Management of Acute Cholecystitis and Cholangitis

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Case 1

- F/65
- C/C: RUQ pain (2DA)
- V/S: 110/80-115-20-37°C
- CBC: 9,420-10.8-230k CRP: 8.8
- AST/ALT: 25/12 T/D-bil: 1.4/0.4 ALP/GGT: 85/13
- RUQ tenderness(+)
What is the presumptive diagnosis?

1. Biliary pain
2. Acute acalculous cholecystitis
3. Acute calculous cholecystitis
4. Chronic cholecystitis
5. Emphysematous cholecystitis
Natural history and complications of gallstones

1. Asymptomatic stone (75%)
2. Stone intermittently obstructing cystic duct, causing intermittent biliary pain (20%)
3. Stone impacted in cystic duct, causing acute cholecystitis (10%)
4. Stone in the cystic duct compressing or fistulizing into the bile duct, causing Mirizzi's syndrome (<0.1%)
5. Stone impacted in distal bile duct, causing jaundice, biliary-type pain, and risk of ascending cholangitis or acute biliary pancreatitis (5%)
6. Stone eroding through gallbladder into duodenum, resulting in cholecystoenteric fistula (prerequisite for gallstone ileus) and leading in some cases to Bouveret's syndrome (gastric outlet obstruction) (<0.1%)
7. Long-standing cholelithiasis, resulting in gallbladder carcinoma (<0.1%)

Diagnostic criteria for acute cholecystitis

Table 1 TG13 diagnostic criteria for acute cholecystitis

A. Local signs of inflammation etc.
   (1) Murphy’s sign, (2) RUQ mass/pain/tenderness

B. Systemic signs of inflammation etc.
   (1) Fever, (2) elevated CRP, (3) elevated WBC count

C. Imaging findings
   Imaging findings characteristic of acute cholecystitis

Suspected diagnosis: One item in A + one item in B
Definite diagnosis: One item in A + one item in B + C

Acute hepatitis, other acute abdominal diseases, and chronic cholecystitis should be excluded

RUQ right upper abdominal quadrant, CRP C-reactive protein, WBC white blood cell

Ref. Updated Tokyo Guidelines for acute cholangitis and acute cholecystitis, 2013
Abdomen ultrasonography

- Thickening of the GB wall (>0.3 cm)
- Pericholecystic fluid
- Enlarged gallbladder
- Gallstones
- Ultrasonographic Murphy's sign
  - Superior to the ordinary Murphy's sign (possible to press the GB accurately)
- Sensitivity: 50~88%
- Specificity: 80~88%
Clinical features of Gallstone disease

<table>
<thead>
<tr>
<th></th>
<th>Biliary pain</th>
<th>Acute cholecystitis</th>
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</table>
| **Pathophysiology** | intermittent obstruction  
No inflammation | impacted stones  
Acute inflammation |
| **Symptoms**    | poorly localized (epi/RUQ)  
1-6 hours | localized pain (RUQ)  
>6 hours  
75% (preceding biliary pain) |
| **Physical findings** | often normal | fever  
RUQ tenderness  
Palpable GB |

What is your next plan?

1. Check abdominal CT
2. Urgent gallbladder drainage
3. Emergency laparoscopic cholecystectomy
4. Early laparoscopic cholecystectomy
5. Delayed laparoscopic cholecystectomy
Severity grading for acute cholecystitis

Table 4 TG13 severity grading for acute cholecystitis

**Grade III (severe) acute cholecystitis**

Associated with dysfunction of any one of the following organs/systems:

1. Cardiovascular dysfunction
   - Hypotension requiring treatment with dopamine ≥ 5 μg/kg per min, or any dose of norepinephrine
2. Neurological dysfunction
   - Decreased level of consciousness
3. Respiratory dysfunction
   - PaO₂/FiO₂ ratio < 300
4. Renal dysfunction
   - Oliguria, creatinine > 2.0 mg/dl
5. Hepatic dysfunction
   - PT-INR > 1.5
6. Hematological dysfunction
   - Platelet count < 100,000/mm³

**Grade II (moderate) acute cholecystitis**

Associated with any one of the following conditions:

1. Elevated white blood cell count (≥ 18,000/mm³)
2. Palpable tender mass in the right upper abdominal quadrant
3. **Duration of complaints** > 72 h
4. Marked local inflammation (gangrenous cholecystitis, pericholecystic abscess, hepatic abscess, biliary peritonitis, emphysematous cholecystitis)

**Grade I (mild) acute cholecystitis**

Does not meet the criteria of “Grade III” or “Grade II” acute cholecystitis. Grade I can also be defined as acute cholecystitis in a healthy patient with no organ dysfunction and mild inflammatory changes in the gallbladder, making cholecystectomy a safe and low-risk operative procedure.

Ref. Updated Tokyo Guidelines for acute cholangitis and acute cholecystitis, 2013
Management

**Diagnosis and Severity Assessment by TG13 Guidelines**

- **Grade I (Mild)**: Antibiotics and General Supportive Care
  - Observation
  - Early LC
  - Delayed/Elective LC

- **Grade II (Moderate)**: Antibiotics and General Supportive Care
  - Advanced laparoscopic technique available
  - Successful therapy
  - Failure therapy
  - Urgent/early GB drainage

- **Grade III (Severe)**: Antibiotics and General Organ Support
  - Urgent/early GB drainage

**Treatment According to Grade and According to Response**

- Observation
- Early LC
- Emergency Surgery
- Delayed/Elective LC

**Notes**

- LC: laparoscopic cholecystectomy, GB: gallbladder
- ※ Performance of a blood culture should be taken into consideration before initiation of administration of antibiotics.
- † A bile culture should be performed during GB drainage.

Ref. Updated Tokyo Guidelines for acute cholangitis and acute cholecystitis, 2013
Case 2

- M/72
- C/C: RUQ pain (2DA)
- HT/DM (-/+)
- V/S: 90/70-115-20-36.4°C
- CBC: 11,800-11.3-147k CRP: 24.9
- BUN/Cr: 38/1.13 AST/ALT: 294/530 TB/DB: 4.0/2.9 ALP/GGT: 273/105
What is the most likely diagnosis?

1. Biliary pain
2. Acute acalculous cholecystitis
3. Acute calculous cholecystitis
4. Chronic cholecystitis
5. Emphysematous cholecystitis
Emphysematous cholecystitis

- DM, Elderly (Atherosclerosis of the cystic artery → Ischemia)
- Ischemia or gangrene of the gallbladder wall and infection by gas-producing organisms (C. welchii, C. perfringens, E. coli)

- Imaging
  - Gas within the gallbladder lumen
  - Dissecting within the gallbladder wall to form a gaseous ring
  - Gas forming in the pericholecystic tissues

- Treatment
  - Cholecystectomy + antibiotics
Case 3

- F/47
- C/C: RUQ pain, colicky (2DA)
- Multiple trauma d/t car accident (1WA)
- V/S: 160/75-98-24-38.3°C
- CBC: 16,420-11.8-330k CRP: 33.20
- BUN/Cr: 16/1.4 OT/PT: 48/42 TB/DB: 1.4/0.3 ALP/GGT: 95/43 PT-INR: 1.28
- RUQ tenderness (+)
Hepatobiliary US and AP-CT
What is the most likely diagnosis?

1. Biliary pain
2. Acute acalculous cholecystitis
3. Acute calculus cholecystitis
4. Chronic cholecystitis
5. Emphysematous cholecystitis
## Acute acalculous cholecystitis

<table>
<thead>
<tr>
<th>TECHNIQUE</th>
<th>FINDINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical examination</td>
<td>Right upper quadrant tenderness is helpful, if present, but is lacking in three quarters of cases. Unexplained fever, leukocytosis, or hyperamylasemia is frequently the only finding.</td>
</tr>
<tr>
<td>Ultrasonography</td>
<td>Thickened gallbladder wall (defined as &gt;4 mm) in the absence of ascites and hypoalbuminemia (defined as serum albumin &lt;3.2 g/dL)  Presence of sonographic Murphy’s sign (maximum tenderness over the ultrasonographically localized gallbladder)  Pericholecystic fluid collection  <em>Bedside availability is a major advantage</em></td>
</tr>
<tr>
<td>Computed tomography</td>
<td>Thickened gallbladder wall (defined as &gt;4 mm) in the absence of ascites and hypoalbuminemia  Pericholecystic fluid, subserosal edema (in the absence of ascites), intramural gas, or sloughed mucosa  <em>Best test for excluding other intra-abdominal diseases but requires moving the patient to a scanner</em></td>
</tr>
<tr>
<td>Hepatobiliary scintigraphy</td>
<td>Nonvisualization of the gallbladder with normal excretion of radionuclide into the bile duct and duodenum indicates a positive result for acute cholecystitis  Results in critically ill, immobilized patients may be falsely positive because of viscous bile  Morphine augmentation may reduce the number of false-positive results (see text)  <em>Better at excluding than confirming acute cholecystitis</em></td>
</tr>
</tbody>
</table>
Next confirmative diagnostic test?

1. EUS
2. ERCP
3. MRI with MRCP
4. Radioisotope scan
5. No need for further test
Radioisotope scans (HIDA, DIDA, etc)

- Technetium-labeled hepatobiliary iminodiacetic acid (HIDA)
- Uptake by the liver, excreted into the biliary tract, and concentrated in the gallbladder.
- The failure of the gallbladder to fill within 60 min after administration → cystic duct obstruction (Normal: within 30 min)
- Sensitivity: 80–90% for acute cholecystitis
- Most specific test for acute cholecystitis
- US is preferred as the first test
  - Immediate availability and easy access
  - A lack of interference by elevated serum bilirubin levels (since cholestasis interferes with biliary excretion of the agents used for scintigraphy)
  - The absence of ionizing radiation
  - Provide information regarding the presence of stones
Acute acalculous cholecystitis

**TABLE 158-8**

**RISK FACTORS AND ORGANISMS ASSOCIATED WITH ACALCULOUS CHOLECYSTITIS**

<table>
<thead>
<tr>
<th>RISK FACTORS</th>
<th>ORGANISMS IMPLICATED AS A PRIMARY CAUSE</th>
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<tbody>
<tr>
<td>Fasting</td>
<td>Salmonella typhi</td>
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<tr>
<td>Total parenteral nutrition</td>
<td>Vibrio cholerae</td>
</tr>
<tr>
<td>Septicemia, biliary infections</td>
<td>Staphylococcus</td>
</tr>
<tr>
<td>Major trauma</td>
<td>Leptospira</td>
</tr>
<tr>
<td>Burns</td>
<td>Listeria</td>
</tr>
<tr>
<td>Major nonbiliary surgery</td>
<td>Pneumocystis carinii</td>
</tr>
<tr>
<td>Childbirth</td>
<td>Mycobacterium spp</td>
</tr>
<tr>
<td>Multiple blood transfusions</td>
<td>Cytomegalovirus</td>
</tr>
<tr>
<td>Mechanical ventilation</td>
<td>Candida</td>
</tr>
<tr>
<td>Opiates</td>
<td>Ascaris</td>
</tr>
<tr>
<td>Immunosuppression—chemotherapy, HIV infection, transplantation</td>
<td>Echinococcus</td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
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<tr>
<td>Ischemic heart disease</td>
<td></td>
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<tr>
<td>Malignancy</td>
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</tr>
</tbody>
</table>

- 3.7-14% of acute cholecystitis
- Treatment
  - IV fluid, antibiotics
  - Urgent cholecystectomy
  - **± Cholecystostomy**
  - gangrene and perforation are more common
- Mortality: 5-20%
Case 4

- M/82
- C/C: Epigastric pain (1MA) & fever (1DA)
- S/P pacemaker insertion for sick sinus syndrome (7YA)
- CVA (10YA), DM (+)
- V/S: 84/50-87-19-38.8°C
- CBC: 17,550-16.9-197k CRP: 27.80
- BUN/Cr: 36/2.1 AST/ALT: 45/32 TB/DB: 2.1/1.4 ALP/GGT: 90/48 PT-INR: 1.33
What is your next plan?

1. ERBD (Endoscopic retrograde biliary drainage)
2. ENBD (Endoscopic nasobiliary drainage)
3. PTBD (Percutaneous transhepatic biliary drainage)
4. PTGBD (Percutaneous transhepatic gallbladder drainage)
5. Emergency laparoscopic cholecystectomy
Management

Diagnosis and Severity Assessment by TG13 Guidelines

Grade I (Mild)
- Antibiotics and General Supportive Care

Grade II (Moderate)
- Antibiotics and General Supportive Care

Grade III (Severe)
- Antibiotics and General Organ Support

Treatment According to Grade and According to Response

Observation
- Early LC

Emergency Surgery
- Successful therapy
  - Delayed/Elective LC
- Failure therapy
  - Urgent/Early GB drainage

Ex: Advanced laparoscopic technique available

LC: Laparoscopic cholecystectomy, GB: Gallbladder
※ Performance of a blood culture should be taken into consideration before initiation of administration of antibiotics.
† A bile culture should be performed during GB drainage.

Ref. Updated Tokyo Guidelines for acute cholangitis and acute cholecystitis, 2013
Case 5

• F/28
• C/C : epigastric pain (3HA)
• s/p hysterectomy, appendectomy
• Postprandial recurrent epigastric pain with febrile sense, 6 months age
• V/S : 126/71-70-18-36.7°C
• CBC : 7,990-14.7-321k CRP : 1.3
• BUN/Cr : 11/0.59 AST/ALT : 74/103 TB/DB : 2.2/1.5
  ALP/GGT : 77/405 PT-INR : 0.94 Amy/lipase : 71/97
What is your next plan?

1. EUS
2. MRCP
3. ERCP
4. AOV manometry
5. Hepatobiliary scintigraphy
# Imaging studies of the biliary tract

<table>
<thead>
<tr>
<th>TECHNIQUE</th>
<th>CONDITION TESTED FOR</th>
<th>FINDINGS/COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultrasonography</td>
<td>Cholelithiasis</td>
<td>Stones manifest as mobile, dependent echogenic foci within the gallbladder lumen with acoustic shadowing. Sludge appears as layering echogenic material without shadows. Sensitivity rate &gt;95% for stones &gt;2 mm. Specificity rate &gt;95% for stones with acoustic shadows. Rarely, a stone-filled gallbladder may be contracted and difficult to see, with a “wall-echo-shadow” sign. <strong>Best single test for stones in the gallbladder</strong>.</td>
</tr>
<tr>
<td></td>
<td>Choledocholithiasis</td>
<td>Stones are seen in BD in only ≈50% of cases but can be inferred from the finding of a dilated BD (&gt;6 mm diameter), with or without gallstones, in another ≈25% of cases. <strong>Can confirm, but not exclude, BD stones</strong>.</td>
</tr>
<tr>
<td></td>
<td>Acute cholecystitis</td>
<td>Ultrasonographic Murphy’s sign (focal gallbladder tenderness under the transducer) has a positive predictive value of &gt;90% in detecting acute cholecystitis when stones are seen. Pericholecystic fluid (in the absence of ascites) and gallbladder wall thickening to &gt;4 mm (in the absence of hypoalbuminemia) are nonspecific findings but are suggestive of acute cholecystitis.</td>
</tr>
<tr>
<td></td>
<td>Choledocholithiasis</td>
<td>Highly accurate for excluding or confirming stones in the BD. Concordance of EUS with the ERCP diagnosis =95%; many studies suggest slightly higher sensitivity rates for EUS than for ERCP. Specificity rate ≈97%. Positive predictive value =99%, negative predictive value =98%, accuracy rate =97%. With experienced operators, EUS can be used in lieu of ERCP to exclude BD stones, particularly when the clinical suspicion is low or intermediate. <strong>Considered for patients with a low-to-moderate clinical probability of choledocholithiasis</strong>.</td>
</tr>
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</table>

# Imaging studies of the biliary tract

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Condition</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERCP</td>
<td>Choledocholithiasis</td>
<td>ERCP is the standard diagnostic test for stones in the BD, with sensitivity and specificity rates of ≥95%. Use of ERCP to extract stones (or at least to drain infected bile) is life-saving in severe cholangitis and reduces the need for BD exploration at the time of cholecystectomy. Recommended for patients with a high clinical probability of choledocholithiasis.</td>
</tr>
<tr>
<td></td>
<td>Cholelithiasis</td>
<td>When contrast agent flows retrograde into the gallbladder, stones appear as filling defects and can be detected with a sensitivity rate of ≥80%, but ultrasonography remains the mainstay for confirming cholelithiasis.</td>
</tr>
<tr>
<td>MRCP</td>
<td>Choledocholithiasis</td>
<td>Rapid, noninvasive modality that provides detailed bile duct and pancreatic duct images equal to those of ERCP. Sensitivity rate = 91% and specificity rate = 94%, comparable with those for ERCP. Useful for examining nondilated ducts, particularly at the distal portion, which often is not well visualized by ultrasonography. Adjacent structures such as liver and pancreas can be examined at the same time. Recommended for patients with a low-to-moderate clinical probability of choledocholithiasis.</td>
</tr>
<tr>
<td>CT</td>
<td>Complications of gallstones</td>
<td>Not well suited for detecting uncomplicated stones, but excellent for detecting complications, such as abscess, perforation of the gallbladder or BD, and pancreatitis. Spiral CT may prove useful as a noninvasive means of excluding BD stones; some studies suggest improved diagnostic accuracy when CT is combined with an oral cholecystographic contrast agent.</td>
</tr>
</tbody>
</table>

BD, bile duct; CT, computed tomography; ERCP, endoscopic retrograde cholangiopancreatography; EUS, endoscopic ultrasonography; MRCP, magnetic resonance cholangiopancreatography.

*Performed infrequently nowadays.

Case 6

- M/75
- C/C: Epigastric pain (3DA)
- S/P TG with Roux-en-Y anastomosis d/t EGC (10YA)
- V/S: 79/56–75–22–36.7°C
- CBC: 28,500-13.7-103k CRP: 18.00
- BUN/Cr: 30/1.02 AST/ALT: 412/403 TB/DB: 8.1/5.0
- ALP/GGT: 142/455 PT-INR: 1.39
What is your treatment plan?

1. PCD
2. ERCP
3. PTBD
4. PTGBD
5. Emergency operation
PTBD and stone extraction
Diagnostic criteria for acute cholangitis

Table 1 TG13 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

Note:
A-2: Abnormal white blood cell counts, increase of serum C-reactive protein levels, and other changes indicating inflammation
B-2: Increased serum ALP, γGTP (GGT), AST and ALT levels.

Other factors which are helpful in diagnosis of acute cholangitis include abdominal pain [right upper quadrant (RUQ) or upper abdominal] and a history of biliary disease such as gallstones, previous biliary procedures, and placement of a biliary stent.

In acute hepatitis, marked systematic inflammatory response is observed infrequently. Virological and serological tests are required when differential diagnosis is difficult.

Thresholds

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
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<tbody>
<tr>
<td>A-1</td>
<td>Fever</td>
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<tr>
<td>A-2</td>
<td>Evidence of inflammatory response</td>
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<td></td>
<td></td>
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<tr>
<td>B-1</td>
<td>Jaundice</td>
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<tr>
<td>B-2</td>
<td>Abnormal liver function tests</td>
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Management

Diagnosis and Severity Assessment by TG13 Guidelines

- **Grade I (Mild)**
  - Antibiotics and General Supportive Care

- **Grade II (Moderate)**
  - Early Biliary Drainage
  - Antibiotics
  - General Supportive Care

- **Grade III (Severe)**
  - Urgent Biliary Drainage
  - Organ Support
  - Antibiotics

Treatment According to Grade, According to Response, and According to Need for Additional Therapy

- Finish course of antibiotics
- Biliary Drainage

Treatment for etiology
- if still needed
  - (Endoscopic treatment, percutaneous treatment, or surgery)

※ Performance of a blood culture should be taken into consideration before initiation of administration of antibiotics. A bile culture should be performed during biliary drainage.

† Principle of treatment for acute cholangitis consists of antimicrobial administration and biliary drainage including treatment for etiology. For patient with choledocholithiasis, treatment for etiology might be performed simultaneously, if possible, with biliary drainage.
Thank you for listening