بسم الله الرحمن الرحيم
ASSESSMENT OF ETIOLOGIC INFECTIOUS AGENTS OF PEPTIC ULCERS & TREATMENT

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Definition:

- A peptic ulcer, sometimes called a stomach ulcer, is a sore that forms in the lining of the stomach or of the duodenum.
- Deeper than just mucosa.
- Gastric ulcer.
- Duodenal ulcer.
- Together, ulcers of the stomach and duodenum are referred to as peptic ulcers.
Peptic Ulcer Disease
History

• In the early 20th century peptic ulcers were thought to be caused by emotional stress and spicy foods.
• Later in the century the disease was blamed on excess stomach acid.
• Then in 1982, Australian doctors Robin Warren and Barry Marshall first discovered a link between ulcers and H. Pylori.
• Peptic ulcer disease is a worldwide problem, affecting about 1 in 10 people
• Half of world adults harbor H.pylori
Anatomy of stomach and duodenum
Anatomy of stomach and duodenum

Stomach
- Esophagus
- Pylorus
- Duodenum
- Fundus
- Rugae

Section:
- Mucosa
- Submucosa
- Muscle layers
- Serosa
• Mucous cells in the gastric pits secrete mucus
• Parietal cells secrete hydrochloric acid
• G cells, which are present predominantly only in the antrum of the stomach, secrete gastrin
• ECL cells secrete histamine
• Chief cells secrete pepsinogen
Defense system of stomach and duodenum

• The *mucous layer*, which coats the stomach and duodenum, forms the first line of defense.

• *Bicarbonate*, which the mucous layer secretes, neutralizes the digestive acids.

• Hormone-like substances called *prostaglandins* help keep the blood vessels in the stomach dilated, ensuring good blood flow and protecting against injury. (Prostaglandins are also believed to stimulate bicarbonate and mucus production.)
Etiology of PUD

Normal

Increased Attack

Hyperacidity

Weak defense

Helicobacter pylori*

Stress, drugs, smoking
General symptoms of Peptic ulcer

- Pain in the upper abdomen below the sternum (breastbone) that comes and goes.
- It may occur most before meal or when you are hungry
- Other symptoms:
  - bloating, dyspepsia, nausea, vomiting, poor appetite, weight loss, burping (belching)

Complication:
- Bleeding from ulcer
- Perforation
Complications:

- Bleeding
- Fibrosis, Stricture obstruction – pyloric stenosis.
- Perforation – Peritonitis- emergency.
- Gastric carcinoma.
Etiology:

- Helicobacter pylori infection (90%).
- Drugs - anti-inflammatory (NSAIDs) & Corticosteroids.
- Hyperacidity - eg. zollinger Ellison syndrome.
- Cigarette smoking, Alcohol
- Stress
- Coffee
Helicobacter pylori
morphology

• Spiral shaped and multipolar flagella
• *H pylori* is a gram-negative rod about 3.5 micrometers long and 0.6 micrometers wide that thrives at 37°C (98.6°F) in a neutral medium.
• Corckscrew motivation
• Micreaerophile
• Producing Urease
Helicobacter pylori:
- Most common infection in the world (20%)
- 10% of men, 4% women develop PUD *
- Positive in 70-100% of PUD patients.
- H. pylori related disorders:
  - Chronic gastritis – 90%
  - Peptic ulcer disease – 95-100%
  - Gastric carcinoma
  - Reflux Oesophagitis (GERD)
  - Non ulcer dyspepsia
Pathogenesis

- Optimum PH 6-7
- Lumen of stomach is with PH of 1-2
- Live in deeper parts under lumen where PH is 7.4
- Urease reduce the acidity of stomach
- Protease – Mucous break down.
- Cytotoxine (vacoullating gene{Vac A}, Cytotoxin-associated gene{Cag A})
1. *H. pylori* penetrate the mucous layer lining the stomach’s epithelium, attracted to the chemotactic substances hemin and urea.

2. *H. pylori* recruit and activate inflammatory cells. It also releases urease that cleaves urea, producing NH$_3$ that neutralizes stomach acid in its vicinity.

3. *H. pylori* cytotoxin, and the ammonia produced by its urease, cause destruction of the mucus-producing cells, exposing the underlying connective tissue to stomach acid.
Helicobacter pylori
- the bacterium causing peptic ulcer disease

Infection
Helicobacter pylori infects the lower part of the stomach, antrum.

Corpus
Pylorus
Antrum
Duodenum

Inflammation
Helicobacter pylori causes inflammation of the gastric mucosa (gastritis). This is often asymptomatic.

Ulcer
Gastric inflammation may lead to duodenal or gastric ulcers. Severe complications include bleeding ulcers and perforated ulcers.

Increased acid secretion
Duodenal ulcer

Bleeding ulcer

Gastric ulcer

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A duodenal ulcer caused by H. pylori

A gastric ulcer caused by H. pylori
Pathogenesis

• Acute gastritis with epigastric disturbance and diarrhea for one week
• In 95% cases of gastric ulcers and duodenal ulcers isolated

• Due to destruction of epithelium and atrophy of secretory glands is a main factor in gastric carcinoma(1-3%)
Transmissibility of H. pylori

- Person-to-person transmission
- Exposure to gastric secretions
- Water-borne transmission
PUD - Diagnosis

- Endoscopy
- Barium meal – contrast x-ray
- Biopsy – bacteria & malignancy
- H. Pylori:
  - Endoscopy cytology
  - Biopsy – Special stains
  - Culture - difficult
  - Urea Breath test (UBT)
  - ELISA
Endoscopy
Endoscopy
Endoscopy

- Capsule endoscopy:
  - tiny camera
  - light source
  - radio transmitter
  2 picture in every second (totally 8 hours)
Barium X-Ray
Histological examination
Urea breath test

1. Patient drinks \( \text{HN}^-\text{C}-\text{NH}_2 \).
   In the stomach, \( \text{HN}^-\text{C}-\text{NH}_2 \) is broken down by urease into \( \text{H}^+\text{CO}_3 \) and \( \text{NH}_4 \).

2. \( \text{H}^+\text{CO}_3 \) travels to the lung and is...

3. ...expired...

4. ...as \( \text{CO}_2 \) into...

5. ...a 0.5 mM hyamine solution, where a scintillation cocktail is added to test for \( \text{C} \).

\( * = ^{14}\text{C} \)
*C-UREA

Unchanged *C-Urea excreted via urine

*CO₂ exhaled

*CO₂ and CO₂ trapped

Counted
Urease test

- The Endosc-Hp® Test consists of a twin well cartridge containing urea, phenol red and buffer salts when reconstituted, and a buffer. If the urease enzyme of *Helicobacter pylori* is present in a biopsy specimen, the rise in pH associated with the hydrolysis of urea causes a change in colour from yellow to pink/red. The colour change indicates a positive reaction and confirms the presence of *Helicobacter pylori*. (30 minute)
Rapid test for H. Pylori
ELISA

(a) Direct Antibody Sandwich Method

1. Antibody is adsorbed to well.
2. Antigen is adsorbed to well.
3. Test antigen is added. If complementary, antigen binds to antibody.
4. Enzyme is added (antibody specific for test antigen then binds to antigen, forming sandwich).
5. Enzyme’s substrate is added, and reaction produces a visible color change.

(b) Indirect Immunosorbent Assay

1. Antibody is adsorbed to well.
2. Antigen is adsorbed to well.
3. Second antibody is added, if antibody is complementary, it binds to antigen.
4. Enzyme is added (antibody specific for test antibody binds to it).
5. Enzyme’s substrate is added, and reaction produces a visible color change.

Positive

Negative

Assay Control

Patient A

Patient B

Patient C
Treatment (H. pylori)

- **Most popular treatment (first choice)**
  - A proton pump inhibitor
    > Omeprazole, Lansoprazole, Esomeprazole, Pantoprazole, Rabeprazol
  - Amoxicillin plus Clarithromycin twice daily for 10-14 days

- **Most popular treatment (second choice)**
  - Bismuth subsalicylate + Tetracycline + Metronidazol (Helicide) four times daily for 10-14 days
  - A proton pump inhibitor
Treatment of other cause and complications

- Antacids
- H2 blockers
- Proton pump inhibitors (CYP2C19 gene 18-20% Asians)
- Sucralfate
- Misoprostol (prostaglandins)
Surgical therapy
Surgical therapy
Surgical treatment
Surgical treatment
Treatment of gastric bleeding

• Photocoagulation (Laser)
Treatment of gastric bleeding

- Electrocoagulation (heat is generated by high frequency electrical current)
Treatment of gastric bleeding

• Injection therapy (Adrenalin or saline)
Treatment of gastric bleeding

- Angiographic therapy
Herbs that may be helpful

- Licorice root (glycerrhiza glabra) (Flavonoids)
- Ayurvedic (banana powder), Musa paradisiaca
- Chamomile (Chamomella recutita)(flavonoied apigenin)
- Calendula officinalis
- Marshmallow (Althea officinalis) (mucilage)
- Acorus calamus
- Garlic (Allium sativum)
- Corydalis(fumaria herba)
- Plantain (Plantago major,Plantago psyllium)
- Apples, onion, red wine, green & black tea contains alkaloids that inhibit H.pylori
Prospects

- cures ulcers
- Currently a vaccine is under investigation.
- Elimination of this bacteria may reduce the ulcer disease by as 80% to 90%.
- Clearly this should be a goal for our next generation.
از توجه تان تشکر
Man is the maker of his own happiness..!