Acute Pancreatitis, Diagnosis and Management

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Acute Pancreatitis

- Annual incidence of pancreatitis 280,000 hospitalizations per year

- Overall mortality of hospitalized patients is approximately 10% whereas the subset with severe acute pancreatitis is as high as 30%
Acute Pancreatitis - Pathophysiology

- Induction of acute pancreatitis due to intraacinar activation proteolytic enzymes, which ultimately leads to an autodigestive injury to the gland.

- Activated pancreatic enzymes, microcirculatory impairment, and release of inflammatory mediators lead to rapid worsening of pancreatic damage and necrosis.
Acute Pancreatitis - International Atlanta Symposium Definition

- Acute inflammatory process of the pancreas that may also involve peripancreatic tissue and/or remote organ systems
- Includes organ failure - shock, pulmonary insufficiency, renal failure, gastrointestinal bleeding
- Local complications - pancreatic necrosis, abscess, pseudocyst
Acute Pancreatitis - Definition

Inflammatory condition of the pancreas requires two of the following three features:

1) abdominal pain suggestive strongly of acute pancreatitis

2) serum amylase and/or lipase 3 X ULN

3) characteristic findings of acute pancreatitis on transabdominal US or CECT

Revision of Atlanta Symposium 2009
Acute Pancreatitis - Overview

- **Diagnosis**: H&P, Labs, Imaging
- **Etiology**: Cholelithiasis, Alcohol, Anatomical Variants, etc.
- **Manage Complications**: Pancreatic Necrosis, Infections, Pseudocysts
- **Clinical Approach to Treatment**: General Supportive Care
Acute Pancreatitis – Clinical Features

- N/V & ABD pain radiating to the scapula area / back relieved by leaning forward occurs in 40 – 70 % of pt.
- Grey Turner – flank discoloration
- Cullen sign - peri umbilical discoloration

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Acute Pancreatitis - Labs

- Amylase
- 40% of serum from pancreas thus note other causes
- Sen. 72%, Spec 99%
- Levels for Dx 3X ULN

- Lipase level 3X ULN
- Sen. 100%, Spec 96%
- Elevated longer
- Varied Causes
- Frequency
- Dx???
Acute Pancreatitis - Phases

- **Interstitial (1st phase):**
  - Onset within 1st week
  - Severity R/T organ failure and response to SIRS
  - Mild
  - Mod-Severe
  - Organ Failure <48hrs

- **Necrotizing (2nd Phase):**
  - Severe
  - Organ Failure >48 hrs
  - Protracted course
  - R/T necrotizing process
**Acute Pancreatitis - Imaging**

**Ultrasound**
- Identifies cholelithiasis and the presence of choledocho-lithiasis
- Sensitivity of ~70%

**Contrast Enhanced Comp Tomography**
- Timing
- Used to confirm diagnosis but NOT needed

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Acute Pancreatitis - Imaging

What does a CT Scan Offer?
- Excludes alternative diagnosis, determine severity, identify complications

What does it show?
- Isolated, or diffuse enlargement or peripancreatic stranding and fluid collections
- Necrosis apparent 3 days after ONSET of disease and seen as absence of enhancing of parenchyma after IV contrast
Acute Pancreatitis - Imaging

- CECT showing peripancreatic and retroperitoneal edema (*large arrows*) and stranding. The pancreas itself (*small arrow*) appears relatively normal.
Acute Pancreatitis - MRI

- Lack nephrotoxicity
- Sensitivity
- Visualization of biliary and pancreatic ductal system
- Limitations
Acute Pancreatitis - Etiology

Cholelithiasis
- Alcohol
- Anatomic Variants

Metabolic Disorders
- Drugs
- Trauma (Blunt vs. Post ERCP)

Autoimmune
- Infections
- Genetic
Severity – How bad is it?

- Demographics & Lab data
- Organ Failure
- Imaging
Acute Pancreatitis - Severity
Ranson Criteria

▶ ADMISSION
▶ Age >55 (70)
▶ WBC >16 K(18K)
▶ Glucose >200 (220)
▶ LDH >350 (400)
▶ AST >250

▶ 48 HOURS:
▶ Drop in HCT >10%,
▶ > 6L (4) Fluid needs
▶ Ca <8 mg/dl
▶ PaO2 <60 mm Hg
▶ BUN increase > 5 mg/dl (2), BD > 4 mmol/L (6)

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Acute Pancreatitis - Severity
APACHE II

- Calculate on admission & at 24 and 48 hours;
- Admit score > 7 predict severe pancreatitis sensitivity 65% spec 76%, PPV 43% and NPV 93%
- Score at 48 hours predicts severe pancreatitis 76% and spec 84% with PPV 54% and NPV 93%

Age, GCS, Temp, MAP, HR, A-a & FiO2, Arterial pH, Serum Co2, Na, K, Creat ARF, WBC

Hx of severe organ insuff. of immunocompromise or post op state

Gastro 2007; 132: 2022 - 2044
# Marshall Scoring System

<table>
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<th>ORGAN SYSTEM</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tr>
<td>Resp (PO2/FIO2)</td>
<td>&gt;400</td>
<td>301-400</td>
<td>201-300</td>
<td>101-200</td>
<td>&lt;101</td>
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<tr>
<td>Renal (Creat)</td>
<td>&lt;1.4</td>
<td>1.4-1.8</td>
<td>1.9-3.6</td>
<td>3.6-4.9</td>
<td>&gt;4.9</td>
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<td>CV: (SBP)</td>
<td>&gt;90</td>
<td>&lt;90 FR</td>
<td>&lt;90 NFR</td>
<td>&lt; 90 pH&lt;7.3</td>
<td>&lt;90 pH&lt;7.2</td>
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Acute Pancreatitis
CT Severity Index

- Pancreatic necrosis is a major negative prognostic factor.

- Large retrospective analysis of 268 patients found that a CT severity index >5 significantly correlated with death, prolonged hospital stay and need for necrosectomy.

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Acute Pancreatitis - CT Severity Index Components

- 0 - Normal
- 1 - Focal/diffuse enlargement
- 2 - Intrinsic abnormalities and inflammation in peripancreatic fat
- 3 - Single, ill-defined fluid collection or phlegmon
- 4 - Two or more poorly defined collections, presence of gas in or adjacent to pancreas
Acute Pancreatitis -
CT Severity Index Components

- 0 - No necrosis
- 2 - Less than or equal to 30%
- 4 - Greater than 30 and less than or equal to 50%
- 6 - Greater than 50%
Acute Pancreatitis - Severity

Balthazar CT Score

- **A** – Normal
  - Focal or diffuse enlargement of the pancreas
- **C** – finding of B with peripancreatic inflammation
  - findings of C + a single fluid collection
  - Findings of C + 2 or more fluid collections
- **E** – and/or presence of gas in/or adjacent to pancreas
Acute Pancreatitis
CT Severity Index

<table>
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<tr>
<th>CT Grade</th>
<th>Points</th>
<th>Percentage</th>
<th>Additional Points</th>
<th>Severity Index*</th>
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<tr>
<td>A</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>B</td>
<td>1</td>
<td>&lt;30</td>
<td>2</td>
<td>1</td>
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<tr>
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<td>D</td>
<td>3</td>
<td>&gt;50</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>E</td>
<td>4</td>
<td></td>
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<td>10</td>
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</table>

Multiple studies with head to head comparison

- APACHE II outperformed Ranson ‘s Criteria
- Balthazar CT Score suggested superior in predicting necrosis but less accurate in predicting organ failure
- Combining CT findings and APACHE II improved predictive outcome over APACHE II alone
Case Study # 1

- 52 yr old male
- **PMHx**: HTN, DM, Etoh Abuse, GI Bleed 3/2013 and pancreatitis 4/2013
- **cc**: 1 wk of sharp epigastric ABD pain with radiation to back, n/v
- **VS**: T 98.9, HR 142, B/P 150/97, RR 26
- **PE**: Awake /Restless
- Lungs clear
- Distended ABD, mod tenderness, hypoactive BS. No ascities
Case Study #1

- **Glucose** 311
- **HCO₃** 14, **K** 3.5
- **Ca** 7.7, **lactate** 9.1
- **BUN** 17, **Creat** 0.77
- **LDH** 754, **Hct** 41%
- **Lipase** 1,210
- **T. B.** 2.2, **AST** 888, **ALT** 557, **Alk phos** 160
- **CT of ABD** done without IV contrast due to IVP allergy;
  Ext peripancreatic inflammatory changes with some free fluid, no gallstones
Acute Pancreatitis - Overview

- Diagnosis
- Etiology
- Management of Complications
- Clinical Approach to Treatment

H&P, Labs, Imaging
Alcohol
Acute Pancreatitis – Etiology Alcohol

- Alcohol activates the pancreatic enzymes in the acinar cells which causes digestion of lysosomal enzymes that are thought to cause pancreatitis.

- Accounts for ~30% of acute on chronic pancreatitis episodes.
Acute Pancreatitis - Management

• Fluid Resuscitation
  - Crystalloids/ LR Bolus 20ml/kg
  - Goal of 0.5ml/kg of body weight urine output

• Metabolic Imbalance
  - O2 requirements, acidosis, monitor ionized Ca, control glucose.

• Nutrition
  - > 72 hours of NPO

• Pain Control
  - Hydromorphone commonly used

• NPO vs PO Intake
  - NJ vs. TPN

• Nutritional
  - NPO vs PO intake
Case Study # 1 - Recs

- Hydration: cont @ 3ml/kg; Reassess Q 6 -8 hrs
- Watch electrolytes & BUN i.e Ca, Mg, acid base balance
- Oxygen support
- PPI (Hx of GIB due to Mallory Weiss Tear)
- Antibiotics ???
Case Study # 1

140 \[\downarrow\] 114 \[\downarrow\] 31
\[\downarrow\]
4.5 \[\downarrow\] 15 \[\downarrow\] 2.94
\[\rightarrow\] 230
\[\rightarrow\] 14.9
\[\rightarrow\] 71
\[\rightarrow\] 17.0
\[\rightarrow\] 44.8

Ca 5.8, Lipase 744
Lactate 9.1

MCV 87.6
Bands 32
(Temp 103.9)

ABG:pH 7.07, PcO2 53, PO2 108, HCO3 15.4, BE -15

Input: 5,856cc
Output: 150cc
Acute Pancreatitis - Management

- Adequate fluid resuscitation
- Correct electrolyte & metabolic imbalance
- Pain control
- Nutritional support
Case Study # 1

- Pt intubated ...developed infiltrates on CXR
- 4 pressors started; spiking fevers
- ABD distention worsened
Case Study # 1

- What do you look at today?
- What would you do differently in your management and recommendation?
Acute Pancreatitis – Organ Failure

- SHOCK (SBP < 90 mm Hg)
- Pulmonary Insufficiency (PaO2 < 60 mm Hg)
- Renal Failure (creatinine > 2 mg/dL)
- GIB > 500 ml of blood loss within 24 hours
- Pancreatic specific Issues; pseudosyst, abscess, parenchymal necrosis

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Case Study # 1 : Outcome

- **LOS**: 42 days
- **ARDS/ Trach & PEG**
- **Repeat CT**: Hypodense fluid collection 8.2 X 4.8 cm ant/inferior to pancreas. ?? Phlegmon or early abscess
- **IR**: drain placed
- **AKI**: HD for 1mth
- **Sent to rehab due to reconditioning**
Acute Pancreatitis - Management

- Prophylactic antibiotic
- Pancreatic specific antibiotics introduced when at least 30% necrosis seen on CT
  - Drug of choice
Acute Pancreatitis - Imaging

Peripancreatic and retroperitoneal edema.
Large non-enhancing areas of necrosis are visible in the body and neck of the pancreas (arrows).
Acute Pancreatitis - Complications

- **Pancreatic Necrosis**
  - Best identified on CECT
  - MRI/EUS to characterize content
Acute Pancreatitis - Complications

- **Pancreatic Infections**
  - Worsen S/S 1-2 weeks after onset
  - CECT presence of “gas” highly suggestive of diagnosis
  - FNA; gram stain, Cx
  - Rx; Antibiotics, CT guided percutaneous drainage, open surgical debridement with necrosectomy
Acute Pancreatitis Complications

Pseudocyst

- Common in moderate & severe case
- Usually resolve in 6 weeks; reassess
- Size matters; <6cm monitor >6 cm drainage needed
- Monitor for symptoms of obstruction, infection, rupture or bleeding
- Prior to treatment; confirm contents with EUS
Acute Pancreatitis - Complications

Well-defined fluid collection in the retroperitoneum (arrow) just below the level of the pancreas.
Acute Pancreatitis – Nutritional Support

Clinical judgement for resumption of PO intake; key elements absent ileus and pain control

Meta analysis of 6 randomized trials of TPN vs NJ feeds

NJ feeds have reduced infection & need for surgery but no decrease in organ failure or mortality

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Acute Pancreatitis – Conclusion

- 85% of patients develop interstitial edematous pancreatitis
- 15% of patients develop necrotizing pancreatitis
- 1 in 5 will develop severe pancreatitis of which 20 – 30% will die

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Acute Pancreatitis

MILD

Conservative management

Resuscitation & Supportive Care

SEVERE APACHE >8
Ranson > 3

CECT

< 30% Necrosis

> 30% Necrosis

Antibiotics

Improve

No improvement
PC drainage
Case Study # 2

- 32 yr old female PMHx of UTI on Cephalexin X3 d
- G5P4 38 wks gest.
- **cc:** epigastric pain X 3 days with radiation to back & N/V x 10; bilious and non bloody
- U/A protein 300 mg/dL
Case Study # 2

- Lipase: 1330
- Amylase: 1617
- Lactate: 2.3
- T. B: 0.7
- AST: 14
- Alk Phos: 92
- ALT: 13
- MCV: 89
- Bands: 8
Case Study # 2

- **U/S:**
  - CBD 6.2 mm
  - Sludge and mild wall thickening

- Anything to add to the work up?
  - **Triglycerides**
  - **Trigs: 12,570**
Case Study # 2

- Emergent C-section done and remained intubated
- Pink milky intraperitoneal fluid seen during surgery
- Septic with APACHE score of 15 with 11% risk of mortality
- Quintin Catheter placed
Case Study #2

- CT with Contrast:
- Severe pancreatitis with no necrosis or pseudocyst or vascular thrombus. Mod ascites. Biliary sludge. No ductal dilatation

- Plasmapharesis
- Trigs – 471 (10426)
- Drug Therapy
- Gemfibrozil 145 mg PO daily
Acute Pancreatitis - Etiology
Metabolic Causes

- **Hypertriglyceridemia**
  - Pathogenesis
  - Occurs in 1.3 to 3.8 cases of pancreatitis
  - Serum levels >1000 mg/dl
  - Acquired in obesity, DM, hypothyroidism, nephrotic syndrome, estrogen therapy & glucocorticoid excess

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