

ADVANCES IN ENDOSCOPY

Current Developments in Diagnostic and Therapeutic Endoscopy

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Managing Perforations Related to Endoscopic Retrograde Cholangiopancreatography



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G&H What complications are associated with an endoscopic retrograde cholangiopancreatography?

VS There are 5 complications that are seen in an endoscopic retrograde cholangiopancreatography (ERCP). The most common complication is post-ERCP pancreatitis, which occurs in approximately 5% to 15% of patients and is the subject of a significant amount of research, including identifying risk factors for and developing drugs to prevent the condition. Other complications relate to infection (eg, cholangitis from incomplete biliary drainage) and sedation. The 2 complications that occur less frequently are postsphincterotomy bleeding and ERCP-related duodenal perforations (Figure 1).

G&H How significant is the risk of perforation?

VS The risk of a perforation occurring during an ERCP is fairly uncommon; studies have reported that the incidence of duodenal perforations is anywhere from 0.08% to 1.6%. However, an increased risk of perforation is seen in patients with sphincter of Oddi dysfunction, patients who are undergoing extensions of prior sphincterotomies, and patients with a periampullary diverticulum.

G&H What are considered the likely mechanisms of injury?

VS There are several mechanisms of injury, and they are classified using the Stapfer classification of duodenal perforations. Perforations can be endoscope-related, in which

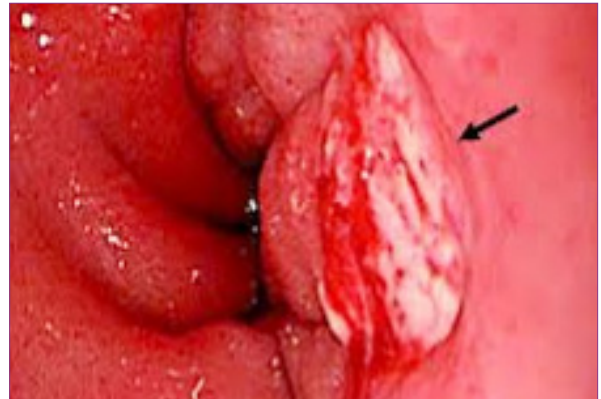


Figure 1. An endoscopic image of a deep duodenal tear suspicious for perforation.

Photo courtesy of Dr John Baillie, Virginia Commonwealth University School of Medicine, Richmond, VA.

an endoscope causes a hole through the wall of the duodenum. These are known as Stapfer I perforations.

Stapfer II perforations are associated with sphincterotomies. When an endoscopist performs an ERCP and uses a catheter to incise the bile and/or pancreatic sphincter using electrosurgical current, the patient can be at risk of developing a Stapfer II perforation, particularly if the endoscopist is performing an extension of an earlier sphincterotomy or if the patient has distortion of the major papilla by a mass or a periampullary diverticulum.

Stapfer III perforations are associated with instrumentation of the actual ducts. Both the bile and pancreatic ducts are like trees; if an endoscopist overzealously passes a guidewire into the branches of the tree, he or she can sometimes cause a side branch perforation.

Stapfer IV perforations are microperforations that occur due to the guidewire or the sphincterotome. They are quite common and typically asymptomatic, and may occur in up to 40% of patients.

G&H Can duodenal perforations be managed medically, or do they require surgical intervention?

VS Stapfer I perforations have to be surgically managed, although the type of surgical repair will depend on when they are discovered. Stapfer II perforations should initially be managed medically. If medical management is not successful, then patients may need surgery. In general, Stapfer III and IV perforations do not require much in the way of any management, as sometimes air is noted in the retroperitoneum (ie, the area where ERCP is performed) but is not causing any symptoms that would necessitate intervention. Often, patients with type III or IV perforations are sent home after ERCP, and a perforation may be incidentally discovered while patients are undergoing imaging for an altogether different reason.

G&H Does the interval between an ERCP and the surgery to deal with a perforation determine what type of repair is needed?

VS To the best of my knowledge, there are no specific guidelines on the repair of ERCP-related perforations. Therefore, my colleagues and I developed an algorithm to determine what type of treatment or repair may be needed. We found that the cutoff of 12 hours appeared to dictate what type of surgical intervention may be needed. For example, if an endoscopist diagnoses a Stapfer I perforation within 12 hours and refers the patient for surgery, the site of perforation can often be repaired using simple oversew techniques. However, if a Stapfer I perforation is diagnosed beyond 12 hours, not only is the perforation repaired using the oversew techniques, but duodenal diversion may be necessary to exclude food and gut secretions that would contaminate the repair site.

G&H What symptoms typically signal a perforation?

VS The first sign that almost immediately signifies a perforation during or after ERCP is when the abdomen becomes very distended and tense with air. Endoscopists use air to insufflate the bowel, and if a perforation occurs, air can escape from the luminal bowel through the perforation and into the retroperitoneum and abdominal cavity. As far as symptoms are concerned, patients can report severe abdominal pain. Additionally, patients may feel

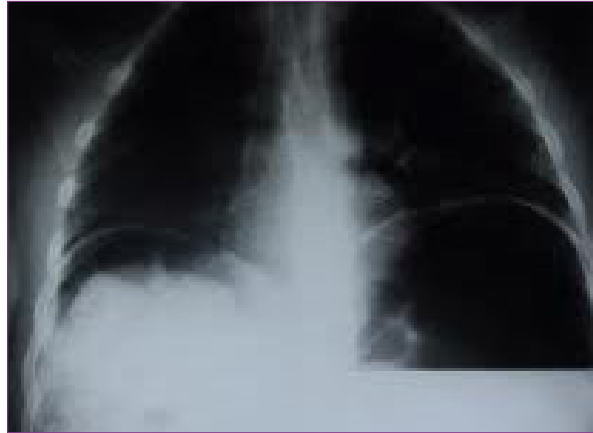


Figure 2. An erect chest film showing air under the diaphragms after a free peritoneal perforation.

Photo courtesy of Dr John Baillie, Virginia Commonwealth University School of Medicine, Richmond, VA.

nauseous or they may start passing more gas, as whatever residual air remaining in the bowel is pushed out by the air-filled abdominal cavity. Patients may also develop a fever.

G&H If a perforation is not recognized immediately, how long do clinical signs and symptoms usually take to appear?

VS In general, the time between ERCP and the development of clinical signs and symptoms of a perforation is based on the size and location of the perforation. Symptoms can appear almost immediately for larger perforations; however, if the perforation is small, symptoms may take longer, as more time is required for air and/or bowel fluid leakage through the perforation and into the retroperitoneum and other parts of the abdominal cavity.

G&H What should the endoscopist do if a perforation is suspected?

VS If the abdomen becomes tense and markedly distended with air immediately after an ERCP, the endoscopist should consider inserting a 19-gauge needle attached to a syringe with saline into the abdomen. As the abdomen deflates, the saline in the syringe will bubble. Once the air is removed, the bubbling will stop and the needle can be removed. A plain radiograph of the abdomen can be obtained; however, it is important to note that this may not show free air under the diaphragms, particularly if the perforation is subtle (Figure 2). Therefore, obtaining a computed tomography scan of the abdomen with oral contrast (preferably water-soluble gastrografin) is important to diagnose a perforation and will be critical for determining if medical management can be attempted or if surgery is required more urgently. It is important to consult a surgeon as soon as a perforation

is suspected, as failure to do so has important implications for medicolegal risk.

G&H What is the relationship between abnormal anatomy and the occurrence of perforation during ERCP?

VS Perforation most commonly occurs when the major papilla lies either within or on the rim of a diverticulum and the endoscopist performs a sphincterotomy in the direction of the diverticulum, as the wall of the duodenum is thin in these areas. There is also a higher risk when the endoscopist attempts to extend a prior sphincterotomy.

In patients with surgically altered anatomy, particularly Billroth II reconstruction, the bile and pancreatic ducts are reversed with regard to their orientation, which not only increases the difficulty of cannulation but also likely increases the risk of perforation if a sphincterotomy is performed.

G&H How should patients with an ERCP-related perforation be followed up?

VS Follow-up is somewhat dependent on when the patient is diagnosed with a perforation. There are some patients who might have a small perforation yet feel okay after the procedure and are sent home. These patients may develop more concerning symptoms and return to the emergency room several hours later. However, patients with larger perforations are often diagnosed during the later part of the ERCP procedure or directly after in the recovery room. Those patients will commonly be admitted to the hospital and treated medically and/or surgically, depending on the type of perforation that is suspected.

G&H Did your study find any relationship between operator experience and the likelihood of an ERCP-related perforation?

VS Because our study was conducted at a single, tertiary referral center, we did not look at the incidence of perforations in community settings. In our study, we examined only patients with Stapfer I and II perforations between 2000 and 2014. Despite having evaluated nearly 15 years of data, we only found 79 perforations, 61 of which were included in the analysis. This is also reassuring, as perforations are clearly an uncommon occurrence given that approximately 1400 to 1500 ERCP procedures are performed annually.

G&H What were the limitations of your study?

VS Our study was retrospective, and certainly there is a possibility that some perforations might not have been identified by the time patients were discharged from the recovery unit following their ERCP. While not necessarily a limitation, it needs to be highlighted that our outcomes might reflect the fact that we are at a tertiary center with experienced endoscopists, radiologists, and surgeons who became involved early in the care of these patients. We were also not able to study the size of perforation as a predictor of outcomes.

G&H What future research is needed in this field?

VS Because most ERCPs are still being performed in community settings, we need to assess the incidence of duodenal perforations in community settings in order to determine how they are evaluated and managed.

We also need to develop better ways to detect and diagnose clinically significant perforations early, and not when the patient already has a fever, is in terrible pain, or has a lot of air in the abdominal cavity.

Lastly, as far as medical management of a perforation is concerned, many endoscopists tend to avoid using nasogastric suction tubes. In reality, this approach works fairly well. Therefore, if a patient has had a Stapfer II perforation, I think there should be a relatively low threshold to insert a nasogastric tube and apply low intermittent suction, as suctioning of air from the bowel will help close a perforation. I think centers should consider this approach in the management algorithm when a patient is suspected of having a Stapfer II perforation. The added benefit of nasogastric suction to current medical management algorithms regarding closing a perforation needs to be quantified in future studies.

Dr Singh has no relevant conflicts of interest to disclose.

Suggested Reading

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