Biliary tract emergencies

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Gallstones are responsible for the majority of biliary tract emergencies and will be the main focus of this article. Gallstones present with features related to the site of the calculi and are therefore considered separately. Cholecystolithiasis refers to gallstones confined to the gallbladder, whereas choledocholithiasis refers to gallstones within the common bile duct.

Gallstone-related disorders remain very common, and although there have been major therapeutic advances in recent years, there has been no progress in the prevention of gallstone development. The prevalence of gallstones in the UK is approximately 12% in men and 24% in women (Godfrey et al, 1984), the incidence increasing with advancing years. It is currently believed that 10–30% of gallstones become symptomatic, with presenting features being related to the site of the gallstones. Acute diagnoses include biliary colic, acute cholecystitis, empyema, mucocele, obstructive jaundice, acute cholangitis and pancreatitis. Surgeons, endoscopists and radiologists may all play an important role in the diagnosis and management of these biliary tract disorders.

CHOLECYSTOLITHIASIS

Biliary colic

Impaction of a stone in the neck of the gallbladder (Hartman's pouch) or in the cystic duct is thought to result in spasm which produces visceral pain. Although referred to as biliary colic, this pain is usually constant in nature, typically lasting for several hours, before resolving spontaneously or with analgesia. Often precipitated by ingestion of fatty foods, the pain usually starts suddenly in the right upper quadrant or epigastrium, classically radiates through to the back or inferior pole of the scapula and may be associated with nausea or vomiting. Clinical examination is usually unremarkable.

Acute cholecystitis

Acute cholecystitis is caused by an obstruction of the cystic duct which initially results in concentration of the bile as a result of absorption of water initiating a chemical inflammation. Bacterial infection invariably follows. This may lead to the development of an empyema (abscess within the gallbladder), or rarely gangrene and perforation of the gallbladder. A mucocele may develop if a gallstone impacts in Hartman's pouch when the gallbladder is empty. The gallbladder subsequently secretes mucus, resulting in an enlarged gallbladder, which may be easily palpable.

Typically, acute cholecystitis presents with severe and persistent right upper quadrant pain, which may be worse on movement or deep inspiration and frequently radiates to the back. Nausea, vomiting and anorexia are common. Examination often reveals a fever and localized tenderness. Occasionally, an inflammatory mass may be palpable because of an enlarged oedematous gallbladder surrounded by adherent omentum. Clinically, swinging pyrexia, tachycardia and impaired cardiorespiratory function should raise clinical suspicion of an empyema. Development of diffuse upper abdominal peritonism may indicate perforation. The presence of jaundice suggests choledocholithiasis, although common bile duct (CBD) compression from an inflamed gallbladder is a possibility (Mirizzi's syndrome).

Acute cholecystitis may develop in the absence of gallstones. Acalculous cholecystitis commonly afflicts critically ill patients in an intensive care unit. Predisposing factors include diabetes and gallbladder stasis secondary to parenteral nutrition and opiate analgesia. The condition often progresses to gangrene and perforation and has a mortality rate close to 15% (Habib and Scott-Combes, 2001). Diagnosis may be difficult owing to the co-existence of other serious conditions.

CHOLEDOCHOLITHIASIS

The incidence of CBD stones found before or during cholecystectomy is estimated at 12% (Motson, 1985). Gallstones in the CBD may present with obstructive jaundice, acute cholangitis or acute pancreatitis. Obstructive jaundice is characterized by dark urine, pale stools and pruritis, and when caused by gallstones, it is more frequently associated with pain than when caused by benign or malignant biliary strictures.

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Acute cholangitis

Acute cholangitis is a common cause of emergency hospital admission and, if left untreated, can rapidly lead to septicaemia and death. It results from bacterial infection within an obstructed or poorly draining biliary system and is most frequently associated with ductal stones (Nathanson, 2001). There may be a history of recent instrumentation of an obstructed biliary tree by endoscopic retrograde cholangiopancreatography (ERCP) or percutaneous transhepatic cholangiography (PTC), especially if the obstruction has not been relieved. Recurrent jaundice and fever, weeks or months after endoscopic or percutaneous insertion of a biliary endoprosthesis usually indicates stent obstruction and sepsis.

The classical clinical syndrome, known as Charcot's triad after the clinician who first described the features in 1877, consists of right upper quadrant pain, jaundice and fever (with or without rigors). Reynolds and Dargan (1959) added mental confusion and hypotension to the classical Charcot's triad to describe the syndrome of acute suppurative or 'toxic' cholangitis (Reynold's pentad). If such clinical features are present, the condition is invariably fatal without urgent biliary decompression.

Gallstone pancreatitis

Although some geographical variation exists, gallstones probably account for more than half of all cases of pancreatitis. Acute pancreatitis occurs in 3–8% of all patients with symptomatic gallstones (Armstrong et al, 1985) and, as with the incidence of gallstones in general, is more common in females than males. Biliary pancreatitis tends to occur in an older age group and is more commonly associated with bacteraemia and cholangitis than alcohol-induced pancreatitis. These latter two factors may contribute to a higher mortality rate in patients with biliary pancreatitis (10–13%) compared with those with alcohol-induced pancreatitis (3–5%) (Raraty et al, 1997).

INVESTIGATION OF GALLSTONE DISEASE

The diagnosis of gallstone disease is suspected on clinical grounds but relies on relevant laboratory and radiological investigations for confirmation. Results of liver function tests (LFTs) may be normal in patients with gallstones confined to the gallbladder, but abnormal LFTs suggest choledocholithiasis. Obstructive jaundice is characterized by hyperbilirubinaemia and a raised alkaline phosphatase. In patients with acute cholangitis or longstanding biliary obstruction, the transaminase levels may rise as hepatocellular damage occurs. A serum amylase level three times the upper limit of normal is diagnostic for acute pancreatitis.

Ultrasonography is the investigation most widely used to confirm the diagnosis of gallstones, which are seen as bright echoes with posterior acoustic shadowing (*Figure 1*). In addition, ultrasonography can identify increased gallbladder wall thickness (caused by inflammation) and dilatation of the CBD (as a result of distal biliary obstruction). The accuracy of ultrasonography in the detection of gallbladder calculi is 95–98%. However, the sensitivity for ductal calculi is only 20–55% (Raraty et al, 1997). Oral cholecystography is rarely undertaken nowadays, but may be used to demonstrate a functioning gallbladder. It is of no value in patients with obstructive jaundice, hepatic failure, intestinal malabsorption or vomiting.

Confirmation that biliary obstruction is caused by gallstones requires imaging of the biliary tree and can be performed by intravenous cholangiography, magnetic resonance cholangiopancreatography (MRCP), ERCP, PTC or intraoperative cholangiography. The role of intravenous cholangiography is limited because of significant failure rates, relatively high cost and risk of allergic reactions. Recent advances in magnetic resonance imaging have resulted in an increased use of MRCP to determine the aetiology of biliary obstruction. However, it is not universally available and remains an expensive technique (*Figure 2*). ERCP is considered the gold standard in bile duct imaging and offers the advantage of proceeding to therapeutic intervention if required. It is associated with morbidity rates of 5–10% and mortality rates of 0.4–1.4% (Winslet and Neoptolemos, 1991). Complications include bleeding, retroduodenal perforation and ERCP-induced pancreatitis. PTC is rarely undertaken as a diagnostic procedure for patients with suspected choledocholithiasis but may be used to establish biliary drainage in patients with obstructive jaundice or acute cholangitis if ERCP is unavailable, unsuccessful or inappropriate (e.g. previous Polya gastrectomy).

Figure 1. Ultrasound scan demonstrating a gallstone in the gallbladder with posterior acoustic shadowing.

TREATMENT OF GALLSTONES

Asymptomatic gallstones diagnosed incidentally need no intervention, as the risks of any procedure outweigh the potential benefits. However, symptomatic gallstones require treatment. Laparoscopic cholecystectomy has become the treatment of choice because of the lack of a major abdominal wound, reduced postoperative pain, shorter hospital stay and more rapid return to normal activity. Approximately 90–95% of cholecystectomy procedures can be completed laparoscopically. Indications for conversion to an open procedure include failure to make progression during the dissection, uncertainty regarding anatomy, uncontrollable bleeding or if there is actual or suspected injury to the extrahepatic biliary tree. Conversion rates should not be viewed negatively since attempts to lower them may lead to unsafe dissection and an increased number of complications. Bile duct injury is the most serious complication of cholecystectomy, and it is recognized that there has been an increased incidence of such injuries since the introduction of laparosopic technique.

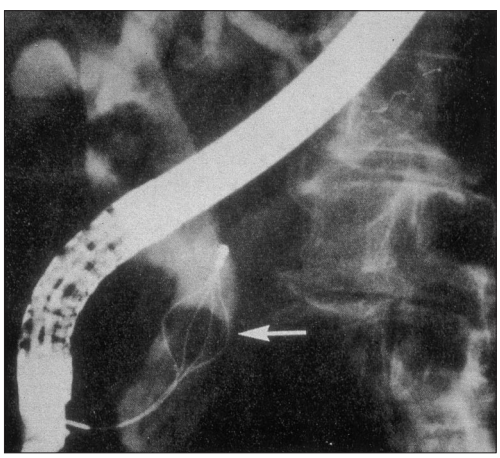
There is good evidence to support early cholecystectomy (ideally within 72 hours of admission) for patients with acute cholecystitis to avoid the risk of recurrent emergency admissions. Patients with significant comorbidity can initially be managed non-operatively with a nil-by-mouth regimen, intravenous fluids and systemic antibiotics. If symptoms of acute cholecystitis do not settle with these conservative measures, the gallbladder may be decompressed by percutaneous insertion of a drain under ultrasound guidance (cholecystostomy). Subsequently, the gallstones may be extracted percutaneously leaving the gallbladder in situ, or if appropriate, a cholecystectomy may be performed when the inflammation has settled.

Endoscopic removal of bile duct stones is preferable to surgery in postcholecystectomy patients, high-risk surgical patients when the gallbladder is still present, patients with acute cholangitis and selected patients with acute biliary pancreatitis. In the author's unit, ERCP before laparoscopic cholecystectomy is only undertaken in patients with persistently abnormal LFTs, otherwise a routine intraoperative cholangiogram is performed. If ductal stones are identified at ERCP, they can be extracted following sphincterotomy using a balloon catheter or Dormia basket (*Figure 3*). The overall success rate is 80–95% (Nathanson, 2001), but if endoscopic extraction is not achieved, a nasobiliary drain or biliary stent should be left in situ to ensure biliary decompression until complete stone clearance can be achieved by further endoscopic manoeuvres or subsequent surgery. If unsuspected ductal stones are found during laparoscopic cholecystectomy, there are three options: to perform laparoscopic exploration of the CBD if adequately trained (via the cystic duct or by direct choledochotomy), convert to an open procedure and explore the CBD or leave the stones in situ and undertake an early postoperative ERCP with stone extraction.

Systemic antibiotic therapy and drainage of the biliary tree are the mainstays of treatment for acute cholangitis. Empirical broad-spectrum antibiotic therapy should be started as soon as the diagnosis is made and blood cultures have been taken. Close monitoring of blood pressure, pulse and urinary output are mandatory in the early stages. Patients with septicaemia and shock may require admission to an intensive care unit, as invasive monitoring, circulatory support and artificial ventilation may be necessary. Choledochotomy and T-tube drainage used to be the standard management, but now decompression can be achieved by endoscopic or radiological methods. Although endoscopic biliary decompression is usually the procedure of choice, percutaneous transhepatic biliary drainage may have certain advantages over ERCP in some criti-

Figure 2. Magnetic resonance cholangiopancreatography image showing a calculus in the common bile duct.

Figure 3. Endoscopic Dormia basket extraction of ductal calculi.



cally ill patients, as sedation is rarely necessary and the risks of hypoxaemia and aspiration with patients in prone positions are avoided.

The initial management of patients with pancreatitis involves intravenous fluids, adequate analgesia and often a nasogastric tube for nausea and vomiting. A number of different scoring systems (modified Glasgow, Ranson, APACHE II) is available to assess the severity of a bout of pancreatitis. These scoring systems allow the clinician to predict which patients are likely to follow a severe disease course with the development of systemic complications and to select which patients may benefit from aggressive interventional therapies. There is evidence to support the use of systemic antibiotics in these patients (Powell et al, 1998), and early ERCP and sphincterotomy have also been shown to be effective in reducing morbidity and mortality rates (Dervenis et al, 1999). As the likelihood of further attacks of pancreatitis always exists if gallstones are present, the current recommendation is that cholecystectomy should preferably be undertaken during the same hospital admission unless a sphincterotomy has already been performed (Glazer et al, 1998).

Other treatment options for cholelithiasis, such as extracorporeal shock wave lithotripsy and bile salt dissolution, are safe but have limited applicability, require prolonged treatment periods and have high rates of recurrence.

CONCLUSION

Cholelithiasis continues to account for most biliary tract emergencies. Laparoscopic cholecystectomy is standard treatment for symptomatic gallbladder calculi. Strategies for the management of choledocholithiasis remains variable, depending on local endoscopic and laparoscopic resources and experience (*Figure 4*). Endoscopic sphincterotomy and stone extraction, either before or after cholecystectomy, is widely practised. However, the CBD can be explored laparoscopically by appropriately trained surgeons with a low incidence of retained stones, minimal increase in hospital stay and few complications.

Conflict of interest: none.

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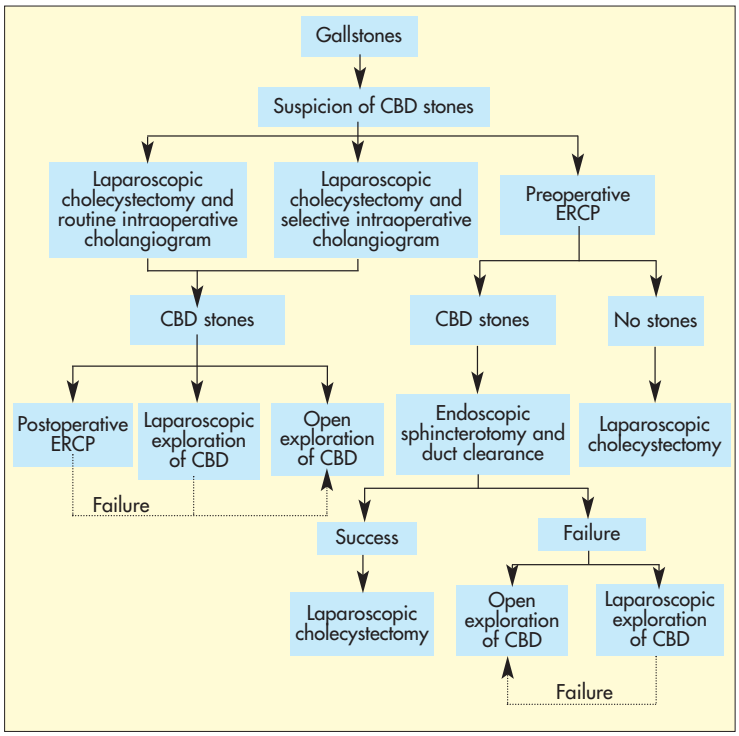

Figure 4. Algorithm showing potential strategies for management of gallstones. CBD = common bile duct; ERCP = endoscopic retrograde cholangio-pancreatography.

KEY POINTS

- Biliary colic results from spasm of the gallbladder or cystic duct as a result of impaction of a gallstone.
- Acute cholecystitis is a chemical inflammation of the gallbladder caused by obstruction of the cystic duct. Secondary bacterial infection invariably follows.
- Choledocholithiasis may present with obstructive jaundice, acute cholangitis or acute pancreatitis. Acute cholangitis requires systemic antibiotic therapy and adequate drainage of the biliary tree.
- Ultrasonography is the investigation most widely used to confirm the diagnosis of gallstones.
- Radiological imaging of the biliary tree is essential in patients presenting with obstructive jaundice.
- Asymptomatic gallstones require no surgical intervention.
- Laparoscopic cholecystectomy is the treatment of choice for uncomplicated choldocholithiasis.
- Ductal calculi can be managed by pre- or postoperative endoscopic retrograde cholangiopancreatography, laparoscopic exploration of the common bile duct or conversion to an open procedure with exploration of the common bile duct.