Patient education: Gastroesophageal reflux disease in adults (Beyond the Basics)

AUTHOR: Peter J Kahrilas, MD
SECTION EDITOR: Nicholas J Talley, MD, PhD
DEPUTY EDITOR: Sara Swenson, MD

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GASTROESOPHAGEAL REFLUX OVERVIEW

Gastroesophageal reflux, also called "acid reflux," occurs when the stomach contents back up into the esophagus and/or mouth. Occasional reflux is normal and can happen in healthy infants, children, and adults, most often after eating a large meal. Most episodes are brief and do not cause bothersome symptoms or complications.

By contrast, people with gastroesophageal reflux **disease** (GERD) experience bothersome symptoms or damage to the esophagus as a result of acid reflux. Symptoms of GERD can include heartburn, regurgitation, and difficulty or pain with swallowing.

This article discusses the symptoms, causes, diagnosis, and treatment of GERD in adults. Reflux in infants, children, and adolescents is discussed separately. (See "Patient education: Gastroesophageal reflux disease in children and adolescents (Beyond the Basics)" and "Patient education: Acid reflux (gastroesophageal reflux) in babies (Beyond the Basics)".)

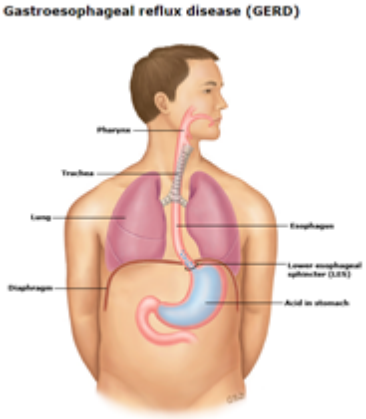
WHAT HAPPENS IN ACID REFLUX AND GERD?

When you eat, food is carried from your mouth to your stomach through the esophagus, a tube-like structure that is approximately 10 inches long and 1 inch wide in adults. The esophagus is

made of tissue and muscle layers that expand and contract to propel food to your stomach through a series of wave-like movements called peristalsis.

At the lower end of the esophagus, where it connects to the stomach, there is a circular ring of muscle called the lower esophageal sphincter (LES). After you swallow, the LES relaxes and opens to allow food to enter your stomach, where it mixes with stomach acid that helps with digestion. The LES then contracts shut to prevent the food and acid from backing up into your esophagus. The action of the LES is normally augmented by the muscle of the diaphragm, which surrounds it.

However, sometimes the antireflux barrier, comprised of the LES and the surrounding diaphragm, fails, allowing liquids in the stomach to wash back into the esophagus (figure 1). This happens occasionally to everyone. Most of these episodes occur shortly after meals, are brief, and do not cause symptoms. Normally, reflux rarely occurs during sleep.



Gastroesophageal reflux disease (GERD)

Figure 1 - larger image below

In some people, acid reflux causes bothersome symptoms or injury to the esophagus over time; when this happens, it is considered GERD. In general, damage to the esophagus is more likely to occur when acid refluxes frequently, the stomach contents are very acidic, or the esophagus is unable to clear away the acid quickly.

GERD RISK FACTORS

Certain things increase a person's risk of developing GERD, including:

- Hiatus hernia – This is a condition in which part of the upper stomach pushes up through the diaphragm (the large, flat muscle at the base of the lungs), positioning the LES in the chest. The diaphragm has an opening for the esophagus to pass through before it joins with the stomach (called the "diaphragmatic hiatus"); in people with a hiatal hernia, the hiatus becomes dilated, and part of the stomach squeezes up through this opening. As a result, the diaphragm no longer augments the function of the LES, and acid reflux becomes more frequent.

- Obesity – People who are obese or overweight have an increased risk of GERD and hiatal hernia. While the reasons for this are not completely understood, it is partially related to

increased pressure in the abdomen.

- Pregnancy – Many women experience acid reflux during pregnancy. This usually resolves after delivery, and complications are rare.
- Lifestyle factors and medications – Some foods (including fatty foods, chocolate, and peppermint), caffeine, alcohol, and cigarette smoking can all exacerbate acid reflux and GERD. Certain medications also increase the risk.

GERD SYMPTOMS

The most common symptoms of GERD are:

- Heartburn – This typically feels like a burning sensation in the center of the chest, which sometimes spreads to the throat. It most often happens after a large meal.
- Regurgitation – This is when stomach contents (acid mixed with bits of undigested food) flow back into your mouth or throat.

Other symptoms of GERD may include:

- Stomach pain (pain in the upper abdomen)
- Chest pain
- Difficulty swallowing where food gets stuck in the esophagus (called dysphagia) or pain on swallowing (called odynophagia)
- Persistent laryngitis/hoarseness (due to the acid irritating the vocal cords)
- Persistent sore throat or cough
- Sense of a lump in the throat (called globus sensation)
- Nausea and/or vomiting

Over time, GERD can lead to complications. These include problems related to esophageal damage as well as other issues. (See 'GERD complications' below.)

When to seek help — The following signs and symptoms may indicate a more serious problem. Tell your health care provider right away if you:

- Have difficulty or pain with swallowing (eg, feeling like food gets stuck in your throat)
- Have no appetite or lose weight without trying
- Have chest pain
- Feel like you are choking

- Have signs of bleeding in the gastrointestinal tract, such as blood in your vomit or dark-colored vomit that looks like coffee grounds or black tarry stools
- Have persistent vomiting
- Have new stomach pain and are age 60 or older

GERD DIAGNOSIS

The diagnosis of GERD is based on your symptoms as well as other risk factors. (See 'GERD risk factors' above.)

Diagnosis based on symptoms — If you have the "classic" symptoms of GERD (heartburn and/or regurgitation), your health care provider may be able to diagnose you with GERD based on this alone. In this situation, they will likely suggest a trial of medication; if your symptoms improve, it is likely that GERD was the cause. (See 'Proton pump inhibitors' below.)

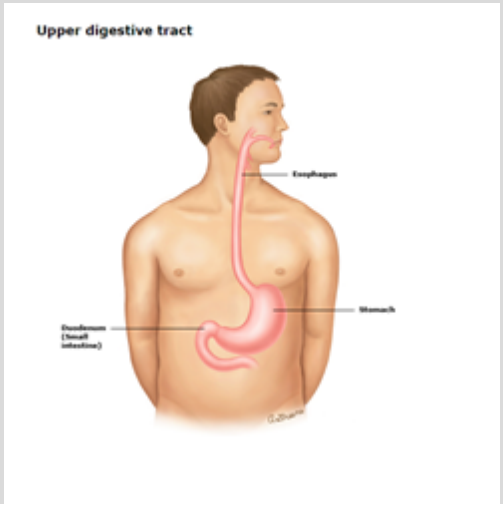
Additional testing — Your provider might recommend additional evaluation and testing if you:

- Do not have an improvement in symptoms after taking a proton pump inhibitor
- Do not have the classic symptoms of GERD (heartburn or regurgitation)
- Have symptoms that may indicate another problem
- Have risk factors for certain complications such as Barrett's esophagus (see 'Barrett's esophagus' below)

It is important to rule out potentially life-threatening problems that can cause symptoms similar to those of GERD. For example, chest pain can also be a symptom of heart disease and should be evaluated immediately. (See "Patient education: Chest pain (Beyond the Basics)".)

If life-threatening problems have been ruled out and the diagnosis of GERD is not clear, your provider will likely recommend one or more of the following tests.

Upper endoscopy — An upper endoscopy is a test that allows a doctor to directly examine the upper gastrointestinal (GI) tract (figure 2). A small, flexible tube is passed through the mouth into the esophagus, stomach, and small intestine. The tube has a light source and a camera that displays magnified images on a monitor. With severe reflux, there is ulceration of the lining of the esophagus (esophagitis). Damage to the lining of the GI tract



can be evaluated, and samples of tissue (biopsies) can be taken to determine the nature and extent of tissue damage. (See "Patient education: Upper endoscopy (Beyond the Basics)".)

Upper digestive tract

Figure 2 - larger image below

Prolonged (24 to 96 hours) esophageal pH study — An esophageal pH study is the most direct way to measure the severity of acid reflux. The test involves inserting a thin tube with a sensor through the nose and into the esophagus (which is left in place for 24 hours); an alternative approach involves placing a wireless sensor, which adheres to the esophageal lining, into your esophagus during an upper endoscopy. During the next one to four days, you will be asked to keep a diary of your symptoms. The sensor measures how often stomach acid reaches your esophagus, how long it persists in the esophagus, and whether the timing of acid in the esophagus correlates with your symptoms. Your provider can use this information to determine the severity of reflux and how this relates to your symptoms.

This test may be used to confirm a diagnosis of GERD if you have suggestive symptoms but no confirmatory findings on endoscopy. It can also be used to monitor how well treatment is working.

Esophageal manometry — Esophageal manometry involves having a tube placed through your nose into your esophagus that measures the pressure from the muscle contractions (esophageal peristalsis). This can help to determine if esophageal peristalsis and the lower esophageal sphincter are functioning normally. It may be done if you have chest pain and/or difficulty swallowing but your upper endoscopy results are normal; this can help diagnose motility disorders (problems with how the muscles in the esophagus work).

GERD COMPLICATIONS

Most people with GERD will **not** develop serious complications, especially if they get treatment. However, potentially serious complications can sometimes happen in people with severe GERD.

Erosive esophagitis — This is when the esophageal lining is damaged as a result of exposure to stomach acid. This can lead to erosions or ulcers, which may bleed. Bleeding from ulcers is not always visible, but it can be detected with stool tests.

Esophageal stricture — Damage from acid can cause the esophagus to scar and narrow, causing a partial blockage (stricture) that can cause food or pills to get stuck in the esophagus. The narrowing is caused by scar tissue that develops as a result of ulcers in the esophagus.

Barrett's esophagus — Barrett's esophagus occurs when the normal cells that line the lower esophagus (called squamous cells) are replaced by a different cell type (called intestinal cells). This process usually results from longstanding GERD with erosive esophagitis.

The intestinal cells have a small risk of transforming into cancer cells over time. As a result, people with Barrett's esophagus are advised to have a periodic upper endoscopy to monitor for early warning signs of cancer. (See "Patient education: Barrett's esophagus (Beyond the Basics)".)

Lung and throat problems — If stomach acid backs up into the throat, this can cause inflammation of the vocal cords, a sore throat, or a hoarse voice. The acid can also be inhaled into the lungs and cause pneumonia or asthma symptoms. Over time, acid in the lungs can lead to permanent lung damage.

Dental problems — Repeated episodes of acid reflux can erode the enamel of the teeth over time.

GERD TREATMENT

GERD treatment is adjusted to match the frequency and severity of GERD symptoms and/or complications.

Lifestyle changes — Certain lifestyle and dietary changes can often help relieve symptoms of GERD. If you have mild symptoms, you can try these approaches before seeking medical attention. If your symptoms are more serious, it's a good idea to talk to your health care provider before making any changes, so they can advise you on how to incorporate these approaches into your treatment plan. (See 'GERD symptoms' above.)

The following lifestyle changes are often recommended:

- **Losing weight (if you are overweight or have recently gained weight)** – Losing weight may help people reduce acid reflux. In addition, weight loss has a number of other health benefits, including a decreased risk of type 2 diabetes and heart disease. (See "Patient education: Losing weight (Beyond the Basics)".)

- **Raising the head of your bed six to eight inches** – Although most people only have heartburn during the two- to three-hour period after meals, some wake up at night with heartburn. People with nighttime heartburn can elevate the head of their bed, which raises the head and shoulders higher than the stomach, allowing gravity to reduce acid reflux and aid in clearing what reflux does occur.

You can raise the head of your bed by putting blocks of wood under the legs or a foam wedge over the mattress. Several companies have developed commercial products for this purpose. However, it is usually **not** helpful to use additional pillows; this only elevates the head and neck with minimal effect on reflux.

- **Sleep on your left side** – Again, although most people only have heartburn during the two- to three-hour period after meals, people with nighttime heartburn can reduce this by lying on their left side during sleep. This positions the stomach fluid away from the upper right side of the stomach where the esophagus connects, making it harder for reflux to occur.

- **Avoiding foods that trigger symptoms** – Some foods also cause relaxation of the lower esophageal sphincter, which can lead to acid reflux. Excessive caffeine, chocolate, alcohol, peppermint, and fatty foods may cause bothersome acid reflux in some people. If you notice that your symptoms are worse after you have certain foods or beverages (trigger foods), it's reasonable to limit or avoid these things.

- **Quitting smoking** – Saliva helps to neutralize refluxed acid, and smoking reduces the amount of saliva in the mouth and throat. Smoking also lowers the pressure in the lower esophageal sphincter and provokes coughing, causing frequent episodes of acid reflux in the esophagus. In addition to having many other health benefits, quitting smoking can reduce or eliminate symptoms of mild reflux. (See "Patient education: Quitting smoking (Beyond the Basics)".)

While evidence is limited, other changes also sometimes seem to help, such as:

- **Avoiding late meals** – Lying down with a full stomach may increase the risk of acid reflux. By planning meals for at least two to three hours before bedtime, symptoms may be reduced. This is especially true for people with nighttime reflux.

- **Wearing loose, comfortable clothing** – At minimum, tight-fitting clothing can increase discomfort, but it may also increase pressure in the abdomen, promoting hiatus hernia and forcing stomach contents into the esophagus.

Mild symptoms — In addition to lifestyle changes, the initial treatment of mild GERD includes the use of nonprescription antacids or histamine receptor antagonists.

Antacids/alginates — Antacids (sample brand names: Tums, Maalox) neutralize stomach acid and are commonly used for short-term relief of heartburn symptoms. While they start working quickly, the neutralizing effect only lasts for approximately 30 to 60 minutes after each dose. Alginates (brand name: Gaviscon) have a more prolonged effect as the alginate floats to the top of gastric content and keeps newly secreted acid away from the esophageal inlet.

Histamine receptor antagonists — The histamine antagonists reduce the production of acid in the stomach. They are more effective than antacids in relieving heartburn, and their effects last for longer; however, they are not usually adequate for the treatment of severe or frequent symptoms. (See 'Moderate to severe symptoms' below.)

Histamine antagonists available in the United States include famotidine (brand name: Pepcid), ranitidine (brand name: Zantac), cimetidine (Tagamet HB), and nizatidine (generic only).

Moderate to severe symptoms — People with more severe or frequent symptoms, complications related to GERD, or mild symptoms that have not responded to the above medications (see 'Mild symptoms' above) usually require treatment with medications called proton pump inhibitors (PPIs) or potassium-competitive acid blockers (PCABs). Lifestyle changes can help as well. (See 'Lifestyle changes' above.)

Proton pump inhibitors — PPIs are more effective than histamine receptor antagonists for reducing stomach acid. They include dexlansoprazole (brand name: Dexilant), esomeprazole (brand name: Nexium), lansoprazole (brand name: Prevacid), omeprazole (brand name: Prilosec), pantoprazole (brand name: Protonix), and rabeprazole (brand name: AcipHex). Some PPIs are available over the counter, although higher doses may require a prescription.

Once your health care provider determines the optimal dose and type of PPI for you, you will probably continue taking it for at least eight weeks. More prolonged treatment depends on whether and when symptoms return after cessation:

- If your symptoms return **within three months** of stopping the medication or if you have severe inflammation of your esophagus, long-term treatment is usually recommended. Your provider will also likely recommend an upper endoscopy (if you haven't already had one) to rule out other problems.

- If your symptoms return **three or more months after** stopping the medication, your provider will likely recommend another course of PPI treatment. The goal is to take the lowest effective dose of medication that controls symptoms and prevents complications.

PPIs are safe, although they may be expensive, especially if taken for a long period of time. Long-term risks of PPIs may include an increased risk of certain gut infections or reduced absorption of minerals and nutrients. In general, these risks are small. However, even a small risk emphasizes the need to take the lowest effective dose for the shortest possible time.

Potassium-competitive acid blockers — PCABs are the most effective medications for reducing stomach acid. This is a new class of medication. Vonoprazan (brand name Voquezna)

is approved for the treatment of erosive esophagitis in the United States. Vonoprazan and other PCABs have been available in Asia for several years.

PCABs are safe but expensive. They have the same long-term risks as PPIs.

If symptoms do not improve — Some people do not experience complete symptom resolution with PPI treatment. Doctors call this "refractory" GERD or refractory GERD-like symptoms. If you continue to have bothersome symptoms after a course of PPI treatment, your provider may recommend one or more of the following:

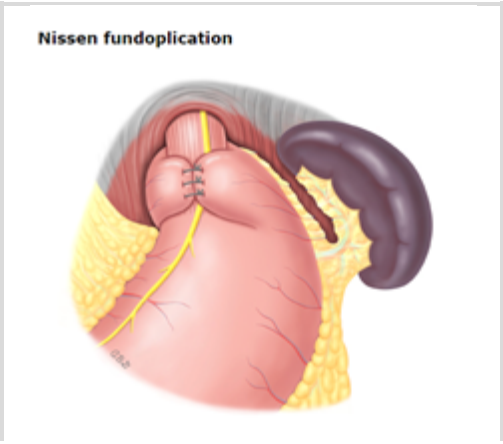
- Splitting the dose of PPI (ie, taking two smaller doses rather than one larger dose daily)
- Increasing the PPI dose or switching to a different (more potent) PPI
- Switching from a PPI to a PCAB
- Adding other medications
- Further testing to confirm (or refute) the GERD diagnosis and/or rule out other problems (see 'Additional testing' above)
- Considering surgical treatment (see 'Surgical treatment' below)

Treatment of GERD during pregnancy — Treatment of GERD during pregnancy begins with lifestyle changes (see 'Lifestyle changes' above). If this does not relieve symptoms, your health care provider may suggest antacids or alginates. (See 'Antacids/alginates' above.)

If the above measures are not effective, your provider might recommend a histamine antagonist followed by a PPI if necessary. Although both classes of medication are safe during pregnancy, the general strategy is to avoid all medications during pregnancy if possible. (See 'Histamine receptor antagonists' above and 'Proton pump inhibitors' above.)

Surgical treatment — Because lifestyle changes and medications are very effective in controlling symptoms in most cases, there is a limited role for surgical treatment of GERD. However, it may be an option for certain people whose symptoms are not adequately controlled with other treatments, or who cannot or do not wish to comply with a medication regimen.

In general, "antireflux" surgery involves repairing a hiatal hernia (if present) and strengthening the lower esophageal sphincter. The most common surgical procedure is called laparoscopic Nissen fundoplication. This procedure involves wrapping the upper part of the stomach around the lower end of the esophagus (figure 3).



Following Nissen fundoplication, most people experience symptoms including difficulty swallowing and feeling bloated (called the "gas bloat syndrome"). These symptoms may resolve over time but can persist. There are other risks associated with surgery as well. Despite this, most people say they are satisfied with the results of the surgery in the long term.

Nissen fundoplication

Figure 3 - larger image below

There are other surgical procedures sometimes used to treat GERD as well, generally devised to minimize the side effects of dysphagia and gas bloat. However, these are relatively newer, less widely available, and less well studied than Nissen fundoplication.

WHERE TO GET MORE INFORMATION

Your health care provider is the best source of information for questions and concerns related to your medical problem.

This article will be updated as needed on our website (www.uptodate.com/patients). Related topics for patients, as well as selected articles written for health care professionals, are also available. Some of the most relevant are listed below.

Patient level information — UpToDate offers two types of patient education materials.

The Basics — The Basics patient education pieces answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials.

Patient education: Acid reflux and GERD in adults (The Basics)
Patient education: Acid reflux and GERD during pregnancy (The Basics)
Patient education: Acid reflux and GERD in children and teens (The Basics)
Patient education: Spitting up and GERD in babies (The Basics)
Patient education: Upper endoscopy (The Basics)
Patient education: Upper gastrointestinal series and esophagram (The Basics)
Patient education: 24-hour pH monitoring (The Basics)
Patient education: Peptic ulcers (The Basics)
Patient education: Barrett's esophagus (The Basics)
Patient education: Hiatal hernia (The Basics)
Patient education: Achalasia (The Basics)
Patient education: Esophageal stricture (The Basics)
Patient education: Esophagitis (The Basics)

Patient education: Eosinophilic esophagitis (The Basics)
Patient education: Thickening liquids (The Basics)
Patient education: Fundoplication (The Basics)

Beyond the Basics — Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are best for patients who want in-depth information and are comfortable with some medical jargon.

Patient education: Gastroesophageal reflux disease in children and adolescents (Beyond the Basics)
Patient education: Acid reflux (gastroesophageal reflux) in babies (Beyond the Basics)
Patient education: Upper endoscopy (Beyond the Basics)
Patient education: Peptic ulcer disease (Beyond the Basics)
Patient education: Barrett's esophagus (Beyond the Basics)
Patient education: Achalasia (Beyond the Basics)

Professional level information — Professional level articles are designed to keep doctors and other health professionals up-to-date on the latest medical findings. These articles are thorough, long, and complex, and they contain multiple references to the research on which they are based. Professional level articles are best for people who are comfortable with a lot of medical terminology and who want to read the same materials their doctors are reading.

Approach to refractory gastroesophageal reflux symptoms in adults
Non-acid reflux: Clinical manifestations, diagnosis, and management
Clinical manifestations and diagnosis of gastroesophageal reflux in adults
Complications of gastroesophageal reflux in adults
Gastroesophageal reflux and asthma
Helicobacter pylori and gastroesophageal reflux disease
Laryngopharyngeal reflux in adults
Initial management of gastroesophageal reflux disease in adults
Proton pump inhibitors: Overview of use and adverse effects in the treatment of acid related disorders
Pathophysiology of gastroesophageal reflux disease
Surgical treatment of gastroesophageal reflux in adults

The following organizations also provide reliable health information.

- National Library of Medicine

  (www.nlm.nih.gov/medlineplus/gerd.html, available in Spanish)

- National Institute of Diabetes and Digestive and Kidney Diseases

  (www.niddk.nih.gov/health-information/digestive-diseases/acid-reflux-ger-gerd-adults)

- American Gastroenterological Association

  (patient.gastro.org/gastroesophageal-reflux-disease-gerd/)

- American College of Gastroenterology

  (www.gi.org/topics/acid-reflux)

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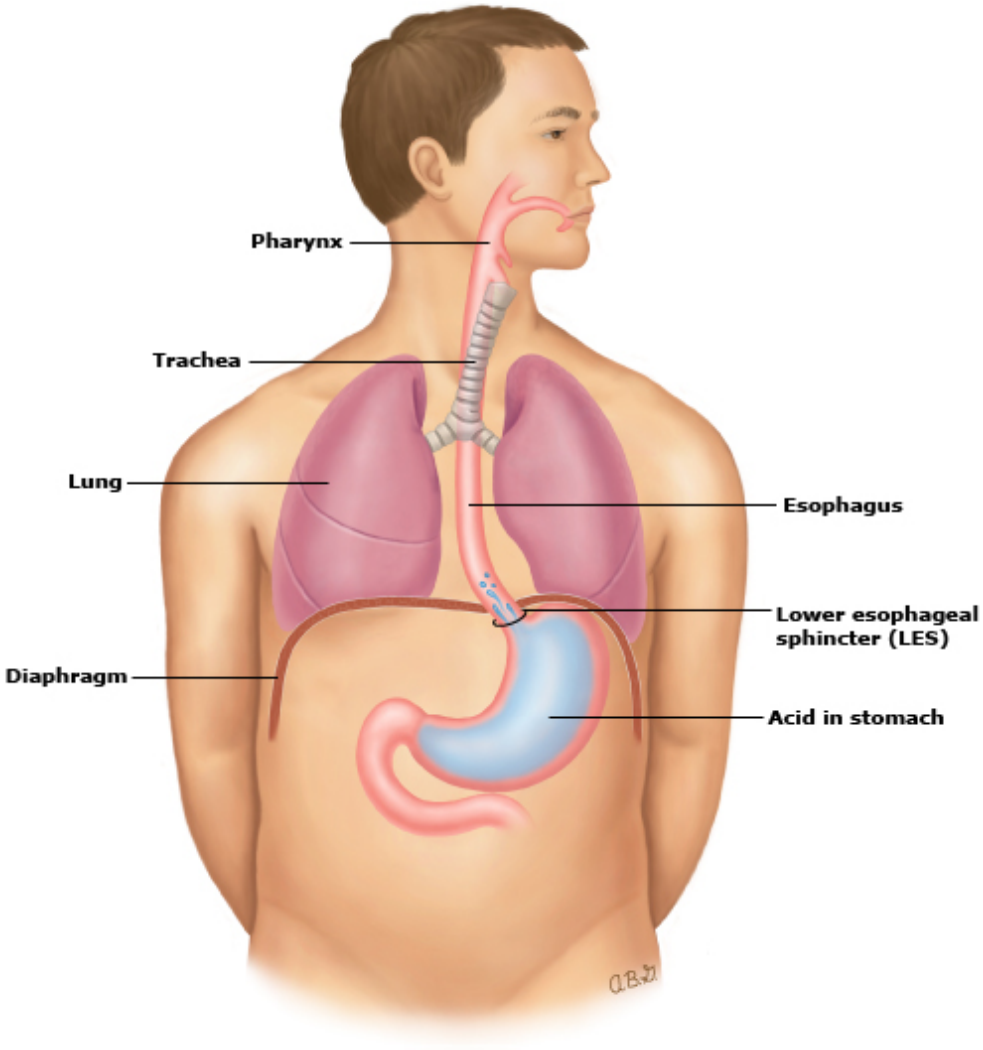
GRAPHICS

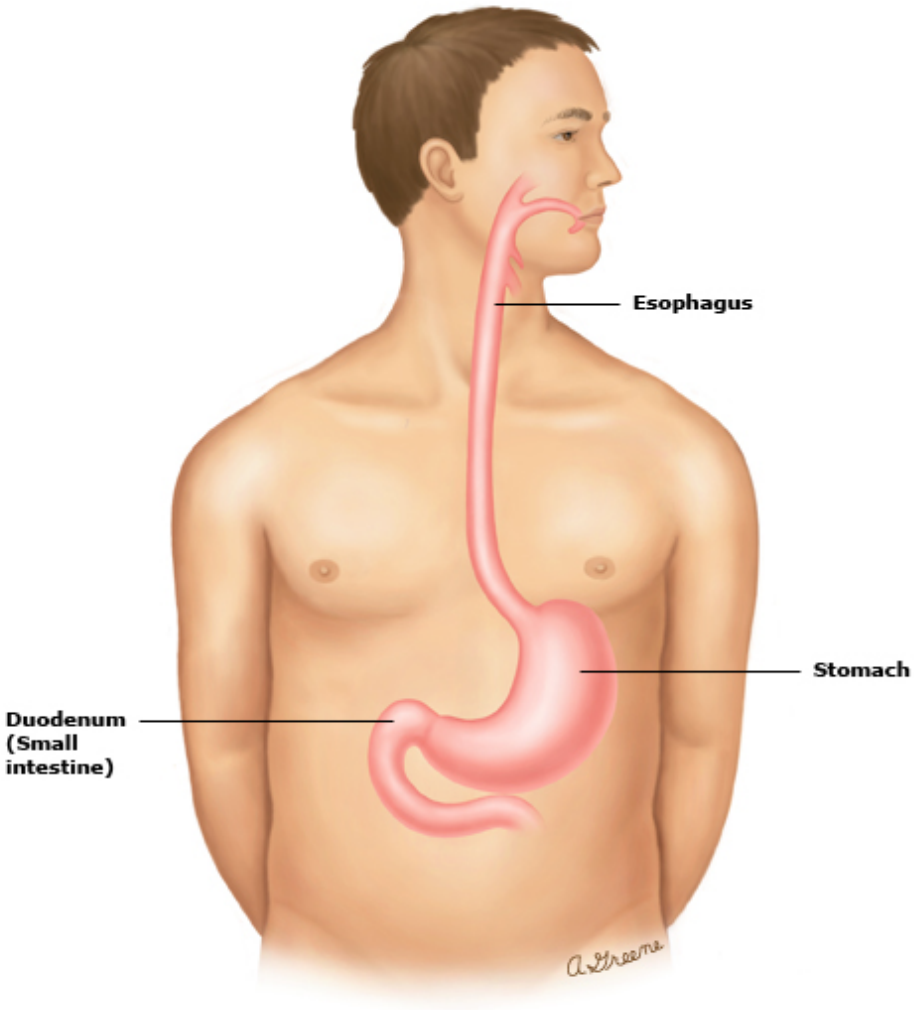
Figure 1: **Gastroesophageal reflux disease (GERD)**



When we eat, food is carried from the mouth through the esophagus, a tube-like structure that is approximately 10 inches long and 1 inch wide in adults. At the lower end of the esophagus, where it joins the stomach, there is a circular ring of muscle that relaxes and opens when food reaches that point, called the lower esophageal sphincter (LES). This allows food to enter the stomach and then closes to prevent the back-up of food and acid into the esophagus. Reflux can occur if the LES is weak or stays relaxed too long.

Graphic 79301 Version 3.0

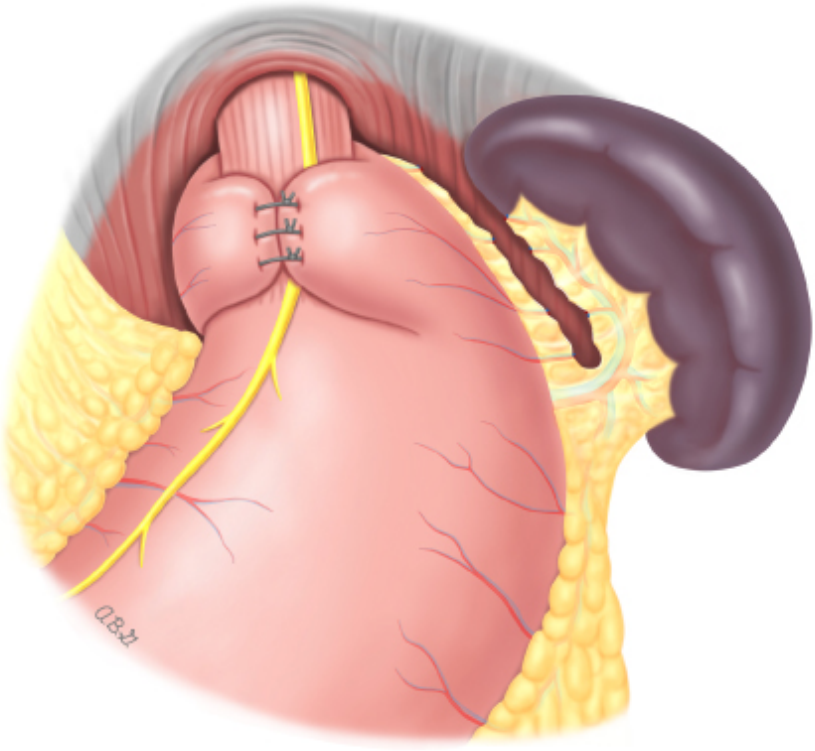
Figure 2: **Upper digestive tract**



The upper digestive tract includes the esophagus (the tube that connects the mouth to the stomach), the stomach, and the duodenum (the first part of the small intestine).

Graphic 55616 Version 6.0

Figure 3: **Nissen fundoplication**



Nissen fundoplication is a surgical procedure used to treat gastroesophageal reflux disease (GERD). It involves wrapping the upper part of the stomach around the lower end of the esophagus.

Graphic 72609 Version 3.0