Acute Pancreatitis – Why Imaging is our Friend

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July 25, 2005
The Patient!

- H.S. is a 43 y.o. male presenting with intense abdominal pain and several episodes of emesis
- PE reveals distressed, obese man with significant epigastric tenderness radiating to back
- Lab studies show elevated serum amylase, elevated serum lipase, WBC of 17,000, glucose of 220, LDH of 330

What is our next step?
For New Pathway students
Basic Anatomy

Important structures?

B = body
H = head
N = neck
T = tail
Un = uncinate

http://pathology2.jhu.edu/pancreas/images/shape.gif

http://www.cosmovisions.com/pancreas.jpg
Which spaces are most frequently involved in pancreatic fluid collections?
To image or not to image...

Pancreatitis is a clinical diagnosis -- why image?

- Confirmation of diagnosis
- Evaluation of severity and complications
  - Contrast enables assessment of perfusion and allows for estimation of necrosis
  - Enables detection and delineation of pancreatic fluid collections (size, location, contents, suitability for drainage)
Modality Options

Ultrasound

- Often difficult to visualize the pancreas during acute phase of pancreatitis due to ileus
- May be useful in following complications of pancreatitis during convalescent phase
  - Evolution of fluid collections
  - Areas of arterial or portal thrombosis via Doppler
Sample Image – U/S

www.bchsys.org/.../ImagingAbUltrasound.htm
MRI

**Strengths:**
- Just as effective as CT in detailing necrosis and the site and character of fluid collections. May be better than CT at imaging internal consistency and drainability of collections
- No iodinated contrast or radiation

**Weaknesses:**
- CT more accessible, cheaper
- CT more sensitive for small gas bubbles, calcifications
- CT more conducive to insertion and monitoring of drainage devices

MRI with increasing use in chronic pancreatitis and pancreatic adenocarcinoma
Modality Options

CT: Gold standard for evaluation of pancreatitis

- Spiral CT with contrast preferable study

- Strengths:
  - Accessibility, cost, speed, detail, staging
  - Compatible with intervention

- Weaknesses:
  - Iodinated Contrast (some studies suggest worsens pancreatitis)
  - Radiation load
CT severity Index

Inflammatory process:  
A: Normal Pancreas  0  
B: Pancreatic enlargement  1  
C: Inflammation or peripancreatic fat stranding  2  
D: Single peripancreatic fluid collection  3  
E: Two or more fluid collections or retroperitoneal air  4  

Gland Necrosis:  
1) No necrosis  0  
2) <30%  2  
3) 30-50%  4  
4) >50%  6
Early Pancreatitis

What’s the Grade?

Courtesy Dr. Anne Kim
CTSI and outcome

- CTSI 0-3:
  - 3% Mortality
  - 8% Morbidity

- CTSI 7-10:
  - 17% Mortality
  - 92% Morbidity
**Pitfalls in staging**

1. Necrosis takes 2-3 days to be evident on scan.
2. Sensitivity in detecting necrosis proportional to size of necrotic area.
3. Difficult to detect retroperitoneal fat necrosis.
Back to our Patient!

- H.S. admitted, treated with IV fluids
- What are early systemic complications of pancreatitis?
- Medical grading systems?
- In order to assess severity of H.S.’s case, CT is performed…
H.S. first scan

Courtesy Dr. Alice Fisher
Complications I

Pancreatic necrosis:

- >80% of deaths occur in patients with necrosis
  - Mortality Dependent on extent of parenchymal injury
  - Appears as areas of decreased attenuation
  - Occurs in 20% of patients with acute pancreatitis

- Infection occurs in 5-10% of pts with necrosis --
  - May see gas bubbles
  - Common organisms?
  - Requires aggressive management
Complications II

Pancreatic Abscess

- Poorly encapsulated collection of pus
  - 3% of cases
  - Appears as low-attenuated fluid collections +/- the presence of air
  - Diagnosis confirmed with FNA

- Treatment and course differ from infected fat necrosis
Several weeks later...
Complications III

Pseudocysts: encapsulated pancreatic fluid collections

- Failure of resorption pancreatic secretions, presence of communicating tracts
  - Develop >4 months post acute
  - Often develop from resolving aseptic necrosis
  - Surgical or percutaneous drainage indicated for cyst larger than 5cm, older than 6 weeks, enlarging cysts, or symptomatic (painful, gastric or biliary outlet obstruction)
Other Complications

- GI and biliary complications
  - Sinus tract formation, fistulas, colonic spasm
- Solid organ involvement
  - Splenic infarcts, hemorrhage, jaundice
- Vascular complications
  - Thrombosis, hemorrhage
- Ascites
  - Transient vs. pancreactic ascites
Things aren’t looking good...

Courtesy Dr. Alice Fisher
Ascites

Courtesy Dr. Vassilios Raptopoulos
Percutaneous drainage

- Require drainage if:
  - Symptomatic
  - >5 cm
- Retroperitoneal, trans-gastric, trans-hepatic routes all shown to be effective
- Aspiration
  - Most do not recur (if do: catheter placement)
  - Analysis of fluid if diagnosis is in doubt
Status post drainage

13.39 mm

Courtesy Dr. Alice Fisher
Homer finds relief

- Following drainage, H.S. feels better, but a catheter is left in place to allow for continual drainage.
- Fluid accumulation shows no signs of infection following labs.
- Will H.S. need surgery?
Points to Remember

- Imaging of pancreatitis allows for confirmation of diagnosis and assessment and grading of complications and severity
- Currently, CT preferred imaging modality
- Pancreatic Necrosis evident on CT and strong indicator of outcome
- CT guided drainage is effective treatment for pseudocysts and fluid collections
Acknowledgments

- Dr. Gillian Lieberman
- Dr. Anne Kim
- Dr. Vassilios Raptopoulos
- Dr. Alice Fisher
- Pamela Lepkowski
- Clotell Forde
Resources