GALLSTONE DISEASE

A Clinical and Surgical Review for Postgraduate Students

Epidemiology • Pathophysiology • Clinical Spectrum
Investigations • Evidence-Based Management
Complications • Special Situations • Current Guidelines

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A concise, examination-oriented text for postgraduate trainees in surgery, medicine and gastroenterology

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Learning Objectives

LEARNING OBJECTIVES

Describe the applied anatomy of the biliary tract relevant to gallstone disease and its surgery.

Classify gallstones by composition and explain the pathogenesis of each type.

Recognise and differentiate the clinical spectrum of gallstone disease, from asymptomatic cholelithiasis to cholangitis and gallstone pancreatitis.

Select and interpret appropriate imaging and laboratory investigations.

Apply the Tokyo Guidelines (TG18) severity grading to acute cholecystitis.

Outline an evidence-based, guideline-concordant management plan, including timing of cholecystectomy and options for common bile duct clearance.

Anticipate and manage the complications of gallstone disease and its treatment.

Adapt management in special situations — pregnancy, the elderly, and cirrhosis.

1. Introduction and Definitions

Gallstones (cholelithiasis) are solid concretions that form within the gallbladder, or less commonly within the bile ducts, from constituents of bile. They represent one of the commonest surgical problems encountered worldwide and are a leading indication for elective abdominal surgery. **Cholelithiasis** refers to stones within the gallbladder; **choledocholithiasis** refers to stones within the common bile duct (CBD), which may be primary (formed de novo in the duct, typically pigment stones associated with stasis or infection) or, far more commonly, secondary (migrated from the gallbladder). The clinical importance of gallstone disease lies not in the stones themselves but in the spectrum of complications they may produce — biliary colic, acute cholecystitis, cholangitis, gallstone pancreatitis and, rarely, gallstone ileus or gallbladder malignancy — each of which carries a distinct diagnostic and management pathway that the postgraduate trainee must be able to apply confidently on call.

2. Applied Surgical Anatomy of the Biliary Tract

The gallbladder is a pear-shaped reservoir, 7–10 cm long, lying in a fossa on the visceral surface of the liver between hepatic segments IVb and V. It is described in four parts — fundus, body, infundibulum and neck — the neck continuing into the cystic duct, which characteristically contains the spiral valves of Heister. The cystic duct joins the common hepatic duct to form the common bile duct (CBD), which passes through the free edge of the lesser omentum (with the hepatic artery to its left and the portal vein posteriorly), behind the first part of the duodenum, and through the head of the pancreas before joining the main pancreatic duct at the ampulla of Vater, guarded by the sphincter of Oddi, to open into the second part of the duodenum.

Calot's triangle (the hepatobiliary/cystohepatic triangle) — bounded by the cystic duct inferolaterally, the common hepatic duct medially, and the inferior edge of the liver superiorly — contains the cystic artery (usually a branch of the right hepatic artery) and is the critical zone dissected during cholecystectomy to achieve the **"critical view of safety"** (Strasberg criteria) and avoid bile duct injury. Anatomical variants of the cystic duct and hepatic arterial anastomosis are common and must always be anticipated.

3. Epidemiology and Risk Factors

Gallstone disease affects an estimated 10–15% of adults in Western populations, with wide geographic and ethnic variation; prevalence is highest in Native American and Hispanic populations and lowest in sub-Saharan Africa and parts of Asia, although rates are rising in urbanising Asian populations in parallel with obesity and metabolic syndrome. A pooled global meta-analysis of population studies published in 2024 confirmed a rising overall prevalence over the past two decades, attributed largely to increasing obesity, sedentary lifestyle and an ageing population, with women affected roughly twice as often as men during reproductive years. Most gallstones (roughly 80%) remain asymptomatic throughout life; the cumulative risk of developing symptoms in a patient with known asymptomatic gallstones is approximately 1–2% per year.

Established Risk Factors — the "classic" and expanded mnemonics

The traditional teaching mnemonic "**5 F's**" (Female, Forty, Fertile, Fat, Family history) remains a useful memory aid but is now understood as an incomplete simplification of a much broader risk profile:

Category	Key risk factors
Non-modifiable	Female sex, age >40 years, family history / genetic predisposition (e.g., ABCG5/G8, cystic fibrosis transmembrane conductance regulator variants), ethnicity (Native American, Hispanic)
Metabolic / hormonal	Obesity and metabolic syndrome, rapid weight loss or bariatric surgery, pregnancy and multiparity, oestrogen therapy / oral contraceptives, diabetes mellitus, hypertriglyceridaemia
Gastrointestinal	Terminal ileal disease or resection (Crohn's disease), total parenteral nutrition, prolonged fasting, vagotomy
Haematological (pigment stones)	Chronic haemolysis (hereditary spherocytosis, sickle cell disease, thalassaemia), cirrhosis, biliary stasis and infection (Clonorchis, recurrent pyogenic cholangitis)
Drugs	Ceftriaxone (biliary sludge), octreotide, fibrates, clofibrate

Rapid weight loss (whether by very-low-calorie diet or bariatric surgery) deserves particular emphasis for postgraduate examinations: it increases biliary cholesterol saturation and reduces gallbladder motility, producing new gallstones in up to 30–40% of patients within months if prophylactic ursodeoxycholic acid is not given.

4. Pathophysiology and Classification of Gallstones

Bile is an aqueous solution in which cholesterol — insoluble in water — is kept in solution within mixed micelles and vesicles formed with bile salts and phospholipids (lecithin). Gallstone formation is classically explained by **Admirand's triangle**: when the relative proportions of cholesterol, bile salts and phospholipids fall outside the zone of solubility, bile becomes supersaturated with cholesterol, which then nucleates and crystallises. Three factors act together to produce clinical stones: (1) cholesterol supersaturation of bile, (2) accelerated nucleation (promoted by mucin glycoproteins, calcium and reduced nucleation inhibitors), and (3) gallbladder hypomotility with biliary stasis, which allows nucleated crystals time to aggregate into macroscopic stones.

Classification by Composition

Type	Morphology / imaging	Key aetiology
Cholesterol stones (≈80% in the West)	Predominantly cholesterol monohydrate; usually yellow-green, often solitary or few, may be faceted. Radiolucent in ~80% of cases (only 10–15% are radio-opaque on plain film).	Cholesterol supersaturation, obesity, oestrogens, rapid weight loss, ileal disease
Black pigment stones	Small, hard, irregular, composed of calcium bilirubinate polymer and mucin; form within the gallbladder. Radio-opaque more often than cholesterol stones (~50–75%).	Chronic haemolysis, cirrhosis, ileal resection
Brown pigment stones	Soft, laminated, earthy; composed of calcium bilirubinate, cholesterol and calcium soaps. Form primarily within the bile ducts.	Biliary stasis and bacterial infection (β-glucuronidase deconjugates bilirubin) — e.g., recurrent pyogenic cholangitis, biliary strictures, parasitic infestation
Mixed stones	The commonest type overall; laminated cholesterol and pigment/calcium salts.	Combination of the above mechanisms

Examination pearl: unlike renal calculi, most gallstones are radiolucent — plain abdominal radiography is an unreliable screening tool, and transabdominal ultrasonography is the investigation of choice for cholelithiasis, with a sensitivity and specificity both exceeding 95% for stones ≥2 mm.

5. Clinical Spectrum of Gallstone Disease

Gallstone disease presents along a continuum determined chiefly by the site and duration of obstruction and whether secondary infection supervenes. A structured understanding of this spectrum is essential for safe on-call decision-making.

5.1 Asymptomatic Cholelithiasis

Incidentally discovered stones with no biliary-type pain. Prophylactic cholecystectomy is **not** routinely recommended, except in specific high-risk groups: porcelain gallbladder, gallbladder polyps >1 cm (or smaller with risk features), stones >3 cm, concomitant sickle-cell disease, prior to bariatric surgery in symptomatic patients, or when a patient will have limited access to care (e.g., before prolonged travel to a remote area).

5.2 Biliary Colic

Transient cystic duct obstruction by a stone produces episodic, severe, constant (not truly “colicky”) right upper quadrant or epigastric pain, often triggered by fatty food, lasting 30 minutes to a few hours and resolving spontaneously as the stone disimpacts. There is no fever, no significant tenderness beyond the episode, and inflammatory markers are normal. Elective laparoscopic cholecystectomy is the definitive treatment once symptomatic disease is confirmed.

5.3 Acute Cholecystitis

Persistent cystic duct obstruction (present in over 90% of cases) leads to gallbladder wall inflammation — initially chemical, then bacterial (typically *E. coli*, *Klebsiella*, *Enterococcus*). Pain lasting >6 hours, with fever, local peritonism and a positive **Murphy's sign** (inspiratory arrest on deep palpation of the right subcostal region), distinguishes it from simple biliary colic. Leucocytosis and mildly deranged liver function tests are common. Untreated, the gallbladder may progress to empyema, gangrene or perforation.

5.4 Choledocholithiasis

Migration of a stone into the CBD may be asymptomatic or cause obstructive (“cholestatic”) jaundice, pale stools, dark urine and pruritus, with a cholestatic liver biochemistry pattern (raised bilirubin, alkaline phosphatase and gamma-glutamyl transferase, with variable transaminase elevation) and a dilated CBD on imaging.

5.5 Acute Cholangitis

Biliary obstruction with superimposed bacterial infection produces **Charcot's triad** (fever/rigors, jaundice, right upper quadrant pain), present in only about 50–70% of cases; the addition of hypotension and altered mental status constitutes **Reynolds' pentad**, signifying suppurative cholangitis and septic shock. Cholangitis is a medical and surgical emergency: it requires prompt resuscitation, broad-spectrum intravenous antibiotics and urgent biliary decompression, most often by ERCP.

5.6 Gallstone (Biliary) Pancreatitis

Transient impaction of a stone at the ampulla of Vater is the commonest cause of acute pancreatitis in most populations. Severity is graded using standard pancreatitis scoring systems (e.g., revised Atlanta classification); early ERCP is reserved for patients with concomitant cholangitis or persistent biliary obstruction, and cholecystectomy should be performed during the index admission for mild gallstone pancreatitis to prevent recurrence.

5.7 Less Common Presentations

- **Mirizzi syndrome** — extrinsic compression of the common hepatic duct by a large stone impacted in the cystic duct or gallbladder neck, causing obstructive jaundice and risk of cholecysto-biliary fistula; pre-operative recognition on MRCP is vital to avoid bile duct injury during surgery.
- **Gallstone ileus** — a large stone erodes through a cholecysto-enteric fistula (most often into the duodenum) and causes mechanical small bowel obstruction, classically at the terminal ileum; Rigler's triad

on imaging (pneumobilia, ectopic gallstone, small bowel obstruction) is diagnostic.

- **Porcelain gallbladder** — extensive intramural calcification from chronic cholecystitis; historically linked to gallbladder carcinoma, warranting cholecystectomy, though contemporary series suggest the risk is lower than once believed and is concentrated in patients with selective (rather than diffuse) mucosal calcification.
- **Acalculous cholecystitis** — gallbladder inflammation without stones, seen in critically ill, ventilated or septic patients due to bile stasis and ischaemia; carries a higher risk of gangrene and is often managed initially with percutaneous cholecystostomy.

6. Investigations

A structured work-up combines clinical assessment, biochemistry and targeted imaging.

6.1 Laboratory Studies

- Full blood count — leucocytosis supports cholecystitis or cholangitis.
- Liver function tests — a cholestatic pattern (raised bilirubin, alkaline phosphatase, gamma-GT) suggests CBD involvement; transaminases may rise transiently with acute obstruction.
- Serum amylase / lipase — to exclude or confirm gallstone pancreatitis.
- C-reactive protein — supports the diagnosis and severity grading of cholecystitis.
- Blood cultures — in suspected cholangitis, prior to starting antibiotics.

6.2 Imaging

Modality	Role / key features
Transabdominal ultrasound	First-line for suspected cholelithiasis/cholecystitis. Sensitivity/specificity >95% for gallstones ≥2 mm. Findings in cholecystitis: gallstones, wall thickening >3 mm, pericholecystic fluid, sonographic Murphy's sign, gallbladder distension.
Magnetic resonance cholangiopancreatography (MRCP)	Non-invasive, highly sensitive (>90–95%) for choledocholithiasis and for delineating biliary anatomy — essential when Mirizzi syndrome or a biliary stricture is suspected.
Endoscopic ultrasound (EUS)	Comparable sensitivity to MRCP for CBD stones, particularly useful for small stones (<5 mm) and when MRCP is equivocal; allows same-session ERCP if stones are confirmed.
CT abdomen	Not first-line for gallstones (many are radiolucent on CT) but valuable for complications — perforation, abscess, gallstone ileus — and for excluding other pathology.
HIDA (hepatobiliary iminodiacetic acid) scan	Reserved for equivocal ultrasound findings; non-visualisation of the gallbladder after 4 hours (or after morphine augmentation) indicates cystic duct obstruction and supports acute cholecystitis.
ERCP	Primarily therapeutic (stone extraction, sphincterotomy, stenting) rather than purely diagnostic given its invasiveness and complication profile (pancreatitis ~3–5%, bleeding, perforation, cholangitis).

The 2019 ASGE guideline stratifies patients into low, intermediate and high probability of choledocholithiasis based on clinical, biochemical and ultrasound predictors (very strong predictors: CBD stone on ultrasound, clinical cholangitis, bilirubin >4 mg/dL), guiding the choice between observation, MRCP/EUS, or proceeding directly to ERCP.

7. Differential Diagnosis

Right upper quadrant and epigastric pain has a broad differential, and gallstone disease must be distinguished from other acute abdominal and thoracic conditions before treatment is committed to:

Condition	Distinguishing features
Peptic ulcer disease / perforation	Epigastric pain related to meals, dyspepsia, or sudden severe pain with peritonism if perforated; free air under the diaphragm on erect chest X-ray in perforation.
Acute pancreatitis (non-biliary)	Epigastric pain radiating to the back, markedly raised amylase/lipase; may coexist with gallstones as the aetiology (see Section 5.6).
Right lower lobe pneumonia / pleurisy	Pleuritic chest pain, cough, fever; may mimic cholecystitis, especially in children — a chest X-ray is a simple discriminator.

Condition	Distinguishing features
Acute coronary syndrome (inferior MI)	Epigastric or right-sided discomfort, especially in diabetics or the elderly; an ECG should be considered in atypical or high-risk presentations.
Right-sided pyelonephritis / renal colic	Loin-to-groin pain, urinary symptoms, costovertebral angle tenderness; urinalysis and renal tract imaging clarify the diagnosis.
Hepatitis / liver abscess	Diffuse hepatic tenderness, deranged transaminases out of proportion to a cholestatic pattern; travel or risk-factor history and cross-sectional imaging help differentiate.
Appendicitis (retrocaecal / high-riding caecum)	Occasionally presents with right upper quadrant pain, particularly in pregnancy or with a mobile caecum.

8. Severity Grading — Tokyo Guidelines (TG18)

The Tokyo Guidelines, most recently revised in 2018 (TG18) and still the internationally accepted standard for diagnosis and severity stratification of acute cholecystitis and cholangitis, base the diagnosis of acute cholecystitis on a combination of local inflammatory signs (Murphy's sign, right upper quadrant mass/pain/tenderness), systemic inflammatory signs (fever, raised CRP, leucocytosis) and confirmatory imaging. Severity is then graded to guide the timing and modality of intervention.

TG18 Grade	Defining features
Grade I (Mild)	Acute cholecystitis that does not meet criteria for Grade II or III; mild gallbladder inflammation with no organ dysfunction. Usually fit for early laparoscopic cholecystectomy.
Grade II (Moderate)	Any one of: WBC >18 × 10■/L; palpable tender mass in the right upper quadrant; duration of complaints >72 hours; marked local inflammation (biliary peritonitis, pericholecystic/hepatic abscess, gangrenous or emphysematous cholecystitis).
Grade III (Severe)	Acute cholecystitis with dysfunction of at least one organ system: cardiovascular (hypotension needing inotropes), neurological (decreased consciousness), respiratory (PaO■/FiO■ <300), renal (oliguria, creatinine >2.0 mg/dL), hepatic (INR >1.5), or haematological (platelets <100 × 10■/L).

TG18 — TREATMENT STRATEGY BY GRADE (SUMMARY)

Grade I: Early laparoscopic cholecystectomy, ideally within 72 hours of symptom onset, in centres with appropriate expertise.

Grade II: Early laparoscopic cholecystectomy at an experienced centre; if severe local inflammation precludes safe dissection, urgent gallbladder drainage (percutaneous cholecystostomy) followed by delayed (interval) cholecystectomy.

Grade III: Aggressive management of organ dysfunction and the source of sepsis takes priority; urgent gallbladder drainage is generally required, with cholecystectomy deferred until the patient has recovered, unless performed at a specialist centre capable of safe early surgery in this group.

9. Evidence-Based Management

9.1 General Principles

Definitive treatment of symptomatic gallstone disease is cholecystectomy — laparoscopic cholecystectomy is the gold-standard approach for the vast majority of patients, offering reduced postoperative pain, shorter hospital stay and faster return to work compared with open surgery, with conversion reserved for cases of severe inflammation, dense adhesions, bleeding or uncertain anatomy where safety cannot otherwise be assured. Achieving the **critical view of safety** before dividing the cystic duct and artery is the single most important technical step in preventing bile duct injury.

9.2 Timing of Cholecystectomy in Acute Cholecystitis

Multiple randomised trials and meta-analyses have established that **early laparoscopic cholecystectomy (within 72 hours to 7 days of symptom onset, and ideally on the index admission)** is preferable to a "cool-down" interval of 6–8 weeks with antibiotics followed by delayed surgery. Early surgery is associated with a shorter total hospital stay and does not increase conversion rates or complications when performed by an appropriately experienced team, and it avoids the risk of recurrent symptoms — up to 20% of patients managed conservatively re-present before their planned interval operation. When surgery is not immediately safe (late presentation with dense inflammation, prohibitive comorbidity, or TG18 Grade III disease), percutaneous cholecystostomy provides source control, with cholecystectomy performed once the patient has stabilised.

9.3 Medical (Non-Surgical) Therapy

Oral **ursodeoxycholic acid (UDCA)** reduces biliary cholesterol saturation and can dissolve small (<5 mm), radiolucent, non-calcified cholesterol stones in a functioning gallbladder over 6–24 months, but recurrence after stopping treatment is common (up to 50% within 5 years); it is used chiefly in patients unfit for surgery, and as prophylaxis against gallstone formation after rapid weight loss or bariatric surgery. Extracorporeal shockwave lithotripsy has a very limited modern role given these recurrence rates and the efficacy of laparoscopic surgery.

9.4 Management of Choledocholithiasis

CBD stones may be cleared endoscopically (ERCP with sphincterotomy and stone extraction, usually followed by interval laparoscopic cholecystectomy), or surgically in a single stage by laparoscopic CBD exploration (transcystic or transductal) combined with cholecystectomy. A single-stage laparoscopic approach avoids a second procedure and its risks (post-ERCP pancreatitis, need for repeat endoscopy) and is favoured where local expertise exists; the ERCP-then-cholecystectomy "two-stage" pathway remains the more widely available option internationally.

MANAGEMENT ALGORITHM — SUSPECTED ACUTE CHOLECYSTITIS

Step 1 — Confirm diagnosis: Clinical assessment + ultrasound (± CRP, WBC) per TG18 diagnostic criteria.

Step 2 — Resuscitate and treat: IV fluids, analgesia, IV antibiotics covering Gram-negative enterics and anaerobes as per local protocol / TG18 recommendations.

Step 3 — Grade severity (TG18 Grade I–III) and assess surgical fitness (ASA status, cardiopulmonary reserve).

Step 4a — Fit, Grade I/II, early presentation: Early laparoscopic cholecystectomy.

Step 4b — Unfit, Grade III, or late/complicated presentation: Percutaneous cholecystostomy / conservative management → interval cholecystectomy once recovered.

Step 5 — Concurrent CBD stones: Add MRCP/EUS or proceed to ERCP or laparoscopic CBD exploration per local pathway.

10. Complications of Gallstone Disease

10.1 Disease-Related Complications

- Gallbladder empyema, gangrene and perforation (localised or free, causing biliary peritonitis).
- Cholecysto-enteric fistula, which may lead to gallstone ileus.
- Mirizzi syndrome and cholecysto-biliary fistula.
- Ascending cholangitis and hepatic abscess.
- Gallstone pancreatitis, ranging from mild oedematous disease to severe necrotising pancreatitis with organ failure.
- Chronic cholecystitis with a shrunken, fibrotic, poorly functioning gallbladder.
- Gallbladder carcinoma — a rare but recognised long-term association, particularly with porcelain gallbladder and large (>3 cm) stones.

10.2 Procedure-Related Complications

- **Bile duct injury** — the most feared complication of cholecystectomy (incidence ≈0.3–0.5% in laparoscopic surgery); most often results from misidentification of the CBD as the cystic duct. Prevention rests on achieving the critical view of safety and a low threshold for intraoperative cholangiography or conversion to open surgery when anatomy is unclear.
- Bile leak from the cystic duct stump or an accessory (duct of Luschka) duct.
- Retained CBD stones after cholecystectomy.
- Post-ERCP pancreatitis, bleeding, perforation and cholangitis.
- Port-site infection, incisional hernia, and — rarely — port-site metastasis if an unsuspected gallbladder malignancy is present.

11. Special Clinical Situations

Pregnancy

Symptomatic gallstone disease is the second commonest non-obstetric surgical emergency in pregnancy. Ultrasound remains the imaging modality of choice; laparoscopic cholecystectomy is safe in all trimesters (ideally the second) when surgery is indicated, and conservative management carries a substantial risk of recurrent symptoms and preterm labour, favouring surgical management over prolonged conservative treatment where feasible.

The Elderly and High-Risk Patients

Older patients more often present atypically (with less pronounced fever or leucocytosis) and have a higher risk of gangrenous cholecystitis and perforation at presentation. Careful risk-stratification (frailty and cardiopulmonary assessment) determines whether early surgery or a “drain-first” strategy with percutaneous cholecystostomy is more appropriate.

Cirrhosis and Portal Hypertension

Gallstones are more prevalent in cirrhotic patients (pigment stones from haemolysis and altered bilirubin metabolism). Laparoscopic cholecystectomy is feasible in Child-Pugh A/B disease with careful attention to coagulopathy and portal hypertensive collaterals in the gallbladder bed; decompensated (Child-Pugh C) cirrhosis carries substantially higher perioperative risk and non-operative or minimally invasive drainage strategies are often preferred.

12. Summary of Current Guidelines

- **Tokyo Guidelines 2018 (TG18)** — international standard for diagnosis, severity grading and management strategy for acute cholecystitis and cholangitis.
- **EASL Clinical Practice Guidelines** on the prevention, diagnosis and treatment of gallstones — evidence-based European recommendations covering the full disease spectrum, including medical dissolution therapy.
- **NICE Clinical Guideline CG188** (UK) — gallstone disease: diagnosis and management, recommending laparoscopic cholecystectomy for symptomatic gallstones and early surgery (within one week of diagnosis) for acute cholecystitis where feasible.
- **ASGE Guideline** on the role of endoscopy in the evaluation and management of choledocholithiasis — risk-stratifies patients for pre-, intra- or post-operative ERCP.
- **WSES (World Society of Emergency Surgery)** guidance on acute calculous cholecystitis — an emergency-surgery perspective reinforcing early cholecystectomy and clear criteria for cholecystostomy in the critically ill.

Key Points for Revision

HIGH-YIELD SUMMARY

80% of gallstones are cholesterol or mixed stones and are radiolucent; ultrasound, not a plain X-ray, is the first-line investigation.

Biliary colic = pain only. Acute cholecystitis = pain + fever + local inflammation (Murphy's sign) lasting >6 hours. Cholangitis = obstruction + infection (Charcot's triad ± Reynolds' pentad) — a surgical emergency needing urgent biliary drainage.

Use TG18 criteria to diagnose and grade acute cholecystitis, and let the grade (plus patient fitness) determine the pathway: early laparoscopic cholecystectomy for most Grade I/II patients; drainage first, surgery later, for Grade III or unfit patients.

Early laparoscopic cholecystectomy (within 72 hours–7 days) is preferred over the traditional “cool-down-then-operate” approach for acute cholecystitis.

Always seek the critical view of safety before dividing the cystic duct/artery — the key step in preventing bile duct injury.

Cholecystectomy should be performed during the index admission for mild gallstone pancreatitis, to prevent recurrence.

Suspect choledocholithiasis with a cholestatic LFT pattern and a dilated CBD; risk-stratify using ASGE criteria to decide between MRCP/EUS and direct ERCP.

Remember the atypical presentations: Mirizzi syndrome, gallstone ileus (Rigler's triad), porcelain gallbladder, and acalculous cholecystitis in the critically ill.

This review is intended as a structured revision resource for postgraduate trainees preparing for surgical and medical postgraduate examinations (e.g., FCPS, MS, MRCS and equivalent), and as a bedside/on-call reference. It should be read alongside primary guideline documents and institutional protocols, which take precedence in individual clinical decision-making.

Further Reading and Key Sources

The following primary sources informed this review and are recommended for deeper study:

1. Kiriyama S, Kozaka K, Takada T, et al. Tokyo Guidelines 2018: diagnostic criteria and severity grading of acute cholecystitis (with videos). *J Hepatobiliary Pancreat Sci.* 2018;25(1):41-54.

2. European Association for the Study of the Liver (EASL). EASL Clinical Practice Guidelines on the prevention, diagnosis and treatment of gallstones. *J Hepatol.* 2016;65(1):146-181.

3. National Institute for Health and Care Excellence (NICE). Gallstone disease: diagnosis and management. Clinical guideline CG188, 2014 (surveillance reviewed 2018).

4. ASGE Standards of Practice Committee. The role of endoscopy in the evaluation and management of choledocholithiasis. *Gastrointest Endosc.* 2019;89(6):1075-1105.

5. World Society of Emergency Surgery (WSES). WSES guidelines on acute calculous cholecystitis. *World J Emerg Surg.* 2016;11:25 (with subsequent WSES/clinical updates on acute cholecystitis and biliary pancreatitis, 2024).

6. Global epidemiology of gallstones in the 21st century: a systematic review and meta-analysis. *Clin Gastroenterol Hepatol.* 2024.

7. Williams N, O'Connell PR, McCaskie AW, eds. *Bailey & Love's Short Practice of Surgery*, 28th ed. Boca Raton: CRC Press.
