Chapter 35
Approach to Cholangitis and Cholecystitis in the ICU

35.1 Introduction

Cholangitis and cholecystitis are acute biliary conditions commonly encountered in critically ill patients, requiring prompt diagnosis and intervention to prevent significant morbidity and mortality. Acute cholangitis results from an infection of the biliary system, typically secondary to obstruction by stones or strictures. Cholecystitis refers to the inflammation of the gallbladder, often caused by gallstones obstructing the cystic duct. Both conditions can lead to life-threatening complications, including sepsis, organ failure, and death if left untreated. This chapter outlines the evidence-based management of these conditions, incorporating recent guidelines such as the 2024 IDSA (Infectious Diseases Society of America) Guidelines and the ASGE (American Society of Gastrointestinal Endoscopy) Guidelines for cholangitis [1, 2] [Ref: Algorithm 35.1].

35.2 Initial Presentation and Resuscitation

Patients typically present with Charcot's Triad (fever, jaundice, right upper quadrant pain (RUQ)) for cholangitis and symptoms like RUQ pain, fever, nausea, and vomiting for cholecystitis. Early recognition and resuscitation are critical.

- Hemodynamic Instability: If the patient is hemodynamically unstable, the primary focus should be fluid resuscitation, antibiotics, and vasopressors. Patients with signs of sepsis must be stabilized with broad-spectrum antibiotics covering biliary pathogens, such as Gram-negative bacteria and anaerobes. The ASGE recommends starting antibiotics early as a bridge to definitive therapy.

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35.3 Diagnostic Approach and Imaging

First-Line Imaging

- Abdominal ultrasound (US) remains the first-line imaging modality, particularly in pregnant patients and those unable to tolerate contrast media. Ultrasound helps visualize biliary dilation, gallstones, and signs of cholecystitis, such as gallbladder wall thickening or pericholecystic fluid. For cholangitis, bile duct dilation is a critical finding [3, 4].

Advanced Imaging

- If the ultrasound is inconclusive, computed tomography (CT) scan or magnetic resonance cholangiopancreatography (MRCP) should be pursued. CT with intravenous contrast provides an excellent view of both the gallbladder and bile ducts, especially when MRCP is not available.
- MRCP is noninvasive and highly sensitive for detecting bile duct obstructions, stones, and biliary strictures, making it ideal for patients who cannot tolerate ERCP.
- In cases where acute cholangitis is suspected, early imaging and biliary decompression are vital to prevent worsening infection.

35.4 Assessing Severity: The Tokyo Guidelines

The Tokyo Guidelines provide a robust framework for assessing the severity of both cholangitis and cholecystitis, which informs treatment decisions.

- Mild Cholangitis: Characterized by a lack of organ dysfunction. These patients typically respond well to antibiotics and may not require immediate decompression.
- Moderate Cholangitis: Includes patients with a systemic inflammatory response or transient organ dysfunction. These patients require early biliary drainage.
- Severe Cholangitis: Involves organ failure, such as altered mental status, hypotension, or renal dysfunction. This is a medical emergency, requiring urgent drainage and intensive care.

In patients with cholecystitis, classification into mild, moderate, or severe guides treatment decisions, including the need for early surgery.

35.5 Treatment Strategies

35.5.1 Cholangitis Management

1. **ERCP Within 48 Hours:**
   - The ASGE guidelines emphasize performing endoscopic retrograde cholangiopancreatography (ERCP) within 48 hours of diagnosis in patients with confirmed cholangitis. ERCP serves as both a diagnostic and therapeutic tool, allowing for the removal of bile duct stones and biliary stent placement to relieve the obstruction.
   - In patients too unstable for a complete ERCP, biliary decompression alone (e.g., stent placement without stone removal) may be sufficient as an initial approach.
2. **Alternative Drainage Techniques:**
   - When ERCP is unavailable or delayed, or if the patient is too unstable to tolerate endoscopic procedures, percutaneous transhepatic biliary drainage (PTBD) offers a valuable alternative. PTBD is often used in ICU settings when surgical options are too risky or delayed, especially in critically ill patients.
   - Percutaneous biliary drainage involves placing a catheter into the bile ducts via the skin, which effectively decompresses the biliary system [5, 6].

35.5.2 Cholecystitis Management

1. **Early Laparoscopic Cholecystectomy:**
   - In stable patients diagnosed with cholecystitis, early laparoscopic cholecystectomy within 72 h is the treatment of choice. Early surgery reduces the risk of recurrent episodes and gallbladder perforation.
2. **Percutaneous Cholecystostomy:**
   - In patients who are poor surgical candidates due to severe comorbidities, percutaneous cholecystostomy is recommended as a bridging option. This procedure involves inserting a drainage catheter into the gallbladder to relieve pressure and infection, particularly in critically ill patients where immediate surgery poses a high risk.

Management in Special Populations

- Pregnancy: Ultrasound is the preferred imaging modality during pregnancy to avoid radiation exposure from CT. Surgery is generally deferred unless there is a risk of sepsis or gallbladder perforation.
- Elderly patients: Frail, elderly patients may not tolerate aggressive interventions. In these cases, conservative management with antibiotics and percutaneous drainage may be preferable.

Complications and Comorbidities

- Sepsis and Multiorgan Failure: Patients with cholangitis are at high risk for septic shock. In these cases, aggressive fluid resuscitation, broad-spectrum antibiotics, and early source control (via drainage or surgery) are paramount.
- Chronic Pancreatitis or Cholangiocarcinoma: These comorbidities complicate the management of biliary disease. If malignancy or chronic pancreatitis is suspected, referral for advanced imaging and possibly biopsy or additional surgical evaluation may be required [7].

35.6 Role of Antibiotics

Limiting systemic response and local inflammation and preventing hepatic abscess formation is the primary goal of antibiotics. Antibiotics can be given prophylactically in early, non-severe cases or therapeutic in severe cases or till the removal of the gall bladder. The most common pathogens involved in acute cholangitis are Gram-negative bacteria (especially *Escherichia coli*, *Klebsiella*, *Enterobacter*, and *Pseudomonas*), with some Gram-positive bacteria (e.g., *Enterococcus* species) and anaerobes also implicated in certain cases. Whereas Gram-negative organisms (e.g., *E. coli*), Gram-positive cocci (e.g., *Streptococcus* and *Enterococcus*), and anaerobes can complicate acute cholecystitis. Targeted organisms, local epidemiology and susceptibility data (antibiogram), alignment of in vitro activity (or spectrum) of the agents with these local data, characteristics of the agents such as pharmacokinetics and pharmacodynamics, and toxicities, renal and hepatic function, and any history of allergies and other adverse events with antimicrobial agent should guide the antimicrobial therapy.

Empiric antimicrobial therapy should target both Gram-negative organisms and anaerobes. Once culture results are available, antibiotic therapy should be adjusted to target the specific pathogens identified. If cholangitis is complicated (e.g., with sepsis, shock, or multi-organ failure), broader coverage may be required initially.

1. **Grade I and II Cholecystitis**:
    - **Therapy Duration**: Discontinue within 24 h after cholecystectomy.
    - **Extended Therapy**: If there are complications like perforation or necrosis, continue therapy for 4–7 days.

2. **Grade I and II Cholangitis**:
   - **Therapy Duration**: 4–7 days after infection source is controlled.
   - **Extended Therapy**: If bacteremia with Gram-positive cocci (*Enterococcus*, *Streptococcus*) is present, continue for a minimum of 2 weeks.
3. **Grade III Cholangitis and Cholecystitis**:
   - **Therapy Duration**: Minimum of 2 weeks if bacteremia with Gram-positive cocci is present.
   - **Extended Therapy**: Continue until any underlying issues (e.g., residual stones, bile duct obstruction, liver abscess) are resolved.
4. **Healthcare-Associated Cholangitis and Cholecystitis** (all grades):
   - **Therapy Duration**: Minimum of 2 weeks if bacteremia with Gram-positive cocci is present.
   - **Extended Therapy**: Continue until resolution of any anatomical issues or liver abscesses.
1. **Community-Acquired Biliary Infections:**
   - **Grade I (Mild)**:
     - **Penicillin-Based Therapy**: Not recommended if >20% resistance to *E. coli* (Ampicillin/sulbactam).
     - **Cephalosporin-Based Therapy**: Cefazolin, Cefuroxime, Ceftriaxone, Cefotaxime ± Metronidazole.
     - **Carbapenem-Based Therapy**: Ertapenem.
     - **Fluoroquinolone-Based Therapy**: Ciprofloxacin, Levofloxacin, Pazufloxacin ± Metronidazole.
   - **Grade II (Moderate)**:
     - **Penicillin-Based Therapy**: Piperacillin/tazobactam.
     - **Cephalosporin-Based Therapy**: Ceftriaxone, Cefotaxime, Cefepime, or Ceftazidime ± Metronidazole.
     - **Carbapenem-Based Therapy**: Ertapenem.
     - **Fluoroquinolone-Based Therapy**: Ciprofloxacin, Levofloxacin, or Pazufloxacin ± Metronidazole.
   - **Grade III (Severe)**:
     - **Penicillin-Based Therapy**: Piperacillin/tazobactam.
     - **Cephalosporin-Based Therapy**: Cefepime, Ceftazidime ± Metronidazole.
     - **Carbapenem-Based Therapy**: Imipenem/cilastatin, Meropenem, or Doripenem.
     - **Monobactam-Based Therapy**: Aztreonam± Metronidazole.
     - **Fluoroquinolone-Based Therapy**: Moxifloxacin, Ciprofloxacin, Levofloxacin with Metronidazole.

2. **Healthcare-Associated Biliary Infections (All Grades):**

- **Penicillin-Based Therapy**: Piperacillin/tazobactam.
- **Cephalosporin-Based Therapy**: Cefepime, Ceftazidime ± Metronidazole.
- **Carbapenem-Based Therapy**: Imipenem/cilastatin, Meropenem, or Doripenem.
- **Monobactam-Based Therapy**: Aztreonam ± Metronidazole.
- **Vancomycin** is recommended for **Grade III** community-acquired and healthcare-associated infections to cover *Enterococcus* spp. If vancomycin resistance (VRE - Vancomycin resistant *Enterococcus*) is a concern, **Linezolid** or **Daptomycin** should be used.
- **Anti-anerobic therapy** (e.g., Metronidazole, Tinidazole) is necessary if there is a biliary-enteric anastomosis.
- **Fluoroquinolones** are recommended for patients with beta-lactam allergies or when the susceptibility of cultured isolates is known.

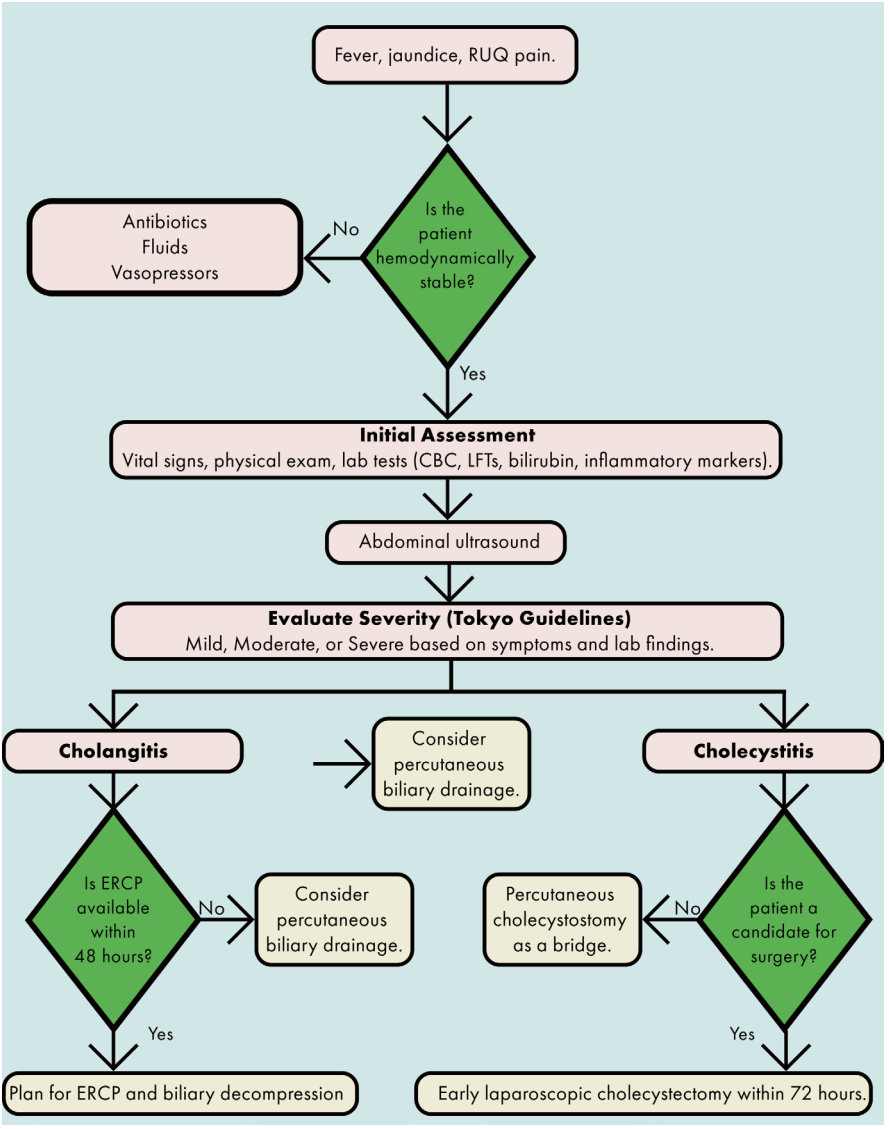
35.7 Outcomes and Mortality

The outcomes in cholangitis and cholecystitis depend heavily on early intervention. Mortality rates for severe cholangitis range from 10% to 40%, particularly in cases where biliary decompression is delayed. Early ERCP within 48 h significantly reduces mortality, morbidity, and the length of hospitalization compared to delayed intervention.

35.8 Conclusion

The management of cholangitis and cholecystitis in the ICU is guided by early recognition, appropriate imaging, and timely interventions such as ERCP or percutaneous drainage. The 2024 IDSA guidelines and ASGE guidelines provide a strong framework for diagnostic and therapeutic decision-making, while the Tokyo Guidelines help assess severity and guide treatment. Ultimately, early biliary decompression, whether through ERCP or percutaneous drainage, remains the cornerstone of managing these conditions and reducing mortality.

Algorithm 35.1: Approach to cholangitis and cholecystitis in the ICU



Bibliography

1. Carbone M, et al. Position paper of the Italian Association for the Study of the liver (AISF): management and treatment of primary biliary cholangitis. Dig Liver Dis. 2024;56(9):1461–74.
2. Bonomo RA, Edwards MS, Abrahamian FM, Bessesen M, Chow AW, Dellinger EP, et al. Clinical practice guideline update by the infectious diseases Society of America on complicated intraabdominal infections: diagnostic imaging of suspected acute cholecystitis and acute cholangitis in adults, children, and pregnant people. Clin Infect Dis. 2024;79(Supplement_3):S104–8.
3. Chazouilleres O, Beuers U, Bergquist A, Karlsen TH, EASL clinical practice guidelines on sclerosing cholangitis. J Hepatol. 2022;77(3):761–806.
4. Bonomi A, Overdevest AG, Busch OR, Kazemier G, Zonderhuis BM, Erdmann JI, et al. Towards a 'step-up approach' for the treatment of recurrent non-stenotic cholangitis after hepaticojejunostomy: systematic review. HPB (Oxford). 2024;26(9):1114–22.
5. Kimura Y, Takada T, Kawarada Y, Nimura Y, Hirata K, Sekimoto M, et al. Definitions, pathophysiology, and epidemiology of acute cholangitis and cholecystitis: Tokyo guidelines. J Hepato-Biliary-Pancreat Surg. 2007;14(1):15–26.
6. Lindor KD, Bowlus CL, Boyer J, Levy C, Mayo M. Primary biliary cholangitis: 2018 practice guidance from the American Association for the study of liver diseases. Hepatology. 2019;69(1):394–419.
7. Buxbaum JL, Buitrago C, Lee A, Elmunzer BJ, Riaz A, Ceppa EP, et al. ASGE guideline on the management of cholangitis. Gastrointest Endosc. 2021;94(2):207–21.