Pancreatic Problems

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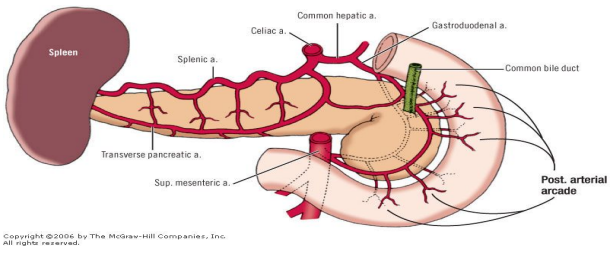
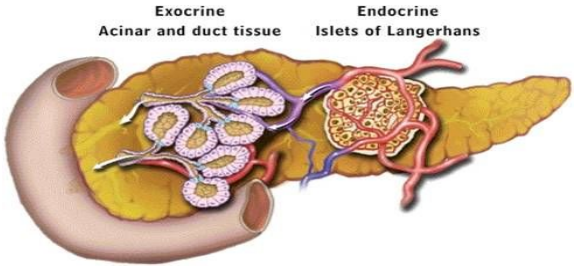
Anatomy/Physiology of the pancreas (not in slides)

The pancreas contains tissue with an endocrine and exocrine role

endocrine	Exocrine
Islets of Langerhans are regions of the pancreas that contain its endocrine cells, composed of five types of cells: 1-Alpha-cells: secretes glucagon (increase blood glucose level) 2-Beta-cells: secretes insulin (decrease blood glucose level) (most important two)	(external digestive role): Release enzymes "amylase, lipase" which help to break down carbohydrates (usually starch), proteins and lipids (fats), and are released into the duodenum.





Blood supply:

A. neck, body and tail of the pancreas by the splenic artery, which branches from the celiac artery
B. head by The superior and inferior pancreaticoduodenal arteries

Nerve supply:

Sympathetic and parasympathetic (vagal) nerve.

Lymphatic drainage:

Celiac and superior mesenteric lymph nodes.

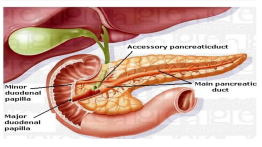
Acute Pancreatitis

Definition

is an acute non-bacterial inflammation of the pancreas caused by activation of auto-digestion of the pancreas by the pancreatic enzymes.

Causes :

1- Gall stones (Cholecystitis) is the most common cause. Doctor said that there are 2 theories in how cholecystitis can lead to pancreatitis. One is the obstruction theory in which small stones will lodge in the Ampulla of Vater (the narrowest part) and block both the common bile duct and pancreatic duct leading to activation of pancreatic enzymes, the other is the reflux theory or the common channel theory in which the stone will go all the way down to the Ampulla of Vater, the bile will follow it and then reflux back to the pancreatic duct which activates the pancreatic enzymes. Small stones eventually pass and can be found in stool.



2- Alcohol is the second most common cause; the underlying mechanism is unclear but two effects are proposed to be involved:

- A. Direct toxic effect on the pancreatic cells
- B. Transient ischemia (cutaneous vasodilation > blood diverted away from the splanchnic circulation > pancreatic ischemia).

3- Iatrogenic:

- A. ERCP-related acute pancreatitis is the 3rd most common cause. ERCP is (endoscopic retrograde cholangiopancreatography).
- B. Drugs: Diuretics (Lasix and Thiazide), Hormone replacement therapy, Oral contraceptive pills, Azathioprine, Steroids and NSAID.

4- Hyperlipidemia (the mechanism is unclear), most commonly there will hypertriglyceridemia.

5- Hypercalcemia because calcium activates pancreatic enzymes (not that common).

6- Obstruction: Tumor in the Ampulla of Vater.

7- Viral Infections: Coxiella and Mumps.

8- Trauma

9- Scorpion bites (found in island of trinidad)

10- Idiopathic

11- Familial (rare).

Acronym to remember all of the causes of pancreatitis?
"I GET SMASHED":
Idiopathic
Gallstones
Ethanol
Trauma
Scorpion bite
Mumps (viruses)
Autoimmune
Steroids
Hyperlipidemia
ERCP
Drugs

History:

1- Epigastric pain that radiates to the back (pancreas is a retroperitoneal organ). The patient will be leaning forward to relieve the pain.

2-Nausea and Vomiting

3-Previous attacks (untreated underlying disease)

4-Symptoms of the underlying disease e.g. Gallstones

Examination:

1- Decrease in blood pressure, increase in peripheral resistance, tachycardia and fever.

2- Dehydration, may lead to shock. (TREAT WITH IV FLUIDS, IF YOU SEE A PATIENT WITH ACUTE PANCREATITIS GIVE HIM 2 LITERS RIGHT AWAY!!).

3- Epigastric tenderness.

4- Pleural effusion especially in the left side because of the inflammation, fluid will accumulate in left side,. Right side effusion is seen with liver problems.

5- Grey turner(bruising of the flank) and Cullen's signs (Superficial edema and bruising around the umbilicus), those two signs are seen in hemorrhagic pancreatitis (very severe inflammation leading to digestion of the blood vessels).

6-Diffuse abdominal tenderness
7-Decreased bowel sounds (adynamic ileus)

Hemorrhagic pancreatitis (form recall)

Very severe inflammation causes digestion of blood vessels → bleeding into the parenchyma and of pancreas and retroperitoneal structures with extensive pancreatic necrosis.

Signs and symptoms : abdominal pain , shock , ARDS, cullen's sign , grey turner's sign and fox's sign.

Grey turner's sign : ecchymosis or discoloration of the flank area.

Cullen's sign : bluish discoloration of the periumbilical area .

Fox's sign : ecchymosis of inguinal ligament.

Grey's turner

Cullen's sign

Fox's sign

Lab tests:

1- Leukocytosis indicating inflammation not infection.

2- High Amylase (Most sensitive and short half-life)

3- High Lipase (Most specific).

4- Serum calcium and lipids.

What is the etiology of hypocalcemia with pancreatitis?
Fat saponification: fat necrosis binds to calcium

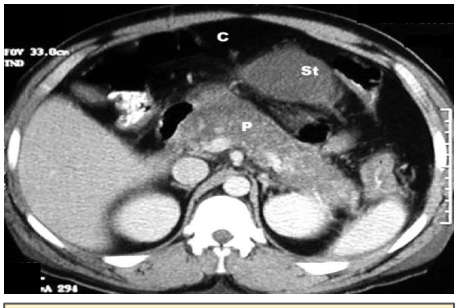
Radiology :

1- Upright chest x-ray.

2- Abdominal x-ray: A-sentinel loop: the most common sign of acute pancreatitis in AXR which is 1-2 inflamed bowel loops dilated around pancreas causing ileus (painful obstruction); localized peritonitis causing localized ileus. B-colon cutoff (describes gaseous distension seen in proximal colon associated with narrowing of the splenic flexure)

3- CT Scan (if you are in doubt): Phlegmon; edematous inflamed pancreas and pancreatic necrosis

4- Ultrasound : Phlegmon or cholelithiasis



Phlegmon on CT scan

Note : ANY PATIENT COMES WITH ABDOMINAL PAIN DO AN UPRIGHT CHEST X-RAY, TO RULE OUT PERFORATION (YOU WILL SEE FREE AIR ON CHEST X-RAY), OR TO EXCLUDE LOWER LOBE PNEUMONIA WHICH CAN PRESENT WITH ABDOMINAL PAIN!!

Ranson's Criteria (to assess severity and prognosis):

1- On admission:

A. Age >55 years.

B. WBC >16.000

C. Glucose > 200 mg/dl

D. AST >250 mg/dl

E. LDH >350 mg/dl

How to remember Ranson criteria on admission
"GA LAW (Georgia law)":
Glucose >200
Age >55
LDH >350
AST >250
WBC >16,000

2- During initial 24-48 hrs

A. Hematocrit drop >10% (hemorrhage)

B. Urea > 8 mg/dl (dehydration)

C. Fluid sequestration > 6 L (patient needs 6 L of fluids)

D. PO2 < 60 mmHg

E. Base deficit > 4 mg/dl (acidosis)

F. Ca < 8 mg/dl (saponification)

How to remember Ranson criteria on 24-48 hrs
"C HOBBS (calvin and Hobbes)":
Calcium < 8 mg/dl
Hematocrit drop > 10%
O2< 60 mmHg
Bun > 8 mg/dl
Base deficit > 4 mg/dl
Sequestration > 5-6 L

The chance of mortality :

0-2 → <5% , 3-4 → 15% , 5-6 → 40%, 7or more → 100%

Note : RANSON'S CRITERIA MOST OF IT WILL DISAPPEAR IF YOU GIVE THE PATIENT GOOD HYDRATION (THE PATIENT MIGHT SCORE 0), WITH BAD MANAGEMENT THE PATIENT WILL HAVE HIGH SCORE AND BAD OUTCOME (GIVE IV FLUIDS IMMEDIATELY).

Management:

Acute pancreatitis is the only acute abdominal emergency that doesn't need surgery.

1- Start with IV FLUID REPLACEMENT. (The initial step in treatment)

A patient may lose a lot of fluid (3-4 L) to the interstitium "3rd spacing" leading to massive edema +/- retroperitoneal bleeding (due to digestion of vessels), leading to hypovolemia. Replace fluid with normal saline or Ringer's lactate.

2-Rest the patient: Analgesia.

3- Rest the bowel: NPO + Nasogastric tube to drain the stomach.

4- Rest the pancreas: NPO. (NPO is Nil per Os: nothing by mouth).

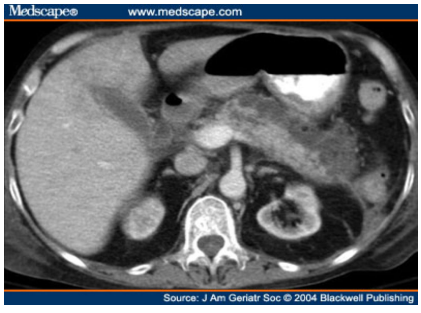
5-Do not administer antibiotics.
90% will improve with conservative management; surgery is rarely indicated (only to debride necrotic tissue in advanced stages "necrosectomy").

6-Cholecystectomy is indicated only if the patient has gallstone pancreatitis, and it is performed during the same admission, after the pain is relieved and pancreatitis is managed.

Note : If the cause of Acute pancreatitis is Gallstones, most of the stones will pass on their own, if there is persistent obstruction from a stone that is the only indication to do ERCP. (If there is Cholangitis with pancreatitis). Otherwise, ERCP will make things worse.

Complications:

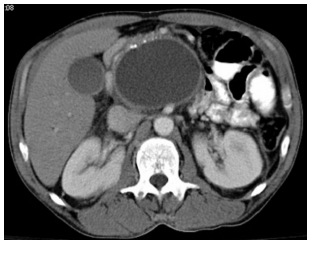
1- Necrosis
(in 30% necrosis start antibiotics for prophylaxis)
2- Infected necrosis (antibiotics for treatment)
3- Abscess (drainage and antibiotics)
4- Pseudocyst.



Necrosis in CT scan

Note : WHEN COMPLICATIONS OCCUR, THAT IS THE ONLY INDICATION TO START ANTIBIOTICS.

Pseudocyst



- "Failure of the pancreas to recover\recurrence of the 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.
- 50% are found to have a communication with the main pancreatic duct.

Presentation:

1- Abdominal pain.

2- Pressure symptoms.
A Stomach: nausea
B Bile duct: Obstructive Jaundice.
3- Epigastric mass.

Note : Pseudocyst occurs when one of the pancreatic ducts have a break, which leads to pancreatic fluid leakage in the lesser sac. Their symptoms occur when the patient goes home or during the same admission.

Investigation:

1- High lipase (rare).
2- Leukocytosis.
3- CT scan is diagnostic.

Complications:

1- Infection > Abscess.
2- Rupture > Pancreatic Ascites.
3- Bleeding (when it is large enough to erode the vessels, especially the gastroduodenal artery).

Management:

- Observation for 6-12 weeks (50% will resolve spontaneously) then repeat CT scan.
- Surgery (Drainage) is indicated only in:

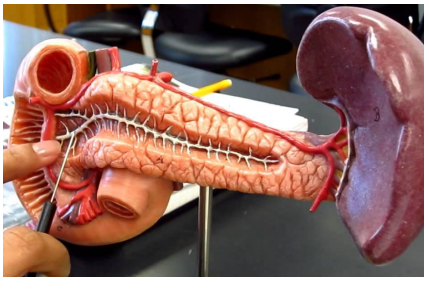
1- Infection (External).
2- Symptomatic (Internal).
3- Pseudocyst is >5 cm in size (Internal).

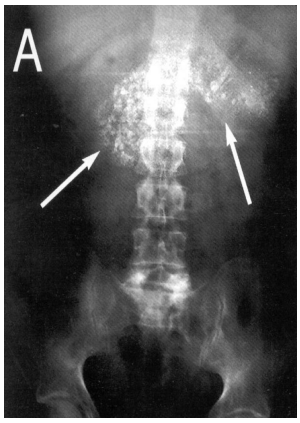
Chronic Pancreatitis

- Progressive inflammatory disease of the pancreas causing fibrosis and loss of endocrine and exocrine functions of the pancreas.
- Most common cause is Chronic Alcoholism. (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, then there will only be fibrosis in the pancreas "no pancreatic tissue" which means loss of both endocrine and exocrine functions).

Signs & Symptoms:

1- Abdominal Pain.
2- Malabsorption.
3- Diabetes.
4- Sometimes they develop stones.





X-ray reveals calcifications that are typical for chronic pancreatitis.

Diagnosis:

1- Lipase/Amylase usually normal
2- Elevated Glucose
3- Abdominal x-ray: calcification, stones.
4- CT scan: Calcification, atrophy, dilated ducts.

Complications:

1- Biliary obstruction (due to fibrosis of the head of pancreas).
2- Pseudocyst (due to rupture of a stricture).
3- Carcinoma (due to chronic inflammation).
4- Splenic vein thrombosis (with repeated inflammation). In splenic vein thrombosis patients will not develop ascites, they might develop left sided portal hypertension, bleeding varices (around the stomach and the spleen), hematemesis. You treat this with Splenectomy.

Treatment:

1- Pancreatic enzymes (for malabsorption).

2- Insulin (for diabetes).

3- Pain is biggest problem, we treat it either with analgesics(narcotics) or celiac block (injection of analgesics) which does not relieve the pain in 50% of the cases, we can also relieve the pain with surgery which include the following types:

A. Pancreaticojejunostomy (Pancreatic duct drainage procedure to decompress the dilated pancreatic duct). It is the most common procedure. Causes relieve of the pain in 70% of the cases.

B. Pancreatic resection (last resort; will lead to "brittle diabetes" which is unstable diabetes with recurrent swings in glucose levels) it also does not relieve the pain in 100% of the cases.

Pancreatic adenocarcinoma

Introduction: There are a number of types of pancreatic cancer. The most common, pancreatic adenocarcinoma, accounts for about 85% of cases, and the term "pancreatic cancer" is sometimes used to refer only to that type. (Arise most commonly in the head 70%)

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

Risk factor	History	Examination
- cigarette smoking - fatty food - remote gastrectomy[1] - black people - Other factors, Chronic pancreatitis, polyposis syndromes, family history and cholecystectomy.	- Weight loss - Jaundice - Deep seated pain - Back pain (it's a bad sign suggesting metastasis) - Gastric outlet obstruction	- Jaundice - Fever - Hepatomegaly - Palpable gallbladder -Succussion splash

Note :Cholangitis " inflammation of the biliary tree" is a medical emergency, patient needs to be admitted to OR immediately. Most patients die because of cholangitis not the cancer itself

Characterized by: Jaundice + fever *Do ERCP

1."partial" gastrectomy is the removal of a part of the stomach.

Investigations

1- Lab

- Obstructive jaundice
- high WBC
- CA 19-9 (tumor marker)

2- Imaging

- double-duct sign (dilated bile duct & pancreatic duct) on U/S & CT :

1- U/S: dilated bile duct
2- CT scan (BEST)

- ERCP (esp. cholangitis*)

Treatment

- Assess resectability (role out local invasion and distant metastasis)
- Whipple's resection
- Palliative biliary and gastric drainage
- Poor long term survival
- Pancreas Transplant: Done to those with:

1. type 1 diabetes
2. renal failure

Note : Doctor said the two most important notes in this lecture are:

1-Give at least 2 liters of fluid to the patient with acute pancreatitis ASAP.

2-Do an upright chest X-ray to eliminate other differentials ex.Pneumonia.

Important notes: (Summary)

- Most common causes for Acute pancreatitis: gallstones, Alcohol consumption.
- Amylase is most sensitive in Acute pancreatitis but lipase is most specific
- CT scan is the best modality to visualize pancreatic diseases
- Most important step to treat Acute pancreatitis is IV fluid replacement
- Patient with pseudocyst usually come with vomiting and nausea
- Most common cause for chronic pancreatitis is chronic alcoholism
- The most specific blood test in diagnosing acute pancreatitis is: Serum lipase
- Ranson's criteria: Age > 55, WBC > 16,000, Glucose > 11 ,AST >250, LDH >350
- The most important factor in pancreatic adenocarcinoma is: Smoking
- The best modality to diagnose pancreatic adenocarcinoma is CT scan

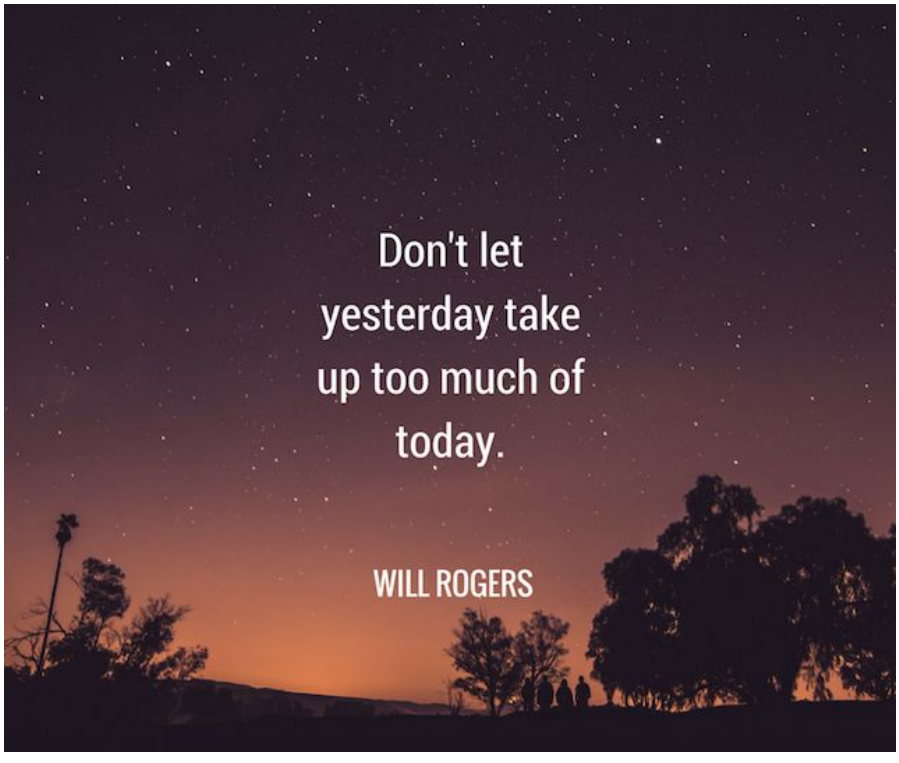
MCQs:

Q1: Patient present with acute pancreatitis, What is the first line of treatment?
A- Analgesic because a sever pain .
B- IV fluid resuscitation
C- Nothing by mouth
D- IV antibiotic by infection from bowel bacteria.

Q2: What is the most common cause of chronic pancreatitis?
A- Smoking B- Gall stone C- Alcohol
D- Complication of Pseudocyst

Q3: Patient 45 years old present to the ER with Nausea , fever and epigastric pain. During complete history taking he recently found color change of his urine and stool. what is the most differential diagnosis?
A- Acute viral hepatitis B- Acute pancreatitis C- cholangitis
D-cholelithiasis

Thank you



B
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