI tract exposed to acidic gastric juices. 98% in Stomach & Duodenum			Stomach
Causes	Esophagus	Stomach	Duodenum (75%)	-Chemical irritations - Extreme hyperacidity (could be in duodenum & jejunum also)
	GERD	-Duodeno-gastric reflux (Mucus-bicarbonate barrier) -NSAIDs & *H. Pylori* infection, (The surface epithelium)	- Excess acid> gastric metaplasia > H. pylori colonization which is a 95% of the causes. -Rarely ZE syndrome -Increased aggressive factors.	
Complications	*-Rupture lead to bleeding from gastroduodenal artery -Acute pancreatitis*			1-severe burns (Curling's ulcer) 2-major trauma (stress ulcer) 3-cerebrovascular accident (Cushing ulcer)
	-Hemorrhage -Penetration of the stomach or duodenal wall >progressing into adherent underlying tissue, particularly the pancreas (severe back pain) or liver. -Perforation > peritonitis. -Fibrous stricture (in esophagus & stomach). (pyloric stenosis) -Malignant change (uncommon)			
Clinical Features	-Epigastric pain (most common) -Gnawing or burning sensation (2-3 hours after meals) -Patient awakens with pain at night. *Some present with: -Iron deficiency anemia -Frank hemorrhage -Perforation.			
Treatment	1- H. pylori eradication (Antibiotics) 2- Neutralization of gastric acid and acid suppression (proton pump inhibitors and H2 blockers)			

MCQ

1- A 55-year-old man presents with upper gastrointestinal bleeding and is found to have multiple ulcers in the duodenum. Workup finds his serum gastrin levels to be markedly elevated, and an abdominal CT scan finds a large mass in the tail of the pancreas. A biopsy from this pancreatic mass finds an islet-cell adenoma that secretes gastrin. Which of the following is the best diagnosis?

A. Hypertrophic-hypersecretory gastropathy
B. Linitis plastica
C. Verner-Morrison syndrome
D. Zollinger-Ellison syndrome

2- gastric ulcer is due to:

A. Increased production of Acid.
B. Breakdown of mucosal defence.
C. GERD.
D. None of the above

3.An important risk factor for peptic ulcer hemorrhage includes:

A. Corticosteroid use.
B. Cigarette smoking.
C. Non-steroidal anti-inflammatory drug use.
D. Ethanol consumption.

***4.Helicobacter pylori* bacteria:**

A. Live in gastric acid.
B. Are never seen in healthy people.
C. Are associated with peptic ulcer relapse.
D. Non invasive bacteria

5.The most frequent cause of UGI bleeding is:

A. Esophageal varices.
B. Peptic ulcer disease.
C. Angiomata.
D. GERD

6. Which is not true of H.pylori infection?

A. 80% of patients with chronic infection will develop ulcers
B. the most common cause of peptic ulcer disease
C. it is a risk factor for adenocarcinoma of the stomach
D. IgG antibody test will remain positive for up to 2 years post eradication limiting its usefulness

Answers: 1-D ,2-B ,3-C ,4-C ,5-B ,6-A.

SAQs

A 30-year-old male banker complains of midepigastric gnawing and boring pain for the last week. The pain is worse at night and is somewhat better imme- diately after he eats. He has not had any fever, nausea, or vomiting. He takes approximately one 500-mg acetaminophen tablet a week for headaches but does not take any other medications. Upper endoscopy reveals a 2-cm mucosal defect in the antrum of the stomach. There is mild edema in the adjacent mucosa, but there is no thickening of the edges of the ulcer.

◆ **Most likely diagnosis:**
Peptic ulcer disease.
◆ **Long-term complications:**
Erosion or perforation with bleeding;
gastric carcinoma in patients with chronic gastritis.
◆ **Most likely mechanism:**
Most often associated with *Helicobacter pylori* organisms that produce bacterial urease and protease, damaging the mucus layer and exposing the underlying epithelium to acid-peptic injury.

Online Quizzes:

http://library.med.utah.edu/WebPath/EXAM/MULTORG/gi1frm.htm

For any suggestions or questions please don't hesitate to contact us on: Pathology434@gmail.com
Twitter: @Pathology434
Ask us: www.ask.fm/Pathology434

GOOD LUCK !!

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