

# Chapter 46

## Approach to Jaundice in the ICU



### 46.1 Introduction

Jaundice in the ICU is a frequent yet complex clinical issue, reflecting a spectrum of underlying hepatic and systemic disorders. It is defined by the yellowish discoloration of the skin and sclera due to elevated bilirubin levels, typically noticeable when serum bilirubin exceeds 2.5–3 mg/dL. Jaundice can be a marker of liver dysfunction, systemic infections like sepsis, or other critical illnesses, requiring a systematic approach to diagnosis and management. This chapter provides an in-depth analysis of the pathophysiology, diagnostic strategies, and management of jaundice in critically ill patients [1, 2]. [Ref: Algorithm 46.1].

### 46.2 Pathophysiology and Classification of Hyperbilirubinemia

Mechanisms of Hyperbilirubinemia:

- Bilirubin metabolism involves the breakdown of heme from red blood cells into unconjugated bilirubin, which is transported to the liver. Hepatocytes convert this into conjugated bilirubin through the action of the enzyme UDP-glucuronosyltransferase (UGT). Conjugated bilirubin is then excreted into bile ducts. Disruptions at any stage—ranging from hemolysis to impaired hepatic conjugation or biliary obstruction—can lead to different forms of jaundice.
- Unconjugated hyperbilirubinemia occurs when there is increased bilirubin production (e.g., hemolysis, resorption from hematomas) or impaired hepatic uptake/conjugation (e.g., Gilbert syndrome). It is characterized by elevated indirect bilirubin.

- Conjugated hyperbilirubinemia suggests hepatocellular dysfunction or cholestasis, where conjugated bilirubin cannot be effectively secreted into the bile ducts, leading to elevated direct bilirubin levels.

*Comprehensive Classification:*

Jaundice can be classified into:

- Intrahepatic Causes: Hepatocellular injury due to viral hepatitis, sepsis-induced cholestasis, total parenteral nutrition (TPN) related cholestasis, or drug-induced liver injury.
- Extrahepatic Causes: Mechanical obstruction from choledocholithiasis, strictures, or tumors compressing the biliary tree. Differentiating between these is crucial for guiding further imaging and interventions.

### 46.3 Diagnostic Approach: Tests and Imaging

Laboratory Evaluation:

- Liver Function Tests (LFTs): Evaluate levels of alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), gamma glutamyl transferase (GGT), and bilirubin (direct and total). Elevated ALP with GGT suggests a hepatobiliary origin, while a marked rise in AST/ALT indicates hepatocellular injury.
- Markers of Liver Function and Synthetic Capacity: PT/INR and albumin levels assess the liver's ability to synthesize proteins and clotting factors. Elevated INR with low albumin may indicate chronic liver disease.
- Hemoglobin Levels, Haptoglobin Levels, Peripheral Smear Comment, Reticulocyte Count, Lactate Dehydrogenase Levels, Coombs Test: To diagnose and identify hemolysis.

Imaging Modalities:

- Ultrasound: The initial imaging choice due to its high specificity for identifying gallstones and bile duct dilation. It is noninvasive and suitable for unstable ICU patients.
- Magnetic Resonance Cholangiopancreaticography (MRCP) and Computed Tomography (CT): Recommended if ultrasound is inconclusive or for better visualization of the biliary tree and pancreatic structures. MRCP is noninvasive and avoids radiation, making it a good alternative to Endoscopic retrograde cholangiopancreaticography (ERCP) in certain cases.
- ERCP/Percutaneous Transhepatic Catheter (PTC): Used for both diagnosis and therapeutic intervention in cases of confirmed biliary obstruction. ERCP is preferred for stone removal and stent placement, while PTC may be required if ERCP is unsuccessful.

## 46.4 Management Strategies for ICU-Associated Jaundice

Obstructive Jaundice:

- Choledocholithiasis and Cholangitis: ERCP for stone removal and biliary drainage is essential. Early intervention can prevent sepsis and reduce the risk of complications like biliary peritonitis.
- Malignancies: Surgical intervention or stenting may be needed for tumors causing biliary obstruction. Biopsy during ERCP can help confirm the diagnosis.

Nonobstructive Jaundice:

- Sepsis-Induced Cholestasis: Treat underlying infections with appropriate antibiotics and manage septic shock with fluid resuscitation and vasopressors. Early source control is critical.
- TPN-Related Cholestasis: Transitioning from continuous to cyclic TPN can mitigate liver damage. Emphasize early enteral feeding where possible to reduce reliance on TPN.
- Shock Liver (Ischemic Hepatitis): Focus on restoring hemodynamic stability through aggressive fluid resuscitation and the use of inotropes to improve liver perfusion.

ICU-Specific Challenges:

- Hemodynamic Management: Avoid excessive use of positive end-expiratory pressure (PEEP) in mechanically ventilated patients, as this can reduce liver perfusion and exacerbate hepatic congestion. Adjust vasoactive medications carefully to balance cardiac output and liver blood flow.

## 46.5 Prognostic Implications and Complications

Prognosis of Persistent Jaundice:

- Persistent jaundice in critically ill patients is associated with increased morbidity and mortality, often indicating underlying sepsis or multi-organ dysfunction. Monitoring trends in bilirubin levels and liver enzymes can help assess the progression of underlying disease.
- Multi-organ Failure: Jaundice that worsens despite intervention may indicate impending or ongoing multi-organ failure, necessitating prompt escalation of care and consideration for liver support therapies or referral for transplantation.

Managing Complications:

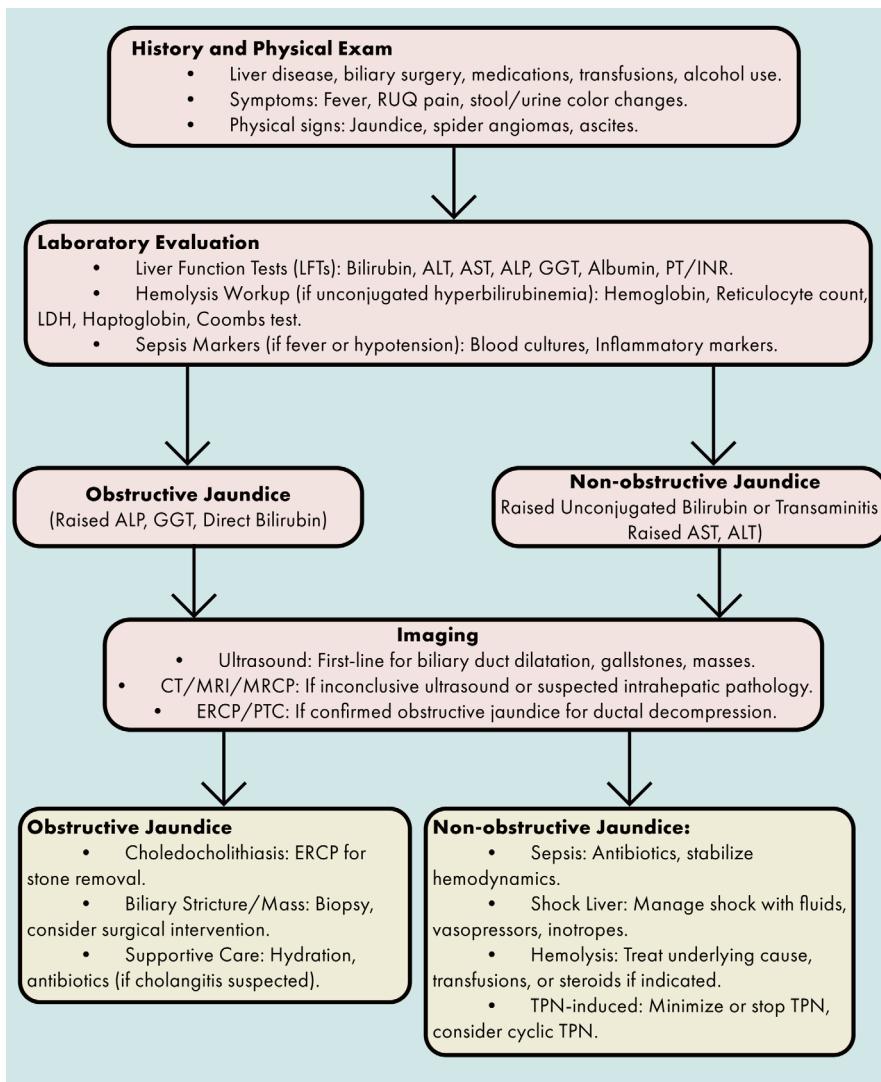
- Biliary Sepsis: Requires urgent biliary decompression via ERCP or PTC and broad-spectrum antibiotics targeting common gram-negative organisms.

- Hepatic Encephalopathy: In severe cases of hyperbilirubinemia, particularly with synthetic dysfunction, hepatic encephalopathy may develop. Management includes lactulose to reduce ammonia levels and close monitoring for neurological changes.

## 46.6 Conclusion

Managing jaundice in the ICU requires a thorough understanding of its pathophysiology, a structured diagnostic approach, and tailored therapeutic strategies. Clinicians should be equipped to differentiate between obstructive and nonobstructive causes and to address the specific needs of critically ill patients, using updated clinical guidelines. Recognizing the potential complications of persistent jaundice and intervening appropriately can significantly impact patient outcomes, emphasizing the importance of a systematic and informed approach.

### Algorithm 46.1: Approach to jaundice in the ICU



### Bibliography

- Bansal V, Schuchert VD. Jaundice in the intensive care unit. *Surg Clin North Am*. 2006;86(6):1495–502.
- Gondal B, Aronsohn A. A systematic approach to patients with jaundice. *Semin Intervent Radiol*. 2016;33(4):253–8.