



432 Surgery Team

20 Pancreatic Diseases



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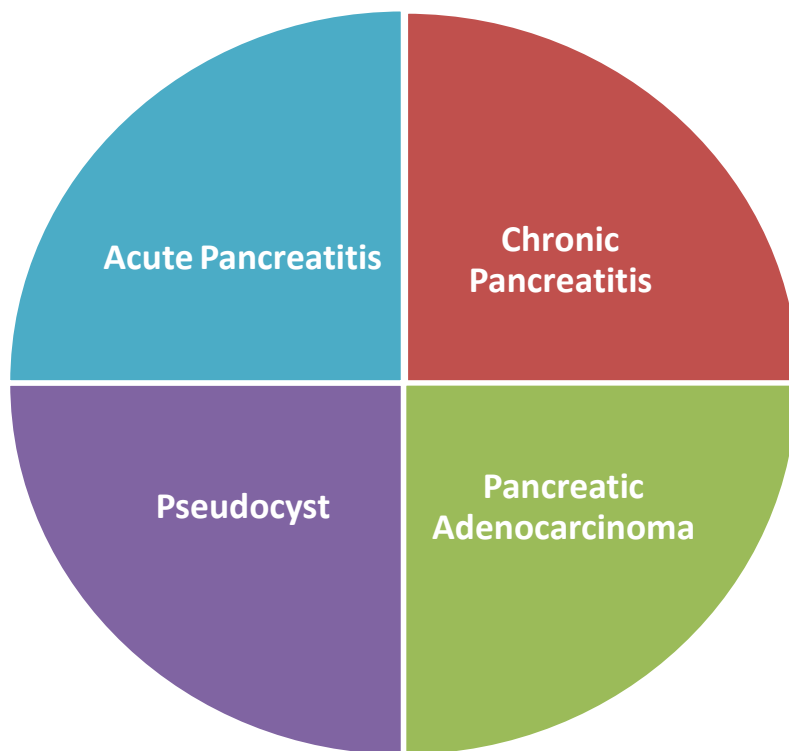
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COLOR GUIDE: • Females' Notes • Males' Notes • Important • Additional

Objectives

Not Given



PANCREATIC DISEASES

1. Acute Pancreatitis

1.1 DEFINITION

Acute non-bacterial inflammation caused by activation of pancreatic enzymes and auto-digestion of the pancreas by its own enzymes. ⓘ
"viruses can cause it"

1.2 ETIOLOGY

1. Gall stones (**most common**) ⓘ:

- Small stones can lodge in the Ampulla of Vater and block both the common bile duct (CBD) & pancreatic duct
- Small stones eventually pass and can be found in stool (**transient**)

Two theories explain how the stone cause acute pancreatitis:

- Block ampulla of Vater by the stone → bile secretion go to pancreatic duct → auto-digestion "bile reflux theory"
- Stone in ampulla of Vater → compress pancreatic duct → obstruction "obstruction theory"

2. Alcohol (**2nd most common**) ⓘ: underlying mechanisms are still unclear, but 2 effects are proposed to be involved:

- Direct **toxic** effect on pancreatic cells
- Transient ischemia** (cutaneous vasodilation → blood diverted away from splanchnic circulation → pancreatic ischemia)

3. Hypercalcemia: Ca⁺⁺ activates enzymes

- Excessive calcium causes:
 - Deposition of Ca in soft tissues leading to obstruction of the pancreatic duct
 - Trypsinogen activation before it reaches the intestines
- With severe inflammation: Ca⁺⁺ + fat = saponification (soap formation) → serum Ca⁺⁺ will be depleted in the process (low normal serum Ca⁺⁺ levels) "it might be before high and after insult it decrease to be normal"

4. Hyperlipidemia (3rd most common cause)

- Mechanism unclear.
- Could be a cause: Elevations greater than 1,000 mg/dL can lead to pancreatitis
- Could be a result: **TG serum levels increase** with inflammatory processes– but the elevation will be moderate (<1000 mg/dL)

5. Familial (rare)

6. Iatrogenic

- Drugs: diuretics (**lasix and thiazides**), **HRT** (hormone replacement therapy)/**OCP** (**oral contraceptive pill**), azathioprine, and **steroids**
- ERCP (endoscopic retrograde cholangiopancreatography): Increased Pressure with duct cannulation or contrast injection

7. Obstruction (1%): tumor at Ampulla of Vater

8. Viral infection: Coxiella, mumps, Coxsackie B, Rubella "viruses may cause Diabetes type one because the body will destroy the virus and islets of Langerhans "cross reaction" "

9. Trauma

10. Scorpion bite

11. Idiopathic

Note(s):

📖 The most important enzymes for protein digestion are trypsin, chymotrypsin, and carboxypolypeptidase. These enzymes are not in the active form until they reach the duodenum. Trypsin is activated (from its precursor: trypsinogen) by an enzyme called enterokinase that is secreted from the intestinal mucosa when chyme enters the intestine. Trypsin then cleaves the other two enzymes and trypsinogen into their active forms.

Note(s):

📖 Antitrypsin is a Substance secreted from the pancreatic acini that prevents the activation of trypsin and subsequently the other enzymes, which prevents auto digestion of the pancreas itself. When the duct gets obstructed or pancreatic cells gets damaged lysosomal enzymes activate trypsin. This is initially controlled by antitrypsin, but its quantities are soon overwhelmed by the amount of activated enzymes, until these enzymes digest the pancreas and cause the condition of acute pancreatitis.

Saponification of Pancreas →



1.3 CLINICAL MANIFESTATIONS

1.3.1 HISTORY

- Acute epigastric pain, radiating to **back** (pancreas is a retroperitoneal organ)
 - Patient will be leaning forward (↓pain as pancreas moves away from the nerves)
- Nausea & vomiting
- Previous attacks (untreated underlying disease e.g. gall stones)
- Symptoms of underlying cause e.g. gall stones

1.3.2 EXAMINATION

- Hypotension, ↑peripheral resistance, tachycardia & fever
- Dehydration – can progress to → shock
- Epigastric tenderness
- Pleural effusion “sympathetic effusion” (**Left lower lobe**) “from tail crossing left hemidiaphragm”

Hemorrhagic pancreatitisⓈ:

- **Grey Turner sign**: bruising of the **flanks**; sign of retroperitoneal hemorrhage
- **Cullen’s sign**: superficial edema and bruising in the subcutaneous fatty tissue around the **umbilicus** – indicating pancreatic necrosis & retroperitoneal bleeding

Figure 1: Grey Turner's Sign Figure 2: Cullen's Sign

1.3.3 LAB TESTS

- ↑ WBC
- ↑ **Amylase** (most **sensitive**; shorter t1/2) : >1000
- ↑ **Lipase** (more **specific** than amylase)
- Serum calcium & lipids (see section 1.2) “don’t forget Liver function test”

1.3.4 RADIOLOGY

- Plain erect chest & **abdominal X-ray**:
 - **Sentinel loop**: 1-2 inflamed bowel loops dilated around pancreas causing ileus (painful obstruction); localized peritonitis causing localized ileus (**paralyzed and enlarged loops**)
 - CT scan (**BEST**): **Phlegmon**; edematous, inflamed pancreas, “dirty mesentery”
- “Ultrasound to look for gall stones”

Note(s):

📖 **Courvoisier sign**: is case of painless jaundice and a palpable gallbladder. It is not caused by stones but most often by malignancies like pancreatic cancer and cholangiocarcinoma.

Note(s):

📖 Shock in acute pancreatitis can be attributed to a few factors: **(a)** Massive exudation and hemorrhage in the retroperitoneal space **(b)** Release of a number of vasodilators, like bradykinin and PAF and in the systemic circulation **(c)** The ileus which causes the accumulation of fluid in the intestine.

Note(s):

📖 **Amylase**:
*It goes up quickly & down quickly.
* Secreted everywhere in the GI, and in the ovaries and fallopian tubes.
*Elevated in GI diseases & ectopic pregnancy.
*>1000 elevation occurs only with pancreatitis.



Sentinel loop



Figure 2



Figure 1

← We see here in lower picture some gasses (arrows) which indicate **infection**

CT scan: phlegmons

1.3.5 RANSON'S CRITERIA ①

Assess severity & prognosis

1. on admission
 - a. Age >55 years
 - b. WBC > 16,000
 - c. Glucose >11 mmol/L (x 18 = 198 mg/dL) (no insulin secretion)
 - d. AST >250
 - e. LDH >350

2. 36-48 hours after admission “most of them will be corrected by IV fluids”
 - a. Urea >8 mg/dL (dehydration)
 - b. Hematocrit: >10% decrease (hemorrhage)
 - c. Fluid sequestration >6 L (patient needed 6 L of fluid)
 - d. PO₂ <60
 - e. Base deficit >4 (acidosis)
 - f. Serum calcium <8 mg/dL (saponification)

1.4 MANAGEMENT ①

- Acute pancreatitis is the only acute abdomen emergency that **DOESN'T NEED SURGERY** “so we have to rule it out in acute abdominal pain”
- Most important: **IV FLUID REPLACEMENT ①①①**
 - Patients lose a lot of fluid (~3-4 L) to the interstitium “3rd spacing” = massive **edema (cause of shock)** +/- retroperitoneal bleeding (due to vessel wall digestion by activated enzymes), leading to **hypovolemia** → replace fluid with normal saline or Ringer's lactate.
- Then:
 - a) Rest the patient: Analgesics
 - b) Rest the bowel: Nasogastric tube (**only in case of vomiting**)
 - c) Rest the pancreas: NPO (Nil per Os: nothing by mouth)
- Do not administer antibiotics
- 90% will improve with conservative management; surgery rarely indicated (Only to debride necrotic tissue in advanced stages “necrosectomy”)

1.5 COMPLICATIONS

The only indications for antibiotics ① (+/- surgery, if no improvement w/antibiotics):

1. Necrosis (**indication to start Antibiotic: >30% necrosis of pancreas**)
2. Infected necrosis
3. Abscess (**treated by drainage + Antibiotics**)
4. Pseudocyst



Pseudocyst



Infected Necrosis (gas formation)

2. Pseudocyst

“Failure of pancreas to recover/recurrence of symptoms”

- A collection of amylase-rich fluid enclosed in a wall of fibrous or granulation tissue (not epithelium) that develops following an acute pancreatitis attack (>4 wks. from onset)
“collected in lesser sac”
- 50% are found to have a communication with the main pancreatic duct.

2.1.1 PRESENTATION

- Abdominal pain
- Pressure symptoms e.g. “that’s what returns the patient to the clinic”
 - Stomach: nausea
 - Bile duct: obstructive jaundice
- Epigastric mass



Pseudocyst

2.1.2 INVESTIGATIONS

- CT scan (**BEST**)
- ↑ Lipase or WBC “it might be normal”

2.1.3 COMPLICATIONS

- Infection --→ abscess
- Rupture → pancreatic ascites
- Bleeding (erode the vessels, esp. **gastroduodenal artery**)



Pseudocyst compressing the stomach

2.1.4 MANAGEMENT

- Observe for 6-12 weeks (50% resolve spontaneously) then repeat CT scan
- Surgery (drainage) indications: “if not change after 12 wks. → Increase risk of complications”
 - Infection (external) “at any time even before 12 wks. + Antibiotics”
 - Symptomatic (internal) “from the stomach by cystogastrostomy”
 - > 5 cm (internal)

Cystgastrostomy: surgical anastomosis of a pancreatic cyst to the stomach for drainage which will drain all pancreatic enzymes through stomach, by the time cyst will shrunken

3. Chronic Pancreatitis

Chronic pancreatitis is a progressive inflammatory disease of the pancreas causing fibrosis and loss of endocrine & exocrine functions of the pancreas.

Most common cause: **Chronic alcoholism**

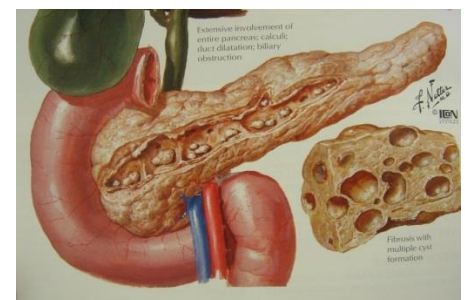
“They have pain → drink more to relive the pain → more inflammation → fibrosis”

3.1.1 SIGNS & SYMPTOMS:

- Abdominal pain (because of the
- Malabsorption
- Diabetes

3.1.2 DIAGNOSIS:

- Lipase & amylase: usually normal
- ↑ Glucose
- Abdominal x-ray: calcification, stones “because of stasis”

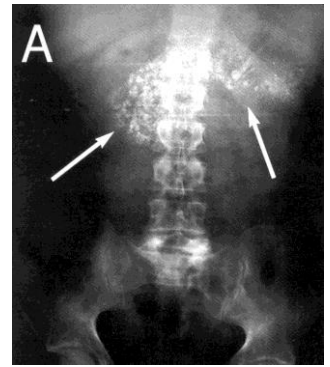


Calcification and fibrosis

- CT scan: calcifications, atrophy, dilated ducts

3.1.3 COMPLICATIONS:

- Biliary obstruction (due to fibrosis of the head of the pancreas)
- Pseudocyst (due to rupture of a stricture)
- Carcinoma (due to repeated inflammation)
- Splenic vein thrombosis (lies on top of the pancreas) “→splenomegaly
→left sided portal hypertension→increased susceptibility to varices”



Calcification

3.1.4 TREATMENT:

- Pancreatic enzymes (for malabsorption)
- Insulin (for diabetes)
- Analgesics (narcotics) or “if not work we give” celiac block (injection of analgesics)
- Surgery
 - Pancreaticojejunostomy (pancreatic duct drainage procedure to decompress the dilated pancreatic duct)—**most common procedure**
 - Bypasses pancreatic duct & relieves pain
 - Pancreatic resection (last resort; will lead to “brittle diabetes*” which is unstable diabetes with recurrent swings in glucose levels)
 - **Brittle diabetes: the sugar level is fluctuating “increased & decreased”**
 - **Patient will have usually hypoglycemia. Why?**
Because the patient will take a hypoglycemic medication which will decrease sugar and there is no glucagon which corrects the sugar level. “Dangerous”

4. Pancreatic Adenocarcinoma

- 3rd leading cause of **cancer death** in men aged 35-55 years

4.1.1 RISK FACTORS

- Most important: **smoking** ⓘ
- Fatty food
- Remote gastrectomy
- Race: Black
- Chronic pancreatitis
- Polyposis syndromes
- Family history
- Cholecystectomy

4.1.2 PRESENTATION

Arise most commonly in the head of the pancreas (70%) → present w/jaundice
Other (tail, body) usually presents late w/metastases.

- Weight loss
- Deep seated pain
- Back pain (sign of retroperitoneal invasion)
- Gastric outlet obstruction

Physical examination:

- **Jaundice**
- Hepatomegaly
- Palpable gallbladder (distended GB due to obstruction)

- Succession splash (gastric outlet obstruction)

4.1.3 INVESTIGATIONS

- Lab
 - ↑ WBC (w/cholangitis)
 - CA 19-9 >100 (tumor marker)
- Imaging: double-duct sign (dilated bile duct & pancreatic duct) on U/S & CT
 - U/S: dilated bile duct
 - ERCP (esp. cholangitis) "show **double duct sign**: dilated pancreatic and bile ducts"
 - CT scan (**BEST**)

① Jaundice + fever = cholangitis

- Cholangitis: inflammation of the biliary tree. **It is a medical emergency.**
- Obstruction of the biliary duct by a pancreatic head tumor promotes infection, leading to cholangitis.

4.1.4 TREATMENT

- Treatment is **surgical**
 - Assess resectability (rule out local invasion & distant metastases)
 - Whipple's resection (pancreatectomy)
 - Palliative biliary & gastric drainage

POOR LONG TERM SURVIVAL



Double duct sign

Dr. Faisal's notes:

- If patient has acute pancreatitis because of gall stone, after resuscitate him and he is stable → we do cholecystectomy because 30% have recurrence.
- In case of cholangitis we do ERCP to remove the stone and to decrease the inflammation and the only indication for ERCP here is acute pancreatitis + persistent jaundice.

SUMMARY

1. Most common causes for Acute pancreatitis: gall stones, Alcohol
2. Amylase is most sensitive in Acute pancreatitis but lipase is most specific
3. CT scan is the best modality to visualize pancreatic diseases
4. Most important step to treat Acute pancreatitis is IV fluid replacement
5. Patient with pseudocyst usually come with vomiting and nausea
6. Most common cause for chronic pancreatitis is chronic alcoholism
7. The most important risk factor for pancreatic adenocarcinoma is smoking

Questions

1. The most specific blood test in diagnosing acute pancreatitis is:
 - a. Serum amylase
 - b. Urinary amylase
 - c. Serum lipase
 - d. CA 19-9
 - e. CEA
2. The most important step in the management of acute pancreatitis is:
 - a. IV fluids
 - b. Antibiotics
 - c. NG tube
 - d. ERCP
 - e. Pain medications
3. Ranson's criteria include the following except:
 - a. WBC
 - b. Age
 - c. Serum glucose
 - d. LDH
 - e. Serum Lipase
4. The following are causes of acute pancreatitis except:
 - a. Alcohol
 - b. Gall stones
 - c. Trauma
 - d. Viral infections
 - e. Hypocalcemia
5. The most important factor in pancreatic adenocarcinoma is:
 - a. Alcohol
 - b. Smoking
 - c. Chronic pancreatitis
 - d. Diabetes
 - e. Gastrectomy
6. Pancreatic pseudocyst might be complicated with all of the following except:
 - a. Malignant transformation
 - b. Rupture
 - c. Bleeding
 - d. Jaundice
 - e. Infection
7. Symptoms of chronic pancreatitis include all of the following except:
 - a. Diabetes
 - b. Constipation
 - c. Diarrhea
 - d. Abdominal pain
8. Which of the following is most helpful in diagnosing pancreatic adenocarcinoma:
 - a. CA 125
 - b. Serum amylase
 - c. CEA
 - d. CA 19-9

9. Pain in chronic pancreatitis could be improved with, except:

- a. Antibiotics
- b. Narcotics
- c. Celiac block
- d. Surgical drainage
- e. Pancreatectomy

10. Pancreatic adenocarcinoma can present with, except:

- a. Hematemesis
- b. Jaundice
- c. Abdominal pain
- d. Abdominal mass
- e. Weight loss



Answers:

1st Questions: c

2nd Questions: a

3rd Questions: e

4th Questions: e

5th Questions: b

6st Questions: a

7nd Questions: b

8rd Questions: e

9nd Questions: a

10rd Questions: a