

Gastroesophageal reflux disease

GERD

- Defined as troublesome symptoms or complications that result from the reflux of gastric contents into the esophagus or beyond into the oral cavity or lung.
- Troublesome is defined by consensus as
 - mild symptoms that occur at least 2 times per week or
 - moderate to severe symptoms at least once per week.
- The pathogenesis is multifactorial.

GERD...

- Caused by abnormal function of the lower esophageal sphincter .
- The most frequent abnormality is
 - an increase in transient lower esophageal sphincter relaxations (TLESR), without an antecedent swallow that results in reflux of gastric contents into the esophagus.
- The LES can be identified with esophageal manometry.

LES - made up of four anatomic structures:

1. The intrinsic musculature of the distal esophagus

- Is in a state of tonic contraction.
- Within 500 milliseconds of the initiation of a swallow, these muscle fibers relax to allow passage of liquid or food into the stomach, and then they return to a state of tonic contraction.

LES...

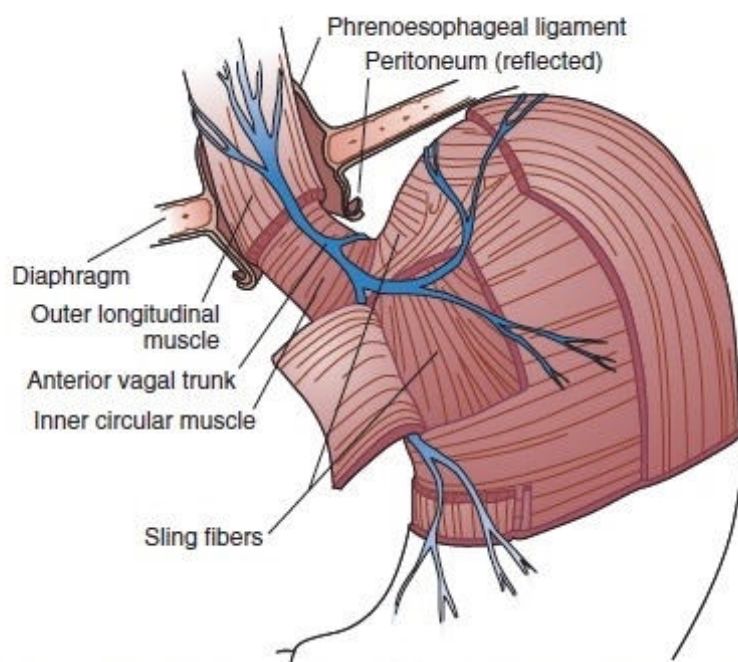


FIGURE 42-1 Schematic drawing of the muscle layers at the gastro-esophageal junction. The intrinsic muscle of the esophagus, diaphragm, and sling fibers contribute to lower esophageal sphincter pressure. The circular muscle fibers of the esophagus are at the same depth as the sling fibers of the cardia.

2. Sling fibers of the gastric cardia

- are oriented diagonally from the cardia-fundus junction to the lesser curve of the stomach.
- the sling fibers contribute significantly to the high-pressure zone of the LES.

LES....

3. The crura of the diaphragm

- surround the esophagus as it passes through the esophageal hiatus.
- During inspiration, when intrathoracic pressure decreases relative to intra-abdominal pressure,
- the anteroposterior diameter of the crural opening is decreased,
- compressing the esophagus and increasing the measured pressure at the LES.

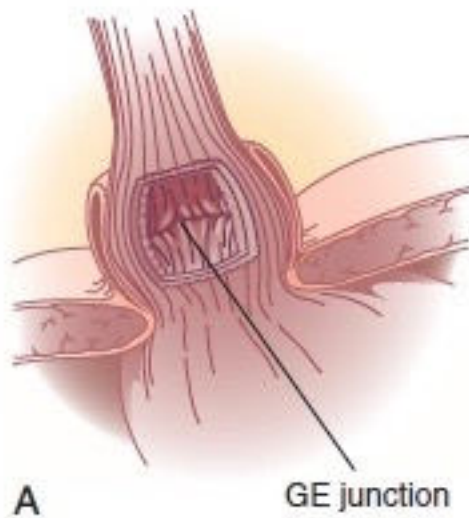
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Hiatal hernias –

Four types (I to IV).

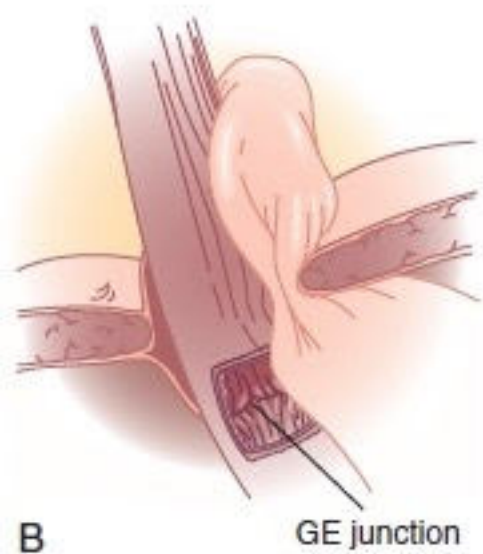
1. Type I hiatal hernia-

- also called a sliding hiatal hernia,
- most common type.
- GEJ migrates cephalad into the posterior mediastinum.
- This occurs because of laxity of the phreno-esophageal membrane.

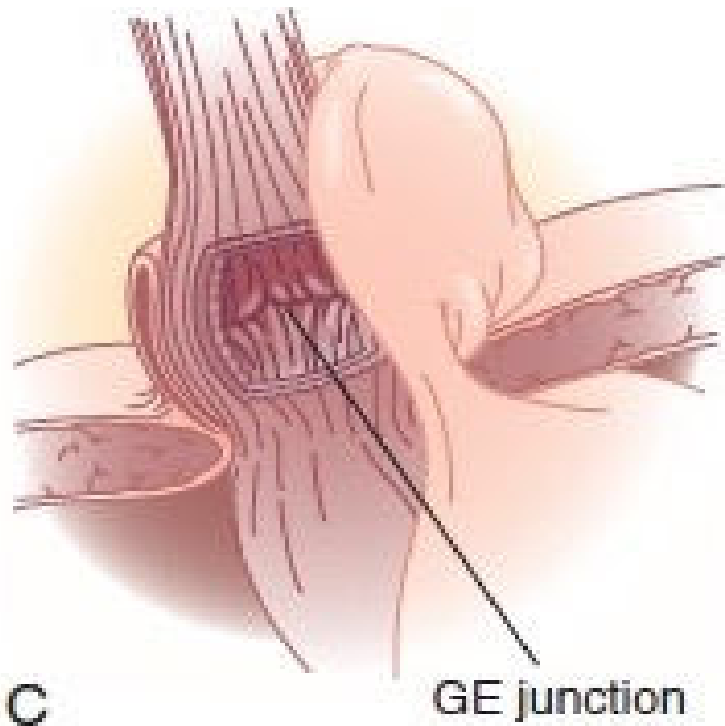


Hiatal hernia...

- Type II is known as a rolling hernia.
- A type II hernia occurs when the **GEJ is anchored in the abdomen, and the gastric fundus migrates into the mediastinum** through the hiatal defect.
- Hiatal hernia types II to IV, also referred to as PEH,
- are frequently associated with gastroesophageal obstructive symptoms
- (e.g., dysphagia, early satiety, and epigastric pain).



Hiatal hernia...



- Type III is referred to as a mixed hernia.
- Characterized by both the GEJ and fundus located in the mediastinum.

type IV hiatal hernia

- occurs when any visceral structure (e.g., colon, spleen, pancreas, or small bowel) migrates cephalad to the esophageal hiatus and is located in the mediastinum.

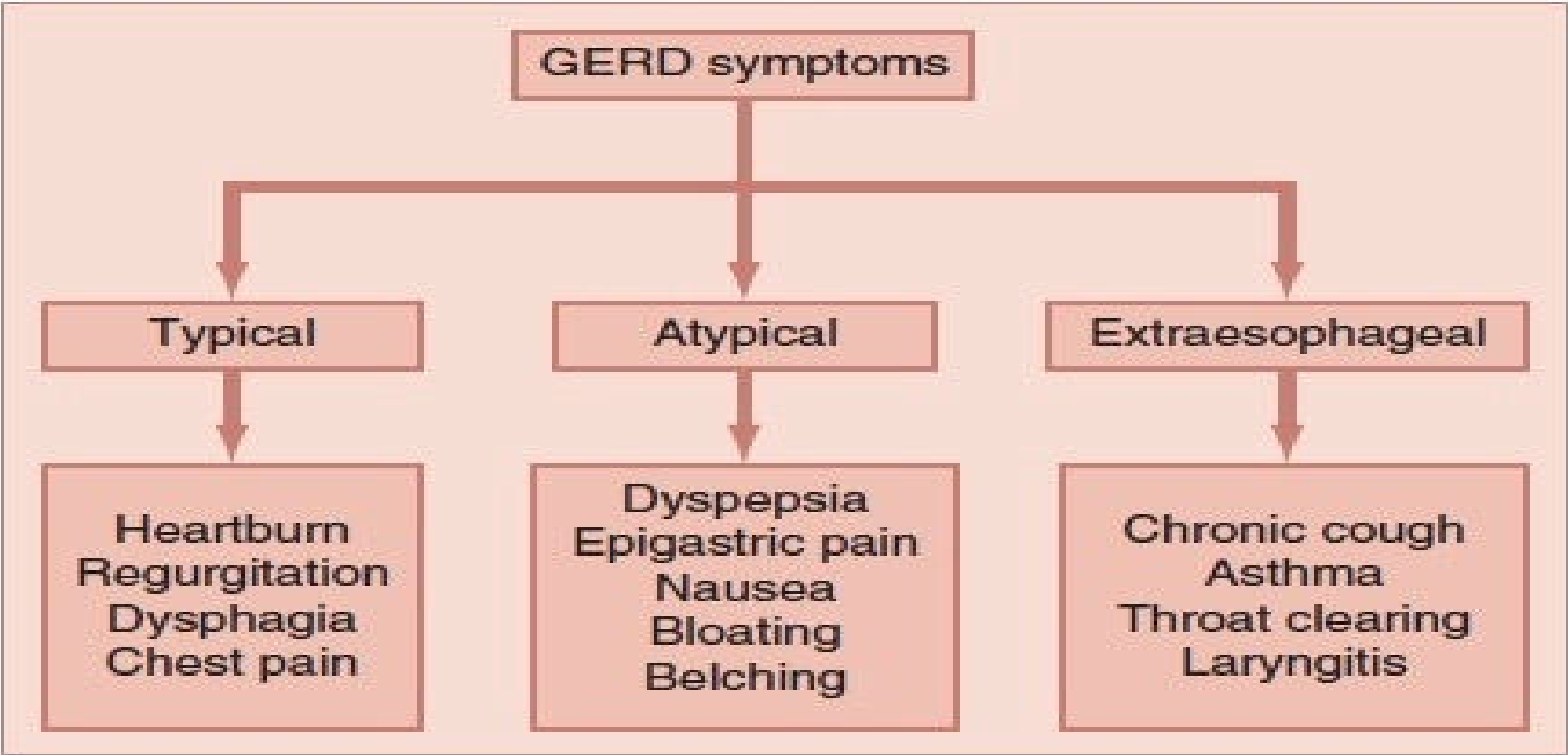


FIGURE 15.1 Gastroesophageal reflux disease (GERD) symptoms.

TABLE 42-1 Prevalence of Symptoms Occurring More Frequently Than Once per Week in 1000 Patients With GERD

SYMPTOM	PREVALENCE (%)
Heartburn	80
Regurgitation	54
Abdominal pain	29
Cough	27
Dysphagia for solids	23
Hoarseness	21
Belching	15
Bloating	15
Aspiration	14
Wheezing	7
Globus	4

Mechanism of extra-esophageal symptoms of GERD

1. Proximal esophageal reflux and micro-aspiration of gastroduodenal contents cause direct caustic injury to the larynx and lower respiratory tract; this is the most common mechanism.
2. Distal esophageal acid exposure triggers a vagal nerve reflex that results in bronchospasm and cough. This mechanism is due to the common vagal innervation of the trachea and esophagus.

BOX 42-1 Extraesophageal Symptoms of GERD

Laryngeal Symptoms of Reflux

Hoarseness or dysphonia
Throat clearing
Throat pain
Globus
Choking
Postnasal drip
Laryngeal and tracheal stenosis
Laryngospasm
Contact ulcers

Pulmonary Symptoms of Reflux

Cough
Shortness of breath
Wheezing
Pulmonary disease (asthma, idiopathic pulmonary fibrosis, chronic bronchitis, and others)

Preoperative diagnostic evaluation

- Four diagnostic tests are useful to establish the diagnosis of GERD and to identify abnormalities in gastroesophageal anatomy and function.
 1. Ambulatory pH and Impedance Monitoring
 2. Esophageal Manometry
 3. Esophagogastroduodenoscopy
 4. Barium Esophagram

1. Ambulatory pH and Impedance Monitoring

- Ambulatory pH monitoring quantifies distal esophageal acid exposure and is the “**gold standard**” test to diagnose GERD.
- A 24-hour pH monitoring is conducted with a thin catheter that is passed into the esophagus .
- Catheter has a dual-probe pH catheter, which contains two solid-state electrodes that are spaced 10 cm apart and detect fluctuations in pH between 2 and 7.
- distal electrode must be placed 5 cm proximal to the LES;
- the location of the LES is identified on esophageal manometry

Impedance Monitoring.....

- Esophageal impedance monitoring identifies episodes of nonacid reflux.
- Similar to 24-hour pH monitoring, esophageal impedance is performed with a thin, flexible catheter placed into the esophagus.
- Impedance catheters use electrodes placed at 1-cm intervals to detect changes in the resistance to flow of an electrical current (i.e., impedance).
- Impedance increases in the presence of air and decreases in the presence of a liquid bolus.
- Therefore, this technology can detect both gas and liquid movement in the esophagus.

- **Combined impedance-pH monitoring has been shown to identify reflux episodes with greater sensitivity than pH testing alone**

2. Esophageal Manometry

- Esophageal manometry is the most effective way **to assess function of the esophageal body and the LES.**
- High-resolution esophageal manometry gathers data using a 32-channel flexible catheter with pressure sensing devices arranged at 1-cm intervals.
- Study is conducted in approximately 15 minutes, during which time the patient performs 10 swallows.
- **Esophageal manometry can exclude achalasia and identify patients with ineffective esophageal body peristalsis.**

time is on the x-axis,
esophageal length is on the y-axis,
and pressure is represented by a color scale

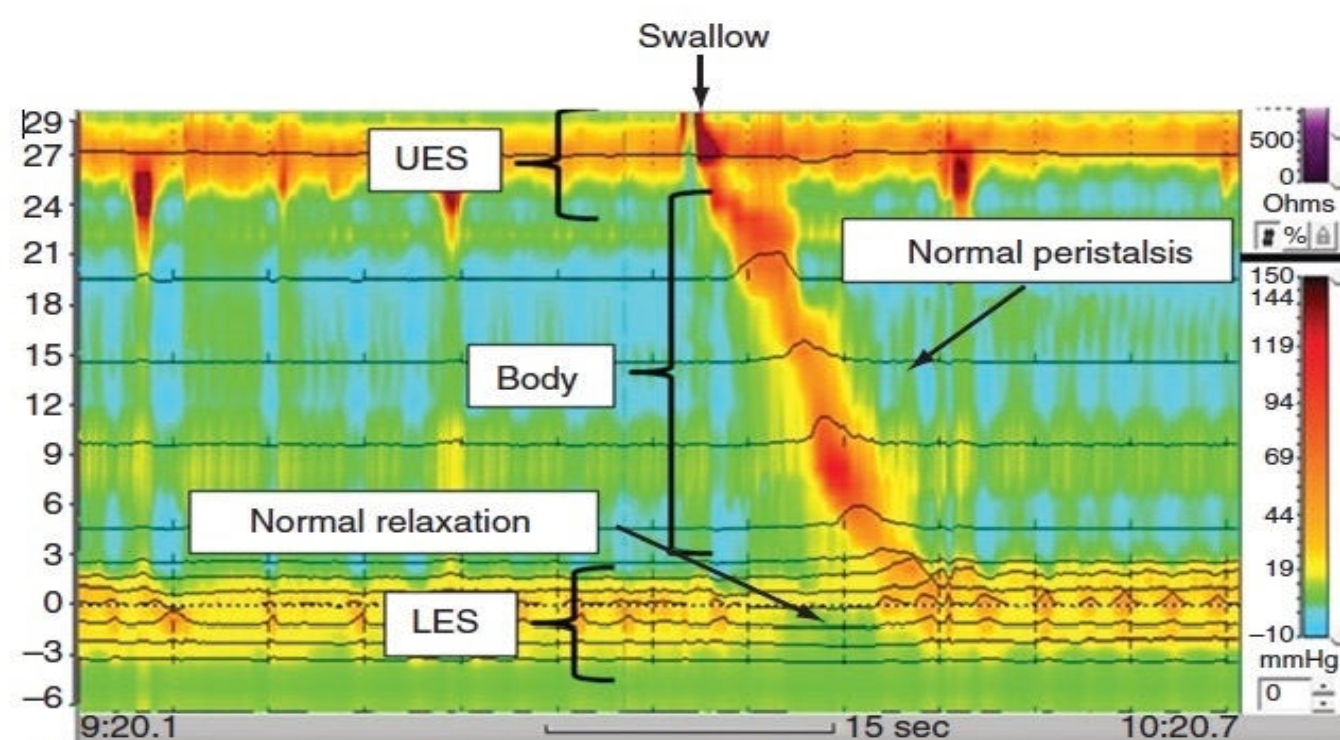


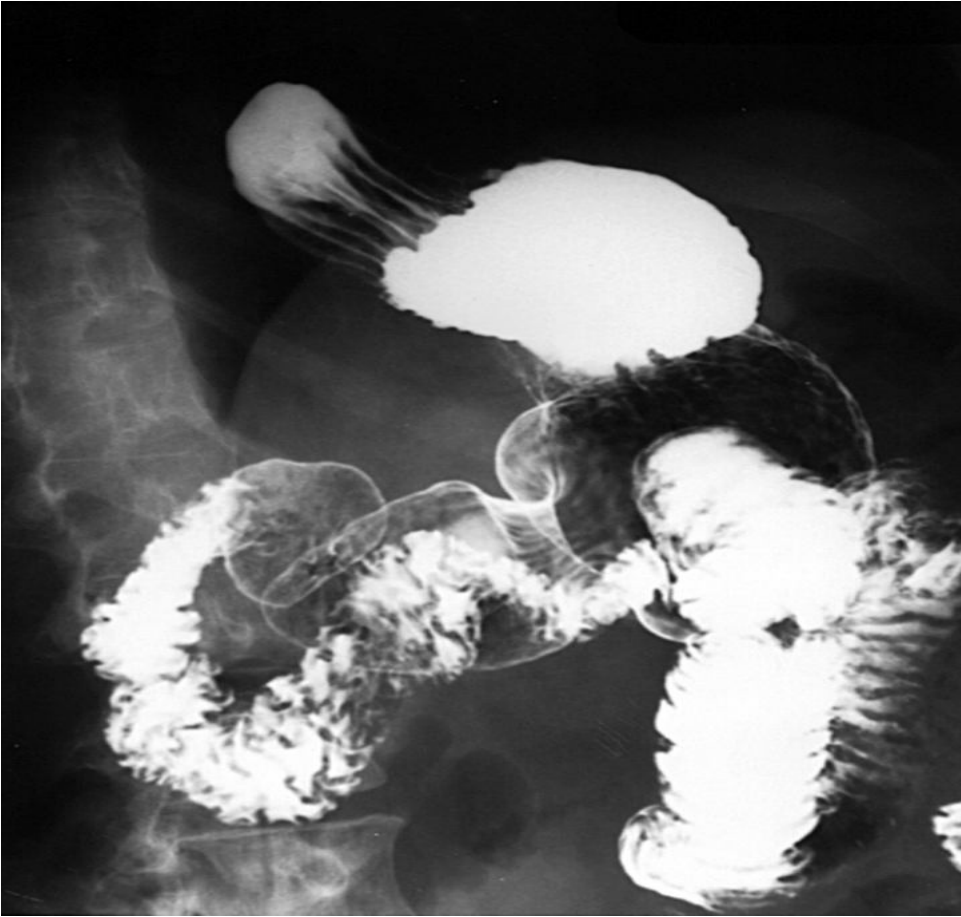
FIGURE 42-6 High-resolution esophageal manometry. The initiation of a swallow is associated with simultaneous relaxation of the upper esophageal sphincter (UES) and lower esophageal sphincter (LES) and onset of peristalsis in the esophageal body.

- Esophageal manometry also measures the
 - LES resting pressure and
 - assesses the LES for appropriate relaxation with deglutition.
- Because the LES is the major barrier to GER, a defective LES is common in patients with GERD.

3. Esophagogastroduodenoscopy

- The esophagus should be examined for evidence of mucosal injury due to GER, including
 - ulcerations, peptic strictures, and Barrett esophagus.
- Both peptic strictures and esophagitis can be considered pathognomonic for GERD.

4. Barium Esophagram



- Provides a detailed **anatomic evaluation** of the esophagus and stomach that is useful during preoperative evaluation of patients with GERD.
- The presence, size, and anatomic characteristics of a **hiatal hernia** or PEH can be evaluated.
- Other condition that can be identified- **esophageal diverticula, tumors, peptic strictures, achalasia, dysmotility, and gastroparesis.**

Additional preoperative evaluation

1. **Dysphagia**

- In patients with GERD, the most common cause of dysphagia is a reflux-associated inflammatory process of the esophageal wall.
- This inflammation can be manifested as a **Schatzki ring**, a diffuse distal esophageal inflammation, or a **peptic stricture**.
- **peptic strictures are pathognomonic for long-standing reflux** and develop from the chronic mucosal inflammation that occurs with GERD.
- When strictures result in significant dysphagia, patients can experience weight loss and protein-calorie malnutrition.

Obesity

- is a significant risk factor for the development of GERD.
- Compared with patients of normal weight, obese patients have
 - increased intra-abdominal pressure,
 - decreased LES pressure, and
 - more frequent transient LES relaxations.

Barrett Esophagus

- Based on endoscopic measurements, it can be classified into
 1. long segment (≥ 3 cm) and
 2. short segment (< 3 cm).
- If Barrett esophagus is suspected on the basis of endoscopic appearance of the esophageal mucosa, multiple biopsy specimens should be taken to histologically establish the diagnosis and to determine the presence of dysplasia.
- When dysplasia is present, there is an increased risk for development of adenocarcinoma.

Treatment of Gastroesophageal Reflux Disease

- **Medical Management :**

- For patients who present with typical symptoms of GERD, an 8-week course of PPI therapy is recommended

Surgical Management

- For patients who exhibit
 - elevated distal esophageal acid exposure and
 - persistent typical GERD symptoms despite maximal medical therapy,
 - antireflux surgery should be strongly considered.
- **Antireflux operations** include
 - partial posterior (180- and 270-degree)- **Toupet fundoplication**
 - partial anterior (90- and 180-degree)- **Dor fundoplication**
 - 360-degree esophagogastric funduplications- **Nissen fundoplication.**

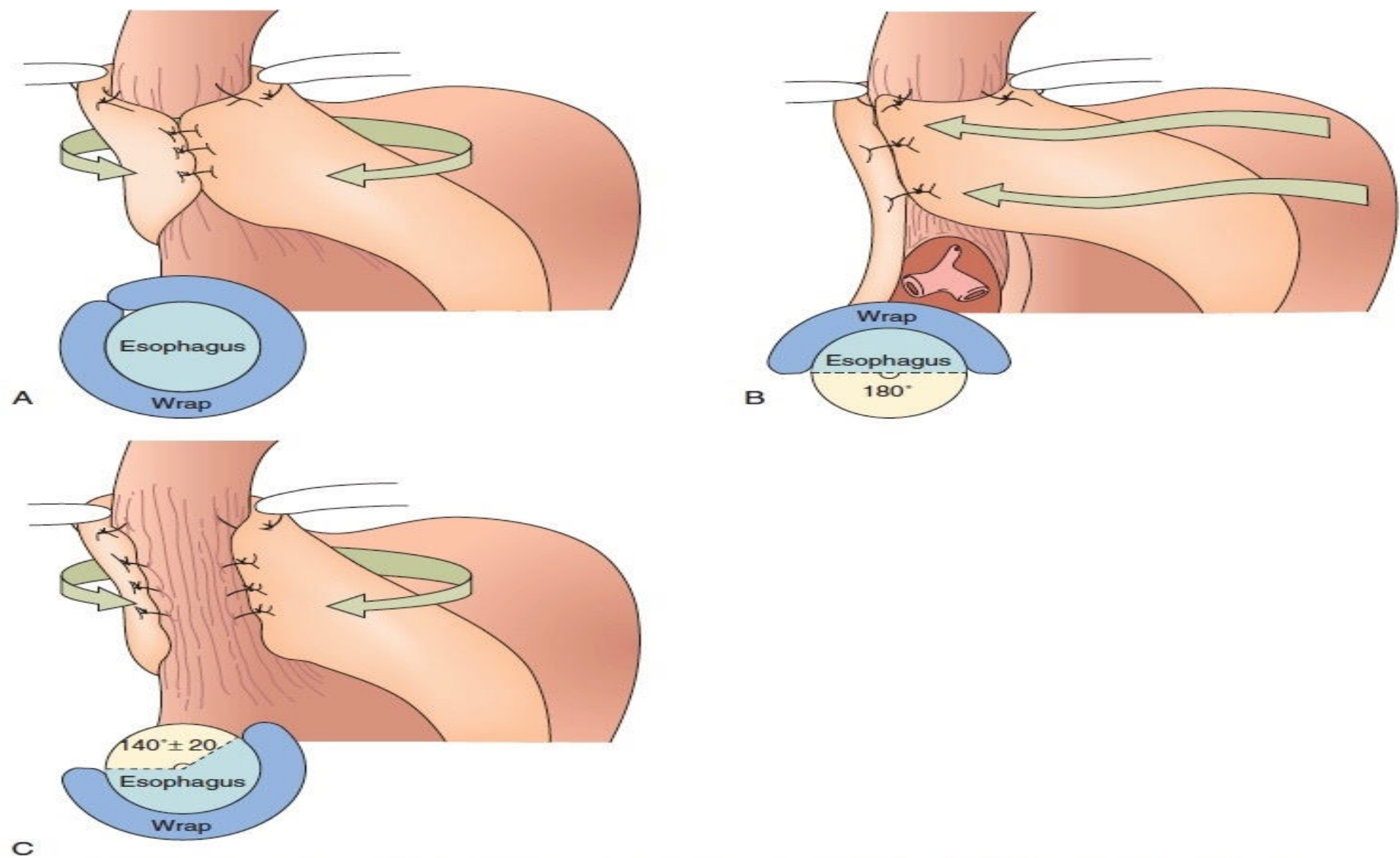


FIGURE 42-15 Three types of fundoplication. **A**, A 360-degree fundoplication. **B**, Partial anterior fundoplication. **C**, Partial posterior fundoplication.

Failed Antireflux Surgery

- The most common symptoms of failed LARS are
 - typical symptoms of GERD (i.e., heartburn, regurgitation, and water brash sensation) and dysphagia.
- All patients who present with recurrent or persistent symptoms of GERD should be evaluated with **esophageal manometry** and **ambulatory pH study**.
- If the pH study demonstrates elevated **distal esophageal acid exposure**,
 - an esophagram and
 - upper endoscopy should be performed.

Failed Antireflux Surgery....

- Once the diagnosis of persistent or recurrent GERD is made, **PPI therapy should be instituted.**
- Most of these patients experience resolution of their symptoms with resumption of PPI therapy.
- If failure of medical therapy,
 - reoperation should be performed.

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