

# Pancreatic Problems



Surgery Team  
MED 433



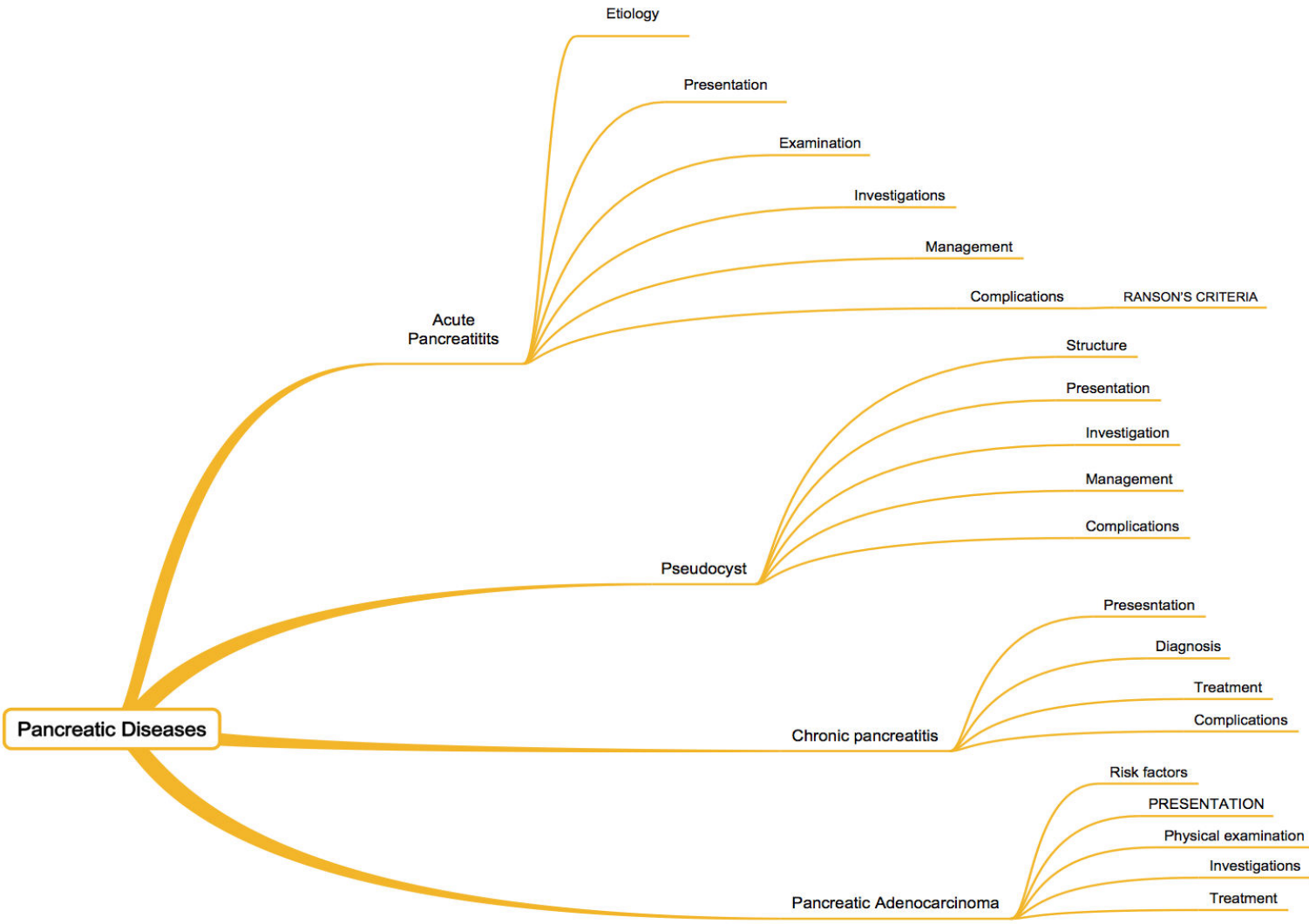
# Objectives :

- ✓ Anatomy and Physiology of pancreas
- ✓ Pancreatitis
  - Acute pancreatitis
  - Chronic pancreatitis
- ✓ Pancreatic Adenocarcinoma

**Sources** : Slides, Raslan's Notebook, Principles & Practice of Surgery by: O. James Garden

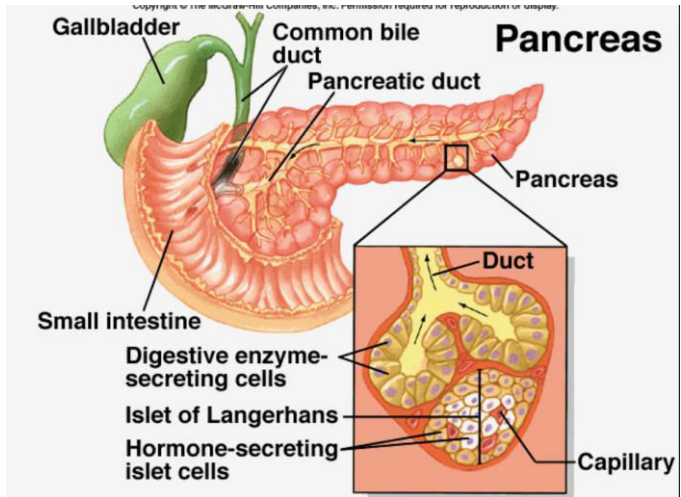
**Color Index** : Slides & Raslan's | Textbook | [Doctor's Notes](#) | Extra Explanation

# Mind Map

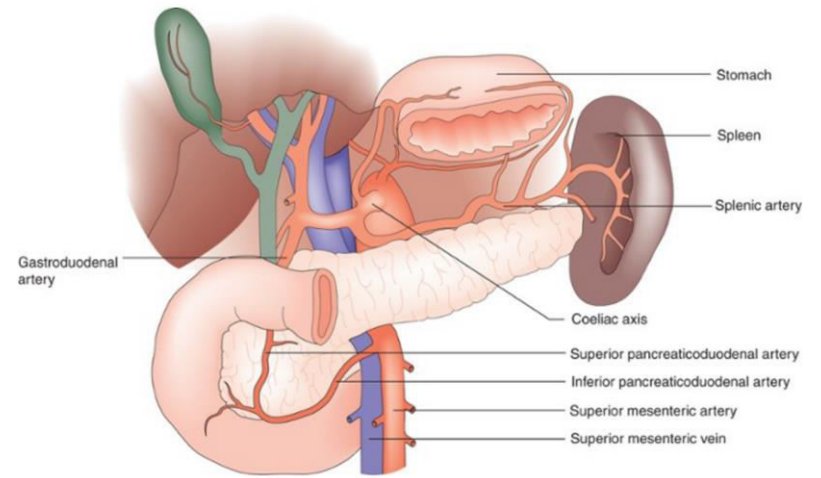




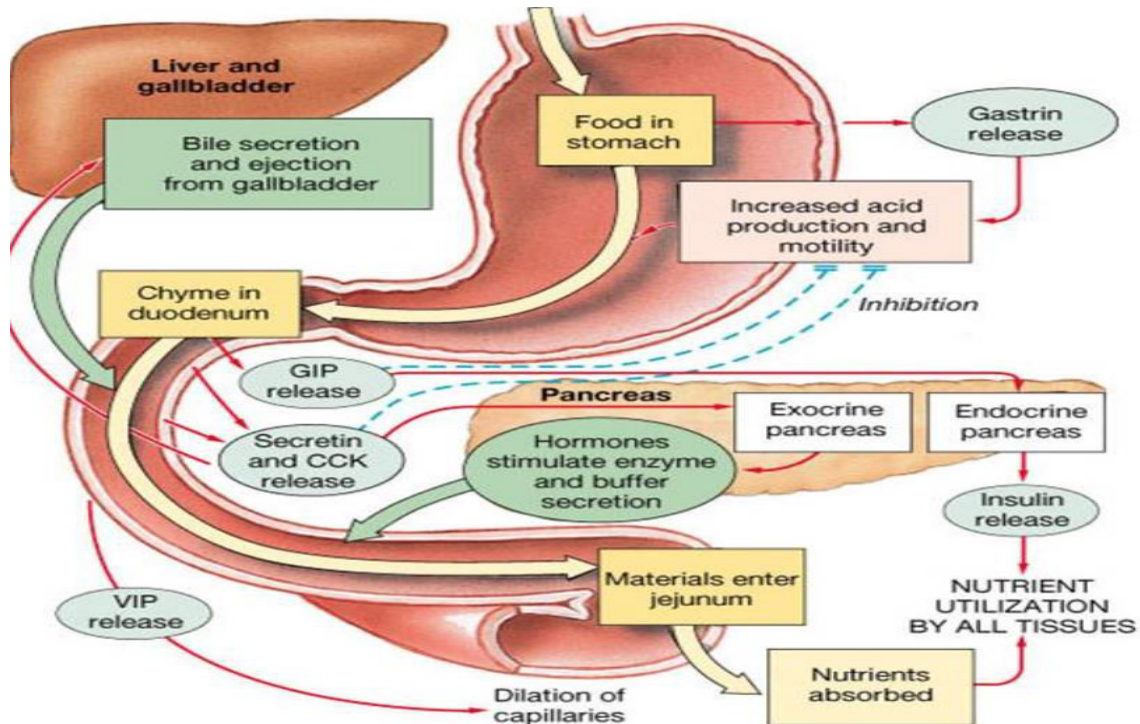
# Anatomy of pancreas :



# Anatomical relations of pancreas :



# Physiology of pancreas :



# 1. Acute pancreatitis :

Acute non-bacterial inflammation caused by activation of pancreatic enzymes and auto-digestion of the pancreas by its own enzymes.

Etiology	Gall Stones :	Alcohol :	Hypercalcemia:	Hyperlipidemia :
	<p><b>Most common</b> (IN ALL COUNTRIES)</p> <p>-Small stones can lodge in the Ampulla of Vater and block both the common bile duct (CBD) &amp; pancreatic duct . * causes high pressure in the pancreatic duct → lead to back flow of the pancreatic enzymes in to the pancreas .</p> <p>- Another theory : Bile reflux</p> <p>The ston will block the ampulla of vater → accumulation between bile duct and pancreatic duct → the bile can't go down so it will go to the pancreas → activation of pancreatic enzymes inside the pancreas</p> <p>- Eventually small stones will pass and can be found in stool .</p>	<p><b>2<sup>nd</sup> Most common</b> (specially in west)</p> <p>-Direct toxic effect on pancreatic cells</p> <p>-<b>Transient ischemia (cutaneous vasodilation → blood diverted away from splanchnic circulation → pancreatic ischemia)</b></p>	<p><b>Ca Activates pancreatic enzymes</b></p> <p>Excessive calcium causes:</p> <ul style="list-style-type: none"> <li>- Deposition of Ca in soft tissues leading to obstruction of the pancreatic duct</li> <li>- -Trypsinogen activation before it reaches the intestines .</li> </ul> <p>❖ with severe inflammation Ca+fat=saponification (soap formation), leading to depletion of blood Ca level.</p>	<p>-Elevations greater than 1,000 mg/dL can lead to pancreatitis</p> <p>- Or it could be a result of TG serum levels increase with inflammatory processes– but the elevation will be moderate (&lt;1000 mg/dL)</p>
	Viral infection :	Iatrogenic :	obstruction :	Others :
	<p>Coxiella , mumps</p> <p>In pediatric can be followed by type 1 diabetes .</p>	<ul style="list-style-type: none"> <li>- <b>diuretics (lasix and thiazides)</b></li> <li>- <b>HRT</b></li> <li>- <b>Steroids</b></li> <li>- <b>ERCP (endoscopic retrograde cholangiopancreatography) : ↑Pressure with duct cannulation or contrast injection</b></li> </ul>	<p>1% of people develop tumor of ampulla of Vater</p>	<p><b>Trauma</b></p> <p><b>Scorpion bite</b></p> <p><b>Idiopathic</b></p>

## Cont. Acute pancreatitis :

<b>Presentation:</b>	<ul style="list-style-type: none"><li>-Acute epigastric pain, radiating to back (pancreas is a retroperitoneal organ)</li><li>- Patient will be leaning forward (↓ pain as pancreas moves away from the nerves)</li><li>-Nausea &amp; vomiting</li><li>-Previous attacks (untreated underlying disease e.g. gall stones)</li><li>-Symptoms of underlying cause e.g. gall stones</li></ul>
<b>Examination :</b>	<p>When you examine the patient he will have :</p> <ul style="list-style-type: none"><li>- Hypotension due to increase peripheral resistance , tachycardia &amp; fever *doesn't indicate infection → any inflammation causes fever .</li><li>- Dehydration <b>"it's what kill patients"</b> → can progress to shock * fluids will accumulate around the pancreas leading to edema</li><li>- Epigastric tenderness</li><li>- Pleural effusion → tail of pancreas near to the diaphragm → left lower effusion</li><li>- Hemorrhagic pancreatitis :</li><li>✓ Grey Turner sign ( always remember you ask the patient to turn so you can see it ): bruising of the flanks, sign of retroperitoneal hemorrhage</li><li>✓ Cullen's sign: superficial edema and bruising in the subcutaneous fatty tissue around the umbilicus – indicating pancreatic necrosis &amp; retroperitoneal bleeding</li></ul>

**Figure 1: Grey Turner's Sign**



**Figure 2: Cullen's Sign**



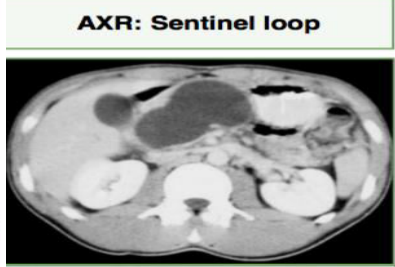
# Cont. Acute pancreatitis :

<b>Investigation :</b>	<b>Lab Tests :</b>	<ul style="list-style-type: none"> <li>- ↑WBC</li> <li>- ↑ *Amylase (<b>most sensitive; shorter t1/2</b>) &gt;1000</li> <li>- ↑ Lipase (<b>more specific than amylase</b>)</li> <li>- Serum calcium &amp; lipids → <b>Ca++ + fat = saponification (soap formation) → serum Ca++ will be depleted in the process (low- normal serum Ca++ levels) → so Ca++ and lipid test should be repeated because maybe they were high and go down after the attack</b></li> </ul>
	<b>Radiological tests :</b>	<ul style="list-style-type: none"> <li>-Plain erect chest &amp; abdominal X-ray: <b>Sentinel loop:</b> 1-2 inflamed bowel loops dilated around pancreas causing ileus (painful obstruction), localized peritonitis causing localized ileus</li> <li>-CT scan (BEST): <b>Phlegmon</b>, edematous, inflamed pancreas, “dirty mesentery”</li> </ul>
<b>Management:</b>	<b>First and most important :</b>	<p><b>*Acute pancreatitis is the only acute abdomen emergency that doesn't need surgery*</b>  <b>Just give IV fluid replacement</b> --&gt; because the patient looses a lot of fluid ( 3-4 L ) due to the edema          -/+ retroperitoneal bleeding due to vessel wall digestion by the enzymes</p>
	<b>Then :</b>	<p>A) Rest the patient: Analgesics          b) Rest the bowel: Nasogastric tube          c) Rest the pancreas: NPO (Nil per Os: nothing by mouth)</p> <p style="text-align: right;"><b>Once the patients are pain free and tender free you can start feed them but if the feel pain you have to stop</b></p>

**\*\*\* If there is no response to previous management you have to :**

- Start antibiotics ( prophylactics) if the patient start to develop necrosis in more than 30% of the pancreas .
- Do pancreaticnecrosectomy if the patient starts to develop infected necrosis ( gas in the pancreas due to sever infection )
- ERCP if the patient has persistence obstructive and jaundice
- Cholecystectomy if the patient has gall stone pancreatitis . ( in this case we have to do cholecystectomy immediately ).

\*Amylase: It goes up quickly & down quickly , Secreted everywhere in the GI, and in the ovaries and fallopian tubes. Elevated in GI diseases & ectopic  
 - Acute pancreatitis is the only acute abdomen emergency that **DOESN'T NEED SURGERY**



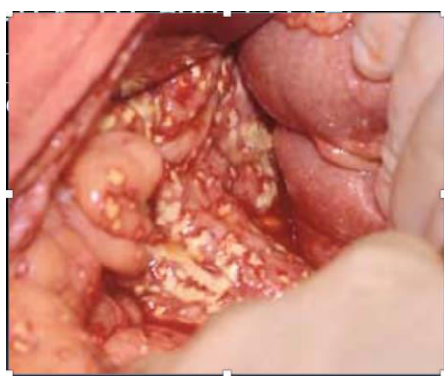


# Cont. Acute pancreatitis :

<b>RANSON'S CRITERIA</b>	<b>They don't change the course of the patient disease , they just tell which patient will develop complication than the others ( assess severity and prognosis ) *with early rehydration, most of them will go back to normal*</b>	
	1. On admission	<ul style="list-style-type: none"> <li>a. Age &gt;55 years</li> <li>b. WBC &gt; 16,000</li> <li>c. Glucose &gt;11 mmol/L (x 18 = 198 mg/dL) (no insulin secretion)</li> <li>d. AST &gt;250</li> <li>e. LDH &gt;350</li> </ul>
	2. 36-48 H after admission	<ul style="list-style-type: none"> <li>a. Urea &gt;8 mg/dL (dehydration)</li> <li>b. Hematocrit: &gt;10% decrease (hemorrhage)</li> <li>c. Fluid sequestration &gt;6 L (patient needed 6 L of fluid)</li> <li>d. PO2 &lt;60</li> <li>e. Base deficit &gt;4 (acidosis)</li> <li>f. Serum calcium &lt;8 mg/dL (saponification)</li> </ul>

## Complication of Acute Pancreatitis

1. Necrosis
  2. Infected necrosis
  3. Abscess
  4. Pseudocyst
- ↓



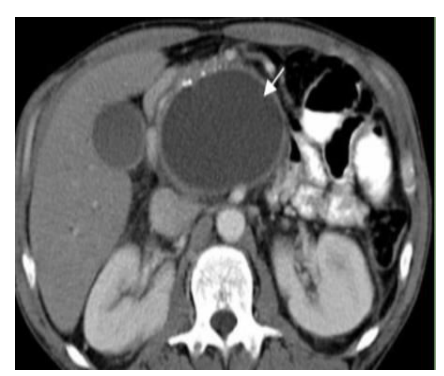
Soap formation



necrosis



Infected necrosis



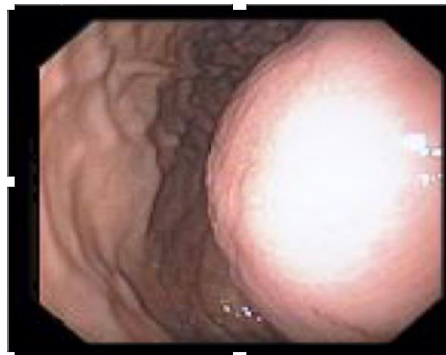
Pseudocyst



## 2. Pseudocyst:

### Due to failure of pancreas to recover / recurrence of symptoms

<b>Structure :</b>	<ul style="list-style-type: none"><li>- A collection of amylase-rich fluid enclosed in a <b>wall of fibrous or granulation tissue (not epithelium)</b> that develops following an acute pancreatitis attack (&gt;4 wks from onset)</li><li>- 50% are found to have a communication with the main pancreatic duct.</li></ul>	
<b>Presentation :</b>	<ul style="list-style-type: none"><li>-Abdominal pain</li><li>-Pressure symptoms e.g :<ul style="list-style-type: none"><li>✓ Stomach: nausea , vomiting and early satiety</li><li>✓ Bile duct: obstructive jaundice</li></ul></li><li>-Epigastric mass</li></ul>	
<b>Investigation :</b>	<ul style="list-style-type: none"><li>-↑ Lipase/WBC → <b>but usually they are normal</b></li><li>- Obstructive jaundice → <b>not very common</b></li><li>-<b>CT scan (BEST)</b> → you can see the cyst</li></ul>	
<b>Management :</b>	<b>Non-invasive :</b>	<b>Invasive :</b>
	Observe <b>for 6-12 weeks</b> (50% resolve spontaneously) then repeat CT scan	Surgery (drainage) if the cyst did not disappear or if the cyst size more than 5 cm , we have to way to drainage it : <ul style="list-style-type: none"><li>✓ If there is an infection we drain it externally</li><li>✓ If there is no infection ( symptomatic ) we drain it internally .</li></ul>
<b>Complications :</b>	<ul style="list-style-type: none"><li>• Infection → abscess</li><li>• Rupture → pancreatic ascites</li><li>• Bleeding (erode the vessels, esp. <b>gastroduodenal artery</b>)</li></ul>	



### 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**

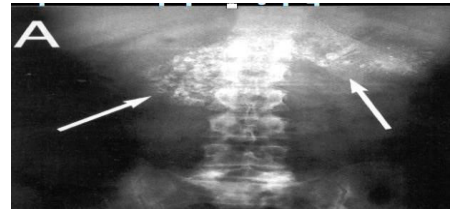
<p>Presentation</p>	<ul style="list-style-type: none"> <li>Abdominal pain</li> <li>Malabsorption</li> <li>Diabetes ( type 1 diabetes )</li> </ul>			
<p>Diagnosis :</p>	<ul style="list-style-type: none"> <li>Lipase &amp; amylase: usually normal</li> <li>↑ Glucose</li> <li>Abdominal x-ray: calcification, stones</li> <li>CT scan: *<b>calcifications</b>, atrophy, dilated ducts</li> </ul>			
<p>Treatment:</p>	<p>Pancreatic enzymes :</p>	<p>Insulin :</p>	<p>Relieving the pain :</p>	<p>Surgery :</p>
	<p>for malabsorption</p>	<p>For diabetes</p>	<ul style="list-style-type: none"> <li>- Analgesics (narcotics)</li> <li>- celiac block (injection of analgesics)</li> </ul>	<ul style="list-style-type: none"> <li>- Pancreaticojejunostomy (pancreatic duct drainage procedure to decompress the dilated pancreatic duct) <b>most common procedure</b></li> <li>- Bypasses pancreatic duct &amp; relieves pain</li> <li>- Pancreatic resection (<b>last resort; will lead to “brittle diabetes”</b> which is unstable diabetes with recurrent swings in glucose levels)</li> </ul>

**COMPLICATIONS**

- Biliary obstruction (due to fibrosis of the head of the pancreas) → **Obstructive jaundice**
- Pseudocyst (due to rupture of a stricture)
- Carcinoma (due to repeated inflammation)
- Splenic vein thrombosis (lies on top of the pancreas) **or behind the pancreas**



\*multiple dilated ducts and stones formation



\*pancreatic calcification on X-ray

# 4. Pancreatic Adenocarcinoma :

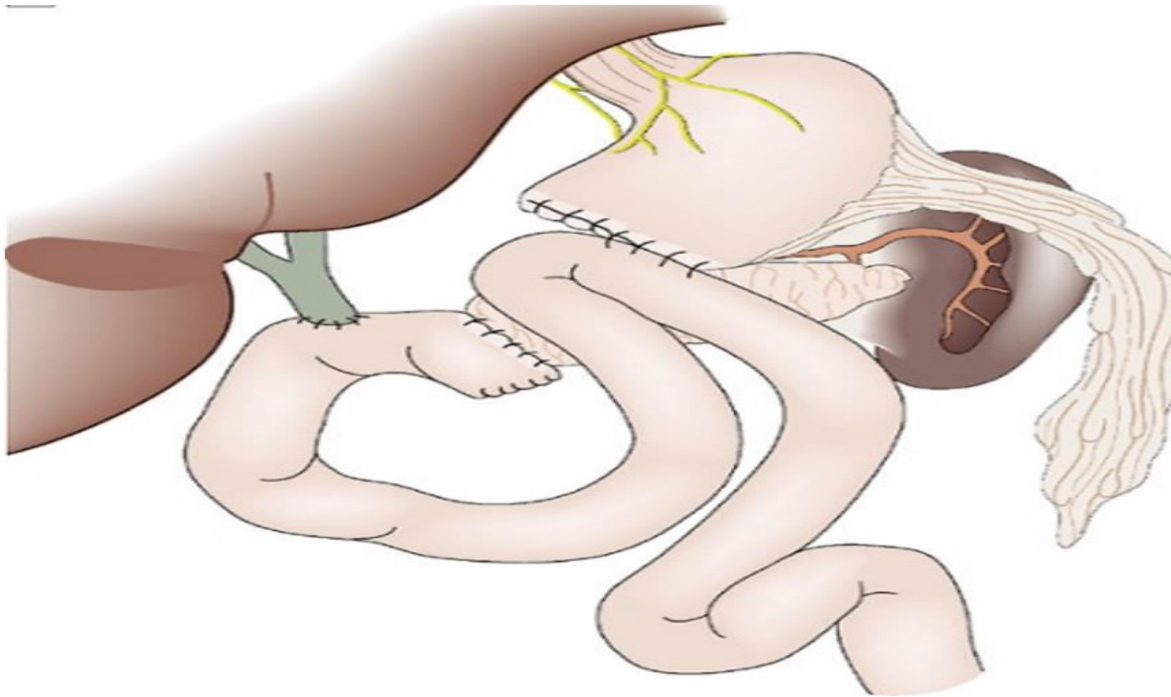
3rd leading cause of cancer death in men aged 35-55 years					
Risk factors :	<ul style="list-style-type: none"> <li>• Most important: smoking</li> <li>• Fatty food Remote gastrectomy</li> <li>• Race: Black</li> <li>• Chronic pancreatitis</li> <li>• Polyposis syndromes</li> <li>• Family history</li> <li>• Cholecystectomy</li> </ul>				
PRESENTATION :	<p>Arise most commonly in the head of the pancreas (70%) → present with jaundice Other (tail, body) usually presents late with metastases.</p> <ul style="list-style-type: none"> <li>• Weight loss</li> <li>• Deep seated pain</li> <li>• Back pain (sign of retroperitoneal invasion)</li> <li>• Gastric outlet obstruction</li> </ul>				
Physical examination:	<ul style="list-style-type: none"> <li>• aundice</li> <li>• Hepatomegaly</li> <li>• Palpable gallbladder (distended GB due to obstruction)</li> <li>• Succession splash (gastric outlet obstruction)</li> </ul>				
Investigations :	<table border="1"> <thead> <tr> <th>Lab :</th> <th>Imaging :</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> <li>• ↑ WBC (w/cholangitis)</li> <li>• CA 19-9 &gt;100 (tumor marker)</li> </ul> </td> <td> <ul style="list-style-type: none"> <li>• double-duct sign (dilated bile duct &amp; pancreatic duct) on U/S &amp; CT :</li> <li>- U/S: dilated bile duct</li> <li>- CT scan (BEST)</li> <li>• ERCP (esp. cholangitis)</li> </ul> </td> </tr> </tbody> </table>	Lab :	Imaging :	<ul style="list-style-type: none"> <li>• ↑ WBC (w/cholangitis)</li> <li>• CA 19-9 &gt;100 (tumor marker)</li> </ul>	<ul style="list-style-type: none"> <li>• double-duct sign (dilated bile duct &amp; pancreatic duct) on U/S &amp; CT :</li> <li>- U/S: dilated bile duct</li> <li>- CT scan (BEST)</li> <li>• ERCP (esp. cholangitis)</li> </ul>
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Treatment :	<p>Treatment is surgical</p> <ul style="list-style-type: none"> <li>- Assess resectability (rule out local invasion &amp; distant metastases)</li> <li>- Whipple’s resection (pancreatectomy)</li> <li>- Palliative biliary &amp; gastric drainage</li> </ul> <p><b>POOR LONG TERM SURVIVAL</b></p>				

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.

**TABLE 15.2** Named signs and laws in pancreatic malignancy

<b>Courvoisier's Law</b>	<b>Trousseau's Sign</b>
In the presence of a non-tender palpable gallbladder, painless jaundice is unlikely to be caused by gallstones	Thrombophlebitis migrans in a patient with pancreatic carcinoma, a non-metastatic manifestation of malignancy



**5.14**  Classic pancreaticoduodenectomy (Kausch-Whipple).



# Summary

1-Acute pancreatitis is nonbacterial mediated so no need for antibiotics unless there is no necrosis.

2- most important intervention in case of acute pancreatitis is resuscitation (rehydration).

3-Most common causes for Acute pancreatitis: gall stones and Alcohol consumption.

4-serious problem in patients with acute pancreatitis during examination is shock that caused by dehydration.

5- Amylase is most sensitive in Acute pancreatitis but lipase is most specific.

6-The best modality to diagnose acute pancreatitis is CT scan.

7-Most common cause of chronic pancreatitis is chronic alcoholism.

8- The most important risk factor for pancreatic adenocarcinoma is smoking.

9- The best modality to diagnose pancreatic adenocarcinoma is CT scan.



# MCQs

**Q 1/ 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 / 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- cholangitis
- C- Acute pancreatitis
- D- cholelithiasis

**Q3/ All of the following are complication of Pancreatic pseudocyst except:**

- A- Malignancy
- B- Rupture
- C- Bleeding
- D- Infection.

**Q4/ Which of the following is used in diagnosing pancreatic adenocarcinoma:**

- A- CA 125
- B- Serum amylase
- C- serum lipase
- D- CA 19-9

Ans: 1-b 2- c 3- a 4-d

# Thank You..

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