Peptic Ulcer Disease: Causes, Symptoms and Treatment

Peptic ulcer disease is the term applied to both duodenal ulcers and gastric ulcers. Therefore it is the formation of ulcers in the lining of the stomach (gastric ulcer) or the first part of the small intestine, the duodenum (duodenal ulcer).

Mainly involves the anterior wall of proximal duodenum and the lesser curvature.

Causes of peptic ulcer disease

Tobacco smoking, alcohol, and the use of steroids by themselves do not cause peptic ulcer disease. Their use can delay healing and are associated with the development of gastritis, but they do not cause ulcers.

The major of ulcers are:

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    - Use of Non-Steroidal Anti-Inflammatory Drugs,
    - Helicobacter pylori infection,
    - Cancer of the stomach,
    - Zollinger-Ellison syndrome,
    - Crohn's disease,
    - Burns,
    - Head trauma, and
    - Prolonged intubation and mechanical ventilation.

NSAIDs lead to ulcer formation because they decrease the normal production of the mucus barrier that protects the epithelial cells of the gastric mucosa. NSAIDs inhibit prostaglandins which protect the stomach walls and hence diminish the protective barrier of the stomach lining.

In the case of burns and head trauma, there is intense vasoconstriction of the vasculature that supplies the gastric mucosa, leading to the sloughing of these cells and ulceration causing stress ulcers.

> Cushing's ulcer is a gastro-duodenal ulcer produced by elevated intracranial pressure caused by an intracranial tumor, head injury or other space-occupying lesion while Curling's ulcer is an acute gastric erosion resulting as a complication from severe burns when reduced plasma volume leads to ischemia and cell necrosis (sloughing) of the gastric mucosa.

What is the Physiology of acid secretion?

Gastric acid is produced by parietal cells in the stomach. The 3 stimulants to the production of acid

from the parietal cells are:

1. *Gastrin,*
2. *Acetylcholine, and*
3. *Histamine.*

Gastrin is produced by G cells in the stomach, and its release is stimulated by distention of the stomach, the presence of amino acids, and vagal stimulation.

Vagal stimulation also releases acetylcholine and gastrin-releasing peptide. However, the single most important stimulant to gastrin release is distention of the stomach like in the case when you are full.

Histamine is released by enterochromaffin-like cells present in the same glandular elements of the stomach that have the parietal and chief cells.

Chief cells release pepsinogen, which is converted to pepsin by the acid environment of the gastric lumen. Histamine directly stimulates the parietal cells to both release acid and potentiate the effects of acetylcholine and gastrin on the parietal cells.

This is the reason why drugs such as H2 blockers such as cimetidine, famotidine, and ranitidine inhibit acid release.

Excessive production and release of gastrin from G cells lead to the development of a condition known as Zollinger Ellison Syndrome.

The counterbalance to this system is somatostatin. Somatostatin works by inhibiting the release of gastrin and histamine, as well as having a direct inhibitory effect on the production of hydrochloric acid from the parietal cells.

S cells of the duodenal lining secrete an enzyme known as secretin. The main stimulant to its release is the presence of acid in the duodenum. Secretin inhibits the production of gastrin, as well as stimulates pancreatic and biliary bicarbonate production and release.

As mentioned above, the most common cause of ulcer disease is Helicobacter pylori followed by the use of NSAIDs; 80–90% of duodenal ulcers and 70–80% of gastric ulcers are associated with H. pylori. Overall,10–20% of ulcers are idiopathic.

Classification of Peptic Ulcer Disease

Peptic ulcers can be categorized into two groups of categories:

1. Acute peptic ulcer disease which is associated with NSAIDs, alcohol, acute illnesses.
These ulcers are superficial , generalized in location and Usually small in size.
2. Chronic peptic ulcer disease includes,

- Duodenal ulcers. Bulbar, post bulbar ulcers,
- Gastric ulcers. Types I, ii, iii, iv.
- Anastomotic (jejunal ulcers).

- Oesophageal ulcers.
- Meckel's.

These types are deep with specific locations and larger in size.

Signs and Symptoms Of Peptic Ulcer Disease

The most common presentation of ulcer disease is **mild epigastric pain.**

Gastric and duodenal ulcers can be distinguished from each other with endoscopy or, occasionally, radiographic studies with barium, such as an upper GI series.

Traditionally, **gastric ulcers** have been associated with pain on eating, and **duodenal ulcers** were thought to be relieved by eating. Because gastric ulcers were thought to be associated with pain on eating, this more frequently led to weight loss.

Tenderness of the abdomen is unusual in mild cases but abdominal tenderness is mostly present in cases of perforation.

Nausea and vomiting are occasionally found with both of them.

Upper GI Bleed in form of haematemesis, melena

Diagnosis.

Ulcer disease is best diagnosed with an upper endoscopy.

Generally healthy patients age <45–55 with epigastric pain, endoscopy can be deferred in favor of a trial of H2 blockers or proton-pump inhibitors (PPIs) ie omeprazole.

If the symptoms persist, then endoscopy can be performed.

In those age >45–55 or those with alarm symptoms (weight loss, anemia,heme-positive stools, or dysphagia), endoscopy should be performed.

The diagnosis of H. pylori is based on either

- Serology,
- Urea breath testing,
- Stool antigen testing, or
- Biopsy with histology.

Among these tests, Serology is the least expensive, is the least invasive, and has a very high degree of sensitivity. This means a negative test for the Helicobacter antibody effectively excludes this agent as an etiology of the ulcer disease.

The drawback to serology is that it does not reliably distinguish between old disease and new disease and therefore lacks specificity.

In addition, neither serology nor breath testing nor stool antigen tests can exclude the presence of gastric cancer. The advantage of both breath testing and stool antigen detection methods is that they are able to easily distinguish new versus old disease.

Biopsy with histology is the most sensitive and specific test. Further, it can exclude cancer. There is a rapid test on the biopsy, known as a CLO test, that can exclude Helicobacter.

The CLO is performed to see if the organisms present in the biopsy specimen can produce urease, demonstrating the presence of the bacterium.

Treatment.

The treatment of ulcer disease centers largely on the eradication of Helicobacter pylori. Use of a PPI combined with clarithromycin and amoxicillin. (Tripple therapy).

You can use any member of the proton pump inhibitors because are all equal in efficacy.

The other 2 choices of antibiotics are tetracycline and metronidazole. Therapy with PPIs is superior to those that use H2 blockers, such as ranitidine or cimetidine. The PPI/clarithromycin/amoxicillin regimen should be effective in over 90% of patients.

Duration of therapy is 10 to 14 days, but sometimes the PPI is continued for a few months in order to heal the gastric mucosa.

In those who fail therapy, a urea breath test should be performed to see if the reason for failure was the inability to eradicate the organism. If the organism was not eradicated, then re-treatment should occur with different antibiotics and the addition of bismuth subsalicylate. (quadruple therapy).

Sensitivity testing for the organism should be explored. If the organism was eradicated and the ulcer persists, recurs, or worsens, the patient may need evaluation for Zollinger-Ellison syndrome.

Ordinary ulcers not related to Helicobacter can be treated with PPIs alone. Misoprostol is a prostaglandin analog that was developed to prevent the development of NSAID-induced ulcers. It is rarely used because it is not very effective.

From the physiology of the gastrointestinal tract that cyclooxygenase 1 (COX-1) is the enzyme that produces the prostaglandins that protect the gastric mucosa. COX-2 enzyme implicated in the development of pain. Therefore COX-2 inhibitors were developed to relieve pain without damaging the gastric lining as much as NSAIDs. COX-2 inhibitors have no effect on platelets.

What are the Indications for surgery in Peptic Ulcer Disease?

- Upper GI bleeding not amenable to endoscopic procedures
- Perforation
- Refractory ulcers
- Gastric outlet obstruction ? can change endoscopic dilation