Review Article

Surgery in biliary lithiasis: from the traditional "open" approach to laparoscopy and the "rendezvous" technique

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BACKGROUND: According to the current literature, biliary lithiasis is a worldwide-diffused condition that affects almost 20% of the general population. The rate of common bile duct stones (CBDS) in patients with symptomatic cholelithiasis is estimated to be 10% to 33%, depending on patient's age. Compared to stones in the gallbladder, the natural history of secondary CBDS is still not completely understood. It is not clear whether an asymptomatic choledocholithiasis requires treatment or not. For many years, open cholecystectomy with choledochotomy and/or surgical sphincterotomy and cleaning of the bile duct were the gold standard to treat both pathologies. Development of both endoscopic retrograde cholangiopancreatography (ERCP) and laparoscopic surgery, together with improvements in diagnostic procedures, influenced new approaches to the management of CBDS in association with gallstones.

DATA SOURCES: We decided to systematically review the literature in order to identify all the current therapeutic options for CBDS. A systematic literature search was performed independently by two authors using PubMed, EMBASE, Scopus and the Cochrane Library Central.

RESULTS: The therapeutic approach nowadays varies greatly according to the availability of experience and expertise in each center, and includes open or laparoscopic common bile duct exploration, various combinations of laparoscopic cholecystectomy and ERCP and combined laparoendoscopic rendezvous.

CONCLUSIONS: Although ERCP followed by laparoscopic cholecystectomy is currently preferred in the majority of hospitals worldwide, the optimal treatment for concomitant gallstones and CBDS is still under debate, and greatly varies among different centers.

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KEY WORDS: biliary obstruction; bile duct stones; gallstones; endoscopic retrograde cholangiopancreatography; laparoscopic cholecystectomy

Introduction

According to the current literature, biliary lithiasis is a worldwide-diffused condition that affects almost 20% of the general population.[1] The rate of common bile duct stones (CBDS) in patients with symptomatic cholelithiasis is approximately 10% to 33%, depending on patient's age.[2-4]

The vast majority of CBDS form within the gallbladder and then move into the common bile duct (CBD), after gallbladder contractions. Then stones may reach the duodenum from CBD following the bile flow, after gallbladder contractions. More often because of the smaller diameter of the distal CBD before the Vater papilla, they may be blocked into the choledochus. When this happens, the patient may be still asymptomatic if gallstones are fluctuant, otherwise it may cause a wide range of problems, including complete obstruction and jaundice.

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Bilostasis may be responsible for bile infection and then ascending cholangitis may happen, whereas bile/pancreatic juice flow problems at the merging of the CBD and the main pancreatic duct (Wirsung) are presumed to potentially trigger the intrapancreatic activation of pancreatic enzymes, thus causing acute biliary pancreatitis.[5, 6]

Compared to stones in the gallbladder, the natural history of secondary CBDS is still not completely understood. It is not clear whether an asymptomatic choledocholithiasis requires treatment. A prospective study of CBDS in patients undergoing laparoscopic cholecystectomy (LC) suggested that a third of patients with CBDS at the time of surgery pass their stones spontaneously within 6 weeks after surgery.[1] It is not known which stone size precludes transpapillary migration into the duodenum nor which risk factors are supposed to predict complications for untreated CBDS. Nevertheless, complications of ductal stones include a great variety of symptoms from mild to more serious clinical conditions: pain, partial or complete biliary obstruction, to cholangitis, hepatic abscesses or pancreatitis, which can also turn in a life threating condition. Therefore, according to the current literature, it is recommended to treat CBDS whenever detected, except when general contraindication are present in high-risk patients: in this latter condition a conservative approach is accepted.[7]

For many years, open cholecystectomy with choledochotomy and/or surgical sphincterotomy and cleaning of the bile duct were the gold standard to treat both pathologies. Development of endoscopic retrograde cholangiopancreatography (ERCP) and laparoscopic surgery and improvement of diagnostic procedures have influenced new approaches to the management of CBDS in association with gallstones.[8]

ERCP has become in the last decades a widely available procedure, while open cholecystectomy has worldwide been replaced by the laparoscopic approach, which is considered the gold standard treatment for gallbladder removal since NIH Consensus on 1993.[9] Despite a great variety of examinations and techniques available nowadays, two main open questions remain without a unique answer: how to cost-effectively diagnose CBDS and how to deal with them. CBDS diagnosis and management has deeply changed during the last 30 years, following the dramatic diffusion of imaging, including endoscopic ultrasound (EUS) and magnetic resonance cholangiography (MRC), endoscopy and laparoscopy. Thus, the therapeutic approach nowadays varies greatly according to the availability of experience and expertise in each center, and includes open or laparoscopic CBD exploration, various combinations of LC and ERCP and combined laparoendoscopic rendezvous (LERV).[10]

Methods

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for conducting and reporting systematic reviews were followed as previously reported.

A systematic literature search was performed independently by two authors (TG and MP) using PubMed, EMBASE, Scopus and the Cochrane Library Central. The search was limited to studies in humans and to those reported in the English language, while no restrictions were set for the type of publication. Participants of any age and gender who underwent treatment for CBDS were included in this study.

The following MESH search headings were used: ((((((CBDS) OR biliary lithiasis) OR gallstones) AND surgery) OR ERCP) OR bile duct exploration) OR rendezvous. Extensive crosschecking of the reference lists of all retrieved articles that fulfilled the inclusion criteria further broadened the search. For all of the databases, the last search was run on January 1, 2016. The same two authors independently screened the titles and abstracts of the primary studies that were identified in the electronic search. Most relevant data and papers are reported in the results section and later discussed.

Results

Open approach

Until the late 1980s, gallstones were managed by laparotomic cholecystectomy and CBDS were treated by open CBD exploration and clearance, which was performed by duodenotomy and sphincterotomy or bilioenteric anastomosis.[11, 12] In the open surgery era, different prospective studies compared the use of ERCP and endoscopic sphincterotomy (ES) before open cholecystectomy versus open cholecystectomy with surgical exploration of the CBD.[10] These papers did not support preoperative ES as a technique for clearance of the CBD of stones on the basis of efficacy, morbidity rate, or cost.[12] In the era of LC, the combination of preoperative ERCP and LC is considered as the treatment of choice for concomitant cholecysto-choledocholithiasis and remains the most frequently used approach in the vast majority of centers.[13]

Nevertheless as reported by some authors[14-16] laparotomic cholecystectomy is a valid and safe option in case of "difficult gallbladders", when the risk for a bile duct injury is supposed to be too high with the laparoscopic approach. A recent systematic review and meta-analysis[14] reported that traditional open approach was used in 19% of partial cholecystectomy whilst in 8% of cases were converted from laparoscopic to open