

Gallstone-related complications and evidence base treatments. A scoop review

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Abstract

The incidence of gallstones is 10-15%, making it one of the most common causes of surgical admissions. The number of admissions and operations for gallstone disease is increasing. Commonly gallstones are formed in the gallbladder but can also develop in the biliary tree. Commonly, gallstones are made of cholesterol. Even though the exact cause of supersaturation of bile is not known, there are multiple associate factors for gallstone formation. Most patients with gallstones never experience any symptoms, but the risk of presenting with complications related to gallstones is 1%-4% a year. Patients with gallstones can present with pain or other more severe complications that demand surgical treatment and follow-up. This article looks into epidemiology, basic pathophysiology, complications, pregnancy and gallstones, diagnosis and recent evidence base treatment of gallstone disease.

Introduction

It is stated that 10-15% of adults in the west are prone to develop gallstones. Symptomatic gallstone diseases result in 1% and 4% a year. Laparoscopic cholecystectomy is a frequently performed surgical procedure in the west^{2,3}. The surgical management of gallstone disease has been changed from open to laparoscopic to natural orifice transluminal endoscopic surgery. Furthermore, in to, day-case surgery. This review aims at the problems that gallstones cause and their optimal treatment based on current evidence.

Systematic review method

A literature search in PubMed, Medline, Cochrane and

Ovid databases of all articles published until June 2022 with the medical subject headings keywords' gallstones, cholecystitis, surgical jaundice, cholangitis, pancreatitis, gallbladder cancer, Mirizzi's syndrome, gallstone ileus, prgenancy and cholecystectomy. The search was limited to humans, English, adults (19+ years), and articles published in the past six years. The keywords were used in all possible combinations to retrieve the maximum number of articles. The bibliography of each selected article was reviewed for other potentially relevant citations. The initial selection was based on the article title and abstract, following which the full-text article was read. The reference lists in the full-text articles were scanned to obtain additional references. Articles relevant to the topic were included


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after removing duplicates. The findings from primary research articles, case reports, and case series are summarized and discussed. In the case of studies whose results were published more than once, data from the most recent article were considered.

Epidemiology of gallstone

An imbalance in chemical components in bile and their supersaturation and deposition results in the formation of gallstones. The exact cause of this remains unclear. However, certain associate factors are known, such as genetics, pregnancy, rapid weight loss, parenteral nutrition, loss of bile salts following terminal ileitis or after ileal resection, and diabetes via metabolic syndrome^{4,6}. The incidence increases with age. Even though it is common among those who are fat, fertile, female and forty, gallstones can occur at any age⁴.

Complications of gallstones

The most common complication is biliary colic (56%) and acute cholecystitis (36%)⁶. Biliary colic and cholecystitis share a spectrum of symptoms, except for vague demarcation of the duration of symptoms, but no exact definition exists to separate them. Jaundice is commonly caused by a stone migrating into the bile duct. Also, it can be due to compression of the common hepatic duct by a stone in the neck of the gall bladder or cystic duct ('Mirizzi's syndrome). In case of bile duct obstruction, conjugated bilirubin in the liver cannot be excreted into the bowel. When the patient is jaundiced, the urine becomes dark, and stools become pale due to the excretion of water-soluble conjugated bilirubin and an absence in the faeces of stercobilin, respectively⁶.

Ascending cholangitis results from entering bacteria in to partly or completely blocked bile duct and causing infection. Stasis of the bile leads to an increase in the resident bacterial flora. Charcot's triad is diagnostic (fever with rigours, jaundice and right upper quadrant pain). Gallstone pancreatitis results in the passage of stones from the gallbladder into the bowel, and transitory obstruction of the biliopancreatic duct in the region of the ampulla, which results in premature activation of enzymes in the pancreas and leading to pancreatitis¹⁻⁶.

Gallstones may fistulate directly into the duodenum from the gallbladder during a period of silent inflammation. The stone can impact the duodenum leading to duodenal obstruction ('Bouveret's syndrome). Alternatively, it can block the most distal

segment of the ileum of the small bowel, where the embryological vitello-intestinal duct once existed in the terminal ileum (a 'Meckel's diverticulum is the embryological remnant). This leads to small bowel obstruction known as gallstone ileus. However, gallstone ileus is a misnomer, as the small bowel obstruction is mechanical and not an ileus. Gallstones are a known risk factor for gallbladder cancer. However, this cancer is rare, accounting for 0.3% of patients with gallstone disease¹⁻⁶.

Ultrasonography in gallstone disease

It is used frequently and as the first line diagnostic test to determine the presence of stones, biliary tract dilatation, and thickening wall indicating chronic disease. Even though, the accuracy of ultrasonography in detecting gallstones is high, the absence of stones on ultrasound scans does not exclude their existence, as very small stones or sludge can be missed²⁻⁷.

Incidental gallstones

People with asymptomatic gallstones develop problems related to gallstones at a rate of 1%-4% a year¹. Prophylactic cholecystectomy is unnecessary as the balance of risks and benefits. However, a young patient will have a higher risk of developing problems and favour treatment¹⁻⁴. In addition, small stones can be more dangerous than large ones since small stones as an independent risk factor for pancreatitis⁸. The decision to treat should be made individually, taking into account the patient's age, the ultrasound findings, and the presence of any symptoms.

Pregnancy and gallstone disease

Symptomatic gallstone disease is the second most common abdominal emergency in pregnancy. Review literature has shown that conservative versus surgical management of cholecystitis had no significant difference in incidence of preterm delivery or foetal mortality. Furthermore, it shows that there was no maternal or foetal mortality in laparoscopic cholecystectomy. However, the surgical interventions will be safe with necessary precautions. Laparoscopic cholecystectomy is a safe procedure in all trimesters and suggesting the need for early surgical intervention⁹.

Non-surgical management

Analgesia has a primary leading role in an acute attack of biliary colic or cholecystitis. NSAIDs and opioids

are very effective, used in combination or separately. Since the symptoms are often associated with vomiting, a suppository or injection of antiemetic is recommended. Oral or intravenous antibiotics are recommended in an infection^{2,4}.

Drug dissolution therapy

The researchers found that gallstone formation was significantly less likely to occur with ursodeoxycholic acid⁹⁻¹⁰. However, ursodeoxycholic acid does not seem helpful once the stones have developed. Another study showed that symptomatic patients with gallstones scheduled for cholecystectomy found that ursodeoxycholic acid did not reduce biliary symptoms⁹⁻¹¹. Percutaneous drainage of gallbladder plays an important role in resolving sepsis in patients at high surgical risk¹⁰⁻¹¹.

Choice of surgical options

Even though the early years of laparoscopic cholecystectomy showed somewhat higher complication rates, our current study, compared laparoscopic with open cholecystectomy found no significant differences in mortality, complications or operative time¹⁻³. However, laparoscopic cholecystectomy recovery, compared with open cholecystectomy, was associated with a significantly shorter hospital stay and quicker convalescence. These results support laparoscopic cholecystectomy rather than open cholecystectomy as the surgical treatment of choice for gallstone disease. However, a Cochrane review comparing laparoscopic with mini cholecystectomy found no differences in mortality, complications, and postoperative recovery^{1,12}. In addition, small incision cholecystectomy had a significantly shorter operative time. There was no significant difference in complication rate in the reviewed studies between the laparoscopic group and the small incision group^{1,2,13,14}.

Day case surgery

Our review showed that day case versus one-day stay laparoscopic cholecystectomy found no difference in complication rate, readmission rate or 'patients' acceptance. However, the day case procedures cost less¹³⁻¹⁵. However, day case surgery is recommended for patients classified as grade 1 or 2 according to the American Association of Anaesthesiologists' preoperative grading system for physical status¹²⁻¹⁶.

Place of an emergency cholecystectomy after biliary colic or cholecystitis

The review compared early laparoscopic cholecystectomy (within seven days of onset of symptoms) with delayed laparoscopic cholecystectomy (more than six weeks after index admission) concerning benefits and harms with that of open cholecystectomy¹⁷. This recent review found no difference in bile duct injury rate in laparoscopic cholecystectomy to that of open surgery. However, the conversion rate was high in both early and delayed laparoscopic cholecystectomy. The total hospital stay was shorter in the early laparoscopic surgery group. Therefore, early laparoscopic cholecystectomy appears safe and shortens hospital stays, but further trials are needed^{1-7, 16-18}.

Further evidence showed a higher readmission rate with gallstones with gallstone-related complications for people on the waiting list for surgery after emergency admission with acute cholecystitis¹⁵⁻¹⁸. We agree that an emergency cholecystectomy in an inexperienced hand is not without risks. However, we would like to propose that the patients presenting as an emergency with symptomatic gallstones and who are admitted should be offered emergency cholecystectomy^{17,18}.

It seems feasible that without skin incisions, access to the peritoneal cavity via natural orifices, the mouth (via the stomach), the rectum, and the vagina, using flexible endoscopes. This experimental technique is known as natural orifice transluminal endoscopic surgery. Although no research has yet been published on humans, the technique is rapidly developing^{19,20}.

Summary

- Among the patient with gallstones, between 1% and 4% a year develop symptoms.
- The incidence of gallstones increases with age, with family history being a significant risk factor.
- Small stones are more dangerous than larger ones since they can cause pancreatitis. Ursodeoxycholic acid does not reduce symptoms of gallstones.
- Percutaneous cholecystostomy is a preferred choice for patients at high surgical risk
- Laparoscopic cholecystectomy is a safe procedure in all trimesters and suggesting the need for early surgical intervention

- Day-case laparoscopic cholecystectomy is beneficial, especially in elective procedures.
- Emergency cholecystectomy on the index admission for biliary symptoms is beneficial.

‘Authors’ contributions

VA Formulated the concept and design of the study, acquisition of data and analysis, and drafted the article.

Availability of data and materials

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

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