Pancreatitis

وزراة التعليم العالي والبحث العلمي
كلية المعارف الجامعة
قسم المختبرات الطبية

Histopathology

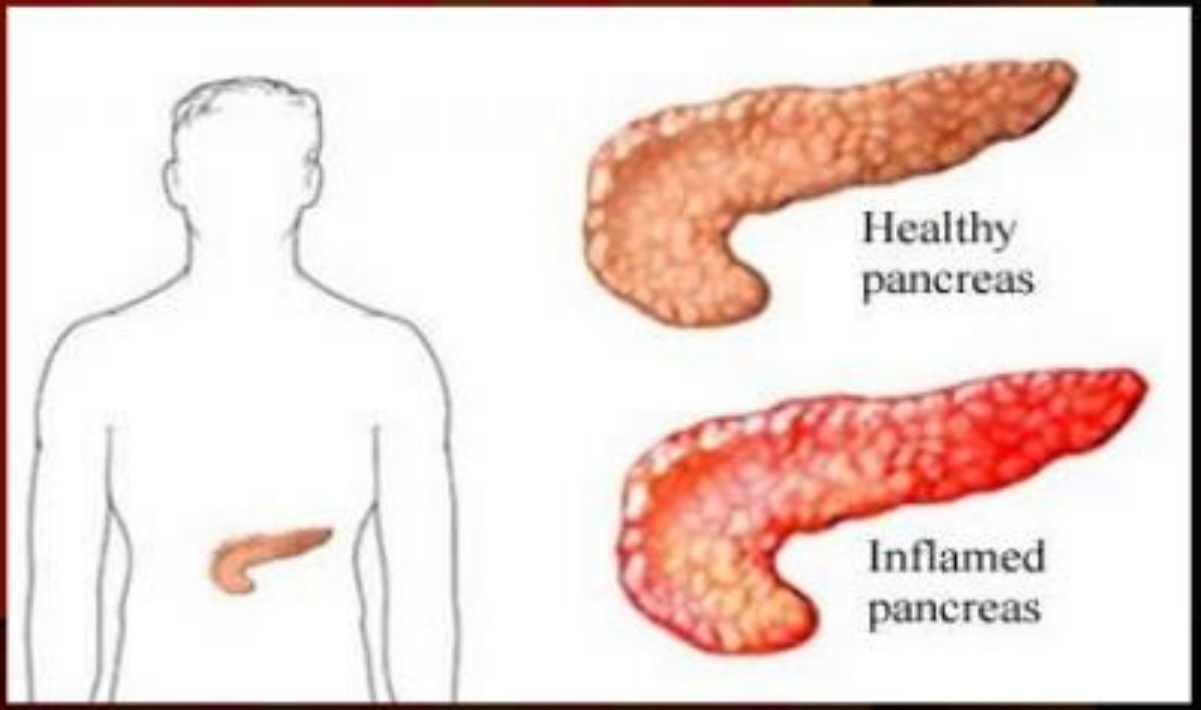
المرحلة الرابعة

Pancreatitis

- Inflammation of pancreas

Acute Pancreatitis

- Is inflammation of the pancreas ranging in severity from edema & fat necrosis to parenchymal necrosis with hemorrhage
- It is due to activation of pancreatic enzymes within the pancreas, particularly trypsin.
- Gland heals without any function or anatomic changes



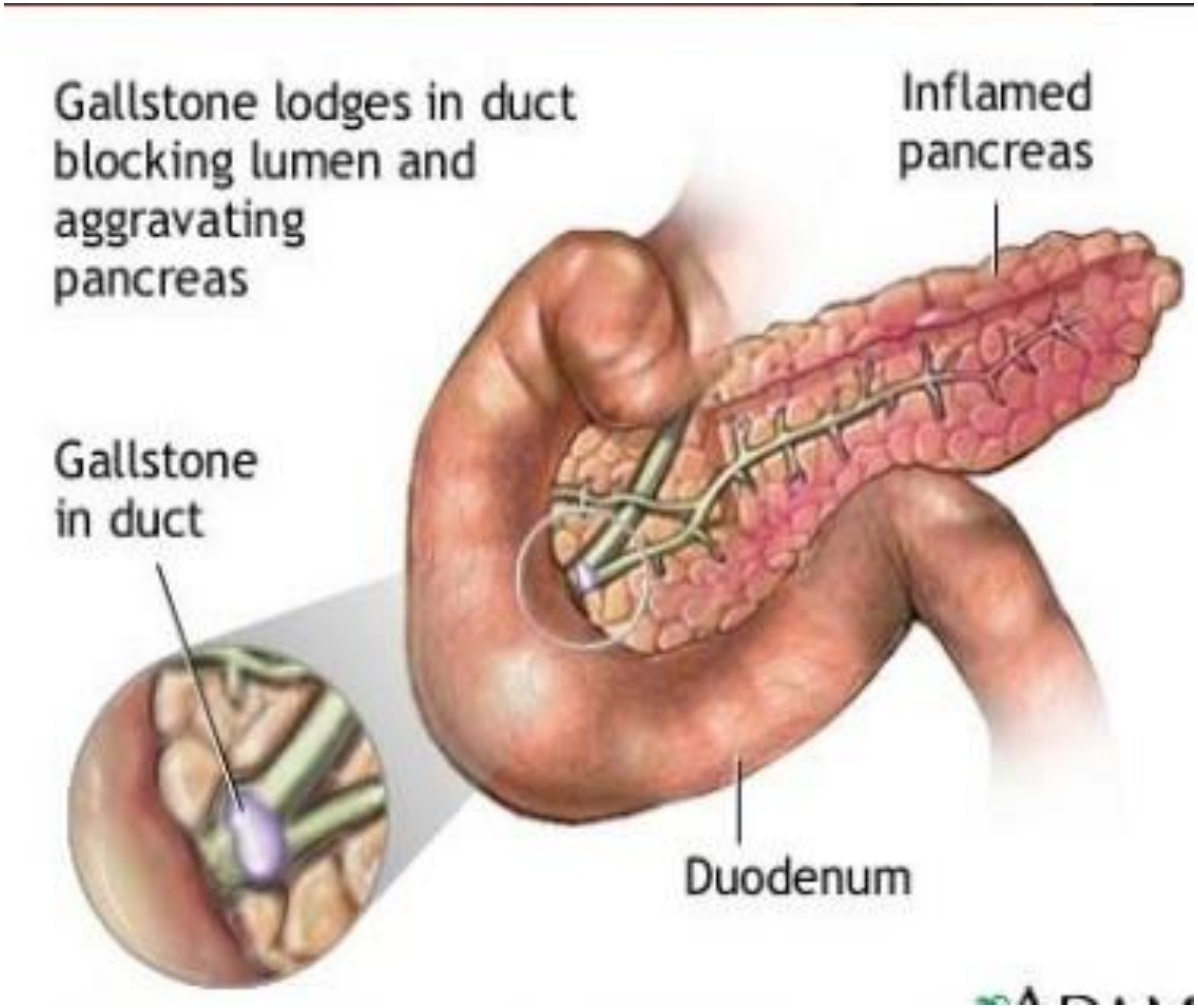
Etiologic Factors in Acute Pancreatitis

- Alcohol intake
- Gallstone disease
- Abdominal surgery
- Trauma
- Recent viral infections
- Medications
- Ischemia

Etiologic factors in acute pancreatits

Metabolic
Alcoholism*
Hyperlipoproteinemia
Hypercalcemia
Drugs (e.g., azathioprine)
Genetic
Mutations in the cationic trypsinogen *(PRSS1)* and trypsin inhibitor *(SPINK1)* genes
Mechanical
Gallstones*
Trauma
Iatrogenic injury
Perioperative injury
Endoscopic procedures with dye injection
Vascular
Shock
Atheroembolism
Polyarteritis nodosa
Infectious
Mumps

Etiologic Factors in Acute Pancreatitis



Pathogenesis

- Acute pancreatitis appears to be caused by autodigestion of the pancreas by inappropriately activated pancreatic enzymes.

1. Trypsin, as we know, when it activated, it will lead to activation of other pancreatic enzymes (phospholipase and elastase) as well as more trypsin. This will lead to autodigestion.

2. Trypsin also activates the kinin system, that will lead to activation of factor XII (Hageman's factor), and this will activate clotting & complement system.

Pathogenesis of acute pancreatitis

Causes that lead to initial activation of pancreatic enzymes are:

1. Pancreatic duct obstruction.
2. Primary acinar(that create, store, and release digestive enzymes. They are named after the Latin word acinus which means "grape." Acinar cells take on a grape cluster formation within pancreatic tissue) cell injury.
3. Defective intracellular transport of proenzymes within acinar cells.
4. Alcohol

Chronic pancreatitis and etiological factors

- Chronic pancreatitis is characterized by long-standing inflammation that leads to irreversible destruction of the exocrine pancreas, followed eventually by loss of the islets of Langerhans.
- Most common cause of chronic pancreatitis is long-term alcohol abuse.
- Other causes may include:

-Duct Obstruction

-Hereditary pancreatitis

- Chronic pancreatitis associated with CFTR mutations
- Autoimmune pancreatitis

- **pathophysiology**
- The **pathophysiology** of acute pancreatitis is characterized by a loss of intracellular and extracellular compartmentation, an obstruction of pancreatic secretory transport, and an activation of pancreatic enzymes
- Pancreatitis is an obstructive disease in which the backup of pancreatic secretions causes the activation and release of enzymes within the pancreatic acinar cells. When these enzymes are activated, they cause the auto-digestion of pancreatic cells and tissues, in turn, causing inflammation, fat and coagulative necrosis, the formation of pseudocysts, and vascular damage

- Summary
- **Acute pancreatitis** is characterized by inflammation and reversible parenchymal damage that ranges from focal edema and fat necrosis to widespread parenchymal necrosis and hemorrhage; the clinical presentation varies widely, from mild abdominal pain to rapidly fatal vascular collapse.
- **Chronic pancreatitis** is characterized by irreversible parenchymal damage and scar formation; clinical presentations include chronic malabsorption (due to pancreatic exocrine insufficiency) and diabetes mellitus (due to islet cell loss).

Morphology

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

The basic alterations are

- An acute inflammatory reaction,
- Microvascular leakage causing edema,
- Proteolytic destruction of pancreatic parenchyma,
- Necrosis of fat by lipases,
- Destruction of blood vessels with hemorrhage.

Grossly:

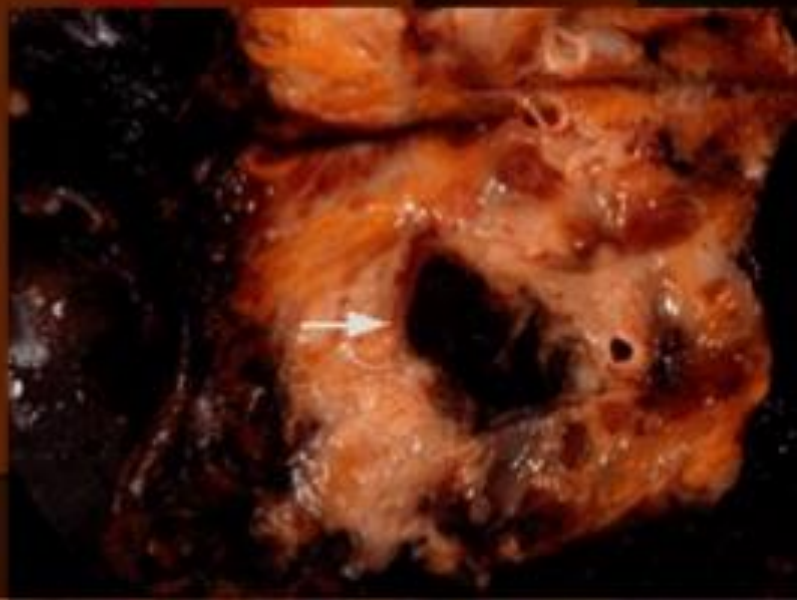
- Focal pancreatic hemorrhage and liquefication
- Yellow-white fat necrosis

Microscopic :

- Necrosis including fat with ghost-like cell outlines
- Dense neutrophilic infiltrate
- Hemorrhage

Complications – most are due to release of toxic enzymes & other mediators into systemic circulation

- Systemic organ failure
  - Shock
  - Adult respiratory distress syndrome (ARDS)
  - Acute renal failure
- DIC
- Pseudocyst – Residium of necrotic pancreatic tissue - surrounded by non epithelial lined fibrous tissue of granulation tissue
- Pancreatic Abscess
- Duodenal obstruction



Disseminated Intravascular Coagulation (DIC)

Disseminated intravascular coagulation (DIC) is a rare but serious condition that causes abnormal blood clotting throughout the body's blood vessels. You may develop DIC if you have an infection or injury that affects the body's normal blood clotting process.

Clinical presentation

- Acute Abdominal emergency with pain & shock

Lab: elevation of serum amylase and lipase

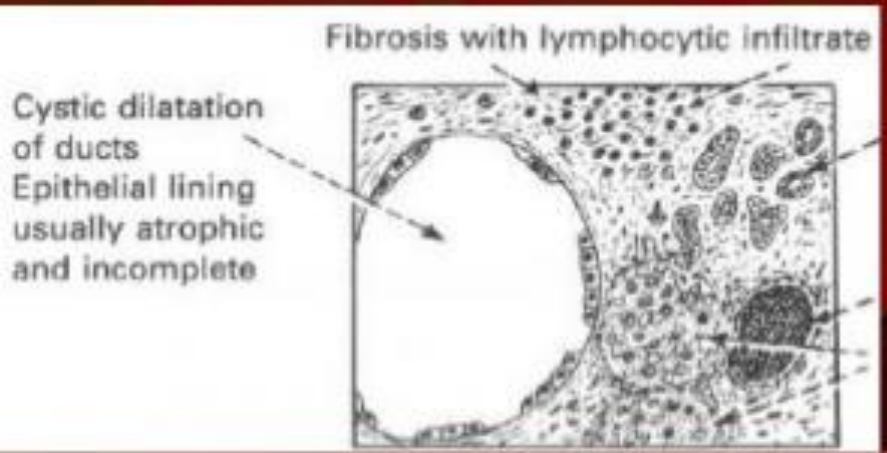
Prognosis: Severe cases have a 30% mortality rate

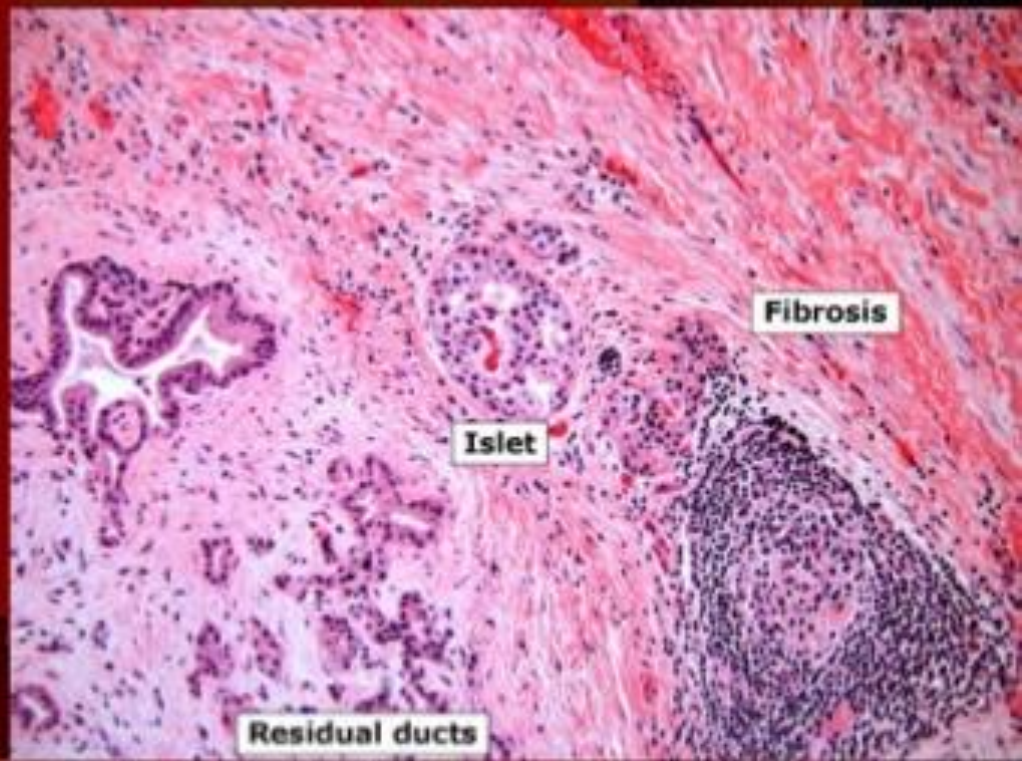
Gross:

Firm, white, fibrotic pancreas

Micro

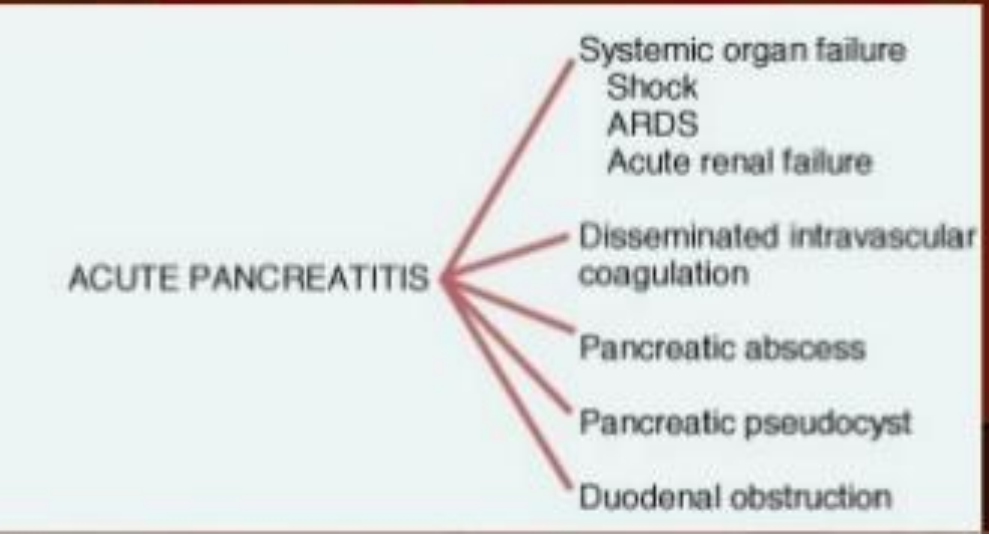
- Extensive fibrosis and parenchymal atrophy
- Chronic inflammation & variable dilatation of ducts

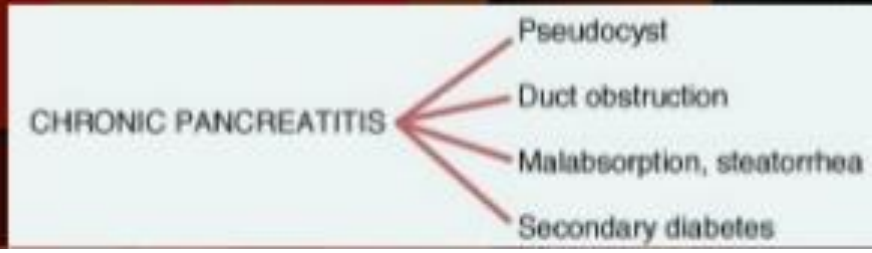




Sequelae

- Pseudocyst
- Duct obstruction
- Malabsorbtion, Steatorrhea
- Secondary diabetes





What is pancreatic cancer?

One kind of cancer that develops in the pancreatic cells and destroys them is called pancreatic cancer. One of the digestive system's organs, the pancreas is primarily responsible for producing hormones that aid in blood sugar regulation and secreting enzymes that aid in digesting.

Types of Pancreatic Cancer

Pancreatic cancer can be divided into two types, based on the type of cell in which the cancer begins to grow:

- **Pancreatic Adenocarcinoma begins in the outer cells of the pancreas responsible for producing enzymes that aid in digestion, and this type of pancreatic cancer is the most common.**

- **Pancreatic Neuroendocrine Tumours, begin in the endocrine cells responsible for secreting other pancreatic hormones and which have a role in controlling mood and metabolic processes. This type of pancreatic cancer is rare.**

Stages of pancreatic cancer

Pancreatic cancer includes several stages, which are :

- **Stage 0: Also known as the pre-pancreatic cancer stage, which is represented by the presence of abnormal cells in the pancreas that are likely to turn into cancer cells.**
- **The first stage: is the growth of cancer cells in the pancreas.**
- **The second stage: Cancer cells reach the bile duct.**
- **The third stage: Cancer cells reach the lymph nodes.**
- **Stage Four: Cancer cells reach other organs and parts of the body.**

It should be noted that the chances of treating and eliminating pancreatic cancer decrease as the stages of the disease advance.

Causes of pancreatic cancer

- There is no clear cause of pancreatic cancer, but there are some factors that increase the risk of developing it.

- This cancer occurs when pancreatic cells make changes or mutations in the DNA of these cells. These changes lead to the growth of abnormal cells in a large way that is difficult to control, and as they accumulate, they can form a cancerous tumor. If left untreated, these cancer cells may spread from the pancreas to other organs surrounding it, and later reach organs distant from it.

Q-1- **Pathogenesis of acute pancreatitis.**

2- Causes that lead to the initial activation of pancreatic enzymes are?