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Symptoms, diagnosis and endoscopic management of common bile duct stones

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Bile duct stones (BDS) are often suspected on history and clinical examination alone but symptoms may be variable ranging from asymptomatic to complications such as biliary colic, pancreatitis, jaundice or cholangitis. The majority of BDS can be diagnosed by transabdominal ultrasound, computed tomography, endoscopic ultrasound or magnetic resonance cholangiography prior to endoscopic or laparoscopic removal. Approximately 90% of BDS can be removed following endoscopic retrograde cholangiography (ERC) + sphincterotomy. Most of the remaining stones can be removed using mechanical lithotripsy. Patients with uncorrected coagulopathies may be treated with ERC + pneumatic dilatation of the sphincter of Oddi. Shockwave lithotripsy (intraductal and extracorporeal) and laser lithotripsy have also been used to fragment large bile duct stones prior to endoscopic removal. The role of medical therapy in treatment of BDS is currently uncertain. This review focuses on the clinical presentation, investigation and current management of BDS.

Key words: bile duct stones; choledocholithiasis; ERCP; Endoscopic retrograde cholangiography; sphincterotomy; endoscopic biliary stenting; lithotripsy; ESWL; MRCP; mechanical lithotripsy; chemical dissolution; ursodeoxycholic acid; review.

SYMPTOMS AND SIGNS OF COMMON BILE DUCT STONES

The symptoms and signs of common bile duct stones (CBDS) are variable and can range from being completely asymptomatic to complications such as biliary colic, jaundice, cholangitis or pancreatitis. Whilst complications of retained bile duct stones (BDS) are common, a proportion of CBDS remain asymptomatic and do not result in any

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complications. However, the natural history of asymptomatic BDS is difficult to determine. Studies have estimated the prevalence of *asymptomatic* BDS to be between 5.2% and 12%.[1–4] The natural history of *asymptomatic* BDS appears to be more benign than that of *symptomatic* BDS.[5] A study by Millbourn of 38 patients presenting with *symptomatic* BDS, who were unfit for surgery or refused surgery, were followed for 6 months to 13 years. Forty-five per cent of the patients became asymptomatic but 55% developed complications such as biliary colic, jaundice and cholangitis.[6] More recently Johnson and Hosking reported similar outcomes with over 50% of patients with retained duct stones developing symptoms over time with 25% developing serious complications.[7] Conversely, a study by Murison and colleagues randomised patients undergoing cholecystectomy, but without symptoms of bile duct stones, to intraoperative or no intraoperative cholangiography. Twelve per cent of patients in the cholangiography group were discovered to have bile duct stones. It was assumed that a similar percentage of patients in the group without cholangiography had stones, but no patients developed symptoms in over 3 years of follow-up.[2] We found similar results in our local population in a non-randomised study.[8]

A common presentation of CBDS is biliary colic. The pain is often situated in the right hypochondrium or epigastrium lasting 30 min to several hours. Associated symptoms with nausea and vomiting are common. Biliary colic typically is not eased by change in body position and is not specifically related to food intake. The pain is thought to be caused by distension of the common bile duct due to an increase in pressure caused by partial or complete obstruction by a CBDS. One study has suggested that presentation of CBDS may depend on the number of stones situated in the CBD (e.g. one to three stones more likely associated with cholangitis, biliary colic and higher bilirubin levels than patients presented with four or more stones who were more likely to present with painless jaundice).[9] In addition to the number of stones, the diameter of CBDS is also important. The likelihood of stones passing spontaneously may be dependent on size.[10] Stones up to 8 mm may pass without problems as suggested by a study in which bile duct stones were shown to pass spontaneously when ERCP was later performed.[11,12]

When a stone becomes impacted in the bile duct, obstructive jaundice ensues. Often the obstruction of the bile duct is incomplete but complete obstruction may occur. Frequently the obstructed bile becomes infected resulting in cholangitis. CBDS often contain bacteria embedded within their matrix. When obstruction of the bile duct occurs, the rise in biliary pressure results in the translocation of bacteria from the bile duct to the blood-stream. Approximately one-fifth of patients presenting with cholangitis from CBDS will have a bacteraemia, usually with gram negative organisms being cultured.[13] The symptoms of cholangitis are described by Charcot's triad of jaundice, fever and pain in up to 75% of patients. However, in a minority of patients (12%) pain alone may be the only presenting feature of cholangitis.[14] Prolonged biliary obstruction results in secondary biliary cirrhosis after approximately 5 years.[15]

Between 4% and 8% of patients with gallstones will develop gallstone pancreatitis secondary to migratory gallstones.[16] Developing gallstone pancreatitis is more likely with smaller stones than with larger stones. In a study by Venneman, it was found that patients presenting with gallstone pancreatitis had mean diameter bile duct stone size of 4 mm compared to that of 9 mm for patients presenting with obstructive jaundice.[17] The majority of these patients will have a self limiting disease but mortality still remains around 10%.[18] There have been several scoring systems devised to predict the severity of pancreatitis including the Ranson system, modified Imrie system, Apache II score and Balthazar grading system. These scoring systems are based on organ dysfunction and local complications.[19,20]