Acute Pancreatitis [created by Paul Young 02/10/07]

Imaging

Ultrasound
Abdominal ultrasonography can be used to detect gallstones, although bowel gas may limit its accuracy in the acute setting.

CT
Contrast enhanced computed tomography (CT) is useful for differentiating SAP from other conditions presenting with abdominal pain and elevated pancreatic enzymes.
It also helps to delineate local complications associated with SAP:
- Pancreatic or peripancreatic necrosis is diagnosed when some or all of the pancreas or surrounding area fails to enhance with contrast.
- To determine whether a necrotic area is infected, it can be sampled by fine-needle aspiration under CT guidance and analyzed with Gram stain and culture for evidence of gut-derived bacteria and/or fungal organisms.

CT grading

A	Normal pancreas
B	Focal or diffuse enlargement of the pancreas
C	Pancreatic gland abnormalities associated with peripancreatic inflammation
D	Fluid collection in a single location
E	Two or more fluid collections and/or the presence of gas in or adjacent to the pancreas

indications for CT

- Patients in whom the clinical diagnosis is in doubt
- Patients with hyperamylasaemia and severe clinical pancreatitis, abdominal distension, tenderness, high fever (>39°C), and leukocytosis
- Patients with Ranson score >3 or APACHE II >8
- Patients showing lack of improvement after 72 hours of initial conservative therapy
- Acute deterioration following initial clinical improvement

MRI
Magnetic resonance imaging is better than CT for distinguishing between an uncomplicated pseudocyst and one that contains necrotic debris

MRCP and ERCP
Magnetic resonance cholangiopancreatography and endoscopic ultrasonography can detect small bile duct stones as a cause of SAP.

classification & definitions

- The widely used Atlanta classification categorizes acute pancreatitis as mild or severe.
- pancreatitis is classified as severe any of the following 4 criteria are met:
(1) Organ failure with 1 or more of the following:
-shock systolic blood pressure <90 mm Hg),
- pulmonary insufficiency (PaO2 <60 mm Hg),
renal failure (serum creatinine level >176.8 lmol/L after rehydration, and gastrointestinal tract bleeding (>500mL in 24 hours);
(2) local complications such as:
- necrosis,
- pseudocyst,
- or abscess;
(3) at least 3 of Ranson's criteria
(4) at least 8 of the APACHE II criteria.

Pancreatic necrosis:
- Pancreatic necrosis is the presence of a diffuse or focal area of nonviable pancreatic parenchyma, often associated with peripancreatic necrosis.
- Severe acute pancreatitis with pancreatic or peripancreatic necrosis is also referred to as necrotizing pancreatitis.

Infected pancreatitis:
- Initially a sterile necrosis (mortality, 10%), necrotizing pancreatitis becomes infected with bacteria of gut origin in 40% to 70% of cases2 and is then called infected necrosis (mortality, 25%).

Pancreatic pseudocyst:
- Pancreatic pseudocyst is a collection of pancreatic juice enclosed by a wall of fibrous or granulation tissue that develops as a result of a persistent leak of pancreatic juice from the pancreatic duct.

Pancreatic abscess:
- Pancreatic abscess is a circumscribed intra-abdominal collection of pus that sometimes contains gas.
- It follows infection of a limited area of pancreatic or peripancreatic necrosis and usually takes 4 to 6 weeks to evolve.

Ranson's criteria

On admission	Age >55 years White cell count >16 000/mm³ Glucose >11 mmol/l LDH >400 IU/l AST >250 IU/l
Within 48 hours of hospitalization	Decrease in Hct >10% Increase in blood urea >1.8 mmol/l Calcium <2 mmol/l PaO_2 <8 kPa Base deficit >4 mmol/l Fluid deficit >6 l

Risk factors	Mortality rate
0–2	<1%
3–4	≅15%
5–6	≅40%
>6	≅100%

Blamey et al[4] found only eight variables (not LDH, base deficit & fluid deficit) were predictive and are often referred to as the Glasgow criteria or Imrie score.

Treatment

General:
- The initial treatment of SAP is supportive. Aggressive fluid resuscitation, oxygen supplementation, and pain relief are critical.
- Interventions used in the past aimed at resting the pancreas (nasogastric suction and acid suppression), diminishing secretion of enzymes (glucagon and somatostatin administration), and countering the damaging effects of enzymes (use of aprotinin, gabexate, or lexipafant) do not improve outcomes

Nutrition:
- In the past, patients with severe acute pancreatitis were administered parenteral nutrition in an effort to avoid stimulation of the pancreas. More recently, it has been shown in animal models that enteral nutrition prevents intestinal atrophy and improves the barrier function of the gut mucosa.
- Three RCTs have demonstrated that enteral feeding is not only safe and feasible but is also associated with fewer infectious complications, and is less expensive than TPN.
- Enteral feeding should be commenced whereever possible

Prevention of Pancreatic Infection:
- Pancreatic or peripancreatic infection develops in 40% to 70% of patients with pancreatic necrosis and is the leading cause of morbidity and mortality
- Infection usually occurs at least 10 days after the onset of SAP.
- Methods to reduce the incidence of infection in patients with SAP include:
(i) selective gut decontamination - unproven
(ii) prophylactic systemic antibiotics - use of broad spectrum antibiotics is supported by metanalysis data but may lead to fungal superinfection
- If fever or leukocytosis persists or develops beyond 7 to 10 days without an obvious source of infection, fine-needle aspiration of the necrotic area should be performed to rule out infection.

ERCP:
- A metaanalysis of 4 RCTs of endoscopic sphincterotomy in patients with severe biliary pancreatitis showed that sphincterotomy reduced complications and mortality of SAP in patients with biliary obstruction or cholangitis.
- The role of early ERCP in patients without biliary obstruction or cholangitis is unclear. One study reported higher mortality after ERCP in such patients.
- An accepted practice is to perform endoscopic sphincterotomy in patients with evidence of biliary obstruction (cholangitis, jaundice) or elevated liver test results except in those with rapidly normalizing test results.

Surgery:
- Debridement by surgery or a less invasive technique is indicated in patients with infected necrosis. Outcomes are better if surgery is delayed until the necrosis has organized, usually about 4 weeks after disease onset.
- The preferred surgical procedure for SAP is necrosectomy (debridement) with the placement of wide-bore drains for continuous postoperative irrigation.
- For patients who are poor surgical candidates or who have well-contained infection, minimal-access necrosectomy by either percutaneous or endoscopic routes has shown encouraging results.
- For patients with biliary pancreatitis, cholecystectomy should be performed during the initial hospitalization or after the resolution of intraabdominal inflammation to prevent recurrence. In patients too ill to undergo cholecystectomy, endoscopic sphincterotomy is an alternative.

indications for surgery

Accepted	Controversial
Differential diagnosis	>50% Sterile pancreatic necrosis
Persistent biliary pancreatitis	Stable but persistent necrosis
Infected pancreatic necrosis	Deterioration in clinical course
Pancreatic abscess	Organ system failure

Aetiology

- From several large studies describing patients with severe acute pancreatitis, the 2 most common causes of SAP are:
(i) chronic heavy alcohol use (approximately 40% of patients) and
(ii) gallstones (approximately 35% of patients).
- Less common causes of severe acute pancreatitis are:
(i) trauma to the pancreas,
(ii) hypercalcemia,
(iii) hypertriglyceridemia,
(iv) complications from ERCP or surgery.
(v) cystic fibrosis
(vi) infectious causes including HIV, EBV, CMV & viral hepatitis as well as mycoplasma & campylobacter
(vii) drugs, poisons & toxins including organophosphates
- azathiprine, thiazides, mercaptopurine, valproate, didanosine, pentamidine, cotrimoxazole & scorpion envenomation
- In about 20% of patients, no cause can be identified.

- Excess alcohol ingestion
- Biliary tract disease
- Idiopathic
- Metabolic
  - Hyperlipidaemia
  - Hyperparathyroidism
  - Diabetic ketoacidosis
  - End-stage renal failure
  - Pregnancy
  - Post renal transplant
- Mechanical disorders
  - Post-traumatic, postoperative, post-ERCP
  - Penetrating duodenal ulcer
  - Duodenal obstruction
- Infections
  - HIV, mumps, EBV, *Mycoplasma*, *Legionella*, *Campylobacter*, Ascariasis
- Vascular
  - Necrotizing vasculitis – SLE, TTP
  - Atheroma
  - Shock
- Drugs
  - Azathioprine, thiazides, furosemide (frusemide), tetracyclines, oestrogens, valproic acid, metronidazole, pentamidine, nitrofuration, erythromycin, methydopa, ranitidine, nucleoside reverse transcriptase inhibitors (didanosine) and hydroxyurea.
- Toxins
  - Scorpion venom, organophosphates, methyl alcohol

Epidemiology

- Severe acute pancreatitis occurs in men more often than in women.
- Alcoholic pancreatitis is more common among men; gallstone pancreatitis is more common among women.

Diagnosis

- Patients with SAP typically complain of fairly sudden onset of severe upper abdominal pain, radiating to the back, often associated with nausea and vomiting.
- Marked elevations in serum amylase and/or lipase (>3 times the upper limit of normal) support the diagnosis of pancreatitis in a patient with severe abdominal pain. However, modest elevations of pancreatic enzymes may be observed in other intra-abdominal emergencies.
- In the presence of pancreatitis, an increase in liver enzyme values, especially of alanine aminotransferase to more than 3 times normal, suggests a biliary cause.

Prognosis

- mild acute pancreatitis has a mortality rate of less than 1%
- the death rate for severe acute pancreatitis is 10% with sterile and 25% with infected pancreatic necrosis.

- Approximately half the deaths of patients with SAP occur within 2 weeks of onset. Early morbidity and mortality in patients with SAP are attributable to organ failure secondary to systemic inflammatory response syndrome.
- The remaining deaths occur because of later complications of infected necrosis.