

## **Section 13**

### **LECTURE**

### **Acute and Chronic Pancreatitis**

**Acute Pancreatitis**

**1) Etiology**

- Alcohol
- Gallstones
- "Idiopathic" (2/3rds from biliary sludge or crystals)
- Drugs
- Post-ERCP
- Hypertriglyceridemia
- Hypercalcemia
- Post-operative
- Trauma
- Cancer or other obstructions of the pancreatic duct
- Other

**2) Putative mechanism of intracellular injury**

- Blocked secretion
- Fusion of lysosomes and zymogens
- Enzyme activation
- Intracellular injury

**3) Local effects: can explain kidney, pulmonary, and intestinal damage**

- Inflammation
- Third space fluid accumulation
- Peri-pancreatic and retroperitoneal fat necrosis
- Pancreatic necrosis

**4) Systemic effects: can explain shock, adult respiratory distress syndrome (ARDS), diffuse intravascular coagulation (DIC), death**

- Activation of kallikrein leads to bradykinin generation, capillary permeability and vasodilatation
- Activation of complement leads to increased WBC chemotaxis, release of WBC elastase, phospholipase A2 and leukotrienes
- Activation of thrombin leads to DIC
- Activation of phospholipase A2 damages cell membranes and lung surfactant
- Activation of elastase leads to blood vessel damage
- Activation of chymotrypsin leads to capillary permeability
- Release of lipase leads to local and/or distal fat necrosis
- Overload of endogenous protease inactivation pathways

## 5) Clinical Features

- Abdominal pain  
Common, virtually all patients  
  
Classically, epigastric with radiation to back, but can be RUQ, LOQ or diffuse  
  
Long duration (days)  
  
Some relief by bending forward
- Nausea and vomiting
- Physical examination  
Abdominal tenderness +/- guarding, distention, and rebound  
Fever  
Tachycardia  
Grey-Turner or Cullen sign, rare

## 6) Laboratory

- Serum amylase  
  
May be normal  
No prognostic significance  
Not specific; elevated in many other GI and non-GI diseases  
Rapid rise and quickly cleared  
Pancreatic isoamylase is more specific than total serum amylase
- Urinary amylase  
  
Normally, 3% of filtered serum amylase is excreted  
During acute pancreatitis, more is excreted  
No advantage over serum measurement in diagnosis except to exclude macroamylasemia
- Serum lipase  
  
May be normal  
No prognostic significance  
Not specific; elevated in many other GI and non-GI diseases  
Elevations last longer than serum amylase
- Other serum or urine markers  
  
Phospholipase A, trypsin, carboxylester lipase, carboxypeptidase A, colipase, urinary and serum trypsinogen-2, pancreatitis associated protein, trypsinogen activation peptide

None of these, either alone or in combination, has a clinical advantage over measurement of serum amylase and lipase

- Ranson's criteria for prognosis of acute pancreatitis

At admission

Age > 55 years  
WBC > 16,000  
Glucose > 200 mg/dl  
LDH > 350 IU/L  
AST > 250 IU/L

During first 48 hours of hospitalization

Hct decrease >10%  
BUN increase of > 5 mg/dl  
Ca<sup>++</sup> < 8 mg/dl  
PaO<sub>2</sub> < 60 mm/Hg  
Base deficit > 4 meq/L  
Fluid sequestration > 6L

## 7) Radiology

- Abdominal plain film (KUB): Sentinel loop or colon cut-off sign, exclude obstruction or perforation
- Chest film: 30% will be abnormal with pleural effusion, infiltrate, atelectasis, or adult respiratory distress syndrome (ARDS)
- Abdominal ultrasonography: best method to detect gallbladder stones
- Abdominal CT scan: most important radiologic test for diagnosis, complications, and prognosis

Interstitial pancreatitis:

Uniform enhancement after contrast  
Represents 75% of all cases of pancreatitis  
Infection and mortality rate

Hemorrhagic or necrotizing:

Non-homogenous uptake of contrast  
Represents 25% of all cases of pancreatitis  
Infection rate high (30-50%)  
Mortality high (10-30%)

Grading scale for severity:

A: normal

B: focal or diffuse pancreatic enlargement w/o peripancreatic inflammation  
C: peripancreatic inflammation  
D: single fluid collection  
E: > 1 fluid collection or gas in pancreas or retroperitoneum

## 8) Treatment

- Reverse underlying precipitating cause

Early ERCP in patients with acute severe gallstone pancreatitis

Correction of hypertriglyceridemia or hypercalcemia

Discontinuation of causative drugs

- Initial treatment is identical regardless of the cause of pancreatitis

Supportive care

Nasogastric tube  
NPO  
IV fluids  
Analgesics  
Nutritional support

- Antibiotics

Older studies showed no benefit

Recent, better designed studies show benefit in patients with severe necrotizing pancreatitis who received cefuroxime, imipenem, or a combination of ceftazidime, amikacin, and metronidazole

CT guided aspiration or surgical drainage of pancreatic fluid collections

- Experimental agents

Possible benefit

Somatostatin or octreotide  
Gabexate mesilate, a protease inhibitor

No benefit

Histamine-2 antagonists  
Anticholinergic medications  
Glucagon

**9) Gallstone versus alcoholic pancreatitis**

- Important therapeutic implications: Gallstone pancreatitis has a very high recurrence rate without definitive treatment (25% have an additional episode within 6 weeks).
- Factors favoring gallstone pancreatitis
  - ALT > 150 IU/L
  - Female gender
  - Age > 50 years
  - Amylase > 4000
  - Alkaline phosphatase > 300 IU/L
- All patients with their first attack of acute pancreatitis need abdominal ultrasonography to look for gallstones in the gallbladder.
- Patients with gallstone pancreatitis should have a cholecystectomy after recovery and before discharge from the hospital.

**10) Complications**

- Hypocalcemia from loss of ionized calcium within areas of fat necrosis by binding to fatty acids.
- Pseudocyst
  - Encapsulated, non-epithelial lined collection of fluid arising from pancreatic inflammation
  - Can cause pain, obstruction, become infected, or rupture
  - Common in up to 40% of patients with pancreatitis
  - Most resolve spontaneously
  - Treat if complications occur or if pseudocyst persists > 6 weeks

## **Chronic Pancreatitis**

### **1) Clinical Features**

#### **2) Abdominal pain**

- Common, but not invariable (20-45% have no pain).
- Usually epigastric, radiating to back.
- Variable pattern
  - Episodic lasting < 10 days with pain free intervals of months
  - Almost continuous with exacerbations which may require hospitalization

#### **3) Pancreatic Insufficiency**

- Enzymes

Steatorrhea > protein malabsorption.  
Must lose >90% of pancreatic function.

- Hormones

Glucose intolerance common.  
Diabetes, a late complication.  
More frequent in patients with family history of diabetes. Management difficult (fragile diabetic)

loss of insulin & glucagon,  
low insulin requirements  
no down regulation of insulin receptors  
no insulin antibodies.  
diabetic complications can occur.

#### **4. Complications**

- Pseudocyst
- Bile duct obstruction
- Duodenal obstruction
- Pancreatic ascites
- Splenic vein thrombosis
- Pseudoaneurysms
- Pancreatic cancer (25-fold increased risk)

#### **5. Diagnosis is difficult**

- Acute on chronic disease
- Laboratory and radiographic findings can be normal.

Laboratory

Amylase & lipase usually normal because fibrosis reduces concentration of these enzymes.

Elevated liver enzymes suggest bile duct stricture or pancreatic cancer.

Fat in stool (oil droplets) by Sudan stain.

## Imaging

KUB: calcification

CT: calcification, ductal distortion, fluid collections, and enlargement of gland

ERCP: beading of the duct which may correlate to functional changes; normal ducts no decreased function; mild to moderate duct changes associated with pancreatic insufficiency in 50% of patients.

Endoscopic ultrasound (EUS): stones, visible side branches, cysts, lobularity, irregular main duct

Magnetic resonance cholangiopancreatography (MRCP): lacks sensitivity and specificity of ERCP or EUS.

- Pancreatic function tests

### Secretin stimulation test

Intravenous secretin stimulates pancreatic bicarbonate secretion  
Collect duodenal fluid after IV secretin administration  
Peak  $[HCO_3^-] < 80$  meq/L suggests chronic pancreatitis  
15% of patients with normal ERCP have abnormal secretin test  
15% of patients with normal secretin test have abnormal ERCP

### Bentiromide test

Bentiromide administered orally  
Cleaved by chymotrypsin releasing p-aminobenzoic acid (PABA)  
Measure urinary excretion of PABA  
Equally sensitive and specific as secretin test



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