

**Scott Tenner, M.D., M.P.H., F.A.C.G.**  
*Assistant Professor of Medicine, Mount Sinai School of Medicine*  
*Director, Medical Education and Research, Maimonides Medical Center*

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**2211 Emmons Ave, Brooklyn, NY 11235**  
**718-368-2960**

## **STOMACH AND DUODENAL ULCERS**

### **WHAT IS AN ULCER?**

During normal digestion, food moves from the mouth down the esophagus into the stomach. The stomach produces hydrochloric acid and an enzyme called pepsin to digest the food. From the stomach, food passes into the upper part of the small intestine, called the duodenum, where digestion and nutrient absorption continue.

An ulcer is a sore or lesion that forms in the lining of the stomach or duodenum where acid and pepsin are present. Ulcers in the stomach are called gastric or stomach ulcers. Those in the duodenum are called duodenal ulcers. In general, ulcers in the stomach and duodenum are referred to as peptic ulcers. Ulcers occur in the esophagus or in the first portion of the duodenum, the duodenal bulb.

### **WHO HAS ULCERS?**

About 20 million Americans develop at least one ulcer during their lifetime.

Each year:

- Ulcers affect about 4 million people.
- More than 40,000 people have surgery because of persistent symptoms or problems from ulcers.
- About 6,000 people died of ulcer-related complications.

Ulcers can develop at any age, but they are rare among teenagers and even more uncommon in children. Duodenal ulcers occur for the first time usually between the ages of 30 and 50. Stomach ulcers are more likely to develop in people over age 60. Duodenal ulcers occur more frequently in men than women; stomach ulcers develop more often in women than men.

### **WHAT CAUSES ULCERS?**

For almost a century, doctors believed lifestyle factors such as stress and diet caused ulcers. Later, researchers discovered that an imbalance between digestive fluids (hydrochloric acid and pepsin) and the stomach's ability to defend itself against these powerful substances resulted in ulcers.

Today, research shows that most ulcers develop as a result of infection with bacteria called *Helicobacter pylori* (*H. pylori*). While all three of these factors – lifestyle, acid and pepsin, and *H. pylori* – play a role in ulcer development, *H. pylori* is now considered the primary cause.

### **LIFESTYLE:**

While scientific evidence refutes the old belief that stress and diet cause ulcers, several lifestyle factors continue to be suspected of playing a role. These factors include cigarettes, foods and beverages containing caffeine, alcohol, and physical stress.

#### SMOKING:

Studies show that cigarette smoking increases one's chances of getting an ulcer. Smoking slows the healing of existing ulcers and also contributes to ulcer recurrence.

#### CAFFEINE:

Coffee, tea, colas, and foods that contain caffeine seem to stimulate acid secretion in the stomach, aggravating the pain of an existing ulcer. However, the amount of acid secretion that occurs after drinking decaffeinated coffee is the same as that produced after drinking regular coffee. Thus, the stimulation of stomach acid cannot be attributed solely to caffeine.

#### ALCOHOL:

Research has not found a link between alcohol consumption and peptic ulcers. However, ulcers are more common in people who have cirrhosis of the liver, a disease often linked to heavy alcohol consumption.

#### STRESS:

Although emotional stress is no longer thought to be a cause of ulcers, people with ulcers often report that emotional stress increases ulcer pain. Physical stress, however, increases the risk of developing ulcers particularly in the stomach. For example, people with injuries such as severe burns and people undergoing major surgery often require rigorous treatment to prevent ulcers and ulcer complications.

#### ACID AND PEPSIN:

Researchers believe that the stomach's inability to defend itself against the powerful digestive fluids, acid and pepsin contributes to ulcer formation. The stomach defends itself from these fluids in several ways. One way is by producing mucus, a lubricant-like coating that shields stomach tissues. Another way is by producing a chemical called bicarbonate. This chemical neutralizes and breaks down digestive fluids into substances less harmful to stomach tissue. Finally, blood circulation to the stomach lining, cell renewal, and cell repair also help protect the stomach.

#### NON-STEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDs):

Non-steroidal anti-inflammatory drugs (NSAIDs) make the stomach vulnerable to the harmful effects of acid and pepsin. NSAIDs such as aspirin, ibuprofen, and naproxen sodium are present in many non-prescription medications used to treat fever, headaches, and minor aches and pains. These, as well as prescription NSAIDs used to treat a variety of arthritic conditions, interfere with the stomach's ability to produce mucus and bicarbonate and affect blood flow to the stomach and cell repair. They can all cause the stomach's defense mechanisms to fail, resulting in an increased chance of developing stomach ulcers. In most cases, these ulcers disappear once the person stops taking NSAIDs.

**HELICOBACTER PYLORI:**

H. pylori is a spiral-shaped bacterium found in the stomach. Research shows that the bacteria (along with acid secretion) damage stomach and duodenal tissue, causing inflammation and ulcers. Scientists believe this damage occurs because of H. pylori's shape and characteristics.

H. pylori survives in the stomach because it produces the enzyme urease. Urease generates substances that neutralize the stomach's acid, enabling the bacteria to survive. Because of their shape and the way they move, the bacteria can penetrate the stomach's protective mucous lining. Here, they can produce substances that weaken the stomach's protective mucus and make the stomach cells more susceptible to the damaging effects of acid and pepsin. The bacteria can also attach to stomach cells further weakening the stomach's defensive mechanisms and producing local inflammation. For reasons not completely understood, H. pylori can also stimulate the stomach to produce more acid.

Excess stomach acid and other irritating factors can cause inflammation of the upper end of the duodenum, the duodenal bulb. In some people, over long periods of time, this inflammation results in production of stomach-like cells called duodenal gastric metaplasia. H. pylori then attacks these cells causing further tissue damage and inflammation, which may result in an ulcer.

**SYMPTOMS OF H. PYLORI:**

Within weeks of infection with H. pylori, most people develop gastritis – an inflammation of the stomach lining. However, most people will never have symptoms or problems related to the infection. Scientists do not yet know what is different in those people who develop H. pylori-related symptoms or ulcers. Perhaps, hereditary or environmental factors yet to be discovered cause some individuals to develop problems. Alternatively, symptoms and ulcers may result from infection with more virulent strains of bacteria. These unanswered questions are the subject of intensive scientific research.

**WHO IS AT HIGH RISK?**

Studies show that H. pylori infection in the United States varies with age, ethnic group, and socioeconomic class. The bacteria are more common in older adults, African Americans, Hispanics, and lower socioeconomic groups.

**HOW DOES IT SPREAD?**

The organism appears to spread through the fecal-oral route (when infected stool comes into contact with hands, food, or water). Most individuals seem to be infected during childhood, and their infection lasts a lifetime.

**WHAT ARE THE SYMPTOMS OF ULCERS?**

The most common ulcer symptoms is a gnawing or burning pain in the abdomen between the breastbone and the naval. The pain often occurs between meals and in the early hours of the morning. It may last from a few minutes to a few hours and may be relieved by eating or by taking antacids.

Less common ulcer symptoms include nausea, vomiting, and loss of appetite and weight. Bleeding from ulcers may occur in the stomach and duodenum. Sometimes people are unaware that they have

a bleeding ulcer, because blood loss is slow and blood may not be obvious in the stool. These people may feel tired and weak. If the bleeding is heavy, blood will appear in vomit or stool. Stool containing blood appears tarry or black.

### **HOW ARE ULCERS DIAGNOSED?**

The NIH Consensus Panel emphasized the importance of adequately diagnosing ulcer disease and *H. pylori* before starting treatment. If the person has an NSAID-induced ulcer, treatment is quite different from the treatment for a person with an *H. pylori*-related ulcer. Also, a person's pain may be the result of non-ulcer dyspepsia (persistent pain or discomfort in the upper abdomen including burning, nausea, and bloating), and not at all related to ulcer disease. Currently, doctors perform painless endoscopy.

### **LOCATING AND MONITORING ULCERS**

Doctors (gastroenterologists) may perform endoscopy. During this test, the patient is lightly sedated and the doctor inserts a small flexible instrument with a camera on the end through the mouth into the esophagus, stomach and duodenum. With this procedure, the entire upper GI tract can be viewed. Ulcers or other conditions can be diagnosed and photographed, and tissue can be taken for biopsy, if necessary.

Once an ulcer is diagnosed and treatment begins, the doctor will usually monitor clinical progress. In the case of a stomach ulcer, the doctor may wish to document healing with repeat endoscopy. Continued monitoring of a stomach ulcer is important because of the small chance the ulcer may be cancerous.

### **TESTING FOR H. PYLORI**

Confirming the presence of *H. pylori* is important once the doctor has diagnosed an ulcer because elimination of the bacteria is likely to cure ulcer disease. Blood, breath, and stomach tissue tests may be performed to detect the presence of *H. pylori*. While some of the tests for *H. pylori* are not approved by the U.S. Food and Drug Administration (FDA), research shows these tests are highly accurate in detecting the bacteria. However, blood tests on occasion give false positive results, and the other tests may give false negative results in people who have recently taken antibiotics, omeprazole (Prilosec), or bismuth (Pepto-Bismol).

#### **BLOOD TESTS:**

Blood tests such as the enzyme-linked immunosorbent assay (ELISA) and quick office-based tests identify and measure *H. pylori* antibodies. The body produces antibodies against *H. pylori* in an attempt to fight the bacteria. The advantages of blood tests are their low cost and availability to doctors. The disadvantage is the possibility of false positive results in patients previously treated for ulcers since the levels of *H. pylori* antibodies fall slowly. Several blood tests have FDA approval.

#### **TISSUE TESTS:**

If the doctor performs an endoscopy to diagnose ulcer tissue, samples of the stomach can be obtained. The doctor may then perform one of several tests on the tissue. A rapid urease test detects the bacteria's enzyme urease. Histology involves visualizing the bacteria under the microscope. Culture involves special processing of the tissue and watching it for growth of *H. pylori* organisms.

## HOW ARE ULCERS TREATED?

### **Lifestyle Changes:**

In the past, doctors advised people with ulcers to avoid spicy, fatty, or acidic foods. However, a bland diet is now known to be ineffective for treating or avoiding ulcers. No particular diet is helpful for most ulcer patients. People who find that certain foods cause irritation should discuss this problem with their doctor. Smoking has been shown to delay ulcer healing and has been linked to ulcer recurrence; therefore, persons with ulcers should not smoke.

### **Medicines:**

Doctors treat stomach and duodenal ulcers with several types of medicines including H2 blockers, acid pump inhibitors, and mucosal protective agents. When treating *H. pylori*, these medications are used in combination with antibiotics.

### **H2 Blockers:**

Currently, most doctors treat ulcers with acid-suppressing drugs known as H2 blockers. These drugs reduce the amount of acid the stomach produces by blocking histamine, a powerful stimulant of acid secretion. H2 blockers reduce pain significantly after several weeks. For the first few days of treatment, doctors often recommend taking an antacid to relieve pain.

Initially, treatment with H2 blockers lasts 6 to 8 weeks. However, because ulcers recur in 50 to 80 percent of cases, many people must continue maintenance therapy for years. This may no longer be the case if *H. pylori* infection is treated. Most ulcers do not recur following successful eradication. Nizatidine (Axiid) is approved for treatment of duodenal ulcers but is not yet approved for treatment of stomach ulcers. H2 blockers that are approved to treat both stomach and duodenal ulcers are:

- Cimetidine (Tagomet)
- Ranitidine (Zantac)
- Famotidine (Pepcid)

### **Acid pump inhibitors:**

Like H2 blockers, acid pump inhibitors modify the stomach's production of acid. However, acid pump inhibitors more completely block stomach acid production by stopping the stomach's acid pump – the final step of acid secretion. The FDA has approved use of omeprazole for short-term treatment of ulcer disease. Similar drugs, including lansoprazole, are currently being studied.

### **Mucosal protective medications:**

Mucosal protective medications protect the stomach's mucus lining from acid. Unlike H2 blockers and acid pump inhibitors, protective agents do not inhibit the release of acid. These medications shield the stomach's mucus lining from the damage of acid. Two commonly prescribed protective agents are:

- Sucralfate (Carafate).
- Misoprostol (Cytotec).

Two common non-prescription protective medications are:

- Antacids. Antacids can offer temporary relief from ulcer pain by neutralizing stomach acid. They may also have a mucosal protective role. Many brand soft antacids are available without prescription.
- Bismuth Subsalicylate. Bismuth subsalicylate has both a protective effect and an antibacterial effect against *H. pylori*.

### **Antibiotics:**

The discovery of the link between ulcers and *H. pylori* has resulted in a new treatment option. Now, in addition to treatment aimed at decreasing the production of stomach acid, doctors may prescribe antibiotics for patients with *H. pylori*. This treatment is a dramatic medical advance because eliminating *H. pylori* means the ulcer may now heal and most likely will not come back.

Again, an accurate diagnosis is important. Accurate diagnosis and appropriate treatment prevent people without ulcers from needless exposure to the side effects of antibiotics and should lessen the risk of bacteria developing resistance to antibiotics.

Although many antibiotics are sold in the United States, the FDA has not yet approved the use of antibiotics for treatment of *H. pylori* or ulcers. Doctors may choose to prescribe antibiotics to their ulcer patients as "off label" prescriptions as they do for many conditions.

### **WHEN IS SURGERY NEEDED?**

In most cases, anti-ulcer medicines heal ulcers quickly and effectively. Eradication of *H. pylori* prevents most ulcers from recurring. However, people who do not respond to medication or who develop complications may require surgery. While surgery is usually successful in healing ulcers and preventing their recurrence and future complications, problems can sometimes result.

At present, standard open surgery is performed to treat ulcers. In the future, surgeons may use laparoscopic methods. A laparoscope is a long tube-like instrument with a camera that allows the surgeon to operate through small incisions while watching a video monitor.

The common types of surgery for ulcers – vagotomy, pyloroplasty, and antrectomy – are described below:

#### **VAGOTOMY:**

A vagotomy involves cutting the vagus nerve, a nerve that transmits messages from the brain to the stomach. Interrupting the messages sent through the vagus nerve reduces acid secretion. However, the surgery may also interfere with stomach emptying. The newest variation of the surgery involves cutting only parts of the nerve that control the acid-secreting cells of the stomach, thereby avoiding the parts that influence stomach emptying.

#### **ANTRECTOMY:**

Another surgical procedure is the antrectomy. This operation removes the lower part of the stomach (antrum), which produces a hormone that stimulates the stomach to secrete digestive juices. Sometimes a surgeon may also remove an adjacent part of the stomach that secretes pepsin and acid. A vagotomy is usually done in conjunction with an antrectomy.

### PYLOROPLASTY:

Pyloroplasty is another surgical procedure that may be performed along with a vagotomy. Pyloroplasty enlarges the opening into the duodenum and small intestine (pylorus), enabling contents to pass more freely from the stomach.

### **WHAT ARE THE COMPLICATIONS OF ULCERS?**

People with ulcers may experience serious complications if they do not get treatment. The most common problems include bleeding, perforation of the organ walls, and narrowing and obstruction of digestive tract passages.

### BLEEDING:

As an ulcer eats into the muscles of the stomach or duodenal wall, blood vessels may also be damaged, which causes bleeding. If the affected blood vessels are small, the blood may slowly seep into the digestive tract. Over a long period of time, a person may become anemic and feel weak, dizzy or tired.

If a damaged blood vessel is large, bleeding is dangerous and requires prompt medical attention. Symptoms include feeling weak and dizzy when standing, vomiting blood, or fainting. The stool may become a tarry black color from the blood.

Most bleeding ulcers can be treated endoscopically – the ulcer is located and the blood vessel is cauterized with a heating device or injected with material to stop bleeding. If endoscopic treatment is unsuccessful, surgery may be required.

### PERFORATION:

Sometimes an ulcer eats a hole in the wall of the stomach or duodenum. Bacteria and partially digested food can spill through the opening into the sterile abdominal cavity (peritoneum). This causes peritonitis, an inflammation of the abdominal cavity and wall. A perforated ulcer that can cause sudden, sharp, severe pain usually requires immediate hospitalizations and surgery.

### NARROWING AND OBSTRUCTION:

Ulcers located at the end of the stomach where the duodenum is attached, can cause swelling and scarring, which can narrow or close the intestinal opening. This obstruction can prevent food from leaving the stomach and entering the small intestine. As a result, a person may vomit the contents of the stomach. Endoscopic balloon dilation to force open a narrow passage, may be performed. If the dilation does not relieve the problem then surgery may be necessary.

### **POINTS TO REMEMBER:**

1. An ulcer is a sore or lesion that forms in the lining of the stomach or duodenum where the digestive fluids, acid and pepsin are present.
2. Recent research shows that most ulcers develop as a result of infection with bacteria called *Helicobacter pylori* (*H. pylori*). The bacteria produce substances that weaken the stomach's protective mucus and make the stomach more susceptible to damaging effects of acid and pepsin. *H. pylori* can also cause the stomach to produce more acid. Although acid, pepsin, and lifestyle factors such as stress and smoking cigarettes play a role in ulcer formation, *H. pylori* is now considered the primary cause.
3. Non-steroidal anti-inflammatory drugs such as aspirin make the stomach vulnerable to the harmful effects of acid and pepsin, leading to an increased chance of stomach ulcers.
4. Ulcers do not always cause symptoms. When they do, the most common symptom is a gnawing or burning pain in the abdomen between the breastbone and navel. Some people have nausea, vomiting and loss of appetite and weight.
5. Bleeding from an ulcer may occur in the stomach and duodenum. Symptoms may include weakness and stool that appears tarry or black. However, sometimes people are not aware they have a bleeding ulcer because blood may not be obvious in the stool.
6. Ulcers are diagnosed with endoscopy. The presence of *H. pylori* may be diagnosed with a blood test or tissue test. Once an ulcer is diagnosed and treatment begins, the doctor will usually monitor progress.
7. Doctors treat ulcers with several types of medicines aimed at reducing acid production, including H<sub>2</sub> blockers, acid pump inhibitors, and mucosal protective drugs. When treating *H. pylori*, these medications are used in combination with antibiotics.
8. According to an NIH panel, the most effective treatment for *H. pylori* is a 2-week, triple therapy of metronidazole, tetracycline or amoxicillin, and bismuth subsalicylate. Other therapies with fewer pills exist, with less efficiency.
9. Surgery may be necessary if an ulcer recurs or fails to heal or if complications such as bleeding, perforation, or obstruction develop.