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Review Article

Unraveling Peptic Ulcer Disease: A Comprehensive Review

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ABSTRACT

Acid-induced mucosal damage to the stomach and proximal duodenum is the hallmark of peptic ulcer disease (PUD), a prevalent and clinically severe gastrointestinal condition. After the discovery of Helicobacter pylori, which established infection and nonsteroidal anti-inflammatory drug (NSAID) use as the primary etiological factors, the concept of PUD, which was previously thought to be an acid-related illness, drastically changed. PUD continues to significantly increase global morbidity and death, even if its incidence is reducing in many areas, especially because of complications, including bleeding and perforation. The illness is caused by an imbalance between defensive systems like prostaglandin synthesis, mucosal defence, and sufficient blood flow and aggressive factors including stomach acid, pepsin, H. pylori, and NSAIDs. Clinical manifestations include acute epigastric discomfort, potentially fatal bleeding, and asymptomatic illness. Endoscopy and H. pylori testing are the main methods used to make the diagnosis. Acid suppression medication, H. pylori eradication, NSAID avoidance, and suitable lifestyle changes are all part of management. Results have greatly improved with the developments in pharmaceutical therapy, particularly proton pump inhibitors and combination antibiotic regimens. The epidemiology, pathophysiology, diagnosis, and comprehensive management of peptic ulcer disease are highlighted in this review, with a focus on the significance of early detection, tailored therapy, and preventative measures to lower consequences and recurrence.

.INTRODUCTION

Over the past 200 years, peptic ulcer disease—which includes both stomach and duodenal ulcers—has posed a serious threat to the world's population, with a high. Significant mortality as well as morbidity. There are notable regional differences in the incidence and frequency of this disease and its consequences, according to epidemiological data. The onset of urbanisation has been linked to the development of ulcer disease and death from it, which was thought to be

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a birth-cohort event with the disease peaking in those born in the late 19th century. The discovery of Campylobacter pyloridis (renamed Helicobacter pylori in 1989 because of a revised taxonomic classification) by Warren and Marshall in 1982 significantly altered our understanding of the disease. This finding transformed the idea of an acid-driven illness into an infectious one, creating a vast field for in-depth investigation that led to the reconciliation of previously proposed pathogenic pathways [1]

The stomach and duodenum develop peptic ulcers, which are acid-induced lesions characterised by denuded mucosa that extend throughout The muscularis propria or submucosa. Erosions are lesions that fall below this depth. Peptic ulcers are known to be preceded by gastric acid [2]

DEFINITION:

A peptic ulcer is an erosion that breaks through the muscularis mucosae in a section of the gastrointestinal mucosa, usually in the stomach (gastric ulcer) or the first few centimetres of the duodenum (duodenal ulcer). The use of nonsteroidal anti-inflammatory drugs (NSAIDs) or Helicobacter pylori infection is the cause of almost all ulcers. Burning epigastric discomfort is a common symptom that is frequently alleviated by eating. Endoscopy and Helicobacter pylori testing are used to make the diagnosis. Acid suppression, H. pylori eradication (if any), and NSAID avoidance are all part of the treatment [3]

Symptoms:

Many people with peptic ulcers don't have symptoms. If there are symptoms, they may include:

- Dull or burning stomach pain. For some individuals, pain tends to worsen between meals and at night. For others, it may be worse after eating
- Feeling of fullness or bloating.
- Belching
- Heartburn.
- Nausea.

Peptic ulcers can cause bleeding from the ulcer. Then symptoms might include:

- Vomiting blood, which may appear red or black
- Having dark blood in stools, or stools that are black or tarry.
- Feeling dizzy or fainting [4]

Types of peptic ulcers:

Peptic ulcers usually develop in your stomach or duodenum.

Duodenal ulcers account for almost 80% of peptic ulcers.

Stomach ulcers account for almost 20% of peptic ulcers.

Rarely, they can appear in other parts of your digestive tract:

Oesophageal ulcers: Chronic acid reflux can erode the lining of your oesophagus, which doesn't have the same protection as your stomach.

Jejunal ulcers: These can occur after surgery that connects your stomach to your jejunum (gastrojejunostomy) [5]

RISK FACTORS:

To avoid and treat this widespread digestive ailment, it is essential to understand the risk factors associated with peptic ulcers. People can take proactive measures to safeguard their

gastrointestinal health by recognising and addressing these risk factors. Helicobacter pylori (H. pylori) infection is one of the main risk factors for peptic ulcers. Most peptic ulcer cases are caused by this bacterium, which can spread by tainted food, water, or intimate contact with an infected person. Regular use of nonsteroidal anti-inflammatory medicines (NSAIDs) like aspirin or ibuprofen, excessive alcohol intake, smoking, and high stress levels are additional risk factors[6] Although they don't cause peptic ulcers, the following factors can exacerbate them: Smoking. People who have an H. pylori infection may be more susceptible to peptic ulcers as a result. Consuming alcohol. Alcohol can damage and irritate the stomach's mucous lining. Additionally, it raises stomach acid. Suffering from unmanaged stress. Consuming spicy foods [4]

CAUSES:

Your digestive tract's mucus lining helps heal damage, particularly in the stomach and duodenum, and shields it from acids and enzymes. When these protections are compromised, PUD occurs. Lowering these defences sufficiently for acid to destroy the lining requires a long-term problem. The majority of cases result from: H.pylori infection: Your stomach and/or duodenum are home to this common bacterium. The majority of patients don't experience any symptoms, but excessive growth can harm the lining. Overuse of NSAIDs: Aspirin and ibuprofen are typical painkillers that are easily obtained. However, overuse of these can disrupt the duodenum's and stomach's chemical equilibrium.

Less common causes of peptic ulcer disease include:

- Other infections
- Chemotherapy
- Crohn’s disease
- Ischemia
- Radiation therapy
- Severe illness or injury
- Stomach cancer
- Zollinger-Ellison syndrome [5]

EPIDEMIOLOGY:

Incidence and prevalence: The pooled incidence of uncomplicated PUD was around one case per 1000 person-years in the general population, whereas the incidence of ulcer complications was about 0.7 cases per 1000 person-years, according to a systematic review of 31 published studies.

The presence of Helicobacter pylori affects the incidence and prevalence of PUD. Countries with greater rates of H. pylori infection have higher rates. H. pylori-infected people have an annual incidence of PUD of about 1%, which is six to ten times higher than that of uninfected people. A population-based one-year prevalence of PUD of 0.1 to 1.5 per cent based on physician diagnosis and 0.1 to 0.19 per cent based on hospitalisation data was found in a systematic evaluation of seven studies from resource-rich nations. According to a US study, 2% of persons with H. pylori who were asymptomatic had endoscopic point prevalence for peptic ulcers.An endoscopic point prevalence ranging from 1 to 6 per cent has been observed in other studies with presumably asymptomatic people whose H. pylori status was unknown.Both duodenal ulcers (DUs) and stomach ulcers (GUs) are more common as people age, although the prevalence of uncomplicated PUD plateaued while that of difficult PUD increased. Particularly in males, DUs happen twenty years before Gus [7]

DIAGNOSIS:

Your healthcare provider may first perform a physical examination and obtain a medical history to identify an ulcer. Additionally, you could

require tests like: Tests for H. pylori in the lab. A blood, stool or breath test can show whether H. pylori is in your body.You consume radioactive carbon-containing food or beverages for the breath test. The material in your stomach is broken down by H. pylori. Afterwards, you blow into a sealed bag. Your breath sample contains radioactive carbon in the form of carbon dioxide if you have Helicobacter pylori. Inform your healthcare provider if you take an antacid or an antibiotic. You might have to temporarily stop taking the medication. Test findings may be impacted by both [8]

PATHOPHYSIOLOGY:

1. Benign gastric ulcers, erosions, and gastritis can occur anywhere in the stomach, although the antrum and lesser curvature represent the most common locations. Most duodenal ulcers occur in the first part of the duodenum (duodenal bulb).

2. Pathophysiology is determined by the balance between aggressive factors (gastric acid and pepsin) and protective factors (mucosal defence and repair). Gastric acid.

3. Helicobacter pylori infection and NSAID use are independent factors that contribute to the disruption of mucosal integrity. Increased acid secretion may be involved in duodenal ulcers, but patients with gastric ulcers usually have normal or reduced acid secretion (hypochlorhydria).

4. Mucus and bicarbonate secretion, intrinsic epithelial cell defence, and mucosal blood flow normally protect the gastroduodenal mucosa from noxious endogenous and exogenous substances. Endogenous prostaglandins (PGs) facilitate mucosal integrity and repair. Disruptions in normal mucosal defence and healing mechanisms allow acid and pepsin to reach the gastric epithelium.

5. HP infection causes gastric mucosal inflammation in all infected individuals, but only a minority develop an ulcer or gastric cancer. Bacterial enzymes (urease, lipases, and proteases), bacterial adherence, and H. pylori virulence factors produce gastric mucosal injury. HP induces gastric inflammation by altering the host's inflammatory response and damaging epithelial cells.

6. Nonselective NSAIDs (including aspirin) cause gastric mucosal damage by two mechanisms: direct or topical irritation of the gastric epithelium, and systemic inhibition of endogenous mucosal PG synthesis. COX-2 selective inhibitors have a lower risk of ulcers and related GI complications than nonselective NSAIDs.

7. The addition of aspirin to a selective COX-2 inhibitor reduces its ulcer-sparing benefit and increases ulcer risk. Use of corticosteroids alone does not increase the risk of ulcer or complications, but ulcer risk is doubled in corticosteroid users taking NSAIDs concurrently.

8. Cigarette smoking has been linked to PUD, impaired ulcer healing, and ulcer recurrence. Risk is proportional to the amount smoked per day. Psychological stress has not been shown to cause PUD, but ulcer patients may be adversely affected by stressful life events.

9. Carbonated beverages, coffee, tea, beer, milk, and spices may cause dyspepsia but do not appear to increase PUD risk. Ethanol ingestion in high concentrations is associated

with acute gastric mucosal damage and upper GI bleeding, but it is not clearly the cause of ulcers [9]

TREATMENT:

NON-PHARMACOLOGICAL TREATMENT:

Patients with PUD should eliminate or reduce psychological stress and cigarette use smoking, and use of NSAIDs (including aspirin). If possible, alternative agents such. As acetaminophen or a nonacetylated salicylate (eg, salsalate) should be used for pain relief. Although there is no need for a special diet, patients should avoid foods and beverages that cause dyspepsia or exacerbate ulcer symptoms (eg, spicy foods, caffeine, and alcohol). Elective surgery is rarely performed because of highly effective medical management. Emergency surgery may be required for bleeding, perforation, or obstruction [9]

PHARMACOLOGICAL TREATMENT:

Healing peptic ulcers Medicines that doctors recommend or prescribe to treat peptic ulcers include

- proton pump inhibitors (PPIs)
- H2 blockers
- other medicines

Treating the causes of peptic ulcers

Doctors treat the underlying causes of peptic ulcers to help the ulcers heal and prevent them from coming back.

Helicobacter pylori (H. pylori) infection

Doctors treat *H. pylori* infection with a combination of medicines. These medicines most often include

- Two or more antibiotics.
- A PPI
- In some cases, bismuth subsalicylate.
- Your doctor may avoid prescribing antibiotics you've taken in the past because the H. pylori bacteria may have developed antibiotic resistance to those antibiotics.

If you are given medicines, take all doses exactly as your doctor prescribes. If you stop taking your medicine early, some bacteria may survive and persist in your stomach. In other words, *H. pylori* bacteria may develop antibiotic resistance. To find out if the medicines worked, your health care professional may recommend testing you for *H. pylori* at least 4 weeks after you've finished taking the antibiotics.[2] If you still have an *H. pylori* infection, your doctor may prescribe a different combination of antibiotics and other medicines to treat the infection. Making sure that all of the *H. pylori* bacteria have been killed is important.

Nonsteroidal anti-inflammatory drugs (NSAIDs)

- If you have a peptic ulcer caused by taking NSAIDs, your doctor may recommend changing your medicines. Depending on the reason you have been taking NSAIDs, your doctor may suggest stopping NSAIDs, taking a different NSAID, taking a lower-dose NSAID, or taking a different medicine for pain.

- If you need to keep taking NSAIDs, your doctor may recommend you also take a PPI.

- Other causes If your peptic ulcers aren't caused by *H. pylori* infection or NSAIDs, doctors will check for uncommon causes. Depending on the cause, doctors may recommend additional treatments [(10)].

LIFESTYLE MODIFICATIONS:

These seven lifestyle adjustments could be beneficial:

- Give up smoking.
- Give up smoking tobacco products.
- Nicotine can exacerbate an ulcer that already exists, hinder its healing, and
- Raise the chance of a recurrence by increasing the stomach's acid production.
- Moderate consumption of alcohol.
- This indicates that women should limit their daily alcohol intake to one drink, while men should limit it to two drinks. (A 5-ounce glass of wine, a 12-
- ounce beer, or 1.5 ounces of liquor is equivalent to one drink.) Alcohol and medication should not be combined, as this can eventually harm the lining of the digestive tract.
- Consume a range of plant-based foods. To obtain vitamins, minerals, fibre, and phytochemicals like flavonoids, which may strengthen the lining of the digestive tract, improve immunity, and treat pre-existing ulcers, eat fruits, vegetables, and grains. Eat fewer fried, greasy, and spicy foods, as they can make PUD worse.
- Limit your intake of caffeine and drink plenty of water. Drink water all day long. Drinking half of your body weight in ounces of fluids, mostly water, each day is a decent general guideline.
- Take probiotics. Fermented foods such as yoghurt, kefir, sauerkraut, and apple cider vinegar contain beneficial bacteria that can strengthen the gut. If you are receiving antibiotic treatment for H. pylori, you might require a tailored probiotic supplement.
- Aspirin, ibuprofen, and naproxen are examples of nonsteroidal anti-inflammatory medications (NSAIDs) that should be avoided unless aspirin is medically required.
- Take care of your emotional well-being. Peptic ulcers may be indirectly caused by stress, anxiety, and melancholy. Ulcers can be caused by bad food habits and harmful lifestyle choices, which can follow mental health disorders.
- Although these lifestyle adjustments might not be simple at first, evidence indicates that they have an impact. One group in a recent risk assessment, which tracked 71 individuals with moderate to high PUD recurrence risk for a year, received a tailored intervention that included educational pamphlets, counselling for lifestyle changes, psychological counselling for anxiety and depression, home health care, and medication recommendations. [11]

CONCLUSION

Despite substantial advancements in knowledge and treatment, peptic ulcer disease is still a serious worldwide health concern. The identification of NSAID use and Helicobacter pylori infection as the main causes of PUD has transformed diagnostic and treatment methods, moving the emphasis from symptomatic acid suppression to focused eradication and preventive measures. Age, lifestyle choices, and concomitant illnesses all have an impact on the severity and course of the

disease, which is caused by a complex interaction between aggressive gastric factors and compromised mucosal defences. Accurate diagnosis, suitable medication therapy, removal of underlying causes, and long-term lifestyle changes are all necessary for effective management. Avoiding ulcerogenic medicines, managing stress, quitting smoking, and moderating alcohol consumption are all essential for preventing recurrence. The majority of peptic ulcers can heal successfully with prompt intervention and medication adherence, greatly lowering the risk of complications and enhancing patients' quality of life. To further reduce the burden of this avoidable and treatable illness, ongoing public health initiatives and patient education are crucial.

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