TABLE 38-1 CAUSES OF ACUTE PANCREATITIS

OBSTRUCTION
Gallstones
Tumors: ampullary or pancreatic tumors
Parasites: *Ascaris* or *Clonorchis* species
Developmental anomalies: pancreas divisum, choledochocele, annular pancreas
Periampullary duodenal diverticula
Hypertensive sphincter of Oddi
Afferent duodenal loop obstruction
TOXINS
Ethyl alcohol
Methyl alcohol
Scorpion venom: excessive cholinergic stimulation causes salivation, sweating, dyspnea, and cardiac arrhythmias; seen mostly in the West Indies
Organophosphorus insecticides
DRUGS
Definite associations (documented with rechallenges): azathioprine or 6-mercaptopurine, valproic acid, estrogens, tetracycline, metronidazole, nitrofurantoin, pentamidine, furosemide, sulfonamides, methyldopa, cytarabine, cimetidine, ranitidine, sulindac, dideoxycytidine
Probable associations: thiazides, ethacrynic acid, phenformin, procainamide, chlorthalidone, L-asparaginase
METABOLIC DISORDERS
Hypertriglyceridemia, hypercalcemia, end-stage renal disease
TRAUMA
Accidental: blunt trauma to the abdomen (e.g., car accident, bicycle)
Iatrogenic: postoperative, endoscopic retrograde cholangiopancreatography
INFECTIOUS DISEASES
Parasitic: ascariasis, clonorchiasis
Viral: mumps, rubella, hepatitis A, hepatitis B, hepatitis C, coxsackievirus B, echovirus, adenovirus, cytomegalovirus, varicella virus, Epstein-Barr virus, human immunodeficiency virus
Bacterial: mycoplasma, *Campylobacter jejuni*, tuberculosis, *Legionella* species, leptospirosis
VASCULAR DISORDERS
Ischemia: hypoperfusion (e.g., postcardiac surgery) or atherosclerotic emboli
Vasculitis: systemic lupus erythematosus, polyarteritis nodosa, malignant hypertension
IDIOPATHIC DISORDERS
Between 10% and 30% of patients have pancreatitis
Up to 60% have occult gallstone disease (e.g., biliary microlithiasis, gallbladder sludge)
Less common causes: sphincter of Oddi dysfunction, mutations in the cystic fibrosis transmembrane regulator
MISCELLANEOUS DISORDERS
Penetrating peptic ulcer
Crohn's disease of the duodenum
Pregnancy-associated disorders
Pediatric associations: Reye's syndrome, cystic fibrosis

Autoimmune Pancreatitis

Autoimmune pancreatitis (AIP) is a benign disease with a unique histology of lymphoplasmacytic sclerosing pancreatitis, which is characterized by a periductal lymphoplasmacytic infiltrate, storiform fibrosis, obliterative phlebitis, and abundant immunoglobulin G4 (IgG4) immunostaining (>10 IgG4-positive cells per high-power field).

The most common manifestation of AIP is obstructive jaundice, which closely mimics pancreatic cancer with focal enlargement of the pancreatic head. AIP can also manifest with acute pancreatitis in up to 15% to 30% of individuals, and about 5% of patients evaluated for acute or chronic pancreatitis have AIP. AIP has a peak incidence in the sixth or seventh decades of life and tends to affect men twice as often as women.

Computed tomography (CT) typically demonstrates diffuse enlargement of the pancreas with delayed (rim) enhancement and a diffusely irregular, attenuated main pancreatic duct. More than 60% of individuals have clinical and histologic involvement of other organs, including the biliary tree, retroperitoneum, lacrimal and salivary glands, lymph nodes, periorbital tissues, kidneys, thyroid, lungs, meninges, aorta, breast, prostate, pericardium, and skin. Patients with AIP frequently respond favorably to corticosteroid treatment.

Pancreas Divisum

At approximately 4 weeks' gestation, the dorsal pancreas forms as an evagination from the duodenum, and shortly thereafter, the ventral pancreas forms from the hepatic diverticulum (E-Fig. 38-2). At approximately the eighth intrauterine week of life, the ventral pancreas rotates posterior to the duodenum and comes to rest posterior and inferior to the head portion of the dorsal pancreas with associated fusion of the main ducts. If fusion is incomplete, the duct of Wirsung drains only the ventral pancreas through the major ampulla, and the duct of Santorini drains the bulk of the pancreas (i.e., dorsal pancreas) through the relatively small accessory (minor) ampulla. This anomaly, called *pancreas divisum*, occurs in 5% to 10% of the general population and is associated with acute and chronic pancreatitis.

Theories suggest that pancreatitis results from relative outflow obstruction of the main dorsal duct through the small accessory ampulla. Endoscopic papillotomy and surgical sphincteroplasty are therapeutic maneuvers that may reduce the incidence of recurrent pancreatitis by increasing drainage through the accessory papilla.

Clinical Presentation

The hallmark of acute pancreatitis is persistent abdominal pain. In atypical cases, patients may have unexplained organ failure or postoperative ileus. The onset of pain is typically sudden, severe, and worse when supine. Pain is usually located in the upper abdomen and may radiate to the back, chest, and flanks. Nausea and vomiting are common. Physical examination usually reveals severe upper abdominal tenderness that is sometimes associated with guarding.

Pancreatic enzymes, vasoactive substances (e.g., kinins), and other toxic substances (e.g., elastase, phospholipase A_2), are liberated by the inflamed pancreas and extravasate along fascial planes in the retroperitoneal space, lesser sac, and peritoneal cavity. These materials cause chemical irritation and contribute to the development of ileus, chemical peritonitis, third-space losses of protein-rich fluid, hypovolemia, and hypotension. The toxic molecules may reach the systemic circulation by lymphatic and venous pathways and contribute to subcutaneous fat necrosis and end-organ damage, including shock, renal failure, and respiratory insufficiency (i.e., atelectasis, effusions, and acute respiratory distress syndrome [ARDS]). Grey Turner's sign (i.e., ecchymosis of the flank) or Cullen's sign (i.e., ecchymosis in the periumbilical region) may be associated with hemorrhagic pancreatitis.