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Peptic Ulcer Disease: A Comprehensive Review of Etiology, Diagnosis, and Modern Therapeutic Approaches

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Abstract

Peptic ulcer disease (PUD) is an ailment of the gastrointestinal tract that is quite common and is marked by the development of open lesions known as ulcers in the stomach as well as in the proximal duodenum. It arises as a consequence of the imbalance between the protective enzymatic mechanisms of the mucosa, and the injurious agents like gastric acid, pepsin, Helicobacter pylori, and even non-steroidal anti-inflammatory drugs (NSAIDs). While many ulcers heal spontaneously, complications such as bleeding, perforation, and gastric outlet obstruction can lead to serious morbidity or mortality. With PUD, they can be treated and/or prevented if basic instruction is provided alongside a proper overview of the condition's etiological basis. In this case, pharmacological therapy and endoscopic procedures are heavily applicable.

Keywords: Peptic ulcer disease, helicobacter pylori, nonsteroidal anti-inflammatory drugs (NSAIDs), gastric ulcer, duodenal ulcer, gastrointestinal

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(GI) bleeding, GI bleeding, proton pump inhibitors, endoscopy, and acid suppression therapy.

Introduction

Peptic ulcer disease is an ailment of tremendous consequence that concerns millions of people around the globe (Xie et al 2022). The term covers both gastric ulcers occurring in the stomach and duodenal ulcers found in the first section of the small intestine.. While it used to be correlated with stress and diet PUD the modern understanding indicates the vital importance of Helicobacter pylori infection and NSAID use. ulcers develop when the protective mucosal layer is breached, permitting the acidic contents of the stomach to damage the tissues beneath. Even with the advancements in the medical field, PUD is one of the conditions that still causes a lot of expenditure and healthcare resources, and remains one of the major reasons for upper gastrointestinal bleeding. For the efficient control and management of this condition, having knowledge of its diverse origin is crucial.

Etiology and Risk Factors

The two most common causes of peptic ulcer disease are infection with H. pylori and prolonged NSAID usage (Huang et al 2002). H. pylori undermines the mucosal barrier using various mechanisms, such as the synthesis of cytotoxins, inflammatory response induction, and injury to epithelial tissues. An estimate suggests that H. Pylori is present in more than a half of the global population, but only a small percentage suffer from ulcers. Moreover, NSAIDs, like most drugs, have their drawbacks; they have been found to inhibit the cyclooxygenase enzymes (COX-1 and COX-2) which results in diminution of Prostaglandin formation. This substance is critical for gastric mucosal defense. Other factors include corticosteroid use, smoking, heavy drinking, and stress, particularly in the presence of serious illness. Also, PUD with familial predisposition may occur from gastrin producing tumors, known as Zollinger-Ellison syndrome. Dietary habits alongside preexisting genetic susceptibilities can further heighten the chances of developing the disorder (Franzago et al 2020).

Clinical Features

The clinical presentation of peptic ulcer disease (PUD) differs from case to case, but the most prominent PUD symptom in patients is epigastric pain which is characteristically described as burning, gnawing, or aching. The pain may either worsen or improve with food, based on the ulcer's location – gastric ulcers cause meal pain while duodenal ulcers have pain 1-3 hours post meals (Ravisankar et al 2016). Additional symptoms include weight loss, bloating, belching, and nausea. Alarm features that suggest complications include hematemesis (blood vomiting), anemia, severe abdominal pain (suggesting perforation), and persistent vomiting (indicating obstruction) alongside melena (black stool). In asymptomatic female patients, especially those over 65 years, or women using NSAIDs, the bulers may remain unnoticed until complications develop. Due to its overlapping symptom profile with functional dyspepsia and GERD, confirmation through diagnostics is necessary (Quigley et al 2013).

Diagnosis

For accurate diagnosis of the PUD, one ought to take an extensive history that details the symptoms along with a thorough physical examination, followed by suitable diagnostic tests. The standard procedure for diagnosing and evaluating peptic ulcers is done through upper gastrointestinal endoscopy (Axon et al 1995). It has the advantage of direct visualization of the ulcer, assessment of its size, location, severity, and the option to biopsy for malignancy (especially in gastric ulcers) or test for H. pylori. Investigation of H. pylori can also be done non-invasively with urea breath test, stool antigen test, or serological testing, though the last one is less specific. In some places, endoscopy is not available at the first visit, and one has to start treatment based on intuition, particularly with low-risk patients. Other conditions of unexplained abdominal pain can be assessed with a complete blood count, fecal occult blood test, and liver function tests (Brown et al 2014).

Treatment and Management

The cornerstone of Anti-Clostridia therapy PUD treatment starts with 'H. Pylori' removal – trimming down the acid suppression. The most widely used regimen is triple therapy, where a proton pump inhibitor (PPI) is combined with a couple of antibiotics which usually include either clarithromycin and amoxicillin or metronidazole. It may be necessary

to switch to either quadruple or sequential therapy in areas where antibiotic resistance is high. For NSAID induced ulcers, stopping the offending agent and starting PPI therapy is very important. Patients who require prolonged PPI use may need to continue the NSAIDs alongside selective COX-2 inhibitors to minimize risk (Hawkey et al 2003). Compared to H2 receptor antagonists, PPIs are more efficacious for the healing and recurrence prevention of ulcers. Additional strategies include cessation of smoking, reduced alcohol intake, and changing the diet. Infrequent surgical intervention is reserved for cases with perforation, obstruction, or uncontrolled bleeding. In ulcers that are hemorrhaging, the use of endoscopic hemostasis techniques like injection therapy, thermal coagulation, and hemoclip placement prove to be very effective.

Prevention and Follow-Up

An approach that combines the alteration of risk factors and the use of medication as a preventive strategy is referred to as medical prophylaxis. Recipients of long-term therapy involving NSAIDs may have reduced injury to the stomach by co-prescribing PPIs or changing the prescription to COX-2 inhibitors (Suh et al 2008). Taking H. pylori out of the infected individuals significantly lessens chances of ulcers reoccurring and developing more complications. Patients with chronic complicated ulcers may require maintenance therapy with PPIs. Not all patients require proactive surveillance endoscopy, even though this may be helpful in confirming healing and exclusion of malignancy for this particular group of patients with gastric ulcers. Educating patients about PUD prevention is focused on encouraging safe self-medicine, smoking cessation, and recognition of symptoms.

Conclusion

Peptic ulcer disease continues to be a common and clinically important problem because of its multifactorial causes and its potential to cause serious complications. Effective management requires at least basic knowledge of its mechanisms, such as H. pylori infection or NSAID-induced mucosal damage. Those receiving greater diagnostic attention, such as endoscopy and non-invasive H. pylori testing, have greatly improved diagnostic accuracy, while the contemporary pharmacological approach yields high rates of cure and symptom relief. Stratification and lifestyle changes constitute preemptive action, which is fundamental to overarching disease management. With prompt diagnosis and treatment,

coupled with adequate patient education, most PUD patients can expect a complete resolution and prevent complications.

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