Imaging of acute pancreatitis: initial evaluation

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Introduction

**Inflammatory disease:** mild (80%)

**severe** (death rates 30 - 50%)

**Diagnosis** of acute pancreatitis:

- clinical (abdominal pain)
- biological (blood lipase level)

**Imaging:**

- US
- MDCT
- MRI

- extension of initial lesions
- radiologic gravity score
- early complications
- etiological diagnosis

Frossard JL Lancet 2008
Introduction

**SOME QUESTIONS** ...

Gravity of AP: which are the prognosis factors?

Etiology: which are the best diagnosis tools?

Early complications: how depict them?
how treat them?
### Pancreatic necrosis

- no viable pancreatic tissue
- in 5 to 20% of AP
- a part or the entire pancreas
- within 48 - 72 h following the beginning of AP
- risks of infection: in 40% to 70% of cases (after 2 weeks)
Pancreatic necrosis

a focal loss of parenchymal enhancement on MDCT

Injection of 2ml/kg of iodine contrast media, at the portal phase
Fluid collections

- enzymatic fluid secretions
- peripancreatic and perirenal spaces
- present in 40 % of AP
- spontaneous resolution in 50 %
- pseudocysts (after 4 weeks)
Other parameters

- pancreatic size and morphology
- peripancreatic fat infiltration
- ascitis
Balthazar score

CT at 48-72 h

normal pancreas

Balthazar EJ. Radiology 1985
Gravity  Etiology  Early complications

- Balthazar score

CT at 48-72 h

enlarged edematous pancreas
effacement of the lobular contours

Balthazar EJ. Radiology 1985
Gravity Etiology Early complications

☞ Balthazar score

Balthazar EJ. Radiology 1985
Balthazar score

- CT at 48-72 h

- Enlarged edematous pancreas
- Peripancreatic stranding
- + one single fluid collection

Balthazar EJ. Radiology 1985
Balthazar score

Gravity

Etiology

Early complications

CT at 48-72 h

enlarged edematous pancreas

peripancreatic stranding

+ one single fluid collection

multiple or extensive fluid collection

Balthazar EJ. Radiology 1985
<table>
<thead>
<tr>
<th>Gravity</th>
<th>Etiology</th>
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<tbody>
<tr>
<td><strong>Balthazar score</strong></td>
<td>Normal pancreas</td>
<td>A 1 pt</td>
</tr>
<tr>
<td></td>
<td>Edematous pancreas</td>
<td>B 2 pts</td>
</tr>
<tr>
<td></td>
<td>+ peripancreatic stranding</td>
<td>C 3 pts</td>
</tr>
<tr>
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<td>+ 1 fluid collection</td>
<td>D 4 pts</td>
</tr>
<tr>
<td></td>
<td>multiple or extensive fluid collections</td>
<td>E 5 pts</td>
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Balthazar EJ. Radiology 1985
## Balthazar Score

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<td>Normal pancreas</td>
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## Necrosis Score

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<tbody>
<tr>
<td>None</td>
<td>0 pt</td>
</tr>
<tr>
<td>&lt; 30%</td>
<td>2 pts</td>
</tr>
<tr>
<td>30% - 50%</td>
<td>4 pts</td>
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<tr>
<td>&gt; 50%</td>
<td>6 pts</td>
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Balthazar EJ. Radiology 1990
**Balthazar score**: to predict adverse outcomes
- pseudocysts, infection, abscesses, fistula
- aneurysms, bowel necrosis / perforation
- hemorrhage
- prolonged hospitalization (> 30j)

**CT Severity Index Score**: to predict mortality and morbidity

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<tr>
<th>Gravité</th>
<th>Nb de points</th>
<th>Morbidity %</th>
<th>Mortality %</th>
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<tr>
<td>I</td>
<td>[0-3]</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
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<td>[4-6]</td>
<td>35</td>
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Casas AJR 2004, Lenhard AJR 2008
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Casas AJR 2004, Lenhard AJR 2008
Use of MRI to depict fluid collection

CT

T2-weighted image

Use of MRI to analyse necrosis

hemorrhagic necrosis?

CT

T1-weighted image

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- **Use of MRI** to analyse fluid collection

  necrotic material inside fluid collections?

---

Use of MRI to analyse common biliary duct

bile stone migration?

MR cholangiopancreatography

Pilleul FJMRI 2007- Stimax D Am J Gastroenterol 2007
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<tbody>
<tr>
<td>Use of MRI?</td>
<td>some difficulties</td>
<td></td>
</tr>
<tr>
<td>• limited access</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• patient apnea (Intensive Care patients)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• no MRI severity score</td>
</tr>
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<td>---------</td>
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<td>---------------------</td>
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<tr>
<td></td>
<td>✔️ Bile stone migration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>✔️ Alcoholic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>✔️ Others:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Iatrogenic (ERCP)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Metabolic (hypercalcemia, hypertriglyceridemia)</td>
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</tr>
<tr>
<td></td>
<td>- Pancreas divisum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Chronic pancreatitis (PD stenoses, stones)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Tumors: - cancer</td>
<td></td>
</tr>
<tr>
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<td>- - intraductal papillary mucinous tumours of the pancreas (TIPMP)</td>
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<td></td>
<td>- Auto immune pancreatitis</td>
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Common bile duct stone migration → therapeutic ERCP?

- Common duct Se = 40 to 60%
- Gallbladder Se > 90%

US in emergency: 24 h
common bile duct stone migration
→ therapeutic ERCP (endoscopic sphincterotomy)?
Gravity  Etiology  Early complications

CT on the initial CT

steatosis

cirrhosis

alcoholic liver disease
Gravity  Etiology  Early complications

CT on the initial CT

chronic pancreatitis

pancreatic disease
Gravity

Etiology

Early complications

- CT
- on the initial CT
- not in emergency

- chronic pancreatitis
- pancreas cancer
- pancreatic disease
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- Intraductal papillary mucinous tumour of the pancreas (IPMTP)
- Autoimmune pancreatitis
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- Pancreas divisum
- Intraductal stone
- Pancreas divisum + ITPMP

**main pancreatic duct abnormalities**
• organ failures

• local complications
  • thrombosis
    (splenic, mesenteric or portal vein)
  • pseudoaneurims
  • necrosis, infarction, hematoma
    spleen rupture
  • intestinal perforation

Gravity | Etiology | Early complications

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<tr>
<td>♦ local complications</td>
<td>infected necrosis</td>
<td>• mortality: 25%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 2d or 3d week</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• clinical and biological criteria</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• gaz within the necrosis area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• CT guided needle aspiration</td>
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Gravity

Etiology

Early complications

local complications  infected necrosis

- Treatment: surgical debridement (solid residues)

If surgery is contraindicated

- Percutaneous drainage on CT
- General anesthesia
- Catheter (24 to 30 French)
- Cleaning of collection
- 89 days (25 to 152)
- Choice of the track

Whitcomb
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<td>local complications</td>
<td>infected necrosis</td>
<td>MRI or CT helpful to guide CT percutaneous drainage</td>
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Gravity

Etiology

Early complications

- local complications
- infected necrosis

where we can!!
Take home messages

MDCT : severity assessment of acute pancreatitis
IV of contrast media; portal phase; 48 -72h
CT Severity Index Score
Take home messages

- MDCT: severity assessment of acute pancreatitis
  IV of contrast media; portal phase; 48 - 72h
  CT Severity Index Score

- Bile stone migration (US)
Take home messages

- **MDCT**: severity assessment of acute pancreatitis
  - IV of contrast media; portal phase; 48-72h
  - CT Severity Index Score

- **Bile stone migration (US)**

- **Use of MRI**:  
  - MRI gravity score?  
  - bile stone migration  
  - other etiologies (IPMTP, autoimmune pancreatitis)  
  - evaluation of collections (to guide drainage)