



Pancreatic problems

Objectives:

1. surgical anatomy.
2. surgical physiology.
3. Congenital disorders of the pancreas
4. Pancreatitis
5. neoplasms of the pancreas.

Resources:

- Davidson's.
- 435 Slides.
- Surgical recall.
- Raslan's notes.
- 435 teamwork.

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COLOR INDEX:

NOTES , IMPORTANT , EXTRA , DAVIDSON'S

[EDITING FILE](#)

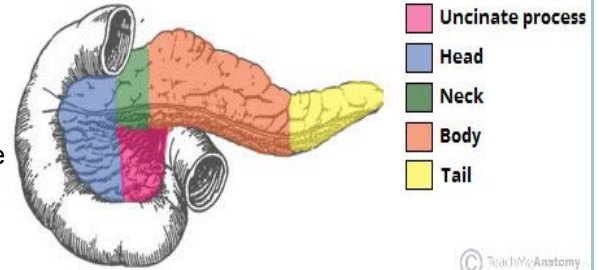
[FEEDBACK](#)



Basic Review (EXTRA but Read it to refresh your mind)

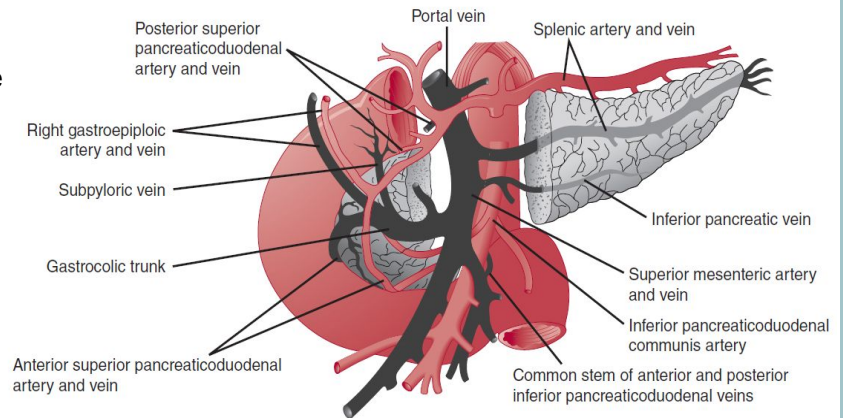
The pancreas is a **glandular organ in the digestive system and endocrine system.**

- it is located in the abdominal cavity and lies retroperitoneally behind the lesser sac and the stomach.
- it has four sections moving from right to left: The **head/uncinate**, **neck**, **body**, and **tail**:
 - o **The head** of the gland lies within the C-loop of the duodenum,
 - o **The neck**, lies anterior to the mesenteric vessels and portal vein.
 - o **The body** “posterior to the stomach” and **tail** “anterior to the left adrenal gland” of the pancreas lie in front of the splenic vein as far as the splenic hilum.

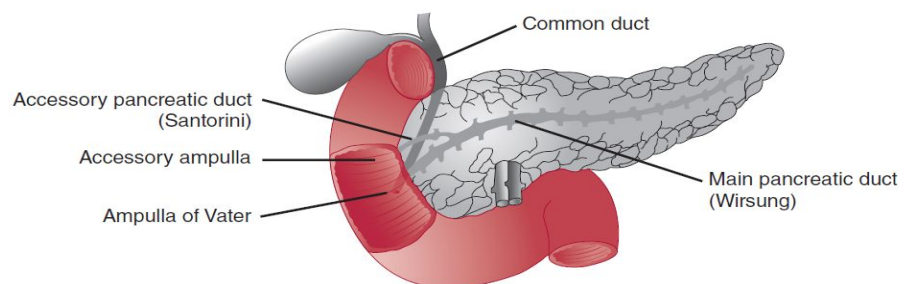


blood supply/ drainage:

- The pancreas receives its blood supply from both the **celiac trunk** and the **superior mesenteric artery** (SMA).
 - o The arterial supply of the pancreatic **head** is provided by the **superior pancreaticoduodenal arteries** (from the gastroduodenal artery “from celiac artery”) and the **inferior pancreaticoduodenal arteries** (from the SMA).
 - o The **distal pancreas** receives its arterial supply from branches of the **splenic artery** “from celiac artery”.
- Venous drainage is primarily by the **pancreaticoduodenal and splenic veins**, which drain into the portal vein.



- The endocrine gland produce several important hormones, including **insulin**, **glucagon**, **somatostatin**, and **pancreatic polypeptide** which circulate in the blood.
- The exocrine gland is a digestive organ:
 - o essential for the digestion of fat, protein and carbohydrate.
 - o it secretes 1–2 litres of alkaline (pH 7.5–8.8) enzyme-rich juice each day “neutralize acidity of chyme moving in from the stomach”
 - o it also secretes digestive enzymes that assist digestion and absorption of nutrients in the small intestine.
 - Pancreatic secretion is stimulated by eating. Hormonal and neural (vagal) mechanisms are involved. Food entering the duodenum (notably fat and protein digestion products) releases cholecystokinin (CCK).



[exocrine pancreas](#)
[endocrine pancreas](#)
[anatomy of pancreas](#)



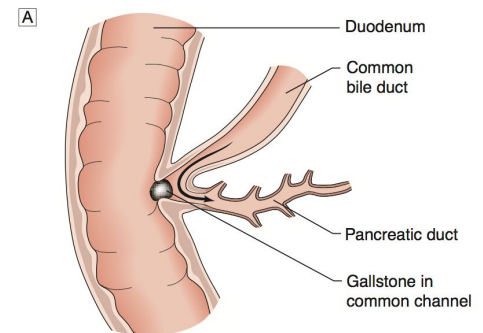


Acute Pancreatitis [Helpful Video 10:01](#)

A **non-bacterial inflammatory** disease caused by **activation** and **autodigestion** of the pancreas by its own enzymes.

Etiology:

- **Gallstones** (cholelithiasis): **(1st most common)** (image A)
 - Small stones can lodge in the Ampulla of Vater and block both the common bile duct (CBD) and the pancreatic duct.
 - They cause obstruction of the pancreatic duct and a sequence of events within the pancreatic acinar cells resulting in intracellular activation of pancreatic enzymes, acinar cell damage and pancreatic inflammation.
- **Alcohol:** **(2nd most common)**
 - Direct toxic effect on pancreatic cells.
 - Transient ischemia (cutaneous vasodilation → blood diverted away from splanchnic circulation → pancreatic ischemia).
 - The pancreas is very sensitive to ischemia.
- **Hypercalcemia¹:**
 - Excessive calcium causes:
 - Deposition of Ca^{+2} in soft tissues leading to obstruction of the pancreatic duct.
 - With severe inflammation: $Ca^{+2} + fat \rightarrow saponification^2$ (soap formation) → serum Ca^{+2} will be depleted in the process (low-normal serum Ca^{+2} levels “**hypocalcemia**”).
 - Usually secondary to hyperparathyroidism.
- **Hyperlipidemia:** Especially triglyceride (hypertriglyceridemia) by direct toxic effects.
 - 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).
 - More common than hypercalcemia.
- Familial
- Drug induced Diuretics (thiazide), steroids, hormone containing medication (contraceptive pills, hormonal replacement therapy)
- **Obstruction** Can be caused by tumors, the mass can block the pancreatic duct. **the etiology of acute pancreatitis in 1% of all cases is cancer** > (not common but something to keep in mind).
- Viral infection.
- **Iatrogenic³(3rd most common)**
 - **ERCP⁴** (endoscopic retrograde cholangiopancreatography):
 - Increase Pressure with duct cannulation or contrast injection.
- **Trauma**
- Scorpion bite
- Idiopathic



I GET SMASHED Mnemonic

Pancreatitis
Idiopathic
Gall Stones
Ethanol (Alcohol)
Trauma
Steroids
Mumps / **M**alignancy
Autoimmune
Scorpion Stings
Hypercalcemia / **H**ypertriglyceridemia
ERCP
Drugs



¹ remember **hyper**calcemia causes pancreatitis, and pancreatitis causes hypocalcemia

² produced by activated lipases

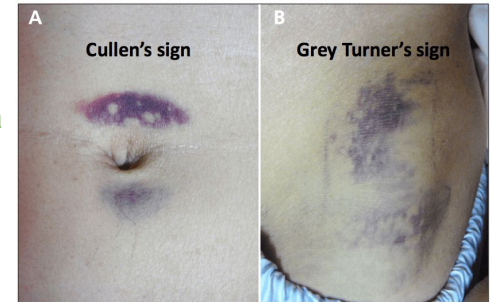
³ induced inadvertently by a physician or surgeon or by medical treatment or diagnostic procedures

⁴A procedure that enables your surgeon to examine the pancreatic and bile ducts.



History:

- **Epigastric pain** the pain refer straight to the back **WHY?** Because pancreas is retroperitoneal organ , and when the patient lean forward they get relieved **WHY?** Because the pancreas move away from the nerves in the back (**one of the differential is acute abdomen**).
- **Nausea and vomiting** defense mechanism the body tells you not to eat or drink , because if the patient eat or drink things will get worse **WHY?** Because the pancreas will be stimulated to work .
- previous attacks especially if the underlying cause still there ,such as Drinking alcohol – gallstone – hypercalcemia – hypertriglycemia .
- underlying disease ask the patient about possible etiologies.



Examination:

- ↓BP ,↑ Temperature Because of the inflammation.
- **Dehydration (Rehydrate immediately by 2 liters)** The most important thing to these patients is hydration **WHY?** Because with any injury inflammation will happen and that would lead to the development of edema. **But in acute pancreatitis we have a big organ in a very big cavity, so the fluid will accumulate and may reach to 2-3 L. Important for the management (I.V fluids)!!**
- **Shock** (they can be in state of shock with very low blood pressure, especially in older patients).
- Epigastric tenderness sometimes associated with peritonitis.
- **Grey Turner's⁵ and Cullen's signs** (around the umbilicus), if the inflammation is very severe it may start to eat up the blood vessels and that could lead to retroperitoneal bleeding. signs of retroperitoneal hemorrhage).
- Pleural effusion: left side because the tail of the pancreas is closer to the left pleural cavity ,due to inflammation, edema will happen and the fluid will be collected around the head of the pancreas and that will affect the pleura and lead to pleural effusion.
- Hypertension, tachycardia, fever (due to inflammation but not necessary infection).

Investigation:

- **lab:**
 - Increase WBC Leukocytosis due to inflammation.
 - Increase serum Lipase.
 - Increase serum Amylase.
 - **Amylase is more sensitive, lipase is more specific.**
 - Amylase will go up quickly and go down quickly while lipase will go up slowly and take time to go down.
 - If we catch the patient very early few hours from the onset of the pain Amylase will be very high and lipase will be normal.
 - Later On when patient is recovering, amylase will be normal but lipase will be high (it takes time).
 - **Ca⁺² & lipids**
 - If the patient has hypercalcemia or hypertriglyceridemia Be careful of two things:
 - 1- when high level of calcium combined with fat in the serum saponification⁶ will happen, as a result calcium level will decrease, **patient may have acute pancreatitis caused by hypercalcemia, but during the attack calcium level will be decreased because all the calcium has been used in saponification.** So, if we measure the calcium and we find it normal we have to repeat the test when the patient is recovering to be sure.
 - 2- hypertriglyceridemia: triglycerides levels must be very high Like slight increase cannot be the cause of acute pancreatitis.

⁵ to remember it "you need to TURN the pt to see it so it's grey TURNER".

⁶ Saponification is referred to as focal areas of fat necrosis in the pancreas and in peripancreatic fat. fatty acids combine with calcium and form insoluble salts.

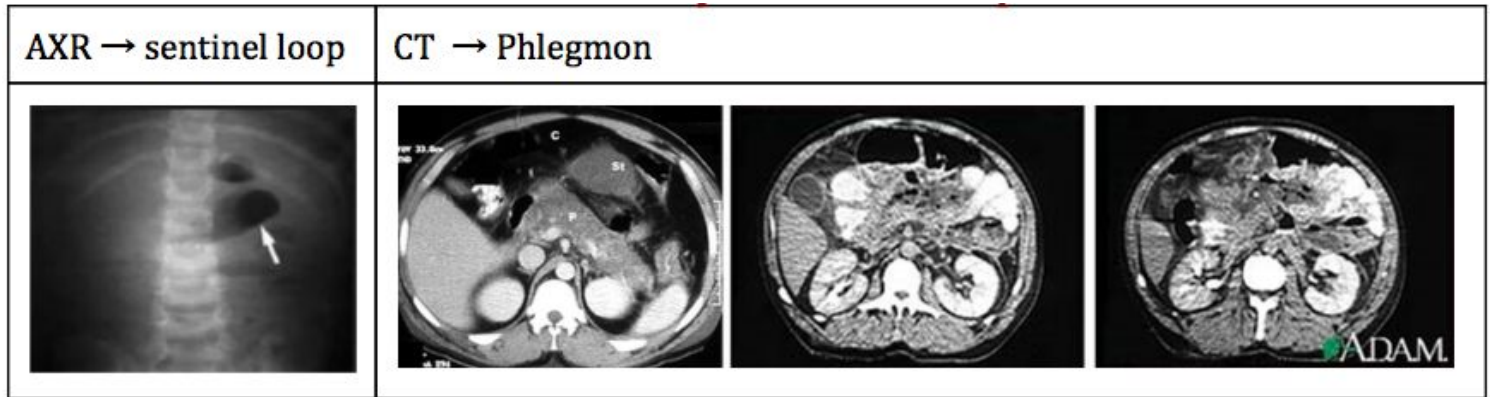


● **Imaging:**

X-ray: because acute pancreatitis is localized → Local peritonitis will develop → which will lead to localized ileus (Sentinel حارس loop) .

CT- Diagnostic procedure (Phlegmon Inflammatory mass. The base of pancreas becomes distended and swollen).

- Plain erect chest & abdominal X-ray to see if there is perforation:



Ranson's Criteria "Assessing severity & prognosis" " **always in MCQs**"

- The Ranson criteria form a clinical prediction rule for predicting the prognosis and mortality risk of acute pancreatitis.
- it help us to asses which patient are more likely to have complication (prognosis).
- if the score is low patient will go home in 2 to 3 days.
- if the score is high patient may take week to months.

❖ **On admission :**

- **Age > 55**
- **WBC > 16,000**
- **Glucose > 11 (200 mg/dL)**
- **AST (Aspartate transaminase) >250**
- **LDH (Lactate dehydrogenase) >350**

❖ **During 24-48 hrs :**

- **Hematocrit >10%**
- **Urea > 8 mg/dl**
- **Fluid sequestration > 6 L**
- **PO2 < 60**
- **Base deficit > 4**
- **Ca < 8 mg/dl** will be low because of sopnication.

TABLE 3-4 Ranson Criteria		
Admission Criteria (GA LAW)	Initial 48-hr Criteria (C HOBBS)	Mortality
Glucose >200 mg/dL	Calcium <8 mg/dL Decrease in Hematocrit >10%	<3 criteria—1%
Age >55 yrs	PaO ₂ <60 mm Hg	3–4 criteria—15%
LDH >350	BUN increase >8 mg/dL	5–6 criteria—40%
AST >250	Base deficit >4 mg/dL	>7 criteria—100%
WBC >16,000	Fluid sequestration >6 L	



Management:

- Acute pancreatitis is the only acute abdominal emergency that **DOESN'T REQUIRE SURGERY**.
- Most important step: **IV FLUID REPLACEMENT. 2 Liters** (إذا ما طلعتوا من المحاضرة إلا بهذي المعلومة يكفي)

Patients lose a lot of fluid (~3-4 L) to the interstitium “**3rd spacing**” (Remember the first lecture?)= massive edema +/- retroperitoneal bleeding (due to vessel wall digestion by activated enzymes), leading to hypovolemia → replace fluid with normal saline or Ringer's lactate.

Then:

- **Rest the patient:** Analgesics.
- **Rest the bowel:** Nasogastric tube. (only if the patient is vomiting)
- **Rest the pancreas:** NPO (Nil per Os: nothing by mouth)

- **Cholecystectomy:** in gallstone pancreatitis, **WHEN DO WE DO THE SURGERY?** **when attack is over (patient has no tenderness or pain), they do not go home till we do the surgery**, long ago they used to tell the patient to go home and do the surgery after 3 months but 30% of patients had second attack before they come for surgery.
- **ERCP:** if patient have gallstone pancreatitis and the stone transmit to ampulla of vater, if it stays and the patient present with jaundice on top of acute pancreatitis, **those patient will need ERCP**. (Endoscopic Retrograde Cholangiopancreatography) only indicated in acute pancreatitis with cholangitis (inflammation of the biliary tree which can be caused by stones).
- **Administering Antibiotics** in acute pancreatitis is controversial. “remember it's not infection”

Complications Only 10% of pts. will have:

- **Necrosis:** the inflammation can be very severe, and a part of the pancreas tissue might die. if the necrosis is **more than 30%, start antibiotic therapy**. (pic A)
- **Infected necrosis** (gas formation) (pic B+C) “white color indicates live tissue that takes up the contrast and black color indicates dead tissue”.

Clean all necrotic tissue “pancreatic necrosectomy”

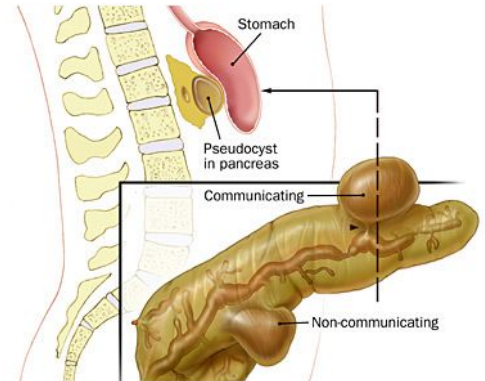
- **Abscess** (drainage and antibiotics).
- **Pseudocyst**.





Pseudocyst

- Its a collection of amylase-rich fluid to the lesser sac and enclosed in a wall of fibrous or granulation tissue (not epithelium) that develops following acute pancreatitis.
- It differs from a true cyst in that the collection has no epithelial lining and is surrounded by inflammatory tissue.
- Due to Failure of pancreatitis to recover or recurrence of symptoms.

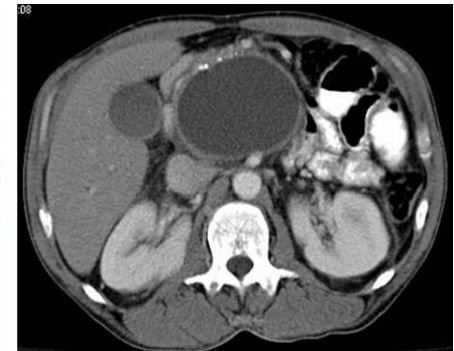


History:

- Abdominal pain.
- Pressure symptoms (big mass pressing adjacent organs).
 - Stomach: **nausea** and vomiting.
 - **Bile duct: obstructive jaundice.**
- Epigastric mass. Big mass compressing adjacent structures leading to (early satiety, gastric obstruction, obstructive jaundice)

Investigation:

- ↑ Lipase or WBC may be normal.
- Obstructive jaundice.
- **CT scan (diagnostic).**



Complications:

- Infection: cause abscess.
- Rupture: causes **pancreatic ascites (our main concern).**
- Bleeding (erode the vessels, esp. gastroduodenal artery or pancreatic artery).



Treatment:

- Observe for 6-12 weeks (**resolve spontaneously**) after 12 weeks the chance the pseudocyst to go away is small, and chance of complication is high. So after 3 months do CT, and if it's more than 5 cm you have to treat!
- Drainage indicated if:
 - **External⁷ drainage:** in case of Infection.
 - **internal⁸ (Endoscopic) drainage:**
 - Symptomatic (related to size).
 - **> 5 cm** (internal drainage).

⁷ puncture through the skin.

⁸ typically through the stomach.

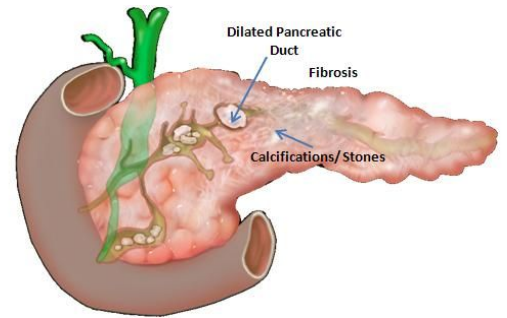
Chronic Pancreatitis [Helpful Video 9:01](#)

Patients who drink alcohol and develop acute pancreatitis tend to **drink more** because they think it relieves the pain, they develop 10 attacks or more of acute pancreatitis for 5 or 6 years, they will have repeated inflammation and healing which result in fibrosis in the pancreas “no pancreatic tissue” which means loss of both endocrine and exocrine functions (in summary repeated episodes of pancreatitis healed by fibrosis).

- Progressive inflammatory disease of the pancreas causing **fibrosis** and loss of endocrine and exocrine function.
- **Commonest cause is alcohol.** (هنا وبری)

Symptoms:

- Abdominal pain.
- **Malabsorption** (leads to **steatorrhea** and **whitish stool**), they do not absorb fat.
- **Diabetes** due to loss of endocrine and exocrine function.
- **fibrosis** → multiple strictures → dilated duct separated by fibrous tissue → **in cross section will look like cyst** (but it is not a cyst).
- **Stones** due to thick secretion stasis in pancreatic juices.

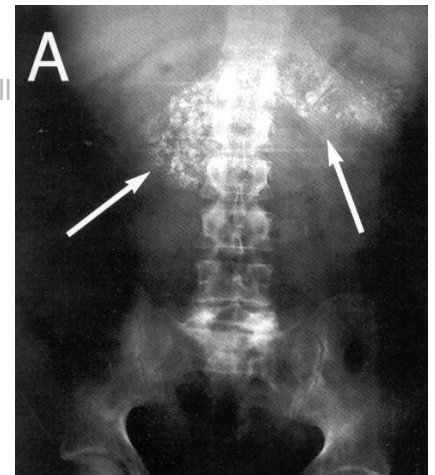


Diagnosis:

- Lipase/Amylase usually **normal**.
- ↑ **Glucose**
- **AXR (Abdominal X-Ray): calcification**
- **The initial investigation for suspected chronic pancreatitis is CT.** it will show: Calcification, atrophy, dilated ducts.

Complications:

- **Biliary obstruction** (due to fibrosis of the head of the pancreas).
- **Pseudocyst**. when dilated ducts open in one of the strictures.
- **Carcinoma** (due to repeated inflammation).
- **Splenic vein thrombosis** (lies on top of pancreas).
 - left sided portal HTN.
 - splenomegaly.



Treatment:

- **Pancreatic enzymes** (for the malabsorption).
- **Insulin**
- **Analgesics**
- **Celiac block** inject celiac plexus with alcohol to kill the nerve to decrease the pain.
- **Surgical drainage: Pancreaticojejunostomy⁹** (we open the pancreas from the head to the tail and attach a part of the duodenum to it) — Most common procedure: Bypasses pancreatic duct & relieves the pain in 70%, we need a big pancreatic duct to do the drainage.
- **Pancreatectomy¹⁰**: last choice (if the pancreatic duct is very small and the pain is not relieved) we try not to do that for 2 reason:
 - 1 -it is a major operation.
 - 2-Patients will have **Brittle Diabetes** (hard to control) because they lose **Glucagon** also so they become more prone to **hypoglycemia**.

⁹ Pancreaticojejunostomy (also called **Puestow procedure**) is a surgical technique used in the treatment of chronic pancreatitis. It involves a side-to-side anastomosis of the pancreatic duct and the jejunum. [Helpful Video 2:00](#)

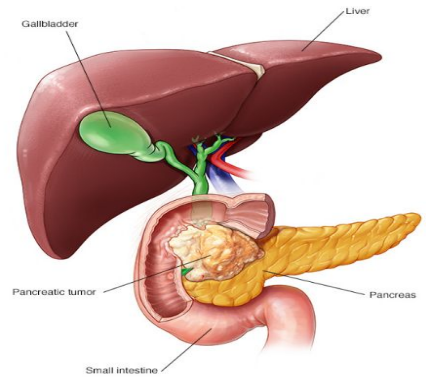
¹⁰ **pancreatectomy** is the surgical removal of all or part of the pancreas.

Pancreatic Adenocarcinoma [Helpful Video 6:48](#)

- 3rd leading cause of cancer death in **men 35-55 of age**.
- ↑ with **cigarette smoking (most important)**, fatty food, remote gastrectomy and in blacks.
- Other risk factors: Chronic pancreatitis, polyposis syndromes, family history and cholecystectomy.
- 70% located in the **head of pancreas**.

History:

- Weight loss
- Jaundice
- Deep seated pain (when they come with **back pain** that means it a **very bad sign**, because the tumor has infiltrated the retroperitoneum)
- Back pain (sign of retroperitoneal invasion)
- Gastric outlet obstruction

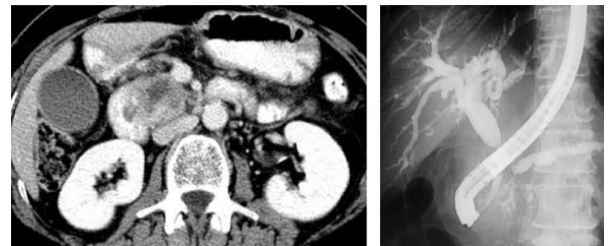


Examination:

- **jaundice:**
 - A- For tumours in the head of the pancreas, painless jaundice, associated with weight loss is the classical presentation. (prognosis is good).
 - B- For tumours of the body and tail, biliary obstruction occurs late, and symptoms are often vague, with anorexia, weight loss. (they do not present with jaundice and the prognosis is poor).
- **Jaundice + fever = cholangitis (Medical emergency), patient need urgent ERCP. always in the EXAM !!**
- ERCP is contraindicated in case of active cholangitis only (unstable hypotensive patient that needs inotropes).
- Fever
- Hepatomegaly
- Palpable gallbladder
- Succussion splash

Investigation:

- **lab:**
 - **Obstructive jaundice (elevated total serum bilirubin).**
 - ↑ WBC
 - CA 19-9 (tumor marker) if > 100 you are dealing with cancer in 90% of cases for pancreatic adenocarcinoma or cholangiocarcinoma.
- **Imaging:**
 - **US**
 - **CT** (all adenocarcinomas don't pick up the contrast and they look dark on CT)
 - **ERCP** (double-duct sign) which is dilatation of the pancreatic duct and the bile duct.



Management:

- Assess resectability (roll out local invasion and distant metastasis).
- **Whipple's resection. if it is resectable** (For tumours sited in the head of the pancreas the standard operation is a pancreaticoduodenectomy¹¹ (Whipple's procedure). [Helpful Video 0:36](#))
- Palliative biliary and gastric drainage. if it is **NOT** resectable, you have to drain using ERCP with a stent. if there was gastric outlet obstruction you have to do palliative **Gastrojejunostomy**.
- Poor long term survival.

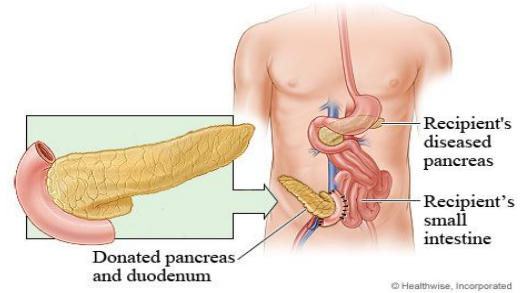
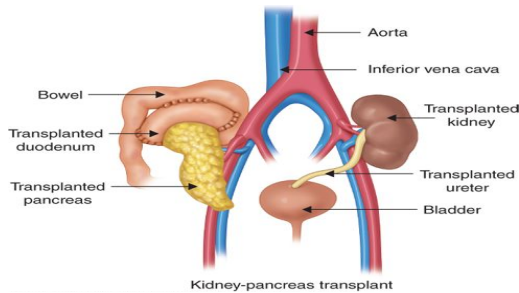
¹¹ Pancreaticoduodenectomy: entails block resection of the head of the pancreas, the distal half of the stomach, the duodenum, gallbladder and common bile duct.



Pancreas Transplant Skipped by the doctor

- Transplantation of the pancreas offers the only treatment that reliably offers insulin independence and normal glucose metabolism for patients with type I diabetes mellitus.
- Contraindications are systemic sepsis, malignancy and significant medical co-morbidity.
- Cardiovascular comorbidity is the most important factor leading to postoperative mortality.

Commonest indication : type one diabetes + hypoglycemia with unawareness.



Recall (EXTRA):

What are the regions of pancreas ?

uncinate process, head, neck, body, tail.

What is the structure that the tail of pancreas said to tickle ?

spleen.

Name the two pancreatic duct, and which one is the main duct ?

wirsung, santorini. the main duct is wirsung (think Santorini = Small = not the main)

How is blood supplied to the head of pancreas ?

- celiac trunk - gastroduodenal - anterior superior pancreaticoduodenal artery, posterior superior pancreaticoduodenal artery.
- superior mesenteric artery - anterior inferior pancreaticoduodenal artery , posterior inferior pancreaticoduodenal artery.
- splenic artery - dorsal pancreatic artery.

What are the most common etiology for ACUTE pancreatitis in the United States ?

1. alcohol abuse 50%
2. gallstones 30%
3. idiopathic 10%

What are the symptoms of ACUTE pancreatitis?

epigastric pain that radiates to the back , nausea , vomiting

What are the signs of ACUTE pancreatitis?

epigastric tenderness, diffuse abdominal tenderness, decreased bowel sounds(adynamic ileus), fever, dehydration\shock.

What lab tests you should order?

CBC, LFT, Amylase/lipase, Type and cross, ABG, Calcium, Chemistry, Coags, Serum lipase.

What is the most common sign on AXR of ACUTE pancreatitis ?

sentinel loop(s)

What are the subtypes of CHRONIC pancreatitis ?

- chronic calcific pancreatitis.
- chronic obstructive pancreatitis (5%)

What are the symptoms of CHRONIC pancreatitis?

epigastric pain, back pain, weight loss, steatorrhea.

What is the surgical treatment ?

- puestow-longitudinal - pancreaticojejunostomy (pancreatic duct must be dilated).
- duval - distal pancreaticojejunostomy.
- near-total pancreatectomy.

What is the differential diagnosis of pseudocyst ?

cystadenocarcinoma, cystadenoma.

What is the treatment of the pseudocyst ?

drainage of the cyst or observation.

What is the average age of pancreatic carcinoma ?

60 yr



Summary

Acute Pancreatitis	
Etiology	Gallstones, Alcohol, Hypercalcemia, Hyperlipidemia, others.
History	Epigastric pain, Nausea and vomiting, previous attacks, underlying disease.
Examination	<ul style="list-style-type: none"> • ↓BP ,↑ Temperature. • Dehydration. • Shock. • Epigastric tenderness. • Grey Turner's and Cullen's signs. • Pleural effusion.
Investigation	<ul style="list-style-type: none"> • increase WBC, serum Lipase, serum Amylase, Ca⁺² & lipids. • CT scan is the best modality to visualize pancreatic diseases.
Management	Most important step to treat Acute pancreatitis is IV fluid replacement.
Complications	Necrosis, Infected necrosis, Abscess, Pseudocyst.
Ranson's Criteria	
Admission criteria	Initial 48-hr criteria
<ul style="list-style-type: none"> • Glucose > 200 mg/dL • Age > 55 • LDH >350 • AST >250 • WBC > 16,000 	<ul style="list-style-type: none"> • Ca < 8 mg/dl • Hematocrit >10% • PO2 < 60 • Base deficit > 4 mg/dl • Fluid sequestration > 6 L • Urea > 8 mg/dl

Chronic Pancreatitis	
Symptoms	Abdominal pain, Malabsorption, Diabetes.
Diagnosis	<ul style="list-style-type: none"> • Lipase/Amylase usually normal. • ↑ Glucose. • AXR calcification. • CT > Calcification, atrophy, dilated ducts.
Complications	Biliary obstruction, Pseudocyst, Carcinoma, Splenic vein thrombosis.
Treatment	<ul style="list-style-type: none"> • Pancreatic enzymes. • Insulin. • Analgesics. • Celiac block. • Surgical drainage. • Pancreatectomy: we try not to do that for 2 reason: <ol style="list-style-type: none"> 1 -it is a major operation. 2-patients will lose both hormones so they become more prone to hypoglycemia.



Pseudocyst	
History	Abdominal pain, nausea and vomiting, obstructive jaundice, Epigastric mass.
Investigation	<ul style="list-style-type: none">• ↑ Lipase or WBC.• Obstructive jaundice.• CT scan (diagnostic).
Complications	<ul style="list-style-type: none">• Infection = abscess.• Rupture = pancreatic ascites.• Bleeding.
Treatment	Drainage indicated if: <ul style="list-style-type: none">• External drainage: in case of Infection.• internal drainage: - Symptomatic related to size. - > 5 cm (internal drainage).

Pancreatic Adenocarcinoma ↑ with cigarette smoking	
History	Weight loss, Jaundice, Deep seated pain, Back pain, Gastric outlet obstruction.
Examination	<ul style="list-style-type: none">• Jaundice = Jaundice + fever = cholangitis , patient need urgent ERCP.• Fever.• Hepatomegaly.• Palpable gallbladder.• Succussion splash.
Management	<ul style="list-style-type: none">• Assess resectability.• Whipple's resection.• Palliative biliary and gastric drainage.• Poor long term survival.



Questions

1. Acute pancreatitis:

- A. Is usually caused by acute cholecystitis.
- B. Can be complicated by pancreatic abscess
- C. Causes inflammation of the pancreas that is usually not discernible by CT scan
- D. Progresses to chronic pancreatitis in about 40% of those affected

2. Which of the following is the most appropriate initial step in the management of patient with acute pancreatitis in ER?

- A. Pancreaticojejunostomy.
- B. Rest the patient with strong Analgesics.
- C. IV fluid replacement with at least 2L.
- D. Rest the pancreas and NPO.

3. A 73-year-old woman presents to the emergency room complaining of severe epigastric pain radiating to her back, nausea, and vomiting. CT scan of the abdomen demonstrates inflammation and edema of the pancreas. A right upper quadrant ultrasound demonstrates the presence of gallstones in the gallbladder. Which of the following is an important prognostic sign in acute pancreatitis according to Ranson's criteria?

- A. Amylase level
- B. Age
- C. Total bilirubin level
- D. Albumin level
- E. Lipase level

4. 39-year-old previously healthy male is hospitalized for 2 weeks with epigastric pain radiating to his back, nausea, and vomiting. Initial laboratory values revealed an elevated amylase level consistent with acute pancreatitis. Five weeks following discharge, he complains of early satiety, epigastric pain, and fevers. On presentation, heart rate is 120 beats per minute; and his amylase level is normal. He undergoes a CT scan demonstrating a 6 cm by 6 cm rim-enhancing fluid collection in the body of the pancreas. Which of the following would be the most definitive management of the fluid collection?

- A. Antibiotic therapy alone.
- B. Antibiotics and CT-guided aspiration with repeat imaging in 2 to 3 days
- C. Antibiotics and percutaneous catheter drainage
- D. Surgical internal drainage of the fluid collection with a cyst-gastrostomy

5. 6-year-old previously healthy, physician notices that his eyes are yellow and he has been losing weight. On physical examination the patient has jaundice and scleral icterus with a benign abdomen. Transcutaneous ultrasound of the abdomen demonstrates biliary ductal dilation without gallstones. The lab investigation revealed elevated serum total bilirubin. what is the most likely diagnose in his case ?

- A. Acute pancreatitis
- B. Chronic pancreatitis
- C. Pseudocysts
- D. Pancreatic cancer

6. An alcoholic man has been suffering excruciating pain from chronic pancreatitis recalcitrant to analgesics and splanchnic block. A surgeon recommends total pancreatectomy. A patient who has a total pancreatectomy might be expected to develop which of the following complications?

- A. Diabetes mellitus and steatorrhea
- B. Diabetes mellitus and constipation
- C. Hypoglycemia and steatorrhea
- D. Hypoglycemia and constipation

Answers:

1: B

2: C

3: B

4: D

5: D

6: A