Endoscopic retrograde cholangiopancreatography (ERCP) is an established diagnostic and therapeutic tool that was first described in 1969 by physicians in Japan and Germany. During the next decade, the utility of the procedure became apparent to gastroenterologists and surgeons throughout the world. Initially, this combined endoscopic and radiologic procedure was performed only in large centers with specific indications. Now, however, this technically difficult procedure is readily available in most community hospitals. In the past three decades, the availability of physicians trained in the performance of this procedure makes it a very commonly done examination. Knowledge of the appropriate indications, as well as the technical aspects of the examination, is important for primary care physicians to provide high-quality medical care to their patients.

The indications for ERCP have been expanded during the past 30 years. Initially, the procedure was performed only for diagnostic purposes. As application of the diagnostic procedure became successful, gastroenterologists began to perform both diagnostic and therapeutic procedures. The initial indications for ERCP included jaundice, recurrent pancreatitis, unexplained abnormal results of liver chemistry studies, suspected postoperative complications from biliary surgery, and preoperative planning of pancreatic surgery (Figure 1). The indications have expanded dramatically since then. The procedure is now performed for all the foregoing reasons as well as for therapeutic applications. In my practice, therapeutic applications of ERCP are by far the most common indication. The findings of cholecdocholithiasis, obstructive jaundice of benign and malignant etiology, postoperative biliary or pancreatic leaks, pancreatic lithiasis, pancreatic stenosis, and sphincter of Oddi dysfunction are appropriate indications.

Performing ERCP

The procedure is performed with the aid of radiologic guidance, usually in the radiology suite, although many large centers have their own dedicated fluoroscopic units in the gastroenterology laboratory. The patient, who has fasted for at least 6 hours before the procedure, is placed prone on the fluoroscopic table and sedated appropriately. Vital signs, including pulse rate, blood pressure, respiratory rate, and pulse oximetry, are monitored continuously. In the elderly, cardiac monitoring is usually done as well.

My personal choice of sedatives for most patients includes meperidine hydrochloride (Demerol), 50 mg to 100 mg, and midazolam hydrochloride (Versed), 5 mg to 10 mg, given intravenously before and during the procedure. Occasionally, I will give fentanyl citrate, 100 µg, in place of the meperidine, usually if the patient has a history of difficulty in sedation. I frequently give droperidol (Inapsine), 2.5 mg to 5.0 mg, usually if the patient has a history of poor cooperation during previous procedures. I also use this combination in an alcoholic patient or if a patient uses mood-altering drugs long term. Rarely, the anesthesiology staff will assist and administer propofol (Diprivan) along with the narcotic and benzodiazepine agents.

Antispasmodic agents are given to quiet duodenal peristalsis, to help in the location and eventual cannulation of the papilla of Vater. My personal choice for this effect is glucagon, given during the procedure in increments of 0.2 mg. Once the patient has been adequately sedated, the side-viewing video endoscope is introduced through the mouth, traversing the esophagus but looking at the distal mucosa for a pathologic process. The stomach is inspected as well; the pylorus is intubated, and the endoscope is passed into the descending duodenum. The papilla of Vater is generally found on the posterior medial aspect of the second portion of the duodenum. The papilla comprises circular muscle bundles that form the pancreatic and biliary sphincters, together called the sphincter of Oddi. The orifice on the papilla is called the ampulla of Vater. The bile duct gen-
erally enters the papilla from the superior or lateral aspect in an oblique angle. The pancreatic duct usually enters the papilla at the lower right aspect, at a right angle to the duodenal wall. The location of the papilla can vary, as can the size, shape, and configuration, sometimes making cannulation difficult. Other anatomic changes such as duodenal diverticula, ulceration, and neoplasia can also affect the success of cannulation.

Once the papilla is identified, the endoscope is positioned close to the papilla and the mucosa is carefully inspected. The cannula is a small plastic catheter, 4 Fr to 6 Fr, usually with a radiopaque tip to aid in visualization on the radiographic image. Contrast material (I use Hypaque 60%) is injected via the cannula into the ductal system to outline both the biliary and pancreatic ducts. This process will allow a proper diagnosis and provide guidance as to further therapy. In select patients such as one who has a suspected common bile duct stone retained after cholecystectomy, I use a dilute contrast solution, which often allows the detection of very small stones. I do not routinely use this contrast, though, because it is more difficult to detect which duct is entered early in the procedure. During cannulation and the injection of the contrast medium, multiple radiographs are obtained. Typically, the procedure takes 30 minutes to 1 hour to complete.

Endoscopic retrograde cholangiopancreatography is generally considered the endoscopic procedure associated with the most complications. The risks of the procedure include pancreatitis, perforation, cholangitis, and hemorrhage (Figure 2). In my practice, I quote a rate of 5% risk (1 in 20) of pancreatitis and about 2% for the remaining complications. Pancreatitis associated with ERCP has multiple causes, including overpressure at injection, multiple injections into the pancreatic duct, adverse response to the contrast agent, and mechanical response to the manipulation of the papilla.

Pancreatitis can range in severity from mild to severe. Mild pancreatitis can be defined as postprocedure abdominal pain requiring admission (if ERCP is done as an outpatient), with the serum amylase level more than three times normal at 24 hours, or prolonged admission to 2 to 3 days after the procedure. Moderate pancreatitis requires hospitalization for 4 to 10 days, whereas severe pancreatitis requires more than 10 days of hospitalization. In addition, the findings of phlegmon, pseudocysts, or intervention by percutaneous drainage or surgery will define a case of severe pancreatitis. Retroperitoneal duodenal perforation may be treated by nasogastric drainage and intravenous administration of fluids, or it may be treated by surgical intervention, as influenced by the size of the perforation. This complication should be suspected if an unusual contrast stain is seen at the termination of the sphincterotomy.

Therapeutic intervention
Therapeutic intervention is an important component of ERCP. The two most commonly performed procedures are endoscopic retrograde sphincterotomy (ERS) with stone extraction and endobiliary stent placement. The indications for ERS include choledocholithiasis, prior to biliary stent placement, prior to other therapeutic interventions (such as lithotripsy), and sphincter of Oddi dysfunction.

The technique has changed little since it was first described in the 1970s, with deep cannulation of the bile duct required. A wide variety of sphincterotomes exist, including differences in the length of wire used and in the length of the nose for insertion. I prefer to use a braided wire that is 20 mm in length. Some designs permit placement over a guidewire and may also include a balloon. Once the sphincterotome is safely in place, after radiologic confirmation of its location in the appropriate duct, electrocautery is applied. I prefer to use a pure cutting current of 60 watts power. This current has worked well for my patients over the years and has resulted in a very low rate of post-ERS bleeding. I try to size the cut to accommodate the easy passage of the stone. Usually, I use a balloon for extraction purposes, as this prevents the possibility of impaction. When a very large stone (>12 mm) is present, I use a wire basket for stone removal. This device then allows me to crush the stone mechanically (lithotripsy) if I cannot extract it by traction. Once the stone has been fragmented, the fragments are then removed either with the basket or by the use of a stone extraction balloon. Pancreatic sphincterotomy is less often performed, but the technique is almost identical to that for biliary ERS.

When placing biliary stents, usually for the palliation of an obstructing malignancy, I perform ERS to facilitate such placement. Once the diagnosis is outlined by the ERCP, ERS is next performed. A hydrophilic guidewire is passed beyond the region of stenosis.
The stenosis is dilated, usually by use of a special balloon, and then, a plastic stent of 10 Fr caliber is inserted beyond the stenosis. A triple-layer system is used for this procedure, with a guidewire and a second plastic catheter in place before pushing the stent over the “layered stiffener device” for drainage purposes.

Besides a malignant obstruction, other less common indications for stents include a biliary stone too large to be removed and postoperative bile leaks from a surgical problem. Stents are placed in the pancreas as well, primarily for recurrent pancreatitis with a region of stenosis. The technical aspects are about the same, with the exception of placement of the wires and stent in the pancreatic duct, before which I perform a pancreatic sphincterotomy. Special stents have been designed for this purpose; they are smaller in diameter because of the smaller caliber of the pancreatic duct. These stents are left in place for only a short time as they can also cause changes in the secondary pancreatic ducts if left in place for more than 1 month.

Comment

Although ERCP will remain as the procedure of choice for nonoperative treatment of biliary tract disease and pancreatic disease, many complementary tools are also available. The development of improved spiral computed tomography, software upgrades for magnetic resonance cholangiopancreatography, and endoscopic ultrasonography will allow enhanced screening methods for many diseases of the upper digestive tract. Such screening should make therapeutic choices more accurate and permit improved techniques using ERCP.

Endoscopic retrograde cholangiopancreatography should be performed only by a physician trained to do therapeutic applications. This restriction helps to prevent performance of an unnecessary second procedure. This approach can help to reduce the cost of medical care, and it improves the quality of care that is provided. This very special tool has unique indications. In the hands of properly trained physicians, the outcomes and benefits far outweigh the risks to the patient.

Reference


Bibliography


