ACUTE PANCREATITIS

Introduction

- Acute pancreatitis is relatively common
- Annual incidence of 1020/million population
- 80% associated with alcohol or gall stones

Definitions Proposed by the International Symposium on Acute Pancreatitis

Acute pancreatitis

Acute inflammatory process of the pancreas with variable involvement of other regional tissues or remote organ systems.

Severe AP

Association with organ failure and/or local complications, such as necrosis, abscess, or pseudocyst.

Acute fluid collection

Occurs early in the course of AP, located in or near the pancreas, always lacking a wall of granulation or fibrous tissue; bacteria variably present; occurs in 30–50% of severe AP; most acute fluid collections regress, but some progress to pseudocyst or abscess.

Pancreatic necrosis

Diffuse or focal area(s) of nonviable pancreatic parenchyma, typically associated with peripancreatic fat necrosis, diagnosed by CT scan with intravenous contrast enhancement.

Acute pseudocyst

Collection of pancreatic juice enclosed by a wall of fibrous or granulation tissue, which arises as a consequence of AP, pancreatic trauma, or chronic pancreatitis; formation requires 4 or more weeks form onset of AP.

Pancreatic abscess

Circumscribed intra-abdominal collection of pus usually in or near the pancreas, containing little or no pancreatic necrosis, arises as a consequence of AP or pancreatic trauma.

Causes of Acute Pancreatitis

- Common Causes

- Gallstones (including microlithiasis)
- Alcohol (acute and chronic alcoholism)
- Hypertriglyceridemia
- Endoscopic retrograde cholangiopancreatography (ERCP), especially after biliary manometry
- Trauma (especially blunt abdominal trauma)
- Postoperative (abdominal and nonabdominal operations)
- Drugs (azathioprine, 6-mercaptopurine, sulfonamides, estrogens, tetracycline, valproic acid, anti-HIV medications)
- Sphincter of Oddi dysfunction

Causes of Acute Pancreatitis

- Uncommon causes

- Vascular causes and vasculitis (ischemic-hypoperfusion states after cardiac surgery)
- Connective tissue disorders and thrombotic thrombocytopenic purpura (TTP)
- Cancer of the pancreas
- Hypercalcemia
- Periampullary diverticulum
- Pancreas divisum
- Hereditary pancreatitis
- Cystic fibrosis
- Renal failure

Causes of Acute Pancreatitis

- **Rare causes**

- Infections (mumps, coxsackievirus, cytomegalovirus, echovirus, parasites)
- Autoimmune (e.g., Sjögren's syndrome)

ETIOLOGY AND PATHOGENESIS

- the mechanisms by which these conditions trigger pancreatic inflammation have not been identified
- Gallstones (30 to 60%)
- Alcohol (15 to 30%) of cases in the U S
- following endoscopic retrograde cholangiopancreatography (ERCP) 5 to 20%
- drug-related 2 to 5%

Etiologic Factors in Acute Pancreatitis (from Maingot's)

METABOLIC

Alcohol, Hyperlipoproteinemia, Hypercalcemia,

Drugs, Genetic, Scorpion venom

MECHANICAL

Cholelithiasis, Postoperative, Pancreas divisum, Post-traumatic, Retrograde pancreatography, Pancreatic duct obstruction: pancreatic tumor, ascaris infestation, Pancreatic ductal bleeding, Duodenal obstruction

VASCULAR

Postoperative (cardiopulmonary bypass) , Periarteritis nodosa, Atheroembolism

INFECTION

Mumps, Coxsackie B, Cytomegalovirus, Cryptococcus

The Ranson Score:

Early Prognostic Signs that Correlate with the Risk of Major Complications or Death in Acute Pancreatitis

At admission or diagnosis

1. Age over 55 years
2. White blood cell count over 16,000/mL
3. Blood glucose level over 200 mg/dL (100 mmol/L)
4. Serum lactic dehydrogenase concentration (LDH) > 350 IU/L
5. Serum glutamic oxaloacetic transaminase (SGOT) > 250 sigma-Frankel units/dL

During initial 48 hours

1. Hematocrit decrease > 10%
2. Blood urea nitrogen (BUN) increase > 5 mg/dL
3. Serum calcium level < 8 mg.dL (2 mmol/L)
4. Arterial PO_2 < 60 mmHg (8 kPa)
5. Base deficit > 4 mEq/L (4 mmol/L)
6. Estimated fluid sequestration > 6000 mL

The Acute Physiology and Chronic Health Evaluation II (APACHE II) Twelve physiologic variables
not specific for pancreatitis and somewhat cumbersome to use
newer APACHE III system uses an additional five physiologic variables to improve accuracy

- pancreatitis is a disease that evolves in three phases

- initial phase - intrapancreatic digestive enzyme activation and acinar cell injury
- second phase - activation, chemoattraction, and sequestration of neutrophils in the pancreas resulting in an intrapancreatic inflammatory reaction of variable severity
- third phase - effects of activated proteolytic enzymes and mediators, released by the inflamed pancreas, on distant organs

CLINICAL FEATURES

- Abdominal pain is the major symptom - steady and boring in character

  located in the epigastrium and periumbilical region

  radiates to the back as well as to the chest, flanks, and lower abdomen

  more intense when the patient is supine

  patients often obtain relief by sitting with the trunk flexed and knees drawn up
- Nausea, vomiting, and abdominal distention due to gastric and intestinal hypomotility and chemical peritonitis

Physical examination

- Reveals a distressed and anxious patient
- Low-grade fever, tachycardia, and hypotension
- Shock is not unusual
- Jaundice occurs infrequently - due to edema of the head of the pancreas with compression of the intrapancreatic portion of the common bile duct
- Erythematous skin nodules due to subcutaneous fat necrosis
- pulmonary findings, including basilar rales, atelectasis, and pleural effusion
- Abdominal tenderness and muscle rigidity are present to a variable degree
- Bowel sounds are usually diminished or absent
- pancreatic pseudocyst may be palpable in the upper abdomen
- faint blue discoloration around the umbilicus (Cullen's sign)
- blue-red-purple or green-brown discoloration of the flanks (Turner's sign) – these two findings indicate the presence of a severe necrotizing pancreatitis

Risk Factors That Adversely Affect Survival in Acute Pancreatitis

- Organ failure[a]
- a. Cardiovascular: hypotension (systolic blood pressure < 90 mmHg) or tachycardia > 130 beats/min
- b. Pulmonary: P_{O2} < 60 mmHg
- c. Renal: oliguria (<50 mL/h) or increasing BUN or creatinine
- d. Gastrointestinal bleeding
- Pancreatic necrosis
- Obesity (BMI > 29); age > 70
- Hemoconcentration (hematocrit > 44%)
- C-Reactive protein > 150 mg/L
- Trypsinogen activation peptide
- a. >3 Ranson criteria (not fully utilizable until 48 h)
- b. Apache II score > 8 (cumbersome)

LABORATORY DATA

- detection of an increased level of serum amylase - Values threefold or more above normal virtually clinch the diagnosis - After 48 to 72 h - total serum amylase values tend to return to normal
- pancreatic isoamylase and lipase levels may remain elevated for 7 to 14 days
- Leukocytosis (15,000 to 20,000 leukocytes µL) occurs frequently
- hemoconcentration with hematocrit values exceeding 50%
- Hyperglycemia is common
- Hypocalcemia occurs in approximately 25% of patients
- Serum alkaline phosphatase and aspartate aminotransferase (AST) levels are also transiently elevated
- Markedly elevated serum lactic dehydrogenase (LDH) levels [>8.5 µmol/L (>500 U/dL)] suggest a poor prognosis
- Serum albumin is decreased to ≤30 g/L (≤3.0 g/dL) - associated with more severe pancreatitis
- Hypertriglyceridemia occurs in 15 to 20% of patients
- hypoxemia (arterial $P_{O2} \leq 60$ mmHg)
- electrocardiogram is occasionally abnormal in acute pancreatitis with ST-segment and T-wave abnormalities simulating myocardial ischemia

Modified Glasgow criteria

- Age > 55 years
- White cell count > 15 · 109/l
- Blood glucose > 10 mmol/l
- Urea > 16 mmol/l
- Arterial oxygen partial pressure < 8.0 kPa
- Albumin < 32 g/l
- Calcium < 2.0 mmol/l
- Lactate dehydrogenase > 600 U/l
- Severe disease is present if >3 factors detected within 48 hours

differential diagnosis

- 1) perforated viscus, especially peptic ulcer
- 2) acute cholecystitis and biliary colic
- 3) acute intestinal obstruction
- 4) mesenteric vascular occlusion
- 5) renal colic
- 6) myocardial infarction
- 7) dissecting aortic aneurysm
- 8) connective tissue disorders with vasculitis
- 9) pneumonia
- 10) diabetic ketoacidosis

Complications of Acute Pancreatitis

- *LOCAL*

Necrosis

Sterile

Infected

Pancreatic fluid collections

Pancreatic abscess

Pancreatic pseudocyst

Pain

Rupture

Hemorrhage

Infection

Obstruction of gastrointestinal tract (stomach, duodenum, colon)

Pancreatic ascites

Disruption of main pancreatic duct

Leaking pseudocyst

Involvement of contiguous organs by necrotizing pancreatitis

Massive intraperitoneal hemorrhage

Thrombosis of blood vessels (splenic vein, portal vein)

Bowel infarction

Obstructive jaundice

Complications of Acute Pancreatitis

SYSTEMIC

- Pulmonary - Pleural effusion . Atelectasis. Mediastinal abscess, Pneumonitis, Adult respiratory distress syndrome
- Cardiovascular – Hypotension, Hypovolemia, Sudden death, Nonspecific ST-T changes in electrocardiogram simulating myocardial infarction, Pericardial effusion
- Hematologic - Disseminated intravascular coagulation
- Gastrointestinal - hemorrhage, Peptic ulcer disease, Erosive gastritis, Hemorrhagic pancreatic necrosis with erosion into major blood vessels, Portal vein thrombosis, variceal hemorrhage
- Renal - Oliguria,Azotemia, Renal artery and/or renal vein thrombosis, Acute tubular necrosis
- Metabolic - Hyperglycemia, Hypertriglyceridemia, Hypocalcemia, Encephalopathy, Sudden blindness (Purtscher's retinopathy)
- Central nervous system- Psychosis, Fat emboli
- Fat necrosis - Subcutaneous tissues (erythematous nodules), Bone, Miscellaneous (mediastinum, pleura, nervous system)

TREATMENT

85 to 90% self-limited and subsides spontaneously, usually within 3 to 7 days

- (1) analgesics for pain
- (2) intravenous fluids and colloids to maintain normal intravascular volume
- (3) no oral feeds NBM
- (4) nasogastric suction
- anticholinergic drugs in order to reduce pancreatic sectretions, are not indicated in acute pancreatitis
- current evidence favors the use of prophylactic antibiotics in necrotizing acute pancreatitis

Evaluation of treatment and Surgical Intervention

- A CT scan, especially a contrast-enhanced dynamic CT (CECT) scan, provides valuable information on the severity and prognosis of acute pancreatitis
- estimation of the presence and extent of pancreatic necrosis
- patient with *unremitting fulminant pancreatitis* usually requires inordinate amounts of fluid and close attention to complications
- peritoneal lavage through a percutaneous dialysis catheter
- Aggressive surgical pancreatic debridement (*necrosectomy*)
- Patients with *severe gallstone-induced pancreatitis* -papillotomy in first 36 to 72 h of the attack by ERCP

Indications for Surgical Intervention in Necrotizing Pancreatitis

- Diagnostic uncertainty
- Intra-abdominal catastrophe unrelated to necrotizing pancreatitis such as perforated viscus
- Infected necrosis documented by FNA or extraluminal gas on CT
- Severe sterile necrosis
- Symptomatic organized pancreatic necrosis