



# Pathology of Pancreatitis

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## Lecture 5

### 430 Pathology Team

Mohamed Bohlega

Seham AlArfaj

Maha AlKubaidan

Red: Doctors' and important notes.

Green: Team notes.

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## 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.

### Types:

- Acute pancreatitis in which gland can return to normal if underlying cause of the pancreatitis is removed.
- Chronic pancreatitis is defined by irreversible destruction of exocrine pancreatic parenchyma.

N.B: acute = inflammation (reversible)

Chronic = fibrosis (irreversible)

### Acute pancreatitis:

Acute pancreatitis is a group of **reversible** lesions characterized by **inflammation** of the pancreas ranging in severity from edema and fat necrosis (because the pancreas is covered by fat) to parenchymal necrosis with severe haemorrhage. (**Fatal condition**)

### Causes:

- Most common:
  - Biliary tract disease or alcoholism in 80% of cases in Western countries. Gallstones are present in 35% to 60% of cases of 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 *Ascariasis lumbricoides* and *Clonorchis sinensis* organisms)
  - Medications. More than 85 drugs have been reported to cause acute pancreatitis. These include thiazide diuretics, azathioprine, estrogens, etc
  - Metabolic disorders, including hypertriglyceridemia, hyperparathyroidism, and other hypercalcemic states **duo to bone cancers**.
  - Acute ischemia induced by vascular thrombosis, embolism, vasculitis and shock
  - Trauma, both blunt trauma and iatrogenic injury (**Injury or sickness caused by medical treatment**) during surgery or endoscopic retrograde cholangiopancreatography

### Another classification of the causes:

- **Metabolic:**
  1. Alcoholism
  2. Hyperlipoproteinemia
  3. Hypercalcemia
  4. Drugs (e.g., thiazide diuretics)
  5. Genetic

- **Mechanical:**
  1. Trauma
  2. Gallstones
  3. Iatrogenic injury
  4. Perioperative injury
  5. Endoscopic procedures with dye injection
- **Vascular**
  1. Shock
  2. Atheroembolism
  3. Polyarteritis nodosa
- **Infectious:**
  1. Mumps
  2. Coxsackievirus
  3. Mycoplasma pneumoniae

### Morphology:

It ranges from **inflammation** and edema to **severe extensive necrosis and haemorrhage**.

### 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. **This mainly happens in the exocrine parenchyma, because 90% of the pancreas is exocrine and only 2% is endocrine.**
- (5) Destruction of blood vessels with subsequent interstitial haemorrhage.

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

### Pathogenesis:

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

**Note: When there is an insulting factor like a mechanical cause, edema develops, which starts pushing blood vessels causing ischemia that ultimately cause damage to the acinar cells of the pancreas.**

**The mechanism by which alcohol causes pancreatitis is unknown, but there have been some suggested theories:**

- **Alcohol can be directly toxic to acinar cells**
- **It may form some stone like material**
- **It may act intracellularly to cause abnormalities in enzyme secretion**

### Clinical Features:

- Abdominal pain is the cardinal (**fundamental**) manifestation of acute pancreatitis. Its severity varies from mild to severe.

- Characteristically, the pain is constant and intense and is often **referred to the upper back (because it is a retroperitoneal organ)**. There is leucocytosis, 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
- 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.

#### 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.

#### Management:

"Resting" the pancreas by total restriction of food and fluids and by supportive therapy.

- A naso-gastric tube may be implanted so it suck any secretion.
- IV fluids for nutrition, antibiotics, and morphine are also given as management.

#### Prognosis:

- 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 some surviving patients, sequelae include a sterile pancreatic abscess and a pancreatic pseudocyst.

**What is the difference between a true cyst and pseudocyst ?**

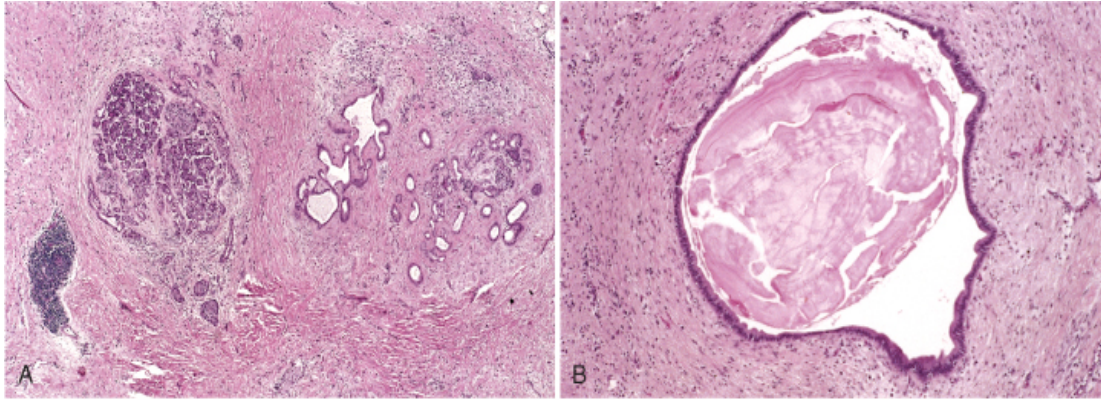
**True Cyst:** A fluid filled cavity which is lined by epithelium

**Pseudo Cyst:** A fluid filled epithelium which is not lined by epithelium.

#### 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. *A*, Extensive fibrosis and atrophy has left only residual islets (*left*) and ducts (*right*), with a sprinkling of chronic inflammatory cells and acinar tissue. *B*, A higher-power view demonstrating dilated ducts with inspissated eosinophilic ductal concretions in a patient with alcoholic chronic pancreatitis.

### Causes:

There is significant overlap in the causes of acute and chronic pancreatitis.

The most common cause of chronic pancreatitis is:

- long-term alcohol abuse
- biliary tract disease, and these patients are usually middle-aged males.

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.

### Morphology:

#### Microscopically:

- 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 (**it might be mistaken with tumors or masses**)

#### 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.

- During an attack of abdominal pain, there may be mild fever and mild-to-moderate elevations of serum amylase. **Calcifications (dystrophic) or cyst formation** can be seen within the pancreas by CT scan and ultrasonography.

### Complications:

1. Severe pancreatic exocrine insufficiency
2. chronic malabsorption
3. diabetes mellitus (due to destruction of islets of Langerhans)
4. severe chronic pain
5. Pancreatic 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.

### Etiology:

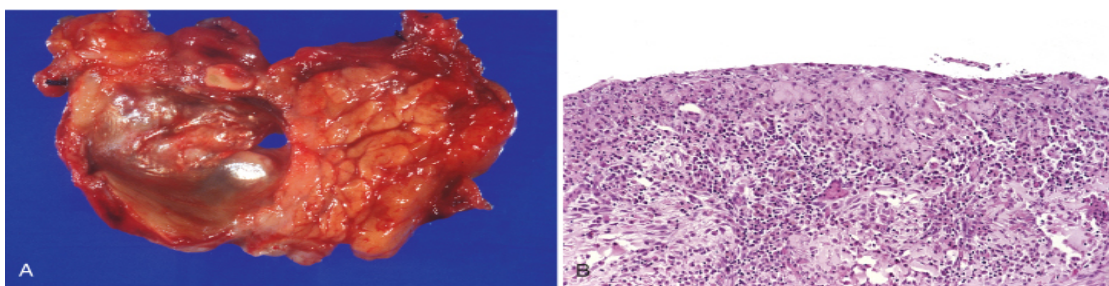
- Pseudocysts usually arise after an episode of acute pancreatitis, or of chronic alcoholic pancreatitis.
- Traumatic injury to the abdomen can also give rise to pseudocysts

### Morphology:

Pseudocysts are usually solitary. Pseudocysts can range in size from 2 to 30 cm in diameter.

### Outcome:

- 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.



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Pancreatic pseudocyst. A, Cross-section through this previously bisected lesion revealing a poorly defined cyst with a necrotic brown-black wall. B, Histologically, the cyst lacks a true epithelial lining and instead is lined by fibrin and granulation tissue.

## Summary:

### We have two types of pancreatitis:

Acute = reversible

Chronic = fibrosis result in **irreversible** injury

### Causes:

Most commonly alcoholism and biliary duct diseases

### Symptoms:

**Acute:** Characteristically, the pain is constant and intense and is often referred to the upper back (because it is a retroperitoneal organ)

**Chronic:** Silent or repeated attacks of abdominal pain, or persistent abdominal and back pain. Attacks may be precipitated by alcohol abuse, overeating. Calcifications (dystrophic) or cyst formation can be seen within the pancreas by CT scan and ultrasonography

### Morphology:

Acute pancreatitis: It ranges from inflammation and edema to severe extensive necrosis and hemorrhage.

Chronic pancreatitis: inflammation of the pancreas with destruction of exocrine parenchyma, fibrosis, and, in the late stages, the destruction of endocrine parenchyma.

### Laboratory findings in acute:

Increase amylase first followed by increase in lipase.

### Management of acute:

"Resting" the pancreas by total restriction of food and fluids and by supportive therapy.

- A naso-gastric tube maybe implanted so it suck any secretion.
- IV fluids for nutrition, antibiotics, and morphine are also given as management.