

# Acute Pancreatitis

## Manifestations, Diagnosis, and Surgical Intervention

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7 December 2016

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# Summary

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# Definition

**Acute Pancreatitis** : an acute inflammatory process of the pancreas (BANKS et al., 2012)

## Mild Acute Pancreatitis

- Without evidence of systemic complications or organ failure

## Moderately Severe Acute Pancreatitis

- Transient organ failure lasting < 48 hrs
- Local or systemic complications without persistent organ failure lasting > 48 hrs

## Severe Acute Pancreatitis

- Organ failure lasting > 48 hrs, involving 1+ organs

## Epidemiology

Incidence data may be underreported due subclinical cases and severe cases which result in death before diagnosis.

**Annual Incidence** is reported to be between 4.9-35 per 100,000 people per year.  
(VEGE, YADAV et CHARI, 2007)

| Mortality and Hospital Stay for Acute Pancreatitis (CAVALLINI et al., 2004) |              |                                    |  |
|---|--------------|------------------------------------|--|
|   | Mortality(%) | Mean Hospitalization Length (Days) |  |
| Mild  | 1.5          | 13 +\/- 8                          |  |
| Severe  | 17           | 30 +\/- 14                         |  |
| Overall   | 5            |                                    |  |

# Pathogenesis

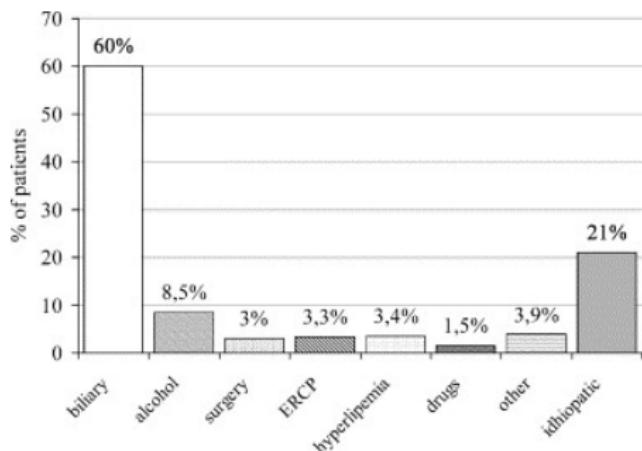


FIGURE – Etiologies of Acute Pancreatitis (CAVALLINI et al., 2004)

- Mechanical Ampullae Obstruction
- Alcohol
- Hypertriglyceridemia
- Post-ERCP
- Hypercalcemia
- Drugs
- Infection\Toxic
- Genetic (e.g. mutated SPINK1)
- Vascular Disease (e.g. vasculitis, atheroembolism, hemorrhagic shock)
- Trauma

# History

## Symptoms

- Acute onset, severe epigastric pain reaching max intensity 10-20min after onset
- May be slower onset in patients with hereditary, metabolic, or alcoholic etiologies
- Radiates to the back ~50% of the time
- As many as 5-10% of patients with acute severe disease may be pain free -  
**unexplained hypotension as only sign** (LANKISCH, SCHIRREN et KUNZE, 1991)

## Determining Etiology

- Focus history on previous symptoms or documentation of **gallstones, alcohol use**, history of hypertriglyceridemia or hypercalcemia, family history of pancreatic disease, prescription and nonprescription drug history, history of trauma, and presence of autoimmune diseases

# Physical

## Abdominal Exam

- Minimally to severely tender over epigastrium
- Bloated with hypoactive bowel sounds (ileus secondary to inflammation)
- Scleral icterus (obstructive jaundice, pancreatic head edema)
- Fever, tachypnea, hypoxemia, and hypotension
- Perumbilical ecchymosis (Cullen Sign) & flank ecchymosis (Grey Turner Sign) occur in about 3% of cases and are associated with 37% mortality (MOOKADAM et CIKES, 2005)
- Rarely, subcutaneous nodular fat necrosis or panniculitis



FIGURE – Cullen Sign



FIGURE – Turner Sign

# Laboratory

On admission, all patients with suggestive H&P should get :

- basic metabolic panel
- serum amylase and lipase
- triglyceride level
- calcium level
- ALT, AST, Alk Phos, bilirubin

Additionally, elevations in the following labs may be seen :

- CRP
- BUN

Calcium levels will likely be low, and blood glucose may be either high or low

# Imaging

## Modalities

- **Abdominal Xray** - may show localized ileus (sentinel loop) or colon cutoff sign
- **Abdominal Ultrasound** - may show diffusely enlarged and hypoechoic pancreas. Pancreas isn't visualized in 25-35% of cases due to ileus gas obstructing view (DERVENIS et al., 1999)
- **Abdominal CT with Contrast (Preferred 1st line)** - more sensitive and specific than ultrasound. Shows focal or diffuse enlargement with heterogeneous contrast enhancement.
- **MRI** - more sensitive than CT scan for early pancreatitis, and can more reliably characterize the pancreatic and biliary ducts



FIGURE – Colon Cutoff Sign



FIGURE – Reduced enhancement of the pancreatic tail

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# Atlanta Classification

## Two Broad Categories

- **Acute Interstitial Edematous Pancreatitis** - (90-95%) inflammation of the pancreas and peripancreatic tissue without surrounding necrosis
- **Necrotizing Pancreatitis** - (5-10%) shows necrosis of the pancreatic parenchyma, peripancreatic tissues, or both, on contrast-enhanced CT.

Also defines collections of fluid or debris within and around the pancreas :

- Acute peripancreatic fluid collection
- Pancreatic pseudocyst
- Acute necrotic collection
- Walled-off necrosis

# Ranson's Criteria

## Ranson's Criteria to Predict Severity of Acute Pancreatitis (RANSON et al., 1974)

### 0 Hours

|                       |             |
|-----------------------|-------------|
| Age                   | > 55 yrs    |
| WBC                   | > 16000/mm3 |
| Blood Glucose         | > 200 mg/dL |
| Lactate Dehydrogenase | >350 U/L    |
| AST                   | >250 U/L    |

### 48 Hours

|                     |                                       |
|---------------------|---------------------------------------|
| Hematocrit          | Fall of >= 10%                        |
| BUN                 | Increase by >= 5 mg/dL despite fluids |
| Serum Calcium       | < 8 mg/dL                             |
| pO2                 | < 60 mmHg                             |
| Base deficit        | > 4 MEq/L                             |
| Fluid Sequestration | > 6 L                                 |

## Ranson's Criteria

Each item in the criteria is one point.

0-2 pts : 0-3% mortality

3-5 pts : 11-15% mortality

6-11 pts : > 40% mortality

However, a meta-analysis of 110 studies reporting Ranson's Criteria found that it was comparable to clinical judgement and had low sensitivity for eventual mortality.  
(BERNARDINIS et al., 1999)

## Other Scoring Systems

- APACHE II
- Bedside Index of Severity in Acute Pancreatitis (BISAP)
- Systemic Inflammatory Response Syndrome (SIRS)
- Glasgow-Imrie Criteria

# Fluids & Nutrition

- 5-10 mL/kg/hr of IV NS or LR
- **Unless** pancreatitis caused by hypercalcemia, then give NS (LR contains 3 mEq/L Ca<sup>2+</sup>)
- If hypotensive/tachycardic, start with 20 mL/kg for 30 min, then 3 mL/kg/hr for 12 hrs
- uptitrate fluids if BUN stays level or increases, or if urine output is < 0.5cc/kg/hr
- In mild pancreatitis, PO intake can begin as soon as pain is controlled and inflammatory markers are improving (unless ileus, nausea, vomiting)
- In severe pancreatitis, enteral or parenteral feeding may be required due to pain, nausea, or vomiting
- Enteral feeding directly into the jejunum is preferred, though nasogastric tube placement is okay if nasojejunal placement is not possible

Local Complications

# Pancreatic Pseudocyst

A **Pancreatic Pseudocyst** is an encapsulated collection of fluid with a well-defined wall, usually found outside the pancreas and exhibiting minimal necrosis and no solid material. (BANKS et al., 2012)

- Drainage or surgery is only indicated for symptoms or if infection is suspected (rare)



FIGURE – Pancreatic pseudocyst

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Local Complications

# Pancreatic Necrosis

Either an Acute Necrotic Collection (ANC) or Walled-off Necrosis (WON) by the Atlanta classification.

Both are initially sterile, but may become infected.

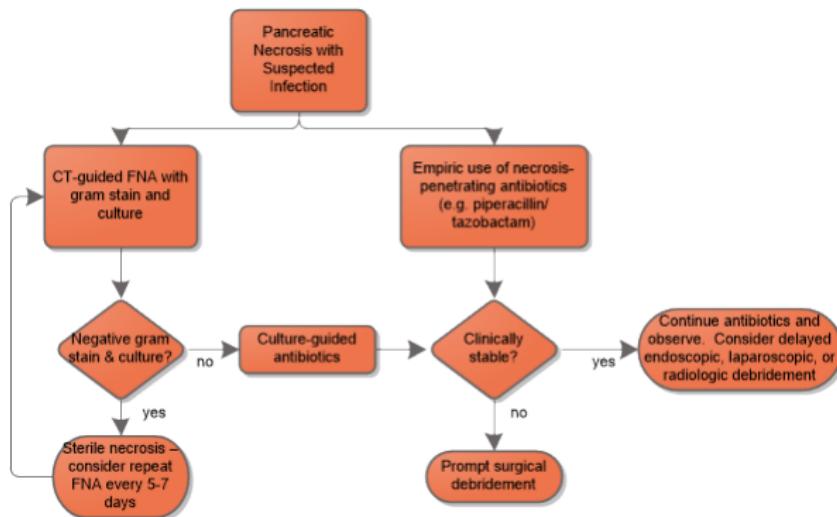


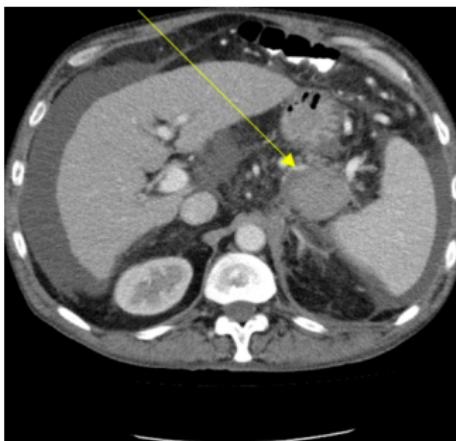
FIGURE – Management of a potentially infected necrotic pancreas

# Splanchnic Venous Thrombosis

- Splenic, portal vein, or superior mesenteric vein thromboses are found incidentally in 1-24% of patients with acute pancreatitis (NADKARNI, KHANNA et VEGE, 2013).
- Treatment centers around the underlying pancreatitis. Anticoagulation is initiated if clot extends into portal vein or SMV.
- Surgical thrombectomy if the bowel or liver are acutely threatened.

## Pseudoaneurysm

- Seen in approximately 10% of patients with a walled-off fluid collection (WON or pseudocysts)
- May be mistaken for pseudocysts or other fluid collections, but high density on CT raises suspicion for blood.
- Suggested by unexplained GI bleeding, sudden expansion of a walled-off fluid collection, or an unexplained drop in Hct.
- Endoscopic drainage is **contraindicated** unless embolized first.
- Typically managed with either embolization or resection.



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FIGURE – A pancreatic pseudoaneurysm (splenic artery)

Other Complications

## Abdominal Compartment Syndrome

- Sustained intra-abdominal pressure > 20 mmHg.
- Increased risk with severe pancreatitis due to tissue edema from fluid resuscitation, peripancreatic inflammation, ascites, and ileus.
- Monitor with serial urinary bladder pressure measurements.
- Surgical management involves opening the abdomen, leaving it open until edema resolves, then closing.



FIGURE – Open abdomen after surgical treatment of abdominal compartment syndrome

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## Indications & Timing

- As mentioned earlier, surgical debridement is indicated in specific cases of infected and symptomatic sterile pancreatic necrosis
- Optimal timing for surgical debridement is approximately **4 weeks** after onset of pancreatitis.

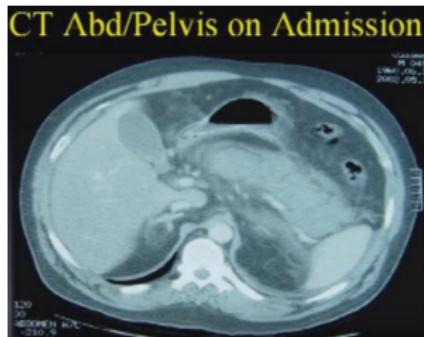


FIGURE – Necrotizing pancreatitis on admission

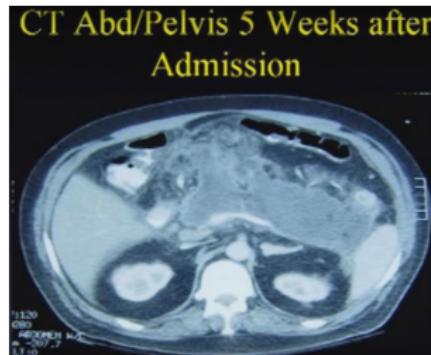


FIGURE – Necrotizing pancreatitis at 5 weeks

## Surgical Options

- Open necrosectomy with closure over drains (gold standard. Mortality 25-30% (DUDEJA, CHRISTEIN, JENSEN et VICKERS, 2017))
- Debridement with open packing and repeated debridement - when necrosis is too poorly demarcated to allow complete debridement
- Laparoscopic debridement

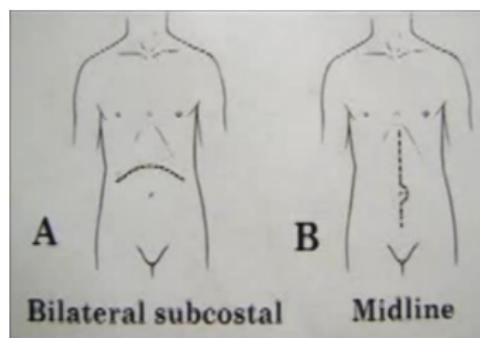


FIGURE – Open approach incisions

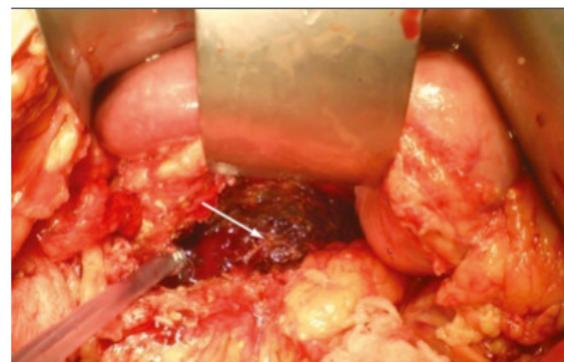


FIGURE – Necrotic pancreas - open subcostal approach

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# Open Operative Approaches

The lesser sac is entered through the gastrocolic ligament, hepatogastric ligament, or (hopefully not) the transverse mesocolon (COIMBRA, 2012).

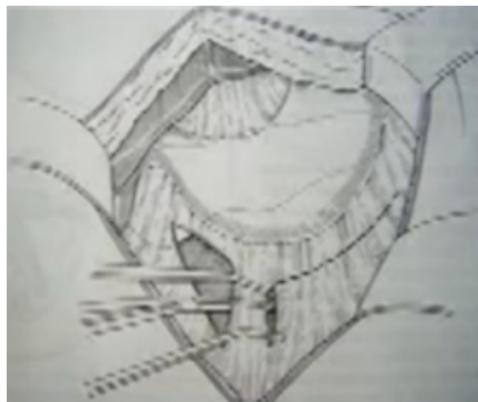


FIGURE – Entering the lesser sac



FIGURE – Finger dissection of necrotic pancreas

# Minimally Invasive Techniques



FIGURE – Path of laparoscopic necrosectomy

# Endoscopic Drainage

- Mostly used as an option when wanting to drain a pseudocyst.
- Also sometimes used in high risk patients with gallstone-associated pancreatitis.
- As mentioned, contraindicated in the presence of a pseudoaneurysm.

# Post-op Management

- Continuous irrigation of the lesser sac at 250 ml/hr is often employed

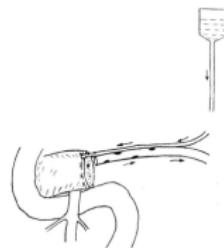


FIGURE – Irrigation of lesser sac and retroperitoneum

- Volume control, glucose management, and pain control are the main postoperative concerns
- Feeding initially through operatively-placed gastrojejunral tube
- Intra-abdominal fluid collection is the most common post-op complication - identified on CT and managed through percutaneous drainage

# Complications

- **Post-operative Bleeding** : laceration of peripancreatic arteries or veins, or rupture of a pseudoaneurysm if late-postop.
- **Pancreatic Fistula** : amylase in drainage fluid  $> 3x$  upper limit of normal.
- **Pancreatic Insufficiency** : patients need supplemental insulin starting early post-op, and PO pancreatic enzyme replacement once diet is initiated.

# Summary

- Wide clinical variability - ranges from subclinical to fulminant with rapid death
- Most commonly associated with gallstones and alcohol abuse
- Initial management with fluids
- Surgery at 4+ weeks if necrotic tissue infection suspected, or earlier if unstable
- Surgical debridement has high morbidity and mortality

# Thank You



Download at <https://goo.gl/53IHVE>

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