Secondary achalasia may arise in Chagas disease, in which Trypanosoma cruzi infection causes destruction of the myenteric plexus, failure of peristalsis, and esophageal dilatation. Duodenal, colonic, and ureteric myenteric plexuses can also be affected in Chagas disease. Achalasia-like disease may be caused by diabetic autonomic neuropathy; infiltrative disorders such as malignancy, amyloidosis, or sarcoidosis; lesions of dorsal motor nuclei, particularly polio or surgical ablation; in association with Down syndrome; or as part of Allgrove (triple A) syndrome, an autosomal recessive disorder characterized by achalasia, alacrima, and adrenocorticotrophic hormone-resistant adrenal insufficiency. The association of some achalasia cases with remote herpes simplex virus 1 (HSV1) infection, linkage of immunoregulatory gene polymorphisms to achalasia, and occasional coexistence of Sjögren syndrome or autoimmune thyroid disease suggest that achalasia may also be driven by immune-mediated destruction of inhibitory esophageal neurons. Treatment modalities for both primary and secondary achalasia aim to overcome the mechanical obstruction, and include laparoscopic myotomy and pneumatic balloon dilatation. Botulinum neurotoxin (Botox) injection, to inhibit LES cholinergic neurons, can also be effective.

Esophagitis

Lacerations

Longitudinal mucosal tears near the gastroesophageal junction are termed *Mallory-Weiss tears,* and are most often associated with severe retching or vomiting secondary to acute alcohol intoxication. Normally, a reflex relaxation of the gastroesophageal musculature precedes the antiperistaltic contractile wave associated with vomiting. It is speculated that this relaxation fails during prolonged vomiting, with the result that refluxing gastric contents overwhelm the gastric inlet and cause the esophageal wall to stretch and tear. The roughly linear lacerations of Mallory-Weiss syndrome are longitudinally oriented and range in length from millimeters to several centimeters. These tears usually cross the gastroesophageal junction and may also be located in the proximal gastric mucosa. Up to 10% of upper GI bleeding, which often presents as hematemesis (Table 17-1), is due to superficial esophageal lacerations such as those associated with Mallory-Weiss syndrome. These do not generally require surgical intervention, and healing tends to be rapid and complete. In contrast, Boerhaave syndrome is a much less common but more serious disorder characterized by transmural tearing and rupture of the distal esophagus. This catastrophic event produces severe mediastinitis and generally requires surgical intervention. Because patients can present with severe chest pain, tachypnea, and shock, the initial differential diagnosis can include myocardial infarction.

Table 17-1 Esophageal Causes of Hematemesis

Lacerations (Mallory-Weiss syndrome)
Esophageal perforation (cancer or Boerhaave syndrome)
Varices (cirrhosis)
Esophageal-aortic fistula (usually with cancer)
Chemical and pill esophagitis
Infectious esophagitis (*Candida*, herpes)
Benign strictures
Vasculitis (autoimmune, cytomegalovirus)
Reflux esophagitis (erosive)
Eosinophilic esophagitis
Esophageal ulcers (many etiologies)
Barrett esophagus
Adenocarcinoma
Squamous cell carcinoma
Hiatal hernia

Chemical and Infectious Esophagitis

The stratified squamous mucosa of the esophagus may be damaged by a variety of irritants including alcohol, corrosive acids or alkalis, excessively hot fluids, and heavy smoking. Symptoms range from self-limited pain, particularly on swallowing, that is, *odynophagia*, to hemorrhage, stricture, or perforation in severe cases.

In children esophageal chemical injury is often secondary to accidental ingestion of household cleaning products; severe damage may follow attempted suicide in adults. Less severe chemical injury to the esophageal mucosa can occur when medicinal pills lodge and dissolve in the esophagus rather than passing into the stomach intact, a condition termed *pill-induced esophagitis.* Iatrogenic esophageal injury may be caused by cytotoxic chemotherapy, radiation therapy, or graft-versus-host disease. The esophagus may also be involved by the desquamative skin diseases bullous pemphigoid, epidermolysis bullosa and, rarely, Crohn disease.

Esophageal infections in otherwise healthy individuals are uncommon and most often due to herpes simplex virus. Infections in patients who are debilitated or immunosuppressed, as a result of disease or therapy, is more common and can be caused by herpes simplex virus, cytomegalovirus (CMV), or fungal organisms. Among fungi, candidiasis is most common, although mucormycosis and aspergillosis are also seen.

MORPHOLOGY

The morphology of chemical and infectious esophagitis varies with etiology. Dense infiltrates of neutrophils are present in most cases but may be absent following injury induced by chemicals (lye, acids, or detergent), which can lead to outright necrosis of the esophageal wall. Pill-induced esophagitis frequently occurs at the site of strictures that impede passage of luminal contents. When present, ulceration is accompanied by superficial necrosis with granulation tissue and eventual fibrosis.

Esophageal irradiation causes damage similar to that seen in other tissues and includes intimal proliferation and luminal narrowing of submucosal and mural blood vessels. The mucosal damage is, in part, secondary to this radiation-induced vascular injury as discussed in Chapter 9.

Infection by fungi or bacteria can either cause injury or complicate a preexisting ulcer. Nonpathogenic oral bacteria are frequently found in ulcer beds, while pathogenic organisms, which account for about 10% of infectious esophagitis, may invade the lamina propria and cause necrosis of overlying mucosa. Candidiasis, in its most advanced form, is characterized by adherent, gray-white **pseudomembranes** composed