The role of imaging in acute pancreatitis

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This talk will focus on:

1. When and why different imaging studies are used to manage acute pancreatitis

2. The range of radiological findings consistent with acute pancreatitis on abd CT
Acute pancreatitis defined:

Acute onset of abd pain resulting from enzymatic necrosis and inflammation of the pancreas.
Anatomy of the pancreas

- Gallbladder
- rt. and lt. hepatic ducts
- cystic duct
- common hepatic duct
- common bile duct
- accessory pancreatic duct
- greater duodenal papilla
- pancreatic duct

U of Michigan Medical School
Clinical assessment + lab studies leads to diagnosis

Presenting complaints
- epigastric pain radiating to the back
- fever/nausea/vomitting
- shock or sepsis

Differential
- pancreatitis
- PUD
- GERD
- biliary tract disease
- bowel obstruction
- ischemic bowel
- MI
- AAA rupture

Labs
- Amy/Lip
- LFTs
- WBC
- Chem 7

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Why image pancreatitis if clinical assessment and labs establish diagnosis?

provide supporting evidence
establish cause
assess severity (necrosis)
Etiology of acute pancreatitis

- Gallstones: 45%
- ETOH: 35%
- Idopathic: 10%
- Other: 10%
Abdominal US

US should be used to rule out gallstone obstruction as the cause

ERCP is used to relieve obstruction

Cholelithiasis  Ultrasound of the gallbladder shows posterior acoustic shadowing (arrowhead) produced by a stone in the lumen of the gallbladder (arrow). There is no gallbladder wall thickening, a finding that may be seen with cholecystitis. Courtesy of Jonathan Kruskal, MD.
Abd plain films

rule out
chronic pancreatitis
SBO
free air

classic signs
colon cut off
sentinel loop
Diagnostic algorithm

signs + symptoms
↑ amylase/lipase

mild

supportive Tx:
pan rest
IV fluids
analgesia

severe

NO necrosis

dynamic contrast CT

necrosis

CT guided FNA

aseptic

Supportive Tx
+ antibiotics

infected

Surgery + antibiotics
Two key points about CT

1. A CT scan is NOT required on the first day unless there are other possible diagnoses.

2. Dynamic contrast-enhanced CT should be performed in patients considered to have clinically severe or worsening acute pancreatitis to determine if necrosis exists.
Natural and Radiological History of Acute Pancreatitis

**week 1**

- shock
- ARF
- ARDS

**week 2**

- abscess
- pseudocyst

- enlargement
- fat stranding
- hemorrhage
- thrombosis
- pseudocyst
- abscess

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Dynamic CT Severity Index (CTSI)

Scoring based on Non-contrast CT

<table>
<thead>
<tr>
<th>Score</th>
<th>Letter</th>
<th>Description</th>
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<tbody>
<tr>
<td>0</td>
<td>A</td>
<td>normal</td>
</tr>
<tr>
<td>1</td>
<td>B</td>
<td>enlarged</td>
</tr>
<tr>
<td>2</td>
<td>C</td>
<td>peripancreatic fluid</td>
</tr>
<tr>
<td>3</td>
<td>D</td>
<td>necrosis</td>
</tr>
<tr>
<td>4</td>
<td>E</td>
<td>abscess</td>
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Necrosis Score based on contrast CT

<table>
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<th>Description</th>
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<tr>
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<td>&lt;33%</td>
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<td>4</td>
<td>33-50%</td>
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<tr>
<td>6</td>
<td>&gt;50%</td>
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>5 = severe
Patient 1

Mr. BW is an 84 yo s/p gastrectomy for PUD and presents with increasing abd distension and pain. Amylase/lipase are slightly elevated.
Patient 1: pancreatitis can present with pleural effusions
Patient 1: acute pancreatitis - mild
Patient 2

Mrs. VS is a 63 yo with a PMH of CHF and diabetes who presented with acute onset of epigastric pain radiating to the back. Amylase: 1802, lipase: 3350. She was diagnosed with acute pancreatitis, and was not showing improvement, so she was taken for dynamic CT to examine the pancreas for necrosis.
Patient 2: acute pancreatitis, r/o necrosis

no contrast
Patient 2: acute pancreatitis, r/o necrosis

dynamic CT w/ contrast

perihepatic fluid
peripancreatic fluid
Patient 3: severe edema, cannot r/o necrosis
Patient 3: severe edema, cannot r/o necrosis
Patient 4: necrosis w/o pseudocyst

no contrast

peritoneal fluid collections
Patient 4: necrosis w/o pseudocyst

>60% necrosis

necrosis with fluid replacement
Patient 4: 6 wks later

low attenuation loculated fluid:
pseudocysts

preserved tissue
Diagnostic algorithm

signs + symptoms
↑ amylase/lipase

mild
supportive Tx:
pan rest
IV fluids
analgesia

severe
NO necrosis
dynamic contrast CT
necrosis
CT guided FNA
aseptic
Supportive Tx + antibiotics
infected
Surgery + antibiotics
Patient 5: severe necrotizing pancreatitis

- Low attenuation loculations
- Necrosis with fluid replacement
- Normally enhancing tissue
Patient 5: severe necrotizing pancreatitis

pseudocysts can be extra-pancreatic
Patient 5: s/p open debridment and CT guided drainage
Patient 5: recurrance of pseudocyst months later
take home points

- clinical, biochemical, radiological
- stones vs ETOH
  - US - r/o gallstones
  - necrosis?
    - dynamic CT
    - infected?
      - CT guided FNA

infected necrosis goes to OR, otherwise medical management (support + abx)
References

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