Med 5 Refresher Course

Biliary Surgery

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Talk Outline

• Gallstone disease
  – Symptomatic gallstones
  – Acute cholecystitis
• Gallbladder polyp
• Carcinoma of gallbladder
• Management of patients with GS/CBD stones
Gallstone diseases

- In United Kingdom, 12% of men and 24% of women of all ages have gallstones
- No Hong Kong data
- Mixed stones are usually encountered
- Poor correlation between post-prandial discomfort and the presence of stones

Gallstone disease: Who to treat?

- Symptomatic GS without complications
  - How to define what is “symptomatic”
- Those with complications related to GS
  - acute cholecystitis
  - GS / CBD stones causing obstructive jaundice or acute cholangitis
  - acute biliary pancreatitis
  - gallstone ileus
  - gallbladder cancer
Rationale for treatment

- Once started to have symptoms related to GS,
  - majority of them would have symptoms recur
  - there is a good chance of developing complications

- Some complications may be potentially fatal
  - biliary pancreatitis (SIRS leading to MOF)
  - acute cholangitis (sepsis leading to MOF)
  - acute cholecystitis (peritonitis)

What are the treatment options?

- (1) Laparoscopic cholecystectomy
  - Currently the gold standard
  - Procedure relatively standardized
  - Very few specific contraindications
  - General anaesthetic considerations
    - (cardiorespiratory responses to pneumonoperitoneum)
  - Some patients can have their procedure done as “Day Case”
  - Conversion rate <5% (for patients with symptomatic GS and higher for those with complications)
Pros and Cons of lap cholecystectomy

- **Pros**
  - Decrease pain with early mobilization
  - Shorter hospital stay and earlier resumption of normal life / work
  - Decrease complications (wound, chest, ileus, stress responses)
  - Cosmetic

- **Cons**
  - Slight increase in the incidence of common bile duct injuries?
Minilaparotomy cholecystectomy

- Lap cholecystectomy vs. mini-laparotomy cholecystectomy
  - MacMahon et al., 1994
  - Majeed et al., 1996
- Less than 10% of cholecystectomy for symptomatic gallstones are done openly in most HA hospitals

Other treatment options

(3) oral dissolution therapy
- chenodeoxycholic acid / ursodeoxycholic acid
- rarely used nowadays
(4) ESWL
  rarely used nowadays
(5) percutaneous cholecystotomy (under local anaesthesia, USG-guidance)
- limited to very poor risks patients
**Special considerations**

- **Asymptomatic patients**
  - No need for cholecystectomy unless
    - procelain gallbladder (25% associated with gallbladder cancer)
- **Suspected gallbladder cancer**
  - For tertiary referral
- **Diabetic patients**
  - Should be treated promptly once symptoms appear

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**Acute cholecystitis**

- 95% cases associated with gallstones
- 10-20% patients with symptomatic gallstones
- Gallstone impaction leads to *inflammatory* response with *secondary bacterial infection*
- Must be differentiated from other gallstone-related complications especially biliary colic or biliary pancreatitis
**Acute cholecystitis vs. Biliary colic**

- **Pain**
  - Usually over epigastrum and < 4 hours (BC)
  - RUQ and > 4 hours and become constant (AC)
- **Murphy’s Sign**
  - Yes (AC) : No (BC)
- **Pyrexia / raised white cell count**
  - Yes (AC) : No (BC)
- **USG findings:**
  - Thickened GB wall
  - Pericholecystitis fluid
  - Distended GB
  - Ultrasonic Murphy

**Plain abdominal X-ray**
Emphysematous cholecystitis

GS lodged in cystic duct
Thickened GB wall – 5.3mm

Pericholecystic fluid
In equivocal cases

• Further investigations and observations are necessary
  – Repeat USG
  – E-HIDA scan
  – CT scan

• Clinical progress would also determine the decision to explore or operate
  – Rising pulses with high fever
  – Evidence of sepsis

CT Scan – Acute Cholecystitis
E-HIDA scan – GB shown up

unlikely to be acute cholecystitis - Continue observation

E-HIDA scan – GB not shown up

likely to be acute cholecystitis - consider OT
Management of acute cholecystitis (Era of open cholecystectomy)

Conventional Rx :-
• initial conservative Rx
• delayed cholecystectomy 6 - 8 weeks later

Several randomised studies done in early 1980s –
  – early open cholecystectomy is more cost effective than delayed cholecystectomy with same operative morbidity and mortality

Randomised study to compare early vs. delayed laparoscopic cholecystectomy for AC

<table>
<thead>
<tr>
<th></th>
<th>Early</th>
<th>Delayed</th>
<th>P value</th>
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</thead>
<tbody>
<tr>
<td>Number of patient</td>
<td>53</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>Default Surgery</td>
<td>-</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Failure of conservative Rx (LC)</td>
<td>-</td>
<td>8</td>
<td></td>
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<tr>
<td>O.T. time (min.)</td>
<td>123</td>
<td>107</td>
<td>n.s.</td>
</tr>
<tr>
<td>Conversion rate</td>
<td>11</td>
<td>9</td>
<td>n.s.</td>
</tr>
<tr>
<td>O.T. time excluding conversion</td>
<td>119</td>
<td>97</td>
<td>n.s.</td>
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<tr>
<td>Post op. Complications</td>
<td>5</td>
<td>3</td>
<td>n.s.</td>
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<tr>
<td>Op. mortality</td>
<td>0</td>
<td>0</td>
<td>n.s.</td>
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<tr>
<td>CBD injury</td>
<td>0</td>
<td>0</td>
<td>n.s.</td>
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<td>Analgesic doses</td>
<td>2</td>
<td>1</td>
<td>n.s.</td>
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<tr>
<td>Hospital stay</td>
<td>8</td>
<td>12</td>
<td>P &lt;0.001</td>
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</table>

Lai et al., 1998 British Journal of Surgery
Status as in 1998

- Issue of early or delay - still favor early surgery
  - Lo et al., 1998 in Annals of Surgery
  - Lai et al., 1998 in British Journal of Surgery
- No difference in conversion/complication rate
- Reduced hospital stay with early laparoscopic cholecystectomy (6 vs. 11 days)
- 20% of delay group readmitted for recurrent attacks or symptoms
- Presentation with symptoms <7 days

### Laparoscopic cholecystectomy for acute cholecystitis – Early or Delayed?

#### Table 1. Recruited studies and details of patient characteristics

<table>
<thead>
<tr>
<th>Studies</th>
<th>Year</th>
<th>Countries</th>
<th>Intervention</th>
<th>Sample size</th>
<th>Male</th>
<th>Female</th>
<th>Age (years)</th>
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<tbody>
<tr>
<td>Serrats et al.</td>
<td>2003</td>
<td>Spain</td>
<td>Early</td>
<td>82</td>
<td>NA</td>
<td></td>
<td>62 (mean)</td>
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<tr>
<td>Johansson et al.</td>
<td>2003</td>
<td>Sweden</td>
<td>Early</td>
<td>74</td>
<td>NA</td>
<td></td>
<td>59 (mean)</td>
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<tr>
<td>Lo et al.</td>
<td>1998</td>
<td>Hong Kong</td>
<td>Delayed</td>
<td>73</td>
<td>57%</td>
<td>43%</td>
<td>55 (mean)</td>
</tr>
<tr>
<td>Lai et al.</td>
<td>1998</td>
<td>Hong Kong</td>
<td>Early</td>
<td>41</td>
<td></td>
<td></td>
<td>56 (mean)</td>
</tr>
<tr>
<td>Lai et al.</td>
<td>1998</td>
<td>Hong Kong</td>
<td>Delayed</td>
<td>51</td>
<td></td>
<td></td>
<td>56 (mean)</td>
</tr>
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</table>

NA, not available

![Fig. 1. Pooled estimates of the risk for conversion comparing early and delayed-interval laparoscopic cholecystectomy.](image)
### Laparoscopic cholecystectomy for acute cholecystitis – Early or Delayed?

<table>
<thead>
<tr>
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<td>Serrattia et al.</td>
<td>2003</td>
<td>-1.00</td>
<td>-2.00</td>
<td>-1.00</td>
<td>-2.00</td>
<td>-1.00</td>
<td>-2.00</td>
<td>-1.485 (-1.828, -1.142)</td>
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<tr>
<td>Johansson et al.</td>
<td>2003</td>
<td>Not estimate</td>
<td>Not estimate</td>
<td>Not estimate</td>
<td>Not estimate</td>
<td>Not estimate</td>
<td>Not estimate</td>
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<tr>
<td>Lo et al.</td>
<td>1998</td>
<td>-0.730</td>
<td>-1.137</td>
<td>-1.137</td>
<td>-1.137</td>
<td>-1.137</td>
<td>-1.137</td>
<td>-1.137 (-1.580, -0.697)</td>
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<td>Lai et al.</td>
<td>1998</td>
<td>-1.137</td>
<td>-1.591</td>
<td>-1.591</td>
<td>-1.591</td>
<td>-1.591</td>
<td>-1.591</td>
<td>-1.591 (-1.933, -1.249)</td>
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<tr>
<td>Overall effect</td>
<td></td>
<td>Favors early</td>
<td>Favors early</td>
<td>Favors delayed</td>
<td>Favors delayed</td>
<td>Favors delayed</td>
<td>Favors delayed</td>
<td>Favors delayed</td>
</tr>
</tbody>
</table>

### Empyema of GB removed laparoscopically
PWH protocol

- **Group 1 – early laparoscopic cholecystectomy**
  - Patients fit for surgery
  - Diagnosis made early (<72 hours)

- **Group 2 – delay laparoscopic cholecystectomy**
  - Patients fit for surgery
  - Delayed presentation and late diagnosis
  - Patients refusing OT

- **Group 3 – conservative treatment +/- percutaneous cholecystostomy**
  - Patients with medical co-morbidity and those who are not an anaesthetic candidate

Cholecystostomy tube
Standard techniques

Modified techniques
Gallbladder polyp

- Prevalence
  - 3-7% of healthy adults
- USG diagnosis of gallbladder polyp
  - Sensitivity around 90%
  - Specificity 93.9%
  - False negative due to thickened GB wall and presence of GS masking polyps
- Natural history
  - 50% similar, 25% increase in size, 25% decrease in size over a period of 6 years
### Risk factors for malignancy

- **Old age (>60)**
- **Coexisting gallstones**
  - 85% in malignant polyp; 59% in benign polyp
- **Solitary polyp**
- **Polyp rapidly increase in size**
- **If the patient is symptomatic**
- **Size of polyp**
  - Size of polyp >10mm – chance of malignancy 37-88%
  - Larger the polyp, higher the chance

### Choices of procedure

- **Smaller than 10mm**
  - Can consider re-scan 6 months later if patient is asymptomatic
- **Larger than 10mm but smaller than 15mm**
  - Laparoscopic cholecystectomy should be considered
- **Larger than 15-20mm**
  - Open cholecystectomy + frozen section +/- liver resection
Carcinoma of gallbladder

• All depends on staging of disease
  – incidental findings of early cancer: good prognosis
  – presented with late features of GB cancer: very bad prognosis
• Decision for treatment options
  – CT scan pre-op
  – operative findings
• Radical surgery
  – radical cholecystectomy with en-bloc resection of liver segment 5 and 4b and porta hepatitis LN dissection
Survival of GB cancer patients

- Radical resection
- Overall survival
- Palliative resection
Management of suspected CBD Stones

- History of jaundice, acute cholangitis, acute pancreatitis
- Deranged liver function tests
  – Raised bilirubin and ALP
- Transabdominal USG
  – stones demonstrated
  – dilated CBD
- MRCP

Management options for CBD Stones

- Pre-op ERCP
- Open Surgery
- Lap Surgery
  - Operative Cholangiogram
  - L.C. for G.S. or leave G.B. intact
  - cholecystectomy + ECBD
  - Lap ECBD + L.C.
  - Intra-op ERCP + L.C.
  - LIOC
Factors in choosing treatment

- patients condition
- number, size, type of CBD stones
- biliary anatomy
- availability of expertise

Laparoscopic ECBD vs. ERCP – trials data

- Pros
  - lap ECBD more cost effective than ERCP/ES
  - decreased morbidity
  - shorter hospital stay
- Cons
  - expertise for lap ECBD
  - OT set up (e.g. imaging)
  - consumables (special catheters)
  - OT time
Management of patients with GS/CBD stones

• Laparoscopic cholecystectomy is generally recommended following endoscopic sphinterotomy and clearance of bile duct stones
• However, it was reported that only 10% of patients with GB in-situ will return with further biliary complications – and thus expectant management is alternatively advocated, particularly for older patients
• How should we advise our patients?

Management of patients with GS/CBD stones

• 178 patients (older than 60) were randomized into two groups – lap chole Vs. expectant management
• 82 of the 89 randomized received laparoscopic cholecystectomy
• Intention-to-treat analysis
• primary outcome: further biliary complications
• other outcomes: complications to cholecystectomy and late deaths for all causes
Management of patients with GS/CBD stones

• Our recommendation:

*In Chinese patients, cholecystectomy after endoscopic treatment to bile duct stones reduces biliary events and should be recommended*

Lau JY; et al. in Gastroenterology 2006 Jan;130(1):96-103.
Needlescopic Cholecystectomy: Reduction of pain – Italian RCT

<table>
<thead>
<tr>
<th></th>
<th>Standard</th>
<th>Miniature</th>
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<tbody>
<tr>
<td>No. of patients (n)</td>
<td>68</td>
<td>67</td>
</tr>
<tr>
<td>Operating time (min)</td>
<td>45</td>
<td>50</td>
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<tr>
<td>GB perforation (n)</td>
<td>9</td>
<td>8</td>
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<tr>
<td>Bleeding (n)</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Analgesic (n)</td>
<td>73.5</td>
<td>41.7 *</td>
</tr>
<tr>
<td>Hospital stay (d)</td>
<td>1 (1-7)</td>
<td>1 (1-6)</td>
</tr>
<tr>
<td>Pt satisfaction (%)</td>
<td>60</td>
<td>86 *</td>
</tr>
</tbody>
</table>

Miniature: 3 x 3mm

*p < 0.05

Sarli; Br J Surg, 2003
Acute Cholangitis

John Wong
Team 1 Surgery
Prince of Wales Hospital

Definition
“…localized or diffuse inflammatory changes of the intrahepatic and extrahepatic bile ducts of diverse aetiology.”
Ascending Cholangitis

- Originates in the gallbladder, duodenum or pancreas

Descending Cholangitis

- From a primary infection of the liver

Pyogenic Cholangitis (Suppurative)

- Emergency
- Pus-filled bile ducts
- Most severe course
**Obstructive Cholangitis**

- Increase in intraductal pressure >15-20 cm H₂O
- Causes a cholangiovenous or cholangiolymphatic reflux of bacteria or endotoxins into the blood circulation

**Aetiology**

A. Infection – bacteria (eg. E.coli, Klebsiella, Enterococcus, Pseudomonas, Strep faecalis)
   - parasites (eg. Clonorchis, ascaris)
   - viruses
   - mycoses (eg. Cryptococcus, Candida)
B. Obstruction – stenosis
   – benign (eg. Mirizzi’s)
   – malignant
   – gallstones
   – blood clots
   – oriental cholangitis
   – parasites
   – suture material, clips
   – highly viscous mucus

C. Immunological
   – primary biliary cholangitis
   – primary sclerosing cholangitis
   – autoimmune cholangitis

D. Caroli’s disease
Oriental Cholangitis
(Recurrent Pyogenic Cholangitis)

- Described in 1930 by Digby
- Ca bilirubinate stones
- Intrahepatic stone
- China, Japan, Malaysia, Taiwan
- Ascaris lumbricoides
- Treatment
  - ERCP
  - Surgery

Clinical Aspects of Acute Cholangitis

Charot’s triad (1877)
1. Pain
2. Fever
3. Jaundice

Reynold’s pentad (1959)
4. Confusion
5. Septic Shock
**Diagnosis**

**Laboratory** – leucocytosis
- ESR, CRP
- amylase

**Bacteraemia**

**USG** – biliary dilatation

**CT Scan** – ? malignant obstruction

**MRCP** – noninvasive, diagnostic

**ERCP** – invasive, diagnostic & therapeutic
- papillotomy
- stone extraction
- internal stent (plastic/metal)
- NB drain

**PTBD** – external drainage

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**Case 1**

*Findings:* The PTC shows a tight narrowing in the middle section of the extrahepatic bile duct (arrow). The location is typical for gallbladder carcinoma. There are multiple gall-stones which appear as faceted filling defects in the gallbladder.
Case 3

Findings: The PTC shows irregular intrahepatic ducts typical of sclerosing cholangitis. Recurrent strictures are found in a significantly higher percentage of patients who underwent transplantation for primary sclerosing cholangitis than in other liver recipients.

Figure 3.6.3  ERCP and MRC Demonstrating a Common Bile Duct Stone

H
AP - 25
Fig. 3.6.7  Endoscopic Sphincterotomy

Fig. 3.6.8  Extraction of Bile Duct Stone with Dormia Basket
Figure 4. This patient sustained bile duct injuries during a laparoscopic cholecystectomy. a) The first pass of the PTC shows an isolated segment of the right biliary ductal system. There is a surgical clip causing the duct (arrow) and there is a leak into the peritoneal space from a peripheral duct (arrowhead). This is a leaky right segment had a PTBD placed prior to surgery as well as a percutaneous abscess drain into this fluid collection resulting from the bile leak. b) A PTC and then drainage of the remainder of the biliary tree was also performed. There is also a surgical clip on this duct (arrow).

Figure 8. A PTC of a patient with Hodgkin’s lymphoma showing narrowing of the mid portion of the extrahepatic bile duct (arrow) caused by external pressure from enlarged lymph nodes.
Fig. 10.4 Percutaneous transhepatic cholangiography (PTC). There is a tight stricture (arrows) of the common hepatic duct caused by cholangiocarcinoma, with intrahepatic biliary dilatation above the stricture. If it is decided to proceed to percutaneous drainage a second puncture should be performed via a suitable duct (curved arrow).

Fig. 10.5 Benign biliary stricture. PTC demonstrating a smooth tapered stricture of the lower common bile duct secondary to pancreatitis (straight arrows). Note the catheter is entering the biliary tree via a duct providing good access for percutaneous intervention (curved arrows).
Fig. 10.9 Malignant biliary stricture. (a) A self-expanding metallic stent has been positioned across a malignant stricture in the lower common bile duct secondary to carcinoma of the head of the pancreas. The narrowing (arrow) of the stent represents the site of the stricture. A safety catheter has been left within the stent. (b) A cholangiogram via the safety catheter 24 hours after stent placement demonstrated free flow into the duodenum with a satisfactory radiological result. The safety catheter can now be withdrawn. (Reproduced with permission from Watkinson, A.F. and Adam A. (1996) Interventional radiology: a practical guide, published by Radcliffe Medical Press, Oxford.)
Figure 11. A 65-year-old woman with gallbladder carcinoma. The cholangiogram shows an internal-external biliary drainage catheter which has been capped and allows drainage from the obstructed ducts through side-holes into the catheter and then down the lumen of the catheter to the duodenum.

Figure 14.3 Large number of pigment stones removed from one patient with RPC.
Figure 14.4  Typical truncated biliary tree appearance together with the arrow or spear head sign (arrow) on ERC. A large stent is in the left duct.

Fig. 25.5  Normal T-tube cholangiogram.
Fig. 25.6 T-tube cholangiogram. Large stone in lower CBD.

Fig. 25.9 Endoscopic removal of gallstone with Dormia basket.
Fig. 25.30  PTC. Cholangiocarcinoma of common duct.

Fig. 25.32  PTC. Portal mass of malignant lymph nodes with dilated intrahepatic ducts. Previous gastric carcinoma.
Fig. 25.33 PTC. Carcinoma of the head of the pancreas obstructing the common duct.

Fig. 25.34 PTC. Gallstone impacted at lower end of CBD. A second stone (arrows) is present in the dilated duct, and there is a stone in the gallbladder.
Fig. 25.35 ERCP. Chronic pancreatitis. Long smooth stricture of the common duct.

Fig. 25.36 PTC. Very large stone in dilated common duct. The intrahepatic ducts are dilated.
Fig. 25.37  PTC. Sclerosing cholangitis in 18-year-old male with Crohn's disease and jaundice.

Fig. 25.38  PTC. Suppurative cholangitis with multiple abscesses following failed endoscopic stent insertion for malignant stricture.
Figure 35-8
Cholangiogram showing retained bile duct stones (arrow) with luencies in the distal duct. A nasobiliary drain has been placed to ensure biliary drainage and to facilitate cholangiography for extracorporeal shockwave lithotripsy (ESWL).

Figure 35-14
Iatrogenic biliary stricture at the liver hilum following a laparoscopic cholecystectomy. The injury is in the vicinity of multiple surgical clips.
Figure 35-15
Anastomotic bile duct stricture seen at the junction of the donor and recipient bile ducts after an orthotopic liver transplantation. This cholangiogram also shows a leak caused by the presence of the T-tube track, a problem that is not uncommon in these chronically immunosuppressed patients. (From Balthazar EJ: Gastrointestinal Endoscopy: Beyond the Basics, Boston, MA: Butterworth-Heinemann, 1997.)

Figure 35-16
Complete transaction of the extrahepatic bile duct, an iatrogenic injury resulting from laparoscopic cholecystectomy.
Figure 35-17
Mintz's syndrome. The smooth, extrinsic compression of the common hepatic duct mimics malignancy, but in this case it is due to the presence of a stone lodged in the cystic duct or the neck of the gallbladder.

Figure 35-23
Malleable forceps being used at endoscopic retrograde cholangiopancreatography to biopsy a low bile duct tumor.