The Bile Duct (and Pancreas) and the Physician

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Not so common?!

Two weeks

38 ERCP’s
Goals

- Introduction
- Assess severity and role of imaging
- Feeding modality
- Antibiotics
- When to intervene
Acute Biliary Pancreatitis

- Gallstones commonest cause worldwide
- Variable severity of presentation
- 10-20% life-threatening course
- 8-10% mortality
- Death associated with pancreatitis associated complications – 2 phases (early <7 days, late >2 weeks)
Severe ABP

- ABP + organ failure and/or
- ABP + local complications
- APACHE II => 8
- Ranson Criteria => 3

Low threshold for managing on HDU

Crit Care Med 1999
# APACHE II

<table>
<thead>
<tr>
<th></th>
<th>+4</th>
<th>+3</th>
<th>+2</th>
<th>+1</th>
<th>0</th>
<th>+1</th>
<th>+2</th>
<th>+3</th>
<th>+4</th>
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</thead>
<tbody>
<tr>
<td>Rectal temp (°C)</td>
<td>&gt;41</td>
<td>39–40.9</td>
<td>38–38.9</td>
<td>36–38.4</td>
<td>34–35.9</td>
<td>32–33.9</td>
<td>30–31.9</td>
<td>&lt;29.9</td>
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<tr>
<td>Mean arterial pressure (mmHg)</td>
<td>&gt;160</td>
<td>130–159</td>
<td>110–129</td>
<td>70–109</td>
<td>50–69</td>
<td>&lt;49</td>
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<tr>
<td>Heart rate (bpm)</td>
<td>&gt;180</td>
<td>140–179</td>
<td>110–139</td>
<td>70–109</td>
<td>55–69</td>
<td>40–54</td>
<td>&lt;39</td>
<td></td>
<td></td>
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<tr>
<td>Respiratory rate (bpm)</td>
<td>&gt;50</td>
<td>35–49</td>
<td>25–34</td>
<td>12–24</td>
<td>10–11</td>
<td>6–9</td>
<td>&lt;5</td>
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<tr>
<td>Oxygen delivery (mL/min)</td>
<td>&gt;500</td>
<td>350–499</td>
<td>200–349</td>
<td>&lt;200</td>
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<tr>
<td>PO₂ (mmHg)</td>
<td>&gt;70</td>
<td>61–70</td>
<td>55–60</td>
<td>&lt;55</td>
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<tr>
<td>Arterial pH</td>
<td>&gt;7.7</td>
<td>7.6–7.69</td>
<td>7.5–7.59</td>
<td>7.3–7.49</td>
<td>7.25–7.3</td>
<td>7.15–7.2</td>
<td>&lt;7.15</td>
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<tr>
<td>Serum sodium (mmol/L)</td>
<td>&gt;180</td>
<td>160–179</td>
<td>155–159</td>
<td>150–154</td>
<td>130–149</td>
<td>120–129</td>
<td>111–119</td>
<td>&lt;110</td>
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<tr>
<td>Serum potassium (mmol/L)</td>
<td>&gt;7</td>
<td>6–6.9</td>
<td>5.5–5.9</td>
<td>3.5–5.4</td>
<td>3–3.4</td>
<td>2.5–2.9</td>
<td>&lt;2.5</td>
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<tr>
<td>Serum creatinine (mg/dL)</td>
<td>&gt;3.5</td>
<td>2–3.4</td>
<td>1.5–1.9</td>
<td>0.6–1.4</td>
<td>&lt;0.6</td>
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<tr>
<td>Hematocrit (%)</td>
<td>&gt;60</td>
<td>50–59.9</td>
<td>46–49.9</td>
<td>30–45.9</td>
<td>20–29.9</td>
<td>&lt;20</td>
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<tr>
<td>White cell count (10³/mL)</td>
<td>&gt;40</td>
<td>20–39.9</td>
<td>15–19.9</td>
<td>3–14.9</td>
<td>1–2.9</td>
<td>&lt;1</td>
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## Age Points

<table>
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<tr>
<th>Age</th>
<th>Points</th>
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<tr>
<td>&lt;44</td>
<td>0</td>
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<tr>
<td>45–54</td>
<td>2</td>
</tr>
<tr>
<td>55–64</td>
<td>3</td>
</tr>
<tr>
<td>65–74</td>
<td>5</td>
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<tr>
<td>&gt;75</td>
<td>6</td>
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## Chronic Health Points

<table>
<thead>
<tr>
<th>History of Severe Organ Insufficiency</th>
<th>Points</th>
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<tbody>
<tr>
<td>Nonoperative patients</td>
<td>5</td>
</tr>
<tr>
<td>Emergency postoperative patients</td>
<td>5</td>
</tr>
<tr>
<td>Elective postoperative patients</td>
<td>2</td>
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</tbody>
</table>
Causes

- Biliary 35-40%
- Alcohol 30%
- Metabolic
- Drugs
- Toxins
- Autoimmune
- Trauma
- Ischaemia
- Infection
- Genetic
- Idiopathic
Inflammatory cascade

**Acute Pancreatitis**

- Capillary Leak
- ARDS
- ATN
- Hypovolaemia
- Shock
Therapeutic Window

Pain
Cytokine cascade
Organ dysfunction

0 12 24 36 48 60 72 84 90 hrs

Initial Ix

- Amylase - >3x ULN (if normal Creat)
- Lipase
- TG’s
- Ca
- LFT’s – ALT/AST, ALKP, Bili
  Transaminases >3x ULN, 95% likelihood ABP
- CRP - >150 at 48 hours – prognostication but more useful for its high NPV 86%

Gastroenterology 2007
Q: 56 year old; Amylase 2500, ALT 330, WCC 16.5, Glucose 21, \( pO2 \) – 7.4kpa

1. Admit, USS, O2, antibiotics, glucose control

2. Admit, CT scan contrast, O2, glucose control, hydration

3. HDU admission, USS, O2, IV fluids, glucose control

4. HDU admission, O2, IV fluids, glucose control, antibiotics
Q: 56 year old; Amylase 2500, ALT 330, WCC 16.5, Glucose 21, pO2 – 7.4kpa......

1. Admit, USS, O2, antibiotics, glucose control
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3. HDU admission, USS, O2, IV fluids, glucose control
4. HDU admission, O2, IV fluids, glucose control, antibiotics
Ranson’s Criteria

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<tr>
<td>• Age greater than 55 years</td>
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<tr>
<td>• A white blood cell count &gt; 16,000/μL</td>
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<tr>
<td>• Blood glucose &gt; 11 mmol/L (&gt; 200 mg/dL)</td>
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<td>• Serum LDH &gt; 350 IU/L</td>
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<td>• Serum AST &gt; 250 IU/L</td>
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<tr>
<th>Ranson’s Criteria after 48 hours of admission</th>
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<tr>
<td>• Fall in hematocrit by more than 10%</td>
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<tr>
<td>• Fluid sequestration of &gt; 6 L</td>
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<td>• Hypocalcemia (serum calcium &lt; 2.0 mmol/L) (&lt; 8.0 mg/dL)</td>
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<tr>
<td>• Hypoxemia (PO2 &lt; 60 mmHg)</td>
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<tr>
<td>• Increase in BUN to &gt; 1.98 mmol/L (&gt; 5 mg/dL) after IV fluid hydration</td>
</tr>
<tr>
<td>• Base deficit of &gt; 4 mmol/L</td>
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PPV 49%
NPV 91%

Surg Gynaec Obstet 1974
CT scan

To assess for severity and pancreatic necrosis
- Avoid in first 72 hours
- Lack of improvement in 72 hours
- Persistent fever in clinically severe ABP
- Acute deterioration after clinical improvement
- Diagnosis in doubt
**TAUSS**

- 90% sensitive for gallbladder stones but...
- Only 30-50% sensitive for **CBD stones**

- **Using 6mm as cut off**
  - **Size** | **Sensitivity**
  - 0 to 4 mm | 3.9 %
  - 4.1 to 6 mm | 9.4 %
  - 6.1 to 8 mm | 28 %
  - 8.1 to 10 mm | 32 %
  - >10 mm | 50 %

- Dilated CBD is the best indirect predictor of a CBD stone

- Porr visualization of distal CBD and pancreas
MRCP

- Magnetic resonance cholangiopancreatography
  - T2 weighted imaging of the biliary system
  - No contrast needed, okay in kidney disease
  - Resolution 1 to 1.5mm
  - Sen 80 – 100%, Spec 83 – 98% for CBD stones
MRCP
EUS Scope

- Electronic scanning
- Frequency: 5, 6, 7.5 and 10MHz
- Doppler facility

- ERCP – ‘was’ gold standard for ductal stones
- EUS – sensitivity 89-94%
  specificity 95%
Management issues

Elderly

Obesity – Can it influence the course of the disease?
Hydration

- Cornerstone of medical therapy
- Stabilise capillary permeability
- Replace intravascular volume
- Maintains gut barrier function
- Can reduce pancreatic necrosis

Which fluid?

Crystalloid vs Colloid
Hydration

- Fluid resuscitation
  
  Aggressive 15ml/kg/hr
  
  vs
  
  Non-aggressive 5-10 ml/kg/hr

Other regimes:

- 20mg/hr bolus then 3mg/kg/hr
- 250-500mls/hour for 48 hrs

Equal number of studies favouring either approach
(Urgent) ERCP in ABP

Severe ABP AND obstructive jaundice +/- Cholangitis

YES

Severe ABP AND CBD stones and not Jaundiced

PROBABLY NOT

Severe ABP AND no CBD stones and not jaundiced

DEFINITELY NOT
Antibiotic Prophylaxis

DO NOT ROUTINELY USE ANTIBIOTICS OR ANTIFUNGAL AGENTS IN NECROTISING PANCREATITIS

World Jour Gastro 2012

Crit Care Med 2004
Probiotics

- Potential role?
- 298 pts with predicted severe pancreatitis multispecies probiotic (153) vs placebo (145)
- Combined infection endpoint
- Infections 30% in probiotic vs 28% in placebo
- 24 (16%) probiotics died vs 9 (6%) RR 2.53
- 9 in probiotics developed bowel ischaemia vs 0 in placebo

Lancet 2008
Most patients with ABP will resolve in a few days and so no additional nutritional support needed.

- ‘Pancreatic rest’ – no longer accepted

- How soon to start feeding?

**TPN vs EN?**
70 pt trial

- MOF – Lower EN (20% vs 50%, p=0.02)
- Infected Necrosis and Surgery
  Lower in EN (20% vs 74%, p <0.001)
  Lower in EN (25% vs 88%, p<0.001)
- Mortality
  Lower in EN (6% vs 35 %, p<0.001)
Necrosis

- Sterile vs Infected
- Timing of intervention
- Type of intervention – Surgical
  - Percutaneous
  - Endoscopic
Conclusion

- Recognise at risk patients for severe disease and use of imaging
- Provide aggressive monitoring and resuscitation
- Evidence-base does NOT support antibiotic prophylaxis
- Urgent ERCP in ABP with jaundice +/- cholangitis
Conclusion cont’d

- No role for urgent ERCP in ABP without jaundice
- Establish early enteral feeding
- Historical surgical necrosectomy rare, with less invasive methods of treating necrosis – step up approach
ACUTE CHOLANGITIS
Highlights
Pathogenesis
Microbiology
Clinical features
Lab findings
Imaging
Management
Highlights

- Cholangitis – Potentially life threatening obstruction and infection of the biliary tree

- Charcoats triad – Pain, Rigors, Jaundice

- 80% + from choledocholithiasis

  Rest – strictures – benign/malignant
Highlights

Immediate

- Fluid resuscitation
- Broad Spectrum Antibiotics cover
- Correction of Coagulopathy

Biliary Drainage
Pathogenesis

- Partial or Complete obstruction of the biliary tree
- Hallmark is raised intraductal biliary pressures
- Defence mechanisms overwhelmed
  - Duodenum
  - Portal venous system
  - Infected gallbladder
  - Periductal lymphatics
Microbiology

- 80%+ will have positive B/C

- Mostly Enteric bacteria
  - E coli, Enterococcus, Enterobacter

- Polymicrobial bacteria
  - Surgery or instrumentation
Clinical Features

- Charcoat triad (20-50%)
- Reynold Pentad (Hypotension/low GCS)
- Jaundice only 60-70%
- High index of suspicion

Elderly
Surgery/instr
Lab findings/Imaging

- CRP/WCC

- LFT’s – may not necessarily be cholestatic.

  ALT/AST >250 is a good discriminator of gallstone aetiology.

  Relatively normal ALT/AST often indicates malignant aetiology

- Blood culture

- USS, CT, MRCP, EUS
Imaging

- USS – biliary dilation, stones

- CT – Malignancy / Staging / biliary dilation

- MRCP – Stones, hilar stricture (after a CT), intra-hepatic stones

- EUS – Never first line investigation
CT scan

- Not sensitive for stones... most are radiolucent stones
- Even when present, stones may not be reported
- Calcified stones are visualized
- Useful to evaluate for other diseases
  - Cholecystitis
  - Tumors, nodes etc
  - Strictures with upstream dilation
MRCP
EUS
Tokyo 2013 guidelines

**TG 13 Diagnostic criteria for acute cholangitis**

A. Systemic Inflammation
   A-1. Fever and/or shaking chills
   A-2. Laboratory data: Evidence of inflammatory response

B. Cholestasis
   B-1. Jaundice
   B-2. Laboratory data: Abnormal liver function tests

C. Imaging
   C-1. Biliary dilatation
   C-2. Evidence of the etiology on imaging (stricture, stone, stent etc)

**Suspected diagnosis:** One item in A + one item in either B or C

**Definite diagnosis:** One item in A, one item in B and one item in C

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<thead>
<tr>
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<th>Charcot triad</th>
<th>TK13</th>
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<tbody>
<tr>
<td>Sensitivity</td>
<td>26%</td>
<td>92%</td>
</tr>
<tr>
<td>Specificity</td>
<td>96%</td>
<td>78%</td>
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</table>
Management

- Antibiotics – after blood cultures
- Fluid resuscitation and electrolyte correction
- Poor penetration into bile duct due to high intra-biliary pressures
- Correction of coagulopathy
- Biliary drainage – vital. – Can occur naturally or by intervention
Management

- Intervention – decide on timing severe or moderate.

- Endoscopic
- Percutaneous (PTC)
- Advanced EUS techniques
- Open Surgery (T-tube drainage + later definitive care)
ERCP

- Superior to surgical drainage
  - Mortality of ERCP vs surgical drainage 10% vs 32% in RCT

  NEJM 1992

- Preferable to PTC
  - Morbidity less, especially in presence of ascites and coagulopathy

  Arch Surg 197, AmJGastro 1998
Management

PTC

More accessible for an unstable patient
May be available when ERCP isn’t
No RCT comparing ERCP vs PTC
Higher M&M
Useful for higher (hilar obstructions)
Conclusion

- High Index of suspicion – Tokyo 13 guidelines
- Antibiotics – May not be effective
- Close observation of mild cholangitis – can become severe within hours
- Recognise severe cholangitis and arrange biliary drainage. Often < 24 hours.
- Prompt biliary drainage and modalities
Hilar single colorectal metastasis [1]
Hilar single colorectal metastasis (2)