Individuals with choledocholithiasis (common bile duct stones or CDL) can present with biliary colic, nonspecific abdominal pain, obstructive jaundice, cholangitis, or acute biliary pancreatitis. Individuals may also harbor asymptomatic stones that are diagnosed serendipitously. The diagnostic studies available are imperfect, and therapies range from expectant management to endoscopic stone extraction or surgery, depending on the clinical scenario.

Choledocholithiasis cannot reliably be diagnosed on the basis of the patient’s history and physical examination alone. Patients with CDL may complain of nausea, emesis, bloating or right upper quadrant/epigastric discomfort, but these symptoms are not necessarily predictive of CDL. Elevations of serum levels of alkaline phosphatase (AP), gamma glutamyl transpeptidase (GGT), aspartate aminotransferase (AST), and alanine aminotransferase (ALT) with associated symptoms suggest CDL, especially in patients with known gallbladder stones. Almost all patients will have an elevated AP and GGT level. Bilirubin and aminotransferase levels are elevated in 70-90% of patients at the onset of symptoms. However, normal liver chemistries do not completely exclude the possibility of CDL.

Transcutaneous ultrasound (US) has been the traditional noninvasive test of choice for diagnosing CDL. Unfortunately, its sensitivity varies widely (30-90%), and the technique is highly operator dependent and can be limited if the patient is obese or if there is intestinal gas overlying the bile duct. However, a normal US result in conjunction with normal total bilirubin and alkaline phosphatase levels has been shown to have an excellent negative predictive value for CDL, approaching 95%. Conversely, abnormal results of these parallel tests yield a poor positive predictive value (approximately 35%) (see algorithms 1&2).

Algorithm 1

\[ S/P \text{ cholecystectomy} \]
\[ \text{Symptoms suggestive of CDL} \]
\[ \text{Noninvasive evaluation} \]
\[ \text{Labs, U/S} \]
\[ \text{Low} \]
\[ \text{Intermediate Suspicion (or high risk patient)} \]
\[ \text{Observe (negative) EUS/MRCP (positive) ERCP +/- noninvasive studies} \]
\[ * \text{expertise in ERCP available} \]
\[ \text{ERCP (where EUS/MRCP not available)} \]

Algorithm 2

\[ \text{Gallbladder intact (surgical candidate)} \]
\[ \text{Symptoms suggestive of CDL} \]
\[ \text{Noninvasive evaluation} \]
\[ \text{Labs, U/S} \]
\[ \text{Low suspicion} \]
\[ \text{Intermediate} \]
\[ \text{High suspicion} \]
\[ \text{Surgery + IOC negative EUS/MRCP positive ERCP w/stone extraction} \]
\[ \text{No CDL} \]
\[ \text{CDL} \]
\[ \text{success} \]
\[ \text{failure} \]
\[ \text{lap chole} \]
\[ \text{open/lap chole} \]

W/CBDE/IOC
Abdominal computed tomography (CT) has test characteristics similar to those of ultrasound. Three-dimensional helical CT and magnetic resonance cholangiopancreatography (MRCP) are significantly more sensitive than US or CT. Helical CT may approach the sensitivity of MRCP. Endoscopic retrograde cholangiopancreatography (ERCP) appears to be >90% sensitive for the detection of CDL and offers the potential for therapeutic intervention. However, there is a 3%-6% complication rate associated with therapeutic ERCP for stone removal. Recent studies indicate that endoscopic ultrasound (EUS) can detect CDL with an accuracy greater than 90%, comparable to ERCP and considerably better than transcutaneous US. The risks of EUS are much lower than those of ERCP but EUS lacks therapeutic capability. Therefore, EUS may be considered in lieu of ERCP as a diagnostic test for patients felt to have a low to intermediate risk of CDL. Patients not found to have CDL will have avoided the risk of ERCP, while those found to have stones will generally undergo stone extraction by ERCP or other means. In a recent prospective study comparing the test characteristics of EUS and MRCP for the diagnosis of CDL, EUS assessment was 93% accurate as compared to 82% for MRCP (p=NS).7

Percutaneous transhepatic cholangiography (PTC) appears to be as effective for diagnosis and therapy of CDL as ERCP, but it has a lower success rate in patients without a dilated biliary tree and may require more than one procedure. When CDL is suspected, the use of ERCP or PTC should depend largely on local expertise.

The skill of the endoscopist in performing therapeutic ERCP will also help determine the timing of ERCP (i.e., before or after laparoscopic cholecystectomy) as will the skill of the biliary surgeon. In experienced hands, post-cholecystectomy ERCP and stone removal can be performed safely and effectively, with expected success rates of greater than 90%. If expert ERCP is not available, or local success rates are not high, conversion to open cholecystectomy, laparoscopic CBD exploration, or post-operative referral to experienced ERCP centers are available options when CBD stones are seen on intraoperative cholangiography (IOC).

Stratification of a patient’s risk for CDL will limit extensive diagnostic testing and potentially minimize the number of unnecessary ERCPs and bile duct explorations. Several investigators have developed predictive models and nomograms to ascertain the risk of CDL in patients with gallstones. These models appear to be better predictors than clinical judgment, but have not gained wide acceptance.

There are currently no prospective randomized trials assessing the utilization and timing of ERCP in patients being considered for cholecystectomy who have findings consistent with CDL. However, 2 decision analyses have addressed this issue. Erickson et al. found that employing postoperative ERCP after laparoscopic cholecystectomy minimized potential costs and morbidity. However, if there was a high likelihood of CDL, then selective preoperative ERCP could be an equivalent strategy. Sahai et al. recently incorporated the use of EUS in a similar decision model. Patients at intermediate risk (11-55%) of CDL should undergo EUS. For patients with a risk greater than 55%, ERCP was the preferred strategy. The authors also found that IOC was the least costly option for patients with a 17%-34% risk of CDL. The authors of both these studies emphasize the paramount importance of local expertise. Algorithms 1 and 2 address the evaluation of patients with findings consistent with CDL.

A recent meta-analysis assessing patients with biliary pancreatitis suggested that the best predictor of CDL was a 3 fold elevation in the serum AST level. Urgent ERCP is indicated in patients with cholangitis and suspected biliary obstruction and in selected patients with ‘severe’ gallstone pancreatitis. Again, timing and choice of intervention will largely depend on local expertise.

REFERENCES

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