cases are MRCP and ERCP. When a diagnosis of sclerosing cholangitis has been established, a search for associated diseases, especially for chronic inflammatory bowel disease, should be carried out.

A recent study describes the natural history and outcome for 305 patients of Swedish descent with primary sclerosing cholangitis; 134 (44%) of the patients were asymptomatic at the time of diagnosis and, not surprisingly, had a significantly higher survival rate. The independent predictors of a bad prognosis were advanced age, serum bilirubin concentration, and liver histologic changes. Cholangiocarcinoma was found in 24 patients (8%). Inflammatory bowel disease was closely associated with primary sclerosing cholangitis and had a prevalence of 81% in this study population.

Small duct PSC is defined by the presence of chronic cholestasis and hepatic histology consistent with PSC but with normal findings on cholangiography. Small duct PSC is found in ~5% of patients with PSC and may represent an earlier stage of PSC associated with a significantly better long-term prognosis. However, such patients may progress to classic PSC and/or end-stage liver disease with consequent necessity of liver transplantation.

In patients with AIDS, cholangiopancreatography may demonstrate a broad range of biliary tract changes as well as pancreatic duct obstruction and occasionally pancreatitis (Chap. 226). Further, biliary tract lesions in AIDS include infection and cholangiopancreatographic changes similar to those of PSC. Changes noted include: (1) diffuse involvement of intrahepatic bile ducts alone, (2) involvement of both intra- and extrahepatic bile ducts, (3) ampullary stenosis, (4) stricture of the intrapancreatic portion of the CBD, and (5) pancreatic duct involvement. Associated infectious organisms include *Cryptosporidium*, *Mycobacterium avium-intracellulare*, cytomegalovirus, *Microsporidia*, and *Isospora*. In addition, acalculous cholecystitis occurs in up to 10% of patients. ERCP sphincterotomy, while not without risk, provides significant pain reduction in patients with AIDS-associated papillary stenosis. Secondary sclerosing cholangitis may occur as a long-term complication of choledocholithiasis, cholangiocarcinoma, operative or traumatic biliary injury, or contiguous inflammatory processes.

**TREATMENT** **SCLEROSING CHOLANGITIS**

Therapy with cholestyramine may help control symptoms of pruritus, and antibiotics are useful when cholangitis complicates the clinical picture. Vitamin D and calcium supplementation may help prevent the loss of bone mass frequently seen in patients with chronic cholestasis. Glucocorticoids, methotrexate, and cyclosporine have not been shown to be efficacious in PSC. UDCA in high dosage (20 mg/kg) improves serum liver tests, but an effect on survival has not been documented. In cases where high-grade biliary obstruction (dominant strictures) has occurred, balloon dilatation or stenting may be appropriate. Only rarely is surgical intervention indicated. Efforts at biliary-enteric anastomosis or stent placement may, however, be complicated by recurrent cholangitis and further progression of the stenosing process. The prognosis is unfavorable, with a median survival of 9–12 years following the diagnosis, regardless of therapy. Four variables (age, serum bilirubin level, histologic stage, and splenomegaly) predict survival in patients with PSC and serve as the basis for a risk score. PSC is one of the most common indications for liver transplantation.



# SECTION 3 DISORDERS OF THE PANCREAS

## 370 Approach to the Patient with Pancreatic Disease

Darwin L. Conwell, Norton J. Greenberger, Peter A. Banks

### GENERAL CONSIDERATIONS

As emphasized in Chap. 371, the etiologies as well as clinical manifestations of pancreatitis are quite varied. Although it is well-appreciated that pancreatitis is frequently secondary to biliary tract disease and alcohol abuse, it can also be caused by drugs, genetic mutations, trauma, and viral infections and is associated with metabolic and connective tissue disorders. In ~30% of patients with acute pancreatitis and 25–40% of patients with chronic pancreatitis, the etiology initially can be obscure.

The incidence of acute pancreatitis is about 5–35/100,000 new cases per year worldwide, with a mortality rate of about 3%. The incidence of chronic pancreatitis is about 4–8 new cases per 100,000 per year with a prevalence of 26–42 cases per 100,000. The number of patients admitted to the hospital who suffer with both acute and chronic pancreatitis in the United States is largely increasing and is now estimated to be 274,119 for acute pancreatitis and 19,724 for chronic pancreatitis. Acute pancreatitis is now the most common gastrointestinal diagnosis requiring hospitalization in the United States. Acute and chronic pancreatic disease costs an estimated 3 billion dollars annually in health care expenditures. These numbers may underestimate the true incidence and prevalence, because non–alcohol-induced pancreatitis has been largely ignored. At autopsy, the prevalence of chronic pancreatitis ranges from 0.04 to 5%.

The diagnosis of acute pancreatitis is generally clearly defined based on a combination of laboratory, imaging, and clinical symptoms. The diagnosis of chronic pancreatitis, especially in mild disease, is hampered by the relative inaccessibility of the pancreas to direct examination and the nonspecificity of the abdominal pain associated with chronic pancreatitis. Many patients with chronic pancreatitis do not have elevated blood amylase or lipase levels. Some patients with chronic pancreatitis develop signs and symptoms of pancreatic exocrine insufficiency, and thus, objective evidence for pancreatic disease can be demonstrated. However, there is a very large reservoir of pancreatic exocrine function. More than 90% of the pancreas must be damaged before maldigestion of fat and protein is manifested. Noninvasive, indirect tests of pancreatic exocrine function (fecal elastase) are much more likely to give abnormal results in patients with obvious advanced pancreatic disease (i.e., pancreatic calcification, steatorrhea, or diabetes mellitus) than in patients with occult disease. Invasive, direct tests of pancreatic secretory function (secretin tests) are the most sensitive and specific tests to detect early chronic pancreatic disease when imaging is equivocal or normal.

### TESTS USEFUL IN THE DIAGNOSIS OF PANCREATIC DISEASE

Several tests have proved of value in the evaluation of pancreatic disease. Examples of specific tests and their usefulness in the diagnosis of acute and chronic pancreatitis are summarized in Table 370-1 and Fig. 370-1. At some institutions, pancreatic function tests are available and performed if the diagnosis of chronic pancreatic disease remains a possibility after noninvasive tests (ultrasound, computed tomography [CT], magnetic resonance cholangiopancreatography [MRCP]) or invasive tests (endoscopic retrograde cholangiopancreatography [ERCP], endoscopic ultrasonography [EUS]) have given normal or