

# Gallstones: What the Medical Student Needs to Know

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**Abstract:** *This review of literature attempts to summarise the vast available information on gallstone disease. Gallstones are concretions that form in the biliary tract. The prevalence of gallstones in India ranges from 6% to 9% in the adult population. Gallstone disease is a common medical condition that every medical student, professional deals with on a regular basis. A thorough understanding of the disease will no doubt be indispensable to the medical practitioner.*

**Keywords:** Cholelithiasis; cholelithiasis; etiology; gall stones; pathogenesis; treatment

## 1. Introduction

Gallstones are concretions that form in the biliary tract. They may be in the gallbladder called as Cholelithiasis, the common bile duct where there are referred to as choledocholithiasis while *Hepatoolithiasis* is defined as the presence of gall stones in the bile duct proximal to the confluence of the right and left hepatic ducts, irrespective the coexistence of gall stones in the common bile duct or the gall bladder [1,2]. The prevalence of gallstones in India ranges from 6% to 9% in the adult population.[3,4].

## 2. Types

Gall stones may be classified as

- 1) *Cholesterol stones* (Cholesterol solitaire—radiating crystalline appearance) are 6% common, often solitary.
- 2) *Mixed stones* are 90% common. It contains cholesterol, calcium salts of phosphate carbonate, palmitate, proteins, and are multiple faceted.
- 3) *Pigment stones* are small, black or greenish black, multiple. Often they can be sludge like.

The exact prevalence of gall stones may be affected by multiple factors including the patient's age, sex and region of domicile. [5]

## 3. Pathogenesis

### 3.1 Metabolic

W. H. Admirand's triangular hypothesis - If cholesterol component increases, bile gets supersaturated and inadequate micelle makes insoluble cholesterol to undergo crystallisation and cholesterol monohydrate stone formation [6]. Any condition which either increases the cholesterol secretion in the bile or reduces the bile salt concentration causes cholesterol stone formation. Old age; OCP; obesity; clofibrate may increase cholesterol secretion. Oestrogen, ileal resection and cholestyramine reduce the bile salt

concentration.

- 1) *Infections and Infestations:* Bacteria like *E. coli*, *Salmonella* and parasites like *Clonorchis sinensis* and *Ascaris lumbricoides* are often associated with gall stone formation. [7,8]
- 2) *Bile stasis:* Occurs due to estrogen therapy, pregnancy, vagotomy and in patients who are on long-term intravenous fluids or TPN.
- 3) *Increased bilirubin production* - Due to any of the causes of haemolysis as in hereditary spherocytosis, sickle cell anaemia, thalassaemia, malaria, cirrhosis. Here pigment stones are common.

### 3.2 Stages

Gallstone disease may be thought of as having the following four stages:

- a) Lithogenic state, in which conditions favor gallstone formation
- b) Asymptomatic gallstones
- c) Symptomatic gallstones, characterized by episodes of biliary colic
- d) Complicated cholelithiasis

Patients with the lithogenic state or asymptomatic gallstones have no abnormal findings on physical examination.

### 3.3 Clinical features

#### 3.3.1 In the gallbladder

- a) Silent asymptomatic stones occur in 10% of males and 20% of females.
- b) *Biliary colic with periodicity*, severe within hours after meal (commonest presentation). Biliary colic is spasmodic pain often severe, in right upper quadrant and epigastrium radiating to chest, upper back and shoulder. It is self-limiting, recurs unpredictably, often precipitated by a fatty/heavy meal. Fever and increased WBC count may be observed.
- c) Acute cholecystitis.
- d) Chronic cholecystitis.
- e) Empyema gallbladder.

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- f) Perforation causing biliary peritonitis or pericholecystic abscess.
- g) Mucocele of gallbladder.
- h) Carcinoma gallbladder.

### 3.3.2 In the CBD

- a) Secondary CBD stones (occurs in 10% of gallstones).
- b) Cholangitis.
- c) Pancreatitis.
- d) *Mirizzi syndrome* (compression of CHD/CBD by stone from cystic duct or cholecysto-choledochal fistula).

### 3.3.3 In the intestine

Cholecystoduodenal fistula causing *gallstone ileus* and so intestinal obstruction

## 3.4 Management of Gallstones

The management of persons with gallstones depends importantly on their symptomatic status (Coleman, 1987; Finlayson, 1989). [9, 10]. Once gallstones become symptomatic, definitive surgical intervention with cholecystectomy usually laparoscopic cholecystectomy. Open surgery may be indicated in patients with gallbladder cancer. [11]. Medical therapy may be offered to patients, who are either not fit for surgery or who are unwilling to undergo surgery. Oral bile salt therapy (ursodeoxycholic acid) is particularly for x-ray-negative cholesterol gallstones in patients with normal gallbladder function. while extracorporeal shockwave lithotripsy may be attempted for noncalcified cholesterol gallstones in patients with normal gallbladder function. However, it should be noted that medical therapy may be required for more than 6 months and is less likely to be effective if the stone size is larger than 1 cm. Asymptomatic patients with incidentally detected gall stones are usually not advised surgical intervention at present with a few exceptions.

Cholecystectomy for asymptomatic gallstones may be indicated in the following patients: [11]

- Patients with large gallstones, greater than 2 cm in diameter
- Patients with nonfunctional or calcified (porcelain) gallbladder observed on imaging studies and who are at high risk of gallbladder carcinoma
- Patients with spinal cord injuries or sensory neuropathies affecting the abdomen
- Patients with sickle cell anemia in whom the distinction between painful crisis and cholecystitis may be difficult
- Patients with cirrhosis or portal hypertension
- Patients with diabetes with minor symptoms

Symptomatic patients should be offered surgical intervention. Cholecystectomy is generally indicated in patients who have experienced symptoms or complications of gallstones, unless the patient's age and general health make the risk of surgery prohibitive. If surgical removal of common bile duct stones is not immediately feasible, endoscopic retrograde sphincterotomy can be used. In this procedure, the endoscopist cannulates the bile duct via the papilla of Vater. In patients with gallbladder stones who are suspected to have concurrent common bile duct stones, the surgeon can perform ERCP with stenting of the CBD and a

cholecystectomy at a later date. Alternatively intraoperative cholangiography can be performed at the time of cholecystectomy. The common bile duct can then be explored using a choledochoscope. If common duct stones are found, they can usually be extracted intraoperatively. Bile duct injuries are one of the most morbid complications of cholecystectomy. The threshold for conversion of laparoscopic cholecystectomy to an open cholecystectomy.

In critically ill patients with gallbladder empyema and sepsis, cholecystectomy can be fraught with peril. Here a cholecystostomy, a minimal procedure involving placement of a drainage tube in the gallbladder could be considered. This usually results in clinical improvement. Once the patient stabilizes, definitive cholecystectomy can be performed under elective circumstances.

Interventional radiologists may also perform a cholecystostomy under CT-scan guidance, and thus eliminate the need for anesthesia making it safer for a patient who is clinically unstable. [11]

Following cholecystectomy, about 5%-10% of patients develop chronic diarrhea. This is usually attributed to changes in the frequency of enterohepatic circulation of bile salts resulting in more bile salt reaching the colon which in turn stimulate mucosal secretion of salt and water. This usually mild and managed with over the counter medication like loperamide. More frequent diarrhea can be treated with daily administration of a bile acid-binding resin (eg, colestipol, cholestyramine, colesevelam).

Recurrent pain resembling biliary colic following cholecystectomy is termed postcholecystectomy syndrome. Many patients with postcholecystectomy syndrome have long-term functional pain that was originally misdiagnosed as being of biliary origin. Patients with postcholecystectomy syndrome may have an underlying motility disorder of the sphincter of Oddi, termed biliary dyskinesia, in which the sphincter fails to relax normally following ingestion of a meal. [12,13]

## 4. Conclusion

Gall stone disease is a complex and important topic, the understanding of which is vital to medical students, recent medical graduates and experienced medical professionals. We have attempted to condense with vast amount of literature available on the subject into the most basic information needed to guide patient care.

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