Pathology and pathogenesis of pancreatitis

Pancreatitis

- Pancreatitis encompasses a group of disorders characterized by inflammation of the pancreas. The clinical manifestations can range in severity from a mild, self-limited disease to a life threatening acute inflammatory process, and the duration of the disease can range from a transient attack to an irreversible loss of function.

Pancreatitis

- In *acute pancreatitis*, gland can return to normal if underlying cause of the pancreatitis is removed.
- By contrast, *chronic pancreatitis* is defined by irreversible destruction of exocrine pancreatic parenchyma.

Acute pancreatitis

- *Acute pancreatitis is a group of reversible lesions characterized by inflammation of the pancreas ranging in severity from edema and fat necrosis to parenchymal necrosis with severe hemorrhage.*

Acute pancreatitis

- 80% of cases in Western countries are associated with one of two conditions: biliary tract disease or alcoholism. Gallstones are present in 35% to 60% of cases of acute pancreatitis.

Acute pancreatitis

Less common causes of acute pancreatitis include the following:

- Obstruction of the pancreatic duct system eg. periampullary tumors, congenital cystic dilatation of the common bile duct, biliary "sludge," and parasites (particularly *Ascarasis lumbricoides* and *Clonorchis sinensis* organisms)
- Medications. More than 85 drugs have been reported to cause acute pancreatitis. These include thiazide diuretics, azathioprine , estrogens, etc

Acute pancreatitis

- Metabolic disorders, including hypertriglyceridemia, hyperparathyroidism, and other hypercalcemic states
- Acute ischemia induced by vascular thrombosis, embolism, vasculitis and shock
- Trauma, both blunt trauma and iatrogenic injury during surgery or endoscopic retrograde cholangiopancreatography

ETIOLOGIC FACTORS IN ACUTE PANCREATITIS

Metabolic
Alcoholism
Hyperlipoproteinemia
Hypercalcemia
Drugs (e.g., thiazide diuretics)
Genetic
Mechanical
Trauma
Gallstones
Iatrogenic injury
Perioperative injury
Endoscopic procedures with dye injection

ETIOLOGIC FACTORS IN ACUTE PANCREATITIS

Vascular
Shock
Atheroembolism
Polyarteritis nodosa
Infectious
Mumps
Coxsackievirus
Mycoplasma pneumoniae

Acute pancreatitis: Morphology

- The morphology of acute pancreatitis ranges from inflammation and edema to severe extensive necrosis and hemorrhage.

Acute pancreatitis: Morphology

- The basic alterations are **(1) microvascular leakage causing edema, (2) necrosis of fat by lipolytic enzymes, (3) an acute inflammatory reaction, (4) proteolytic destruction of pancreatic parenchyma, and (5) destruction of blood vessels with subsequent interstitial hemorrhage**.

Acute pancreatitis: Morphology

- Fat necrosis, as we have seen, results from enzymatic destruction of fat cells. The released fatty acids combine with calcium to form insoluble salts that precipitate in situ.

Acute pancreatitis

- **Pathogenesis.** *autodigestion of the pancreatic substance by inappropriately activated pancreatic enzymes*. Thus, *activation of trypsinogen is an important triggering event in acute pancreatitis*.

Acute pancreatitis: Clinical Features.

- *Abdominal pain* is the cardinal manifestation of acute pancreatitis. Its severity varies from mild to severe.
- *Full-blown acute pancreatitis is a medical emergency of the first magnitude*. These patients usually have the sudden onset of an "acute abdomen" that must be differentiated from diseases such as ruptured acute appendicitis, perforated peptic ulcer, acute cholecystitis with rupture, and occlusion of mesenteric vessels with infarction of the bowel.

Acute pancreatitis: Clinical Features.

- Characteristically, the pain is constant and intense and is often referred to the upper back. There is *leukocytosis*, *hemolysis*, *disseminated intravascular coagulation*, *fluid sequestration, acute respiratory distress syndrome*, *and diffuse fat necrosis*. *Peripheral vascular collapse and shock with acute renal tubular necrosis may occur*

Acute pancreatitis

- *Laboratory findings:* marked elevation of serum amylase levels during the first 24 hours, followed within 72 to 96 hours by a rising serum lipase level.

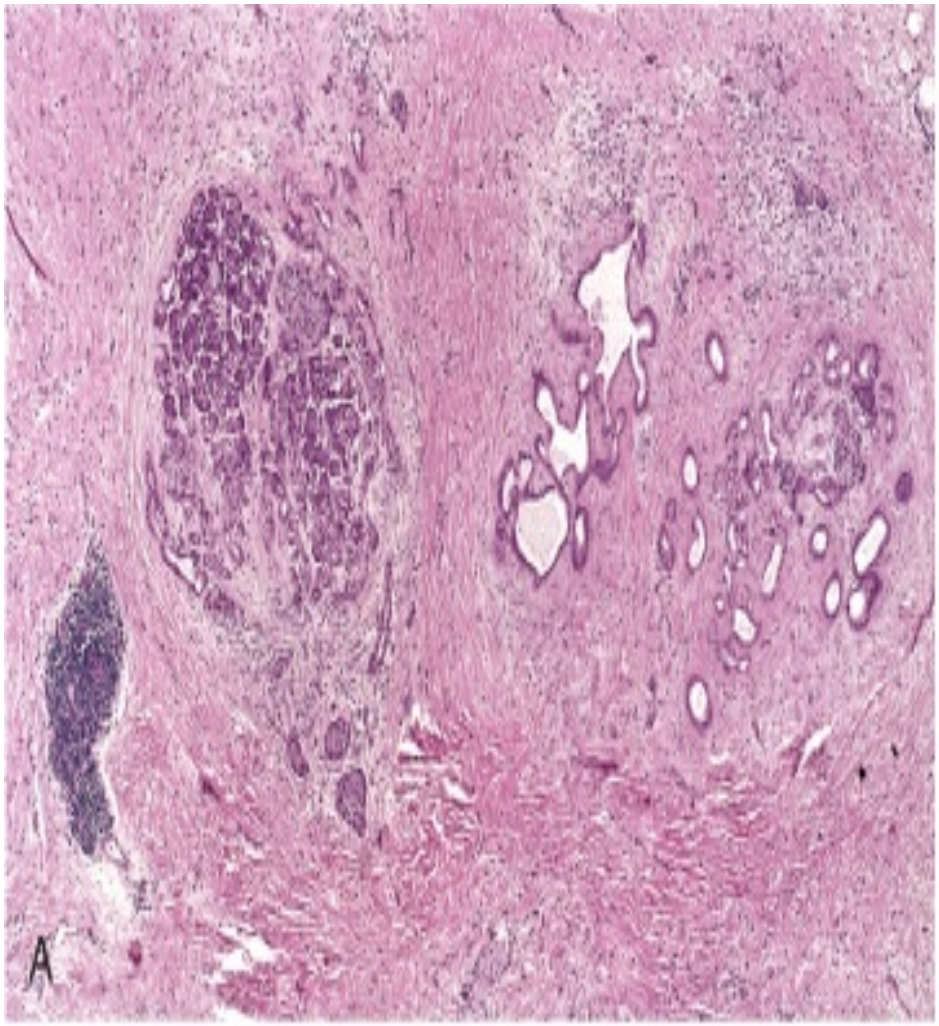
Acute pancreatitis

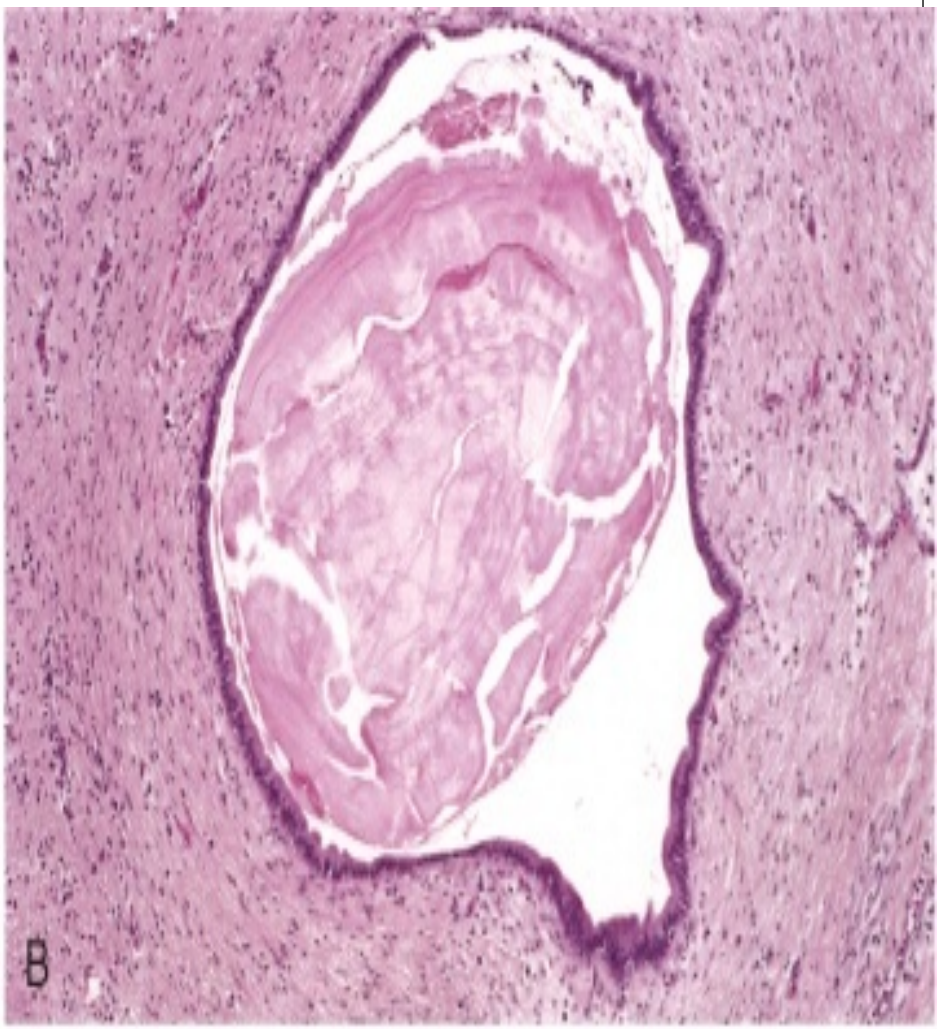
- The key to the management is "resting" the pancreas by total restriction of food and fluids and by supportive therapy.
- Most patients recover fully. About 5% die from shock during the first week of illness. Acute respiratory distress syndrome and acute renal failure are fatal complications.
- In surviving patients, sequelae include a sterile *pancreatic abscess* and a *pancreatic pseudocyst*.

Chronic pancreatitis

- Chronic pancreatitis is characterized by inflammation of the pancreas with destruction of exocrine parenchyma, fibrosis, and, in the late stages, the destruction of endocrine parenchyma.
- The chief distinction between acute and chronic pancreatitis is the irreversible impairment in pancreatic function that is characteristic of chronic pancreatitis.

Chronic pancreatitis





Chronic pancreatitis

- There is significant overlap in the causes of acute and chronic pancreatitis. By far *the most common cause of chronic pancreatitis is long-term alcohol abuse and biliary tract disease*, and these patients are usually middle-aged males.

Chronic pancreatitis

Less common causes of chronic pancreatitis include the following:

- Hypercalcemia, hyperlipidemia.
- Long-standing *obstruction* of the pancreatic duct by pseudocysts, calculi, trauma, neoplasms, or pancreas divisum.
- *Tropical pancreatitis*, which is a poorly characterized disease seen in Africa and Asia. It has been attributed to malnutrition.
- *Hereditary pancreatitis*
- *Idiopathic chronic pancreatitis*.

Chronic pancreatitis: Morphology

- **Chronic pancreatitis is characterized by parenchymal fibrosis, reduced number and size of acini with relative sparing of the islets of Langerhans, and variable dilation of the pancreatic ducts**
- These changes are usually accompanied by a chronic inflammatory infiltrate around lobules and ducts.
- Grossly: gland is hard, sometimes with extremely dilated ducts and visible calcification

Chronic pancreatitis: Clinical Features

- Silent or repeated attacks of abdominal pain, or persistent abdominal and back pain. Attacks may be precipitated by alcohol abuse, overeating (which increases demand on the pancreas), or the use of opiates and other drugs.

Chronic pancreatitis: Clinical Features

- During an attack of abdominal pain, there may be mild fever and mild-to-moderate elevations of serum amylase. Calcifications can be seen within the pancreas by CT scan and ultrasonography.
- Complications: Severe *pancreatic exocrine insufficiency,* chronic malabsorption, *diabetes mellitus* (due to destruction of islets of Langerhans), *severe chronic pain* and p*ancreatic pseudocysts.*

PSEUDOCYSTS OF PANCREAS

- Pseudocysts are localized collections of necrotic-hemorrhagic material rich in pancreatic enzymes. Such cysts lack an epithelial lining (hence the prefix "pseudo"), and they account for majority of cysts in the pancreas.
- Pseudocysts usually arise after an episode of acute pancreatitis, or of chronic alcoholic pancreatitis.
- Traumatic injury to the abdomen can also give rise to pseudocysts

PSEUDOCYSTS OF PANCREAS

- **Morphology.** Pseudocysts are usually solitary. Pseudocysts can range in size from 2 to 30 cm in diameter.
- While many pseudocysts spontaneously resolve, they may become secondarily infected, and larger pseudocysts may compress or even perforate into adjacent structures.
- They can produce abdominal pain and predispose to intraperitoneal hemorrhage or peritonitis.

PSEUDOCYSTS OF PANCREAS