

Ask the expert

Management of bile duct stones



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Ask the expert features questions submitted by members, with answers provided by ASGE physician experts. ASGE's Publications Committee identifies authors and topics for the column. In this issue, David L. Carr-Locke, MD, FASGE, responds to questions on the management of bile duct stones. Dr. Carr-Locke is a professor of Medicine at the Albert Einstein College of Medicine and chief of the Division of Digestive Diseases, Beth Israel Medical Center, New York, N.Y. and co-director of its Center for Digestive Health.

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1. Q: When should prophylactic antibiotics be given to patients with choledocholithiasis undergoing endoscopic retrograde cholangiopancreatography (ERCP)?

A: There are two considerations here. First, for prophylaxis against remote site infections, e.g., to prevent endocarditis or infections of a joint prosthesis, ventricularperitoneal shunt or ascites, there are no indications for antibiotics before ERCP.¹ Second, if cholangitis is not already being treated, routine antibiotics prior to ERCP to reduce the risk of cholangitis is much less important than providing adequate biliary drainage after cholangiography and especially after manipulation of a bile duct potentially carrying bacteria.² Antibiotics alone are inadequate to treat or prevent cholangitis if bile drainage is poor.

2. Q: What is the best way to manage patients with symptomatic bile duct stones who are on clopidogrel, warfarin or nonsteroidal anti-inflammatory drugs (NSAIDs)?

A: This question revolves around two considerations: (1) the risk of bleeding after sphincterotomy versus other options and (2) whether the procedure is emergent or elective. In the emergent situation of cholangitis and calculous biliary obstruction in patients who are anticoagulated, it is safest and most expedient to place a plastic stent to provide biliary drainage and return for definitive bile duct clearance at a later occasion.

When elective, the cardiac or other vascular risk of discontinuing the anticoagulant agent(s) must be weighed against the risk of bleeding from the ERCP.³ If the vascular risk is low, then anticoagulant drugs may be discontinued for at least five days prior to ERCP. If the vascular risk is high, then a short-acting anticoagulant can be administered by injection up to a few hours before the procedure, which may then safely include a sphincterotomy in both scenarios.

The more difficult situation is when anti-platelet drugs cannot be stopped because of recent coronary stent placement. Here the risk of post-sphincterotomy bleeding is not clearly known, but this is one circumstance in which I would empirically favor using primary balloon dilation of the papilla in place of sphincterotomy. There does not appear to be an increased bleeding risk in patients on NSAIDs.

3. Q: When should balloon dilation be used instead of sphincterotomy? Can balloon dilation be done on an intact papilla? What are the complication rates? What techniques are available? What balloon size should be used, and what are the long-term effects?

A: There has been increasing interest in the use of balloon dilation of the papilla as an alternative, or in addition, to sphincterotomy.⁴ The original attractive concept, proposed more than 25 years ago, was to achieve the goal of bile duct clearance while maintaining an intact biliary sphincter and also removing the risk of bleeding from a sphincterotomy.

Worldwide experience, however, has not made balloon dilation a routine technique; additionally, there are considerable differences in the risks of the procedure between East and West, for reasons that are not clear. In Japan, China and Korea, primary balloon dilation of the papilla for removing bile duct stones has a success rate and complication risk similar to those of sphincterotomy, with the exception of bleeding,⁴ although there is an increased need for mechanical lithotripsy.

When balloon dilation is performed in the West, the risk of acute pancreatitis appears to be unacceptably high, which has limited its popularity as a primary method for treating bile duct stones. Nevertheless, there are some situations in which this technique may be an advantage over sphincterotomy and in which I consider its preferential use: altered anatomy where the approach to the papilla is from below and sphincterotomy is challenging; spontaneous or iatrogenic coagulopathy in which sphincterotomy carries a significant risk of bleeding; and presence of a periampullary duodenal diverticulum where access for sphincterotomy may be difficult.

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In general, the balloon size to be used will be determined by the diameter of the bile duct and the stone(s) to be removed, but an upper limit of 8 to 10 mm is common. Although there are wire-guided hydrostatic balloons available in the United States, there are no balloons that are specifically designed for this application. Therefore, be aware of the straightening and considerable rigidity of such balloons when inflated across the papilla, adjust the endoscope position accordingly and allow space for this to occur.

The long-term adverse effects of balloon dilation seem to be less than those after sphincterotomy, but the populations that have been studied are confined to areas where primary balloon dilation has become used more commonly and may not necessarily be extrapolated to the West.⁵

These remarks are in distinct contrast to the impressive safety and efficacy of secondary large-size (up to 18 mm) balloon dilation after prior sphincterotomy for difficult stones, an approach that is gaining in popularity.⁴

4. Q: Is cholangitis always an indication for emergent ERCP, and how emergent is it?

A: For the majority of patients with suspected or established calculous cholangitis demonstrating Charcot's triad, intravenous fluids and antibiotics followed by an early ERCP within a few hours are appropriate, since most patients make an initial improvement. The exceptions to this are patients who (1) fail to improve after a few hours of antibiotics (12 hours is a reasonable guide) or (2) show signs of deterioration in their septic parameters and/or organ function (renal, cardiac, pulmonary, mental state, coagulation) or (3) have severe characteristics on presentation (Reynolds' pentad), in whom immediate biliary drainage is indicated whenever these criteria are fulfilled.

Remember that many of these patients are elderly and do not withstand the effects of continuing biliary obstruction with sepsis as well as younger patients. In this situation, it is permissible (and indicated) to undertake ERCP in a gravely ill patient (ASA class IV), since the cause is endoscopically treatable. This is indeed one of the most dramatic therapies we, as endoscopists, can offer, with the expectation of an almost immediate improvement.

5. Q: How should symptomatic bile duct stones be managed during pregnancy?

A: The indications for endoscopic intervention for bile duct stones are the same as those in the non-pregnant state. The risks to the fetus of calculous biliary obstruction with sepsis or acute pancreatitis are much greater than the risks of an emergent ERCP. Intervention for the more problematic elective situation of pain with or without jaundice should be guided by the severity of symptoms and proximity to the date of delivery. Procedural risks to the pregnancy are small, but the endoscopist must always ensure that there is an appropriate indication for ERCP. Endoscopic ultrasonography (EUS) can always be performed first to confirm the diagnosis.

There are technical aspects of ERCP during pregnancy that require consideration. The uterus must be protected from radiation by a lead apron placed between the radiation source and the patient (determine whether the source is under or over the table); the fetus must be monitored; and, with increasing uterine size, ERCP may have to be undertaken in the left lateral position since the prone position may be impossible and supine orientation may place pressure on the inferior vena cava.

6. Q: What stone size is too large to attempt removal? How many times should ERCP be attempted with multiple stones? Can we use stents long term if the bile duct cannot be cleared? Which methods of lithotripsy are best? How can we remove stones proximal to a stricture? What is the role of cholangioscopy?

A: There are many considerations when approaching the challenge of clearing the bile duct of "difficult" stones. First the definition of "difficult" is somewhat subjective and reflects the endoscopist's expertise. Many would agree, however, that stones larger than 15 mm in diameter, stones equal in diameter to the bile duct in which they reside, stones larger than the diameter of the duct distal to them, square or faceted stones, a large number of stones, impacted stones, intrahepatic stones, a tortuous bile duct, a duct stricture distal to the stone(s) and surgically-altered anatomy all present additional difficulties.

My seven axioms for stone extraction apply to all of these scenarios and help determine which approach and accessories are likely to be needed: (1) assess the bile duct anatomy; (2) adjust the procedure to the clinical

situation – there is no mandatory rule to finish in one session – safety first; (3) make an adequate exit for the stone by sphincterotomy, with balloon dilation if necessary; (4) have a low threshold for mechanical lithotripsy; (5) remember that baskets are more mechanically effective than balloons, but beware of impaction; (6) always extract in the axis of the bile duct and (7) additional methods of lithotripsy are always available.

Applying these rules will answer many of the questions posed by members. Size alone may not, therefore, be the limiting factor if the bile duct and endoscopic exit are adequate, but a mechanical lithotripsy basket is the safest way to extract stones if fragmentation is at all likely to be needed. The number of times endoscopic attempts should be made to clear a duct of multiple stones will depend on the appropriateness of a surgical alternative, the general condition of the patient and whether or not progress is being made.

It is imperative to provide adequate biliary drainage between sessions to reduce the risk of obstruction and cholangitis. Long-term use of stents is no longer considered an alternative to duct clearance, except for unusual circumstances, since mortality and the incidence of biliary complications are unacceptably high. Strictures in the presence of stones should be assessed as for any biliary stricture if the pathology is unknown or its behavior over time is not as expected. Dilation to remove proximal stones can be accomplished safely if the diameter of the unaffected bile duct is used as a guide.

Lithotripsy can be thought of as primary (mechanical) and secondary (additional methods). Mechanical lithotripsy should be available in all units treating bile duct stones. The most popular are disposable “through-the-scope” types with a reusable cranking handle. There are also extraction baskets that can be converted to lithotriptors by attaching a purpose-designed handle; others are “lithotripsy-compatible,” if impaction occurs, at which point a nonendoscopic cranking reel is applied to the basket wires and sheath after cutting off the basket handle. Mechanical lithotripsy increases the success rate of duct clearance to at least 90 percent, but secondary lithotripsy may be needed for the remainder. The choice will depend on local availability of these modalities.

A popular next step is the combination of direct cholangioscopy (its principal use in stone management) and electrohydraulic lithotripsy, both of which are highly effective. Laser lithotriptors can also be applied during cholangioscopy and are becoming more affordable. There are also some “smart” laser technologies that allow lithotripsy under fluoroscopic guidance alone, since they can detect the difference between stone and duct wall. These are all intracorporeal methods, but extracorporeal shockwave lithotripsy is also effective, provided the stones can be targeted by the integrated fluoroscopic guidance system. The stones either need to be calcified or a method of instilling contrast into the bile duct needs to be present.

7. Q: In what circumstances after sphincterotomy and stone extraction would a pancreatic stent be indicated?

A: There is no doubt that the incidence and severity of post-ERCP pancreatitis has been reduced significantly by the liberal use of pancreatic stents placed during an ERCP considered to carry a higher than normal risk of pancreatitis. Patient and procedural factors have been well-defined to help select those likely to need pancreatic drainage.

Those factors relevant to this question may include difficult cannulation, difficult sphincterotomy, use of access [precut] papillotomy, (inadvertent) pancreatic duct manipulation, percutaneous-endoscopic rendezvous procedures, a young female patient or a history of previous ERCP pancreatitis. In general, the risk of post-ERCP pancreatitis is lower in patients undergoing endoscopic therapy for choledocholithiasis than other indications; however, if any of the factors listed above is present, I would have a low threshold for placing a pancreatic stent.

8. Q: What should be done in an elderly patient with several comorbidities who is recovering from gallstone pancreatitis and has a small stone in a nondilated bile duct on magnetic resonance cholangiopancreatography?

A: In a patient recovering from acute gallstone pancreatitis, I would consider the risk associated with leaving the stone in the bile duct greater than the risk of attempted removal. If the risk of cholecystectomy is considered high, then ERCP, sphincterotomy and clearance of the bile duct would confer some degree of protection against gallstone pancreatitis.

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9. Q: What is the current role of ERCP in Mirizzi's syndrome?

A: Pablo Luis Mirizzi (1893-1964) was an Argentine surgeon who introduced intraoperative cholangiography to cholecystectomy in the 1930s. He is best known for the condition that bears his name, which he described in 1948. Mirizzi's syndrome is obstruction of the common hepatic duct resulting from either a stone impacted in Hartmann's pouch of the gallbladder or an inflammatory mass caused by a stone.

There are two basic types of Mirizzi's syndrome, one without a fistula between the gallbladder and bile duct (Type 1) and one with a fistula (Type 2). The presence or absence of a fistula determines the optimal choice of therapy. Most cases will require surgery to remove the gallbladder and the offending stone, with repair of any bile duct wall defect. The initial management, however, should involve a carefully made diagnosis by EUS, computed tomography, MRCP or ERCP and relief of biliary obstruction by the placement of one or more plastic stents.

In the patient with Type 2 Mirizzi's syndrome who is considered at high risk for surgery, it may be possible to fragment the stone partly or completely by direct cholangioscopy with intraductal electrohydraulic lithotripsy by or laser. ●

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ADDITIONAL RESOURCES

- [Endoscopic Retrograde Cholangiogram for Benign Biliary Diseases](#)
Endoscopic Learning Library DVD
Anthony Yuen Bun Teoh, MD, FRCS
DV044 1.00 CME Credits
Member price: \$125; non-member price: \$175

