MORPHOLOGY

The morphology of acute pancreatitis ranges from trivial inflammation and edema to severe extensive necrosis and hemorrhage. The basic alterations are **(1) microvascular leak and edema, (2) fat necrosis, (3) acute inflammation, (4) destruction of pancreatic parenchyma, and (5) destruction of blood vessels and interstitial hemorrhage.** The extent of each of these alterations depends on the duration and severity of the process.

In the milder form, **acute interstitial pancreatitis,** histologic alterations are limited to mild inflammation, interstitial edema, and focal areas of fat necrosis in the pancreas and the peripancreatic fat (Fig. 19-3). Fat necrosis, as we have seen, results from enzymatic activity of lipase. The released fatty acids combine with calcium to form insoluble salts that impart a granular blue microscopic appearance to the fat cells (Chapter 2).

In the more severe form, **acute necrotizing pancreatitis,** there is necrosis of acinar and ductal tissues as well as islets of Langerhans. Vascular injury can lead to hemorrhage into the pancreatic parenchyma. Macroscopically, the pancreatic substance is red-black from hemorrhage and contains interspersed foci of yellow-white, chalky fat necrosis (Fig. 19-4). Focal fat necrosis may also occur adjacent to the pancreas in the omentum and the mesentery of the bowel, and even outside the abdominal cavity, such as in the subcutaneous fat. In most cases the peritoneal cavity contains a serous, slightly turbid, brown-tinged fluid containing globules of fat (derived from the action of enzymes on adipose tissue). In its most severe form, **hemorrhagic pancreatitis,** extensive parenchymal necrosis is accompanied by dramatic hemorrhage within the substance of the gland.

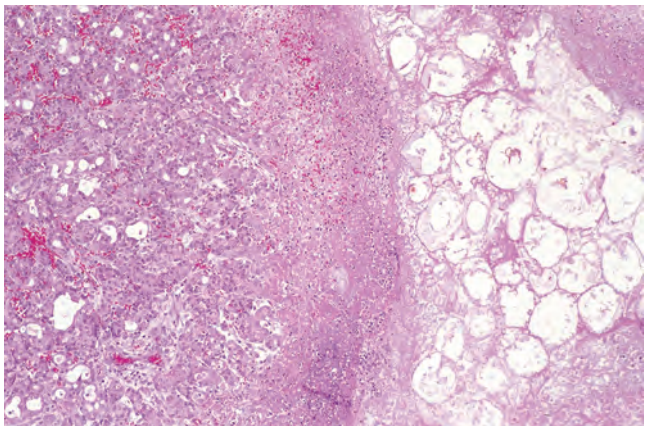

Figure 19-3 The microscopic field shows a region of fat necrosis on the right and focal pancreatic parenchymal necrosis *(center)*.

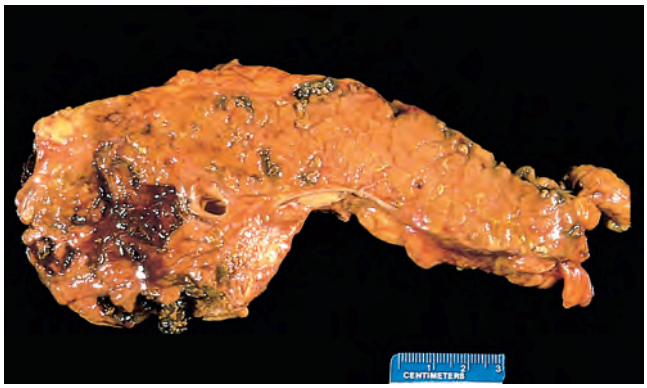

Figure 19-4 The pancreas has been sectioned longitudinally to reveal dark areas of hemorrhage in the head of the pancreas and a focal area of pale fat necrosis in the peripancreatic fat *(upper left)*.

Clinical Features. *Abdominal pain* is the cardinal manifestation of acute pancreatitis. Characteristically, the pain is constant and intense and is referred to the upper back and occasionally to the left shoulder. Its severity varies from mild and uncomfortable to severe and incapacitating. Anorexia, nausea, and vomiting frequently accompany the pain. Elevated plasma levels of amylase and lipase support the diagnosis of acute pancreatitis, as does the exclusion of other causes of abdominal pain.

Full-blown acute pancreatitis is a medical emergency. Patients usually have the sudden calamitous onset of an "acute abdomen." Many of the systemic features of severe acute pancreatitis can be attributed to release of toxic enzymes, cytokines, and other mediators into the circulation and explosive activation of a systemic inflammatory response, resulting in *leukocytosis, disseminated intravascular coagulation, edema, and acute respiratory distress syndrome.* Shock, due to the systemic inflammatory response syndrome (Chapters 4), and acute renal tubular necrosis may occur.

Laboratory findings include *marked elevation of serum amylase* levels during the first 24 hours, followed by a rising serum lipase level by 72 to 96 hours after the beginning of the attack. *Glycosuria* occurs in 10% of cases. *Hypocalcemia* may result from precipitation of calcium soaps in necrotic fat. Direct visualization of the enlarged inflamed pancreas by CT scanning is useful in the diagnosis of pancreatitis.

The key to the management of acute pancreatitis is "resting" the pancreas by total restriction of oral intake and by supportive therapy with intravenous fluids and analgesia. Although most individuals with acute pancreatitis recover fully, about 5% with severe acute pancreatitis die in the first week of illness. Acute respiratory distress syndrome and acute renal failure are ominous complications. Sequelae can include a sterile *pancreatic abscess* and a *pancreatic pseudocyst* (discussed later). In 40% to 60% of patients with acute necrotizing pancreatitis the necrotic debris becomes infected, usually by gram-negative organisms from the alimentary tract, further complicating the clinical course. Systemic organ failure and necrosis in the pancreas are both poor prognostic findings.

KEY CONCEPTS

- Acute pancreatitis is a form of *reversible* pancreatic parenchymal injury associated with inflammation.
- Acute pancreatitis may be caused by
  - Excessive alcohol intake
  - Pancreatic duct obstruction (e.g., gallstones)
  - Genetic factors (e.g., *PRSS1*, *SPINK1*)
  - Traumatic injuries
  - Medications
  - Infections (e.g., mumps)
  - Metabolic disorders leading to hypercalcemia
  - Ischemia