ADVANCES IN ENDOSCOPY

Current Developments in Diagnostic and Therapeutic Endoscopy

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Management of Post-ERCP Pancreatitis

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G&H How commonly does pancreatitis occur as a complication of endoscopic retrograde cholangiopancreatography?

JB There is no easy answer to this question. When obtaining a patient's informed consent to perform endoscopic retrograde cholangiopancreatography (ERCP), many endoscopists quote a post-ERCP pancreatitis (PEP) rate of 3–5%. However, 10–15% is probably a more realistic answer for the majority of ERCP endoscopists. Wise endoscopists inform their patients that there is a spectrum of PEP severity, from mild (>95% of cases) to severe (1–5% of cases).

The risk of PEP is also significantly related to the type of ERCP procedure being performed (Figures 1 and 2). Endoscopic sphincterotomy is a risk factor, and the risk of PEP increases if a precutting technique that employs a needle-knife papillotome is involved. The ERCP procedures with the highest risk of PEP are those involving patients with suspected type III sphincter of Oddi dysfunction (SOD); in a large, multicenter study, Freeman and associates found a PEP rate exceeding 40% in these patients. Factors such as female gender, normal liver serology/liver function tests (LFTs), nondilated bile ducts, and obesity increase the risk of PEP. The patient with the highest risk of PEP is the obese young woman with normal LFTs and a nondilated bile duct (ie, type III SOD) who is undergoing ERCP with biliary manometry for postcholecystectomy abdominal pain.

G&H Is sphincter of Oddi manometry associated with a high risk of PEP?

JB Historically, sphincter of Oddi manometry (SOM) has had a bad reputation for causing PEP, but it is likely that the risk lies in the type of patient being studied (type III SOD), not the manometry procedure itself. Patients with nondilated bile ducts are often challenging

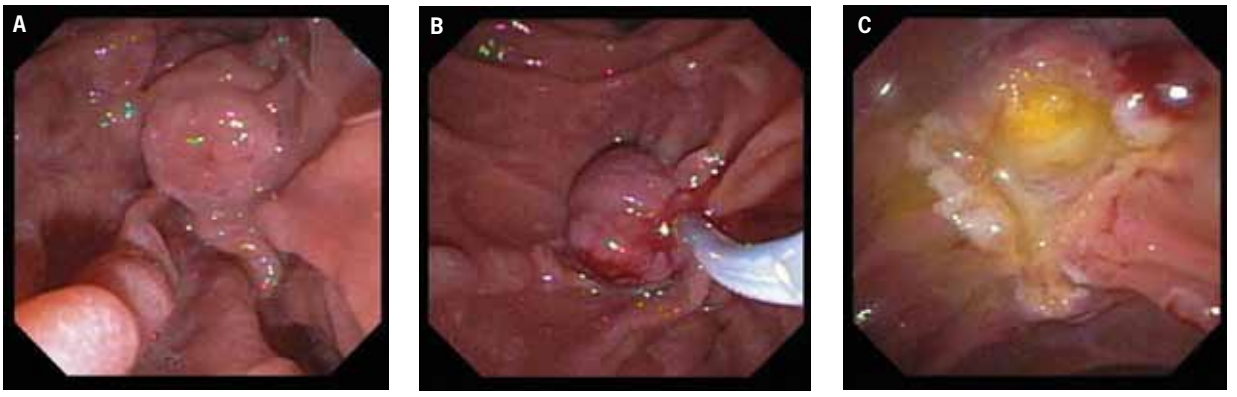

Figure 1. A small ampullary adenoma is seen during endoscopic retrograde cholangiopancreatography **(A)**. A duodenal papilla is encircled by a small snare in preparation for hot snare excision **(B)**. A clear base is seen after ampullectomy. Now, the first priority is to find the pancreatic duct orifice and place a prophylactic plastic stent **(C)**.

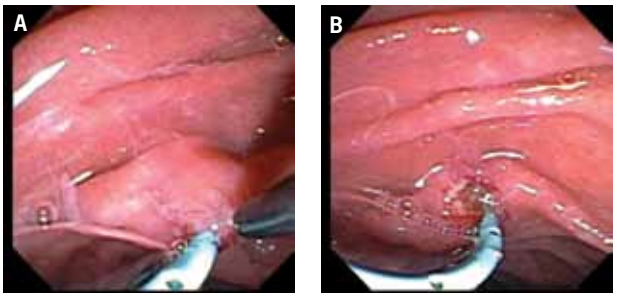

Figure 2. A 5 French gauge, single-pigtail stent has been placed in the minor ampulla, and minor papillotomy is being performed with a needle-knife papillotome over the stent **(A)**. The completed minor papillotomy is shown; the stent will be left in place and allowed to migrate spontaneously, which will typically occur in 3–7 days **(B)**.

to cannulate, even for experienced endoscopists, and the duodenal papilla is frequently traumatized during the process. Edema of the papilla following instrumentation is a potent cause of PEP. Prophylactic stenting of the pancreatic duct (PD) orifice before the papilla becomes edematous is known to greatly reduce the risk of PEP and virtually abolish the risk of severe pancreatitis. The key is to act early enough during the procedure that PD stenting can be rendered effective as a prophylactic procedure. If the papilla has already been traumatized by the time the PD is stented, it may be too late to prevent PEP.

G&H Can pancreatic stents cause pancreatitis?

JB Yes. The larger the caliber of the stent, and the longer the stent stays in place, the more likely it is that the patient will develop pancreatic pain. One of the greatest innovations in ERCP practice over the last decade has been the widespread adoption of prophylactic temporary stenting of the PD following high-risk procedures (such as ERCP with manometry, needle-knife papillotomy, and ampullectomy; Figure 3). The smaller the caliber of the placed stent, the less likelihood that the stent will cause focal pancreatitis by occluding small PD side branches. The smallest caliber PD stents currently available for this purpose are 3 French (Fr) gauge. Fr gauge is a measure of circumference [$\pi \times$ diameter]; thus, a 3 Fr stent is a little less than 1 mm in external diameter. Although a 3 Fr stent has a very small caliber, it still provides enough flow to prevent edema from blocking pancreatic exocrine secretion, which is considered the event that likely initiates PEP. Three Fr stents require a very thin and floppy guidewire (0.018" diameter) for placement, which is technically difficult for many endoscopists to manipulate. As a result, many endoscopists who perform ERCP are more comfortable placing a 5 Fr caliber PD stent, which is placed over a 0.021" guidewire. These PD stents are designed to fall out on their own. Unflanged stents migrate faster than those with 1 or more flanges. Three Fr PD stents are unflanged and must be long enough to cross the neck (genu) of the duct (eg, >7 cm); otherwise, the stents will migrate rapidly (sometimes while the endoscopist is watching).

G&H How long should a prophylactic PD stent stay in place?

JB There are no definitive data on this subject, but at least 24 hours appears to me to be the minimum amount of time. I recently treated a patient with pancreatic sphincter hypertension whose single-pigtail, single-flanged, 5 Fr gauge, prophylactic PD stent migrated, by my estimate, approximately 10 hours after pancreatic sphincterotomy and stent placement. Her pancreatitis began later than normally expected in the PEP setting. An abdominal computed tomography scan performed approximately 15 hours postprocedure showed the stent in the transverse colon. This middle-aged woman subsequently underwent a prolonged hospitalization for pancreatitis complicated by pleural effusion and empyema. What should have been a straightforward procedure turned into a life-threatening event for the patient and her family. In our eagerness to spare patients repeat procedures (for stent retrieval) by placing stents that are designed to migrate spontaneously, we likely put a small number of patients at risk for premature stent migration and the development of severe acute pancreatitis.

However, the Indiana University ERCP group suggests that factors other than stent migration may be involved when patients suffer an outcome similar to this

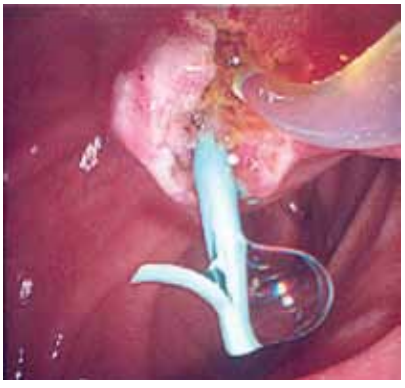

Figure 3. Needle-knife papillotomy performed over a plastic stent.

patient's. Temporary stents that can be prompted by external methods (eg, a magnet passed over the abdomen) to exit the bile duct and PD after a defined period of time (eg, 72 hours) have been designed and tested in animal models; however, these stents are not yet available for use in humans. Endoscopists should encourage accessory manufacturers to pursue this technology to improve patient safety.

G&H What should endoscopists tell patients about PEP when obtaining informed consent to perform a high-risk procedure?

JB The management of PEP starts with a thorough informed consent discussion before the procedure. As the most dangerous endoscopic procedure routinely performed on patients, ERCP deserves detailed discussion. I typically spend 15–20 minutes discussing the indication for the procedure; pros and cons of ERCP; alternative approaches; and, especially, potential complications. Whenever possible, I prefer to meet with patients well ahead of the procedure to give them and their relatives time to reflect on all of the issues. I also try to give them reading materials, such as brochures from the American Society for Gastrointestinal Endoscopy. It may be tempting to abridge or bypass the consent process when dealing with elderly or impaired patients, but this is unwise and never justifiable; spouses, significant others, relatives, or friends with power of attorney should be present during the consent discussion and be aware of all of the issues. ERCP consent is so important that it should not be delegated to trainees or physician extenders.

In addition, endoscopists should use their own complication data, as the legal concept of informed consent requires an open and honest discussion of risk when a particular endoscopist performs the procedure; for example, if an endoscopist's personal PEP rate is 25%, this figure should be disclosed and noted on the consent form. Should the patient choose not to undergo ERCP based on the endoscopist's complication data or reported failure rate for biliary cannulation, then informed consent has worked. Informed consent is the sharing of risk between the patient and the physician; if the patient decides not to accept the degree of risk outlined by the endoscopist, that is the patient's right. An alternative approach will be needed, which may be not to undergo treatment.

G&H What does the monitoring process consist of post-ERCP?

JB Patients are typically monitored for a longer period of time after ERCP than after esophagogastroduodenoscopy or colonoscopy, particularly if they had general anesthesia. To maintain turnover in a busy endoscopy unit, it is difficult to keep patients for observation for more than approximately 1 hour. Patients who require more than 1 dose of narcotic analgesia for abdominal pain in the recovery area after ERCP may be developing PEP. However, even if this is not the case—and studies have shown that approximately 1 of 3 patients admitted for post-ERCP pain have normal amylase and lipase levels—patients should still be admitted to a day hospital (or the equivalent) for a minimum of 4 hours. Similarly, nausea and/or vomiting that prevents oral hydration requires intervention. PEP may develop after the standard hour-long observation period in some patients; these patients may become unwell in transit or after they return home. A serum amylase level greater than 1,000 IU/L 2 hours postprocedure strongly predicts the development of PEP; however, it is rarely practical to keep patients for blood draws for this purpose.

Patients and their escorts should be given both verbal and printed instructions regarding diet, activity, and what to do in the event of a complication. Heavy meals and alcohol should be discouraged on the day of the procedure, and the patient is considered legally unfit to drive a car until the next day. Patients should be given a way to contact the ERCP endoscopist or an on-call physician associated with the ERCP team with any concerns, even in the middle of the night. A copy of the ERCP report should be given to the patient, in case another physician has to treat the patient.

When patients are admitted with PEP, it is important for the endoscopist to be actively involved in their management; important decisions—such as the volume of fluid resuscitation and the type and frequency of narcotic analgesia—should not be delegated to less experienced colleagues. If the endoscopist cannot be available for on-site consultation, the team managing the patient should be able to reach the endoscopist for input at any time. If the patient was admitted to another hospital with severe PEP, the endoscopist should offer to transfer the patient to their own institution for close supervision. The old adage, "Hope for the best, but prepare for the worst" applies to much of what we do in endoscopy, particularly after ERCP.

Suggested Reading

Choudhury P, Bechtold ML, Arif M, et al. Pancreatic stent for prophylaxis against post-ERCP pancreatitis: a meta-analysis and systematic review. *Gastrointest Endosc.* 2001;73:275-282.

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