Acute pancreatitis

Doctor 2019

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With some past papers included

Definition

- "Acute pancreatitis":

Pathology:

- A reversible inflammation of the pancreas as a result of auto digestion by its own enzymes. It appears suddenly (an emergency) and lasts for days.

Clinical diagnosis:

- OR: An acute condition presenting with abdominal pain, a threefold or greater rise in the serum levels of the pancreatic enzymes ((amylase or lipase)),and/ or characteristic findings of pancreatic inflammation on contrast-enhanced CT.

Epidemiology

- Accounts for 3% of all cases of abdominal pain among patients admitted to hospital in the UK.

- The disease may occur at any age, with a peak in young men and older women.

Epidemiology

- The incidence of acute pancreatitis varies between populations. In large population studies from Scotland and Finland the incidence of the disease has risen steadily to the current 400 patients/million per year.
- (Biliary + alcoholic) 90%
- Even in the west, biliary pancreatitis is the most prevalent type.

Epidemiology

- Overall mortality is from 2.0 to 7.5%, highest in those who are over 70 years, obese individuals, and those with comorbidity at the time of onset.
- Prospective and retrospective studies record 45 to 50% of deaths as occurring in the initial week of the illness secondary to fulminant multiple organ failure

Causes

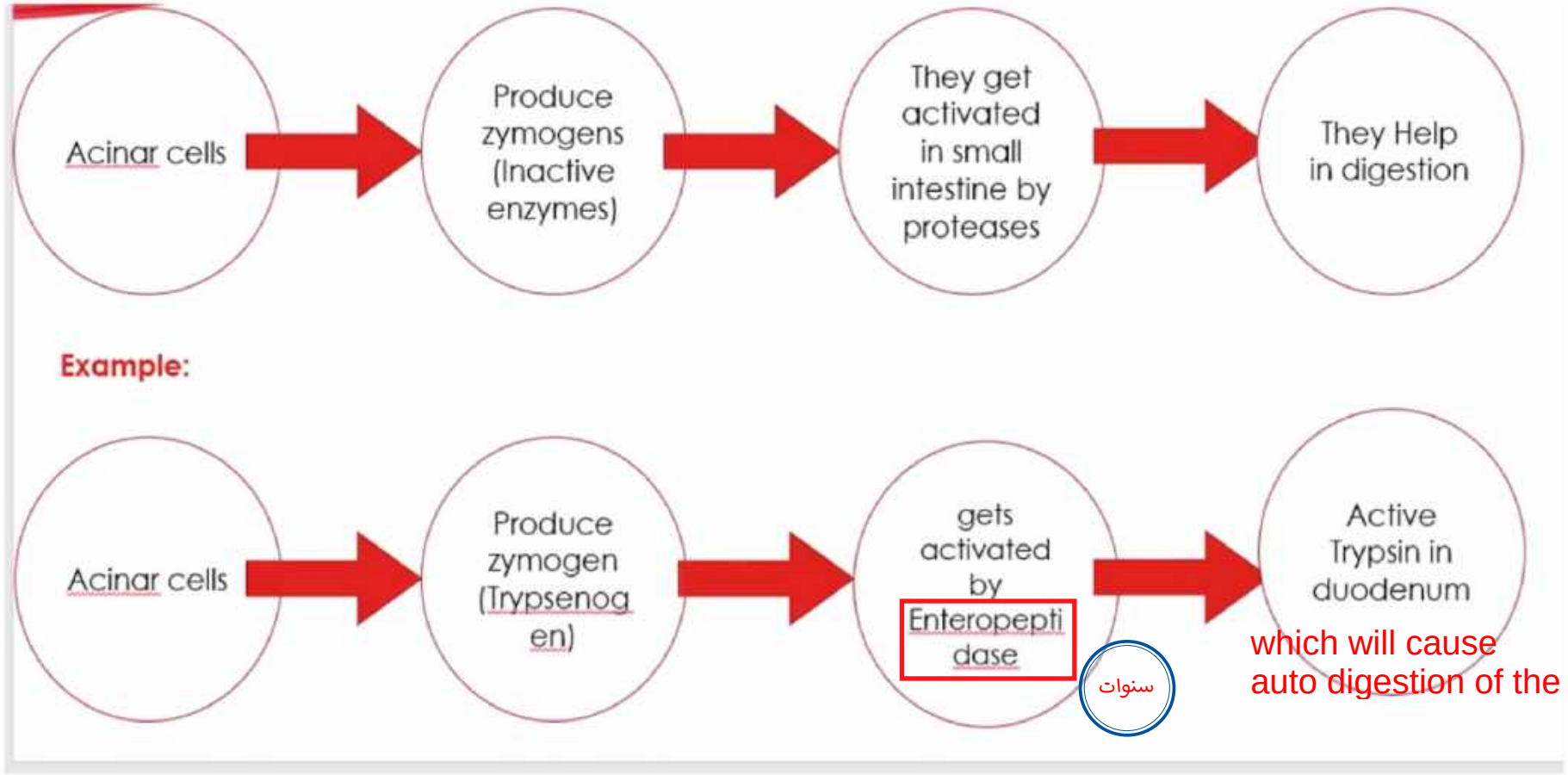
- Idiopathic
- **Gallstones** 1st most common
- **Ethanol (alcohol)** 2nd most common
- Trauma (usually a penetrating one)
- Steroids
- Mumps(viral)
- Autoimmune disease (ex: polyarteritis nodosa).
- Scorpion bite (Rare)
- Hyperlipidemia/ Hypercalcemia
- ERCP [endoscopic retrograde cholengio-pancreatography] → Iatrogenic
- Drugs (diuretics, Isonazid {INH}, reverse transcriptase inhibitors and Metronidazole).

Past Paper:

Past papers: About acute pancreatitis what is wrong?
Answer: Alcohol is responsible for 30% of cases in Jordan

PATHOPHYSIOLOGY

What happens at the cellular level?



PATHOPHYSIOLOGY

- Any early activation of the pancreatic pro-enzymes (zymogens) leads to acute pancreatitis due to auto-digestion

PATHOPHYSIOLOGY

But, why do we have early activation of the pancreatic enzymes?

- An initial cause
- Injury to the pancreatic ductal cells
- Cell membrane trafficking problem (signaling error)
- Early activation of pancreatic enzymes
- Destruction of the pancreatic tissue.
- Cell injury causes the release of activated neutrophils which produces proteolytic enzymes and activation of zymogens.

PATHOPHYSIOLOGY

Cells injury may take place as a result of any cause

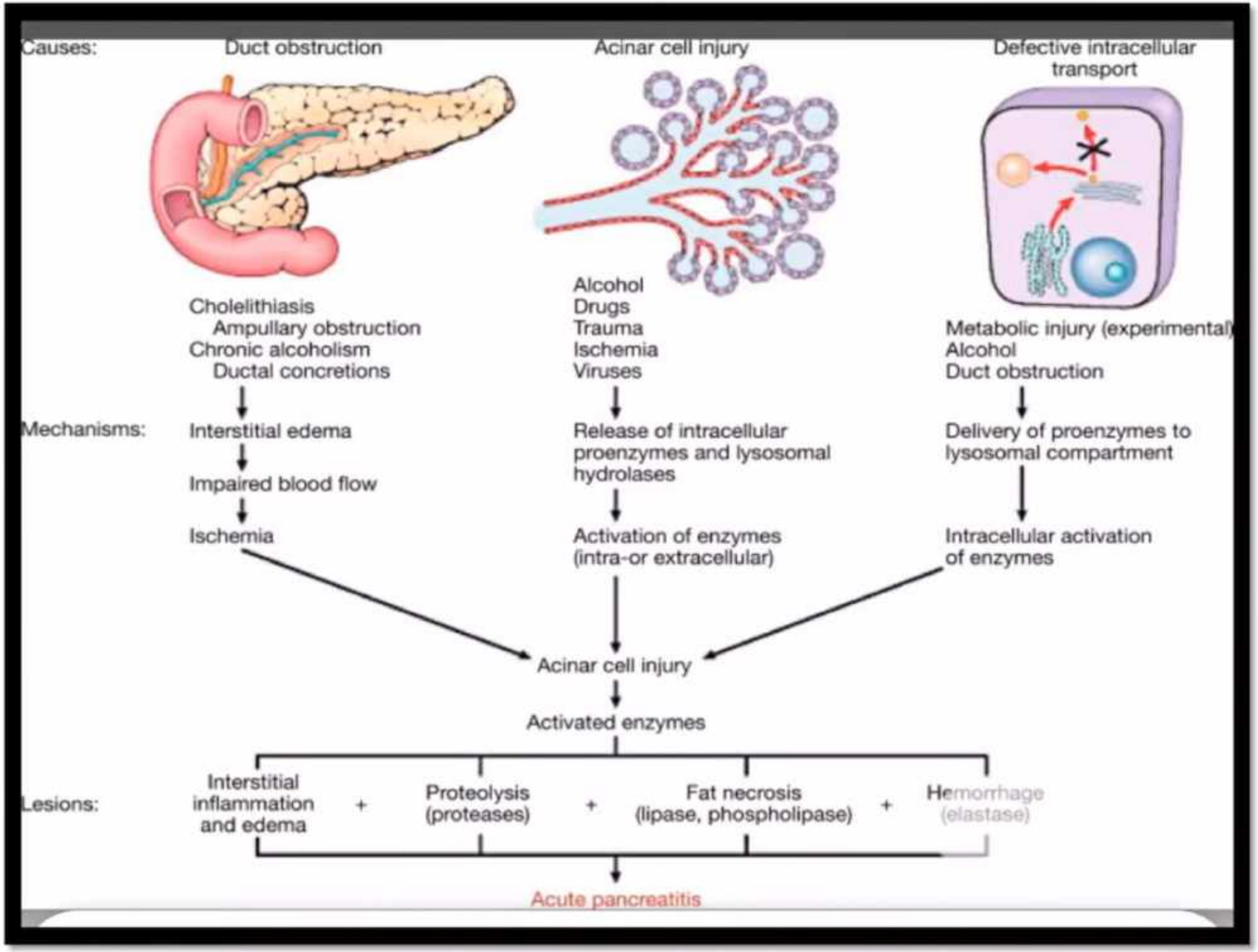
mentioned in page 6

Once cellular injury has been initiated, the inflammatory process can lead to pancreatic edema, haemorrhage and, eventually, necrosis.

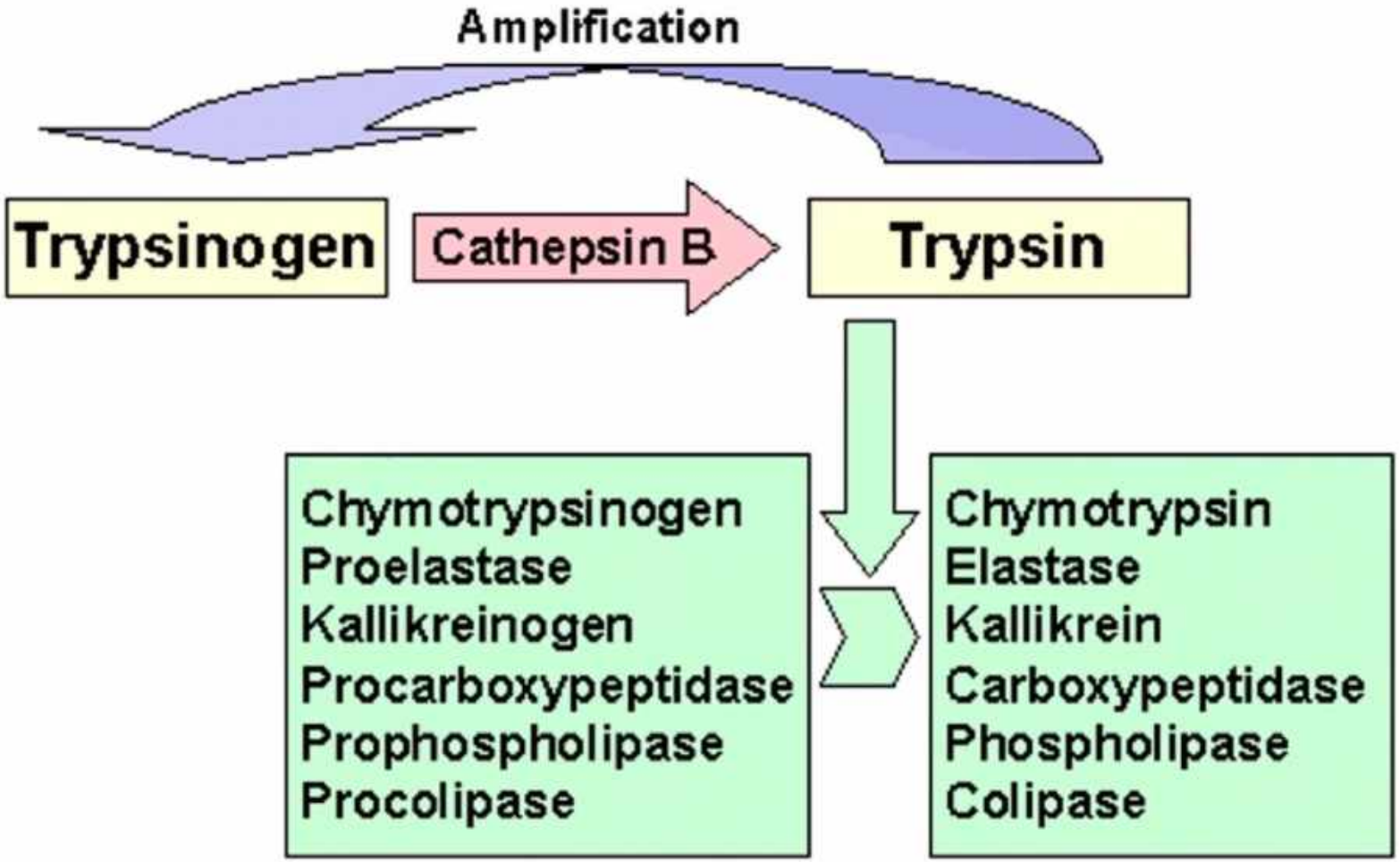
As inflammatory mediators are released into the circulation, systemic complications can arise such as haemodynamic instability, acute respiratory distress syndrome and pleural effusions.

So, we have to think about it like this:
We have a pancreas, with enzymes inside the cells, and they're in an inactive form.
If they were active, they will digest the cell.
This inactive form should be preserved inside a membrane that's secreted by cells within the duct of the pancreas.

At the cellular level, we have some enzymes that can activate zymogens which are lysosomal enzymes. Any injury will cause lysosomal enzymes to leak out of the cell so they'll activate zymogens and cause auto digestion of the cell and tissues around


Causes:
Duct obstruction
Acinar cell injury
Defective intracellular transport
Cholelithiasis
Ampullary obstruction
Chronic alcoholism
Ductal concretions
Alcohol
Drugs
Trauma
Ischemia
Viruses
Metabolic injury (experimental)
Alcohol
Duct obstruction
Mechanisms:
Interstitial edema
Impaired blood flow
Ischemia
Release of intracellular proenzymes and lysosomal hydrolases
Activation of enzymes (intra-or extracellular)
Delivery of proenzymes to lysosomal compartment
Intracellular activation of enzymes
Acinar cell injury
Activated enzymes
Lesions:
Interstitial inflammation and edema
+
Proteolysis (proteases)
+
Fat necrosis (lipase, phospholipase)
+
Hemorrhage (elastase)
Acute pancreatitis

PATHOPHYSIOLOGY



Presentation

- The cardinal symptom of acute pancreatitis is **abdominal pain**
- **dull, boring, and steady**
- **sudden in onset** generally following substantial meal and gradually **intensifies in severity until reaching a constant ache.**
- located in the **upper abdomen**, usually in the epigastric region
- The pain **radiates directly** through the abdomen **to the back** in approximately one half of cases
- Nausea and vomiting

Presentation

- Ask the patient about recent operative or other invasive procedures (eg, endoscopic retrograde cholangiopancreatography **[ERCP]** or **family history of hypertriglyceridemia**. Patients frequently have a **history of previous biliary colic and binge alcohol consumption**, the major causes of acute pancreatitis.

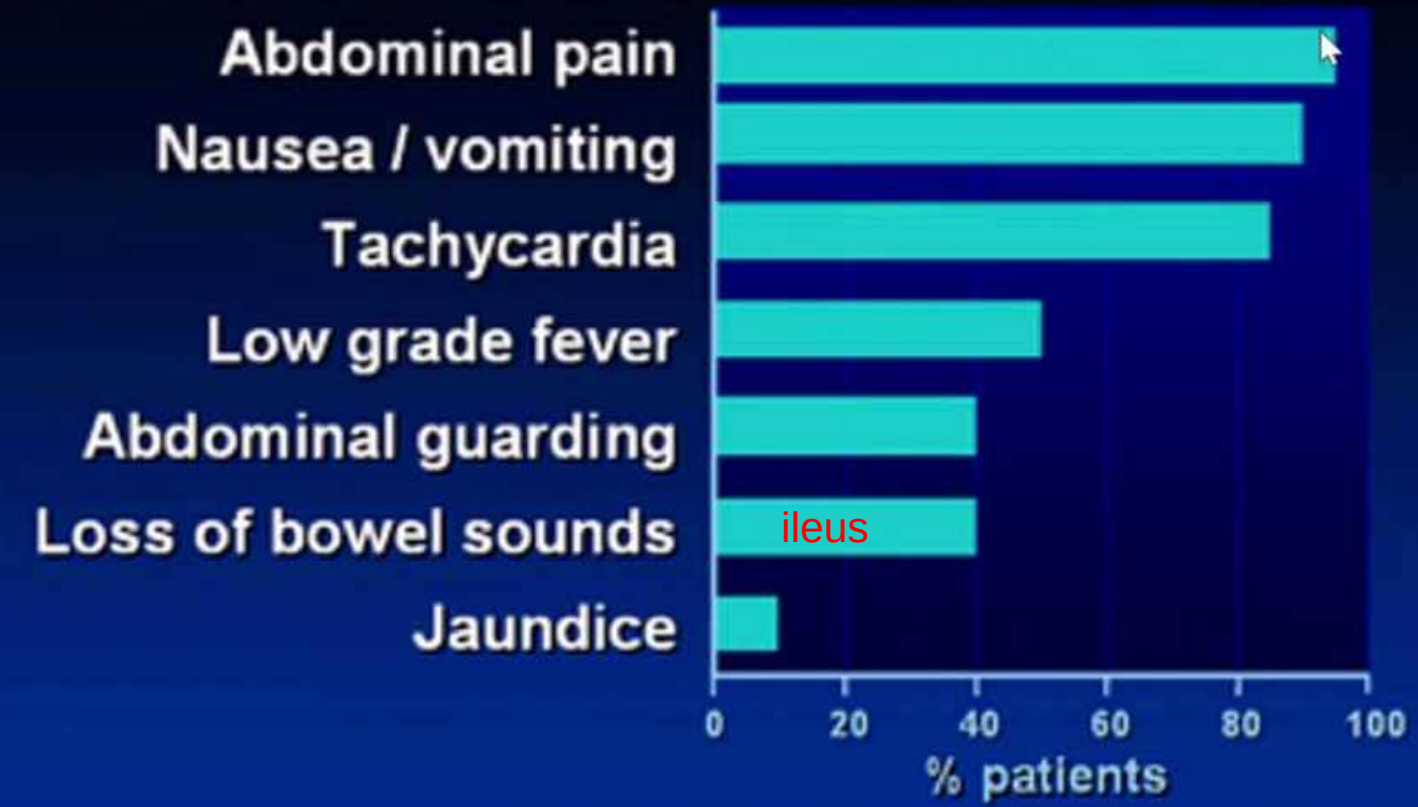
we have to rule out other causes of epigastric pain other than acute pancreatitis, as we might have any gastric problem like perforated duodenal ulcer, acute cholecystitis, cholangitis or obstructive jaundice.
if other causes are ruled out, then we can start thinking of acute pancreatitis.

We have 2 types of patients; mild or severe. Severe conditions could have systemic manifestation and inflammatory responses.

- Appearance: Gravely ill with profound shock, toxicity and confusion in severe cases
- Fever (76%) and tachycardia (65%) are common abnormal vital signs; hypotension may be noted

Acute Pancreatitis

Presenting Features



Diagnosis

- The diagnosis of AP is most often established by the presence of 2 of the 3 following criteria: (i) abdominal pain consistent with the disease, (ii) serum amylase and / or lipase greater than three times the upper limit of normal, and / or (iii) characteristic findings from abdominal imaging

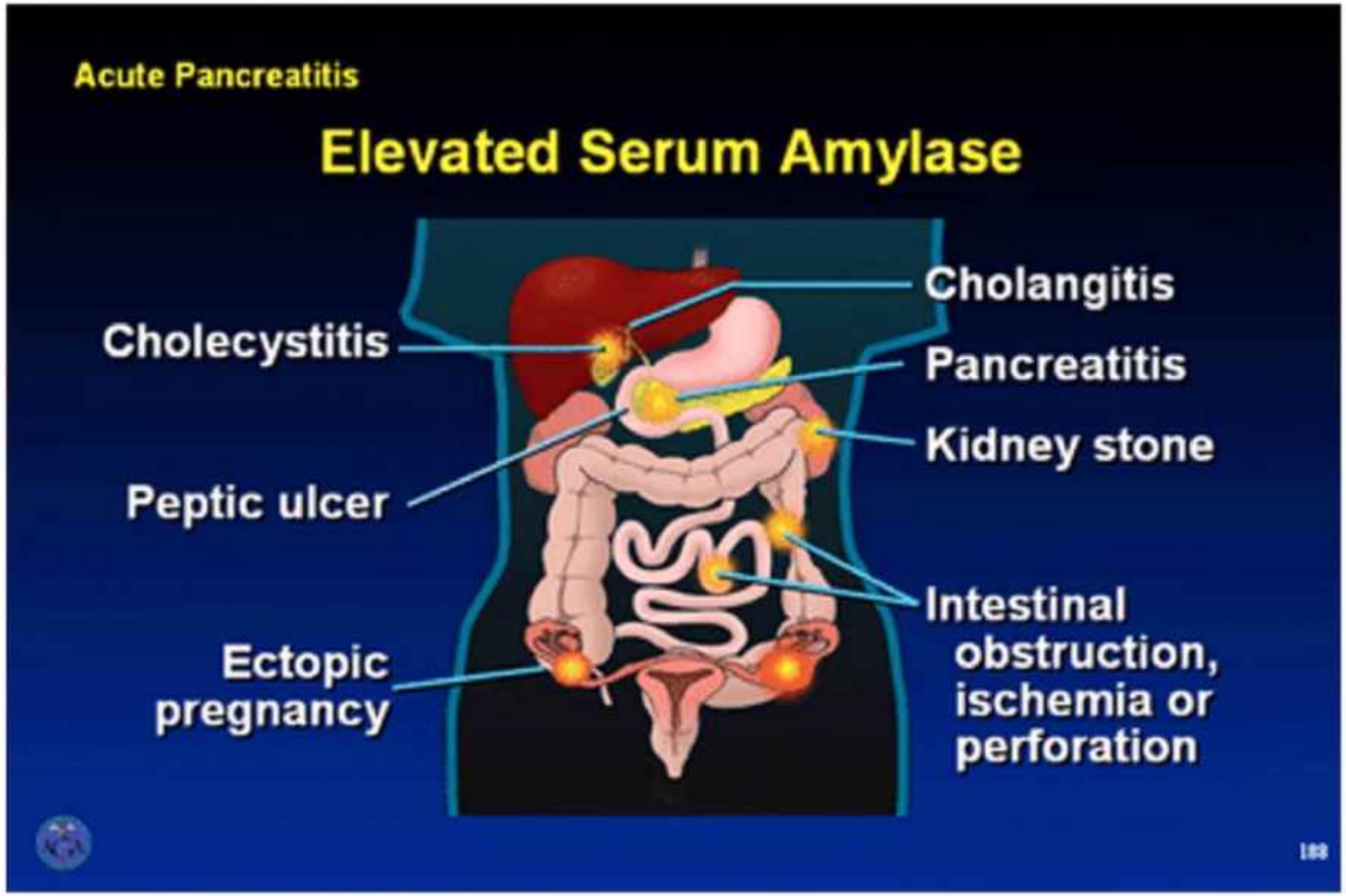
if we found a patient with amylase levels 3x the normal, and the patient has typical presentation of acute pancreatitis, then we have 2 of 3 criteria to diagnose AP. at the same time, we have to rule out other causes of acute abdomen because sometimes amylase might be elevated due to other causes (usually not to 3x)

Diagnosis

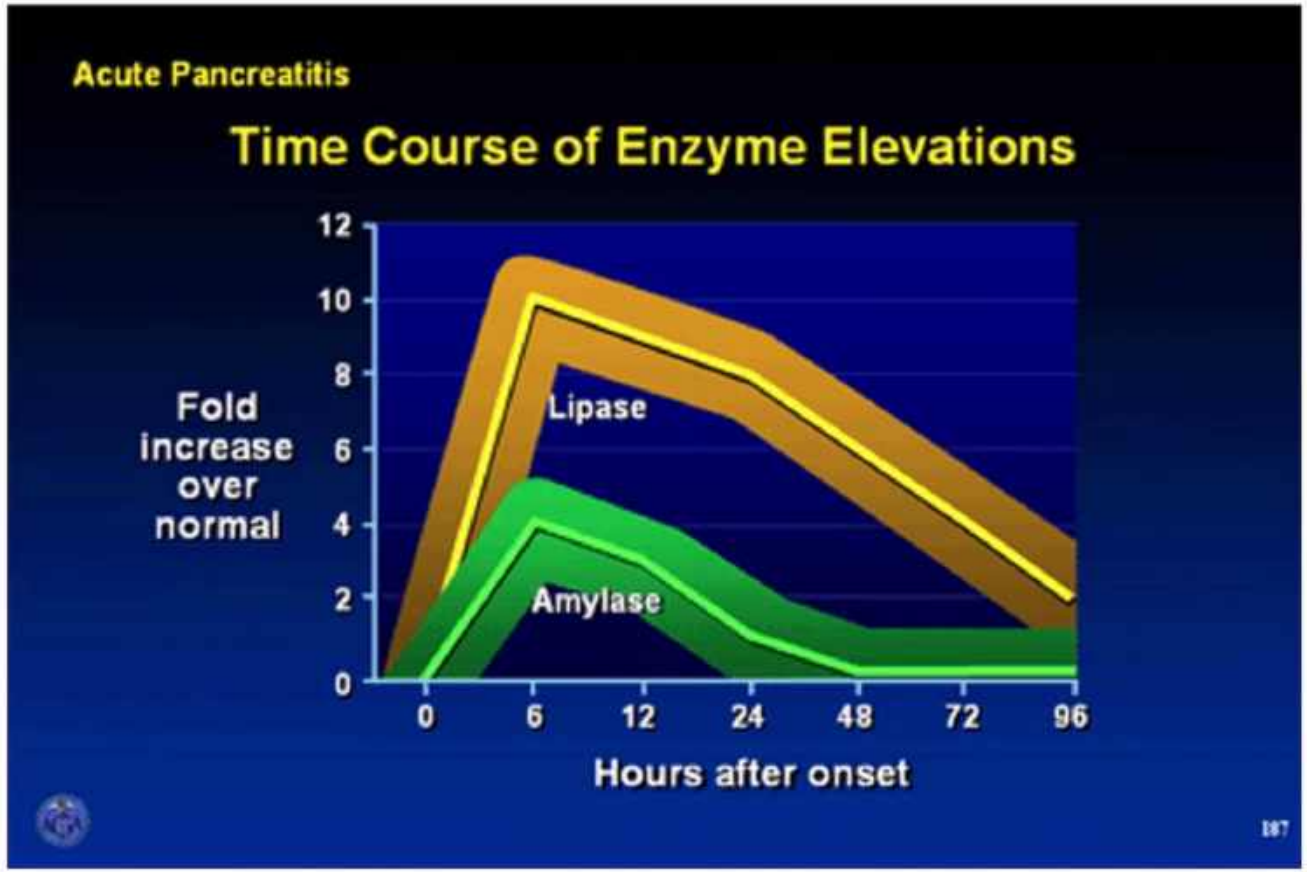
- Serum markers
  - Amylase
    - Easiest to measure and most widely used
    - Rises immediately
    - Peaks in few hours
    - Remains for 3-5 days in systemic circulation
    - "Three fold rise is diagnostic"
    - May be normal in severe attacks because the whole pancreas will be necrotic and digested, so there will be no amylase at all to be detected!
    - May be falsely negative in hyperlipedimic patients
    - Inverse correlation between severity and serum amylase level
    - No need to repeat

Note: there's no direct correlation between amylase level and the degree of severity of AP, it's just related to the diagnosis

Causes of hyperamylesemia



Lipase is more specific for AP, it doesn't elevate in other conditions. And it lasts longer than Amylase.



Past Paper:

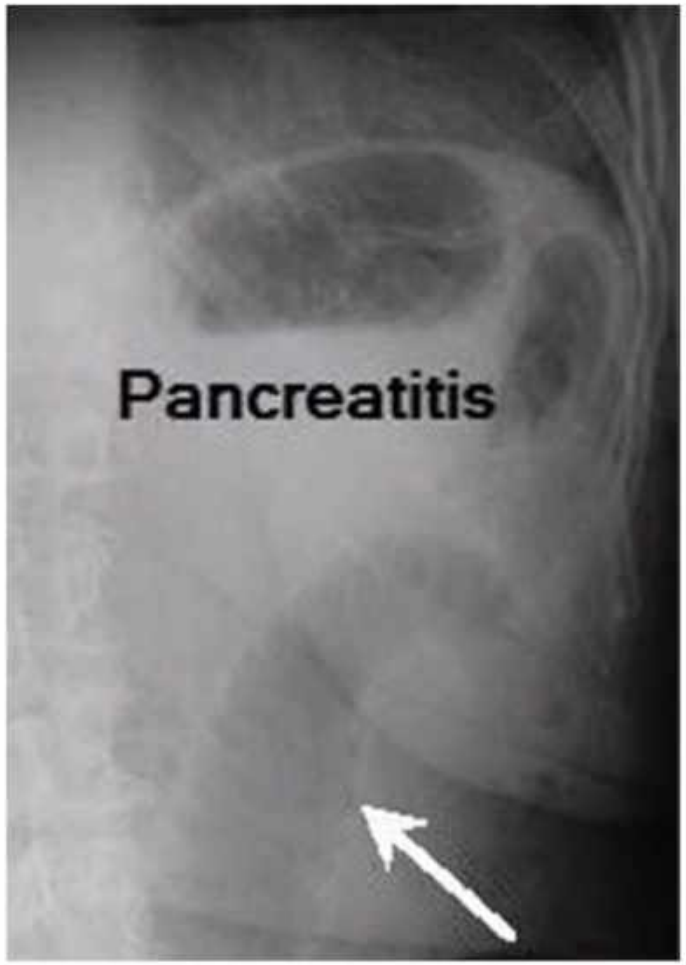
Q. Wrong about pancreatitis?
Ans. amylase levels does correlate with the severity of the infection

Radiology

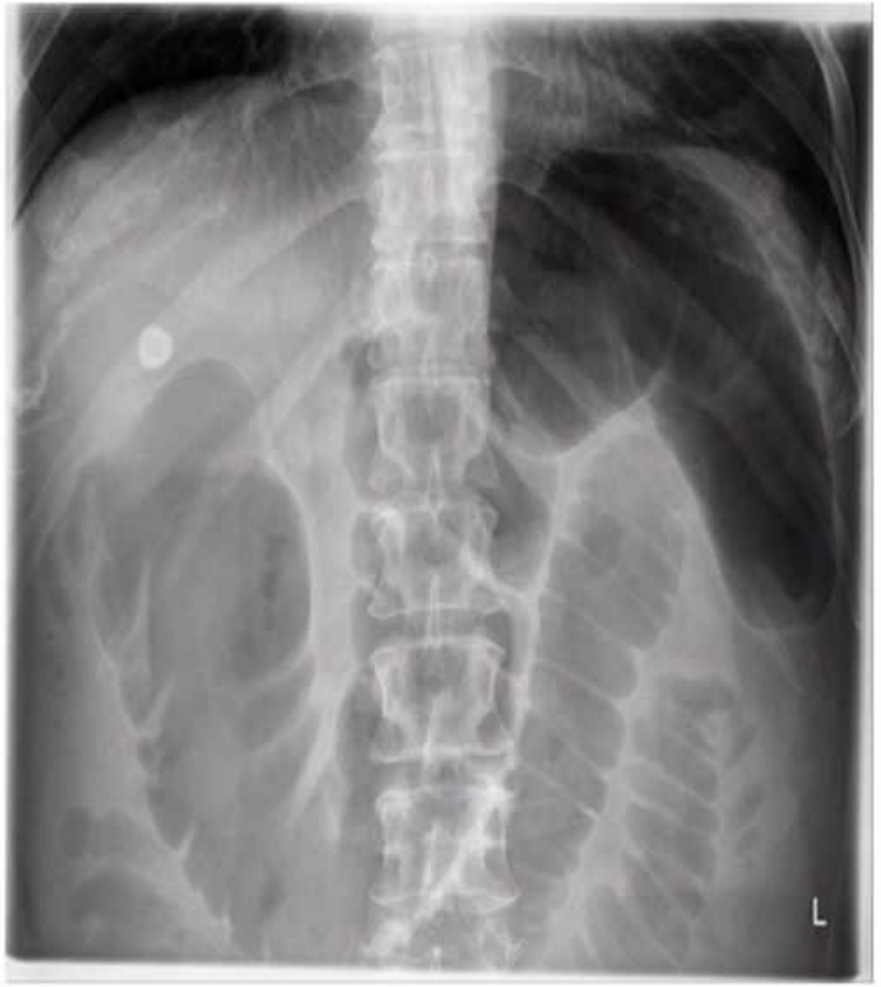
- X-ray
  - Air in the duodenal C loop
  - Sentinel loop sign
  - Colon cutoff sign
  - All these signs are **non specific**

because inflammation affects the duodenum, so the duodenum gets dilated and filled with air and appears as C loop

Sentinel loop



Colon cutoff sign

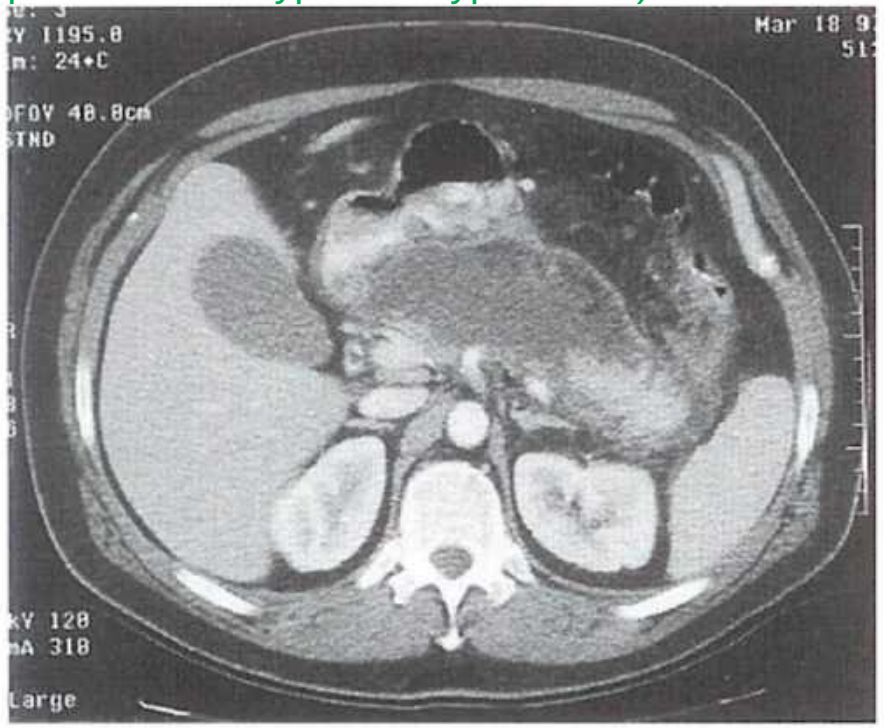


Radiology

CT is the most important tool for diagnosing patients with AP

- CE-CT
  - Enlargement of the pancreas
    - (focal/diffuse)
  - Irregular enhancement
  - Shaggy Pancreatic contour due to necrosis
  - Thickening of fascial planes
  - fluid collections.
    - Intraperitoneal / retroperitoneal

we give IV contrast. areas of necrosis don't take contrast which causes irregular enhancement (some areas of pancreas are hypo and hyperdense)



We don't always do CT scans; sometimes if a patient present with an early stage (within 2 or 3 days of presentation of AP), and X-rays, amylase level (3X normal) and typical presentation of AP are enough to diagnose AP

ex: If a patient presents after 7 days with abdominal pain (at this time, amylase would have came back to normal levels), so CT is a mandatory step here!

ex: if a patient presents within 2 days of abdominal pain, amylase is elevated, and he has severe epigastric tenderness with peritoneal signs. In this case, we suspect the diagnosis of AP, but have fears that he might have perforated DU, acute cholecystitis. So we have to do CT scan in this case!

Radiology

- U/S we do ultrasound for all patients with epigastric pain
  - Diagnosis of gallstones (biliary pancreatitis)
  - F/U of pseudocysts

PROGNOSIS

- Course either mild or severe
  - Mild = edematous pancreatitis
  - Severe = necrotic pancreatitis or hemorrhagic pancreatitis
- Most episodes of AP are mild and self-limiting, needing only brief hospitalization.
- In patients with severe disease, two phases of AP are recognized: early (within the first week) and late.

PROGNOSIS

How to know if the patient has mild or severe pancreatitis?

- Serum markers (inflammatory markers and others)
- CT
- Systemic complications
- Prognostic scores
  - Ranson
  - Apache II
  - Modified Glasgow
  - Atlanta

Serum markers and systemic complications don't show up at early presentation.

♦ At presentation, if the patient has any organ failure with acute pancreatitis -> this means severe pancreatitis

Atlanta Revision (2013)
Mild acute pancreatitis
Absence of organ failure
Absence of local complications
Moderately severe acute pancreatitis
1. Local complications **AND/OR**
2. Transient organ failure (<48h)
Severe acute pancreatitis
Persistent organ failure >48h[a]

GI bleeding (>500cc/24hr)
Shock – SBP ≤90mmHg
PaO 2 ≤60%
Creatinine ≥2mg/dl

Predicting severe AP
Clinical findings associated with a severe course for initial risk assessment a

Patient characteristics
Age >55 years (53,57)
Obesity (BMI >30 kg/m²) (68)
Altered mental status (69)
Comorbid disease (53)

The systemic inflammatory response syndrome (SIRS) (6,53,54,70,71) Presence of >2 of the following criteria:
– pulse >90 beats/min
– respirations >20/min or $PaCO_2$ >32 mm Hg
– temperature >38 °C or <36 °C
–WBC count >12,000 or <4,000 cells/mm³ or >10% immature neutrophils (bands)

Laboratory findings
BUN >20 mg/dl (63)
Rising BUN (63)
HCT >44% (62)
Rising HCT (62)
Elevated creatinine (72)
Radiology findings
Pleural effusions (73)
Pulmonary infiltrates (53)
Multiple or extensive extrapancreatic collections (67)

❋ All finding don't guarantee the diagnosis of severe AP, but they indicate that there's risk of having it

PROGNOSIS (Scoring systems)

Table 32-4
Ranson's Prognostic Signs of Pancreatitis

Criteria for acute pancreatitis not due to gallstones	
At admission	*During the initial 48 h*
Age >55 y	Hematocrit fall >10 points
WBC >16,000/mm^3	BUN elevation >5 mg/dL
Blood glucose >200 mg/dL	Serum calcium <8 mg/dL
Serum LDH >350 IU/L	Arterial Po_2 <60 mm Hg
Serum AST >250 U/dL	Base deficit >4 mEq/L
	Estimated fluid sequestration >6 L
Criteria for acute gallstone pancreatitis	
At admission	*During the initial 48 h*
Age >70 y	Hematocrit fall >10 points
WBC >18,000/mm^3	BUN elevation >2 mg/dL
Blood glucose >220 mg/dL	Serum calcium <8 mg/dL
Serum LDH >400 IU/L	Base deficit >5 mEq/L
Serum AST >250 U/dL	Estimated fluid sequestration >4 L

AST = aspartate transaminase; BUN = blood urea nitrogen; LDH = lactate dehydrogenase; Po_2 = partial pressure of oxygen; WBC = white blood cell count.

SOURCE: Reproduced with permission from Ranson JHC: Etiological and prognostic factors in human acute pancreatitis: A review. *Am J Gastroenterol* 77:633, 1982.

PROGNOSIS (CT)

- “CT scanning with bolus IV contrast has become the gold standard for detecting and assessing the severity of pancreatitis”
- “Currently, IV bolus contrast enhanced CT scanning is routinely performed on patients who are suspected of harboring severe pancreatitis, regardless of their Ranson’s or APACHE scores”

PROGNOSIS (CT)

- Balthazar CT-severity index (CTSI)
  - CTSI considers degree of necrosis
  - Also considers the CT grade
  - A final score is given and correlates with mortality and complication development

PROGNOSIS (CT)

- Balthazar grading
  - Grade A - Normal-appearing pancreas 0
  - Grade B - Enlargement of the pancreas 1
  - Grade C - Pancreatic gland abnormalities with peripancreatic fat infiltration 2
  - Grade D - A single fluid collection 3
  - Grade E - Two or more fluid collections 4

PROGNOSIS (CT)

- Grade of necrosis and the points assigned per grade are as follows:
  - None 0 points
  - Grade 0.33 2 points
  - Grade 0.5 4 points
  - Grade > 0.5 6 points

PROGNOSIS (CT)

CTSI	Mortality	Complications
0-3	3%	8%
4-6	6%	35%
7-10	17%	92%

PROGNOSIS

- Mild is defined as:
  - No systemic complications
  - Low APACHE/Ranson scores
  - CE-CT findings (Balthazar)
  - CRP level <150

MANAGEMENT

- Core of treatment based on
  - Physiological monitoring
  - Metabolic support
  - Maintenance of fluids and electrolytes

MANAGEMENT (Mild)

- Mainstay of management is supportive
  - NPO
  - IVF the most important thing in management
- When to resume oral intake?
  - Absence of pain
  - Absence of tenderness
  - Patient feeling hungry
- On average takes about 3-7 days
- Sips of water and build up to low protein low fat diet

MANAGEMENT (Mild)

- **Proved of no benefit**
- N/G tube
- H2 blockers
- Anti-secretory agents (eg. Somatostatin)
- Antibiotic therapy in the absence of signs or documented sources of infection

Management (severe)

- **Sterile Necrosis**

  - No sys. Comp., no infec. (i.e. uncomplicated)
    - Supportive + Prophylactic Abx
  - Sys. Comp. + infection? (mild complication)
    - CT guided aspiration → gram stain/culture → Abx
  - Mult. Sys comp + toxicity/shock (frank complication)
    - surgical debridment

Management (severe)

- Nutritional support
  nothing per oral
  - NPO with resumption of diet when fit
  - If NPO > 7 days…
  - TPN vs. Jujenal tube feeding?
    - TPN: gastric mucosal atrophy → bacterial translocation
    - Jujenal tube feeding: induces pancreatic secretion
  - Inconclusive studies:
    - Jujenal T. feeding is superior

Biliary Pancreatitis

- **Bilirubin Dropping**
- Lap. Chlecystectomy and I/O cholangiogram (same admission)
- **Bilirubin Persists**
- MRCP to confirm presense of stone thin ERCP

to remove the stone

- Lap. Cholycystectomy

All patients with mild attack of acute biliary pnacreatitis should do Lap. chole within the same admission, because recurrence rate is very high.

Pancreatic Pseudocyst

They present lately with severe pancreatitis

- **Pseudocysts are encapsulated localized collection of pancreatic enzyme, inflammatory fluid and necrotic debris on pancreas or in part or the whole of the lesser sac.**
- **They are distinguished from other types of pancreatic cysts by their lack of an epithelial lining.**

Pancreatic Pseudocyst

- CT scan is the investigation of choice in pancreatic pseudocysts. It has a sensitivity of 90-100%
- All cysts do not require treatment. In many cases the pseudocysts may improve and go away on their own.
- In a patient with a small (less than 5cm) cyst that is not causing any symptoms, careful observation of the cyst with periodic CT scans is indicated.

Pancreatic Pseudocyst

- **Percutaneous catheter drainage** (we usually avoid it, because we might end up with causing fistula)
- **Internal Drainage**
  - **Surgical**
  - **Endoscopic**