

Acute Pancreatitis

Inflammation of the pancreas characterized by a discrete episode of abdominal pain and elevated serum amylase and lipase levels. Acute pancreatitis has a return to normal pancreatic function. Major issues involve fluid deficits (including possible hemorrhage), electrolyte disturbances (esp. hypocalcemia), sepsis, respiratory compromise and aspiration risk. Commonly associated with EtOH abuse. Patients may be glucose intolerant or diabetic.

ANESTHETIC CONSIDERATIONS:

- Risk of aspiration secondary to ileus and decreased gut motility.
- Systemic sequelae of acute pancreatitis:
 - Increased risk of respiratory insufficiency – ARDS, pleural effusions, RLD secondary to ascites.
 - Hemodynamic instability with large fluid deficits requiring volume resuscitation.
 - Renal failure
 - Electrolyte disturbances: hypoCa, hyperK
 - Potential for hematologic disturbances – DIC, anemia, leukocytosis
 - Pancreatic pseudocyst
 - Sepsis
 - Endocrinopathies: insulin deficiency
- Associated disease processes:
 - Chronic alcohol use – risk of withdrawal, DTs, wernicke/korsakoff
 - DM
 - AIDS
 - Hypercalcemia and hyperparathyroidism

ANESTHETIC GOALS:

- Preoperative optimization:
 - Treat fluid deficit – may need up to 10 L of crystalloid. Blood products may be necessary if there is significant bleeding or albumin loss into interstitial spaces.
 - Correct Electrolyte and Acid/Base disturbances
- Hemodynamically stable induction (fluid deficit often present)
- Adequate pain management pre-operatively, intraoperatively and post-operatively
- Consider ICU admission post-operatively based on possible need of ventilatory support (ARDS), CVS support (sepsis), or renal failure

PATHOPHYSIOLOGY AND EPIDEMIOLOGY

- Pancreatic autodigestion is the most likely explanation for the pathogenesis of acute pancreatitis.
- Gallstones and alcohol abuse are etiologic factors in 60% to 80% of patients with acute pancreatitis.
- Gallstones are believed to cause pancreatitis by transiently obstructing the ampulla of Vater, leading to pancreatic ductal hypertension.
- Acute pancreatitis is common in patients with acquired immunodeficiency syndrome and those with hyperparathyroidism and associated hypercalcemia.
- Pancreatitis can develop following abdominal or thoracic surgery (esp. when CBP is used).
- 1-2% of ERCP will develop pancreatitis post-procedure.

HISTORY

- Unrelenting mid-epigastric abdominal pain that radiates to the back occurs (relieved by sitting forward)
- History of EtOH use, gallstones, Complaints of N+V
- DDx includes: Perforated duodenal ulcer, acute cholecystitis, mesenteric ischemia, myocardial infarction, pneumonia and bowel obstruction.

PHYSICAL

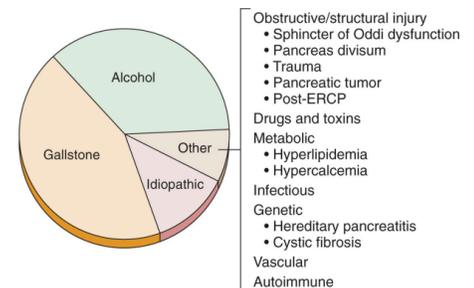
- **Airway:** Possible stridor secondary to hypocalcemia
- **Respiratory:** ARDS is seen in 20% of patients. Pancreatitis-associated ARDS results from injury to the alveolar membrane or degradation of surfactant by circulating enzymes, such as phospholipase, that may be released from the inflamed pancreas. Arterial hypoxemia with an arterial P_{O_2} less than 70 mm Hg is often associated with mild respiratory alkalosis and is frequently noted in patients with severe acute pancreatitis
- **CVS:** Hypotension secondary to decreased SVR, fluid deficit, sepsis, and or hypotension. Dysrhythmias and decreased cardiac contractility secondary to electrolyte disturbances (hypocalcemia)
- **GI:** Jaundice may be seen both with pancreatitis associated gallstones and not associated with gallstones (inflammation causing obstruction of bile flow). Ileus and abdominal distention. Splenomegaly if occlusion of splenic vein occurs. Evidence of liver disease secondary to EtOH use
- **GU:** Renal failure occurs in 25% of patients and is associated with a poor prognosis. Renal failure generally occurs as a result of hypovolemia and decreased renal perfusion
- **Heme:** Possible evidence of coagulopathy secondary to DIC or Vitamin K deficiency. Possible evidence of hemorrhage with large ecchymoses at flanks (Grey Turner's sign) or at umbilical area (Cullen's sign)
- **MSK:** Evidence of hypocalcemia - Trousseau's sign (carpopedal spasm), Chvostek's sign (masseter spasm)

INVESTIGATIONS

- **Laboratory:** CBC, Electrolytes, Creatinine, Urea, Calcium, LDH, LFT's, Lipase, Glucose, PT/PTT, serum amylase concentration, serum triglyceride, Fibrinogen if DIC suspected
- **ABG:** Evaluate acidosis and respiratory status
- **CXR:** Look for ARDS, pleural effusions
- **ECG:** Check for cardiac disturbances secondary to hypocalcemia (prolonged QT, arrhythmias)
- **CT:** primary modality for evaluating the extent and local complications of pancreatitis
- **ERCP:** Useful for evaluating traumatic pancreatitis (localization of injury) and severe gallstone pancreatitis (endoscopic drainage).

PRE-OPERATIVE TREATMENT AND OPTIMIZATION

- Correct fluid deficits and electrolyte imbalances



- Nasogastric suction is needed only to treat persistent vomiting or ileus
- Pain Management - Opioids administered intravenously are likely to be necessary
- Prophylactic antibiotic therapy may be instituted in patients with necrotizing pancreatitis. (see complications)
- Endoscopic removal of obstructing gallstones is indicated within the first 24 to 72 hours of the onset of symptoms to decrease the risk of cholangitis.
- ARDS treatment is mainly supportive because specific therapy for pancreatitis-associated ARDS has not been defined
- Contemporary practice is to begin enteral nutrition early (within 48-72 hours) in the course of the disease. (A meta-analysis of seven trials showed that compared with TPN, enteral nutrition is associated with less infectious morbidity, shorter hospital lengths of stay, and less organ failure, with no effect on mortality)
- Consider treatment for EtOH withdrawal pre-operatively

SURGICAL TREATMENT OF PANCREATITIS

- **Operative Drainage for Pancreatitis** - indicated for drainage or debridement of infected peripancreatic tissue or pancreatic necrosis
- **Internal drainage of a pancreatic pseudocyst** - may be accomplished by anastomosing the cyst to the stomach, duodenum, or other small bowel via a Roux-en-Y loop of jejunum.
- **Pancreaticojejunostomy** - longitudinal opening of the pancreatic duct is then anastomosed to a Roux-en-Y loop of jejunum. Ensures adequate drainage of a duct with multiple strictures and dilatations.
- **Whipple resection (pancreaticoduodenectomy)** - alternative surgical treatment for chronic pancreatitis confined to the head of the gland.
- **Subtotal pancreatectomy** - Resect the pancreas from the mesenteric vessels distally, leaving the head and uncinata process intact. This procedure may be performed for tumor or chronic pancreatitis.

PROGNOSIS

- **Ranson Criteria**
 - Age older than 55
 - White blood cell count more than $16 \times 10^9/L$
 - Blood urea more than 16 mmol/L
 - Aspartate transaminase more than 250 U/L
 - Arterial PO_2 less than 8 kPa (60 mm Hg)
 - Fluid deficit more than 6L
 - Blood glucose more than 200 mg/dL, no history of DM
 - Lactate dehydrogenase more than 350 IU/L
 - Corrected calcium less than 8 mg/dL
 - Decreasing hematocrit more than 10
 - Metabolic acidosis with base deficit more than 4 mmol/L
 - **(Note that the serum amylase value is not one of the criteria.)**
- Mortality per positive criterion
 - 0 to 2: less than 5% mortality
 - 3 to 4: 20% mortality
 - 5 to 6: 40% mortality
 - 7 to 8: 100% mortality
- **CT Criteria**
 - Normal
 - Enlargement
 - Pancreatic Inflammation
 - Single Fluid Collection
 - Multiple Fluid Collection
 - Grades A and B - mild disease with essentially no risk for infection or death.
 - Grade C - moderately severe disease, minimal chance of infection low risk of mortality.

ANESTHETIC OPTIONS

- Anesthetic options are more dependant on the surgery to be performed rather than pancreatitis.
- Epidurals should be considered if the surgery is to be thoracic or upper abdominal in nature to assist in pain management and respiratory function (may already have decreased respiratory function)

ANESTHETIC SETUP

- **Monitors** – Standard CAS monitors, urine output, +/- Arterial line, +/- Cvp (based on proposed procedure, laboratory results and patient stability)
- **Vascular Access** – 2 large bore iv's +/- Central line (Based on proposed procedure, laboratory results and patient stability)
- **Positioning** - Based on procedure – most pancreatic procedures are done in a supine position
- **Fluids** – Patient crossmatched, Blood available based on procedure and patient stability

MANAGEMENT OF ANESTHESIA

- **Induction** – RSI with hemodynamically stable agents as indicated by volume status (ex. Etomidate 0.2–0.4 mg/kg iv or ketamine 1–2 mg/kg iv)
- **Maintenance** – Based patient stability, no contraindication to any particular anesthetic, prolonged propofol infusion may worsen pancreatitis.
- **Emergency** – Patients not to go to ICU should be awakened when stable, reversed and electrolyte imbalances corrected

POSTOPERATIVE CONSIDERATIONS

- ICU admission maybe required for:
 - Postop mechanical ventilation (ARDS),
 - Hemodynamic instability (sepsis, fluid deficit)
 - Renal Failure

COMPLICATIONS

- Surgical drainage complications include:

- Fistulae formation: 18–55%
- Delayed gastric emptying: 50%
- Unremitting sepsis: 10–30%
- Atelectasis: 5–10%
- Respiratory deterioration: 5%
- Hemorrhage
- Bowel perforations
- Pancreatic pseudocysts occur in 10 to 20% of cases of acute pancreatitis. Cysts that have been present for more than 6 weeks and are larger than 5 cm in diameter usually require treatment.
 - Arterial hemorrhage occurs when a pseudocyst erodes into a pancreatic artery and transforms the pseudocyst cavity into a pseudoaneurysm
- Acute pancreatitis may infrequently cause bleeding or thrombosis of peripancreatic vessels. The most common venous complication of pancreatitis is occlusion of the splenic vein, which may result in splenomegaly and gastric varices.
- Infected pancreatic necrosis
 - The demonstration of polymorphonuclear cells and bacteria is highly suggestive of infected pancreatic necrosis and should lead to urgent surgical intervention because the mortality in conservatively treated patients with infected pancreatic necrosis is greater than 60%.
 - Antibiotic therapy should be initiated or continued to cover gram-negative enteric and anaerobic organisms. Antibiotics with high penetration into pancreatic tissue include imipenem-cilastatin, fluoroquinolones, and metronidazole.

REFERENCES

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- Anesthesiologist's Manual of Surgical Procedures 4th ed. Chapter 7.8 - Pancreatic Surgery
- Goldman: Cecil Medicine. 23rd ed