OBSCURE SMALL BOWEL BLEEDING: CAPSULES, BALLOONS, CATHETERS, AND SCANNERS

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At the end of this presentation, the learners should be able to:

- Identify etiologies of obscure GI bleeding and the endoscopic technologies and techniques available for its management
- Formulate an effective diagnostic and treatment strategy for the obscure GI bleeding etiology identified
- Apply the best available endoscopic technologies and techniques toward the optimal management of obscure GI bleeding

Until the past decade and a half, the work-up and management of obscure gastrointestinal bleeding (OGIB) often required a trip to the operating room. Historically, diagnosis of gastrointestinal tract bleeding out of reach of esophagogastroduodenoscopy (EGD) and colonoscopy would prompt radiologic investigation for a potential localization of distal duodenal, jejunal, or ileal source of bleeding via radionuclide scintigraphy or angiography, followed by treatment requiring angiographic embolization by an interventional radiologist, or operative intervention by a surgeon. Until the late 1990s, endoscopic management of bleeding from a small intestinal source was largely restricted to push enteroscopy (either with a pediatric colonoscope or with a dedicated push enteroscope with or without an overtube) or surgically/endoscopically-assisted enteroscopy, with the surgeon helping to pleat the entire small intestine onto the colonoscope or push enteroscope intraoperatively. A few referral centers had access to the sonde enteroscope, an interesting but cumbersome instrument with a highly limited repertoire. This narrow caliber fiberoptic endoscope was long enough to navigate the entire small intestine. However, doing so meant inflating a balloon at the distal end of the enteroscope, and allowing several hours for peristalsis to carry the scope distally while the patient waited in the endoscopy suite. Once peristalsis had succeeded in delivering the device to the distal small bowel, the endoscopist would slowly withdraw the instrument, attempting to obtain as full a view of the small intestine as possible in the process. The instrument was solely diagnostic; it had no therapeutic capability.

Real change came about when two revolutionary developments occurred in the late 1990s, leading to the nearly simultaneous availability, shortly thereafter, of two endoscopic technologies which together, could deliver reliable diagnostic imaging and endoluminal therapeutic capability to the entire small intestine: video capsule endoscopy (VCE) and balloon overtube-assisted deep enteroscopy (balloon enteroscopy). While early debates often focused on comparing the usefulness of these two technologies, it became very clear very quickly that they were, indeed, truly complementary technologies in many ways. A few years later, rotational overtube (spiral overtube) deep enteroscopy would be released, offering yet another overtube-assisted deep enteroscopy technique to offer the potential to visualize and deliver therapy to the entire small intestine.

Endoscopic Diagnosis of Obscure Gastrointestinal Bleeding Etiologies

Obscure gastrointestinal bleeding is most often the result of vascular lesions, typically vascular ectasias known commonly by the misnomer “arterovenous malformation,” or “AVM.” Less frequently encountered are ulcers, whether due to undiagnosed Crohn’s disease or medication such as NSAIDs, or small intestinal neoplasms. Frank arterial bleeding episodes may arise from the ectopic gastric mucosa of a Meckel’s diverticulum or, less often, from a small bowel Dieulafoy lesion, or a fistulization to the intestine from a nearby blood vessel or vascular graft. While not technically small intestinal bleeding sources, hemobilia or hemosuccus pancreaticus can present similarly to intestinal bleeding etiologies, though such presentations would be admittedly rare.

It is important to consider esophageal, gastric, or proximal duodenal etiologies of bleeding that could have been missed or misdiagnosed at a previous EGD or colonoscopy. Thus, depending on the clinical scenario, repeating EGD and/or colonoscopy may be a very reasonable first diagnostic step in the work-up of obscure GI bleeding.

Once adequate endoscopic examination of the esophagus, stomach, proximal duodenum, colon, and terminal ileum have been obtained via careful and expertly conducted EGD and colonoscopy, an endoscopic means of visualizing the distal duodenal, jejunal, and ileal mucosa is imperative. Of course, if there is already good evidence suggesting that the source is at a particular anatomical location, it may be most reasonable to proceed straight to deep enteroscopy (a catch-all term that includes single-balloon, double-balloon, and spiral overtube enteroscopy). Otherwise, when the location of blood loss is unknown, starting with VCE is usually an excellent option. This is because VCE possesses a number of advantages as the small bowel visualization modality of initial employ: it is much less invasive than deep enteroscopy, requiring no sedation or endoscopic unit procedure, and having little in the way of complication risk. While it is possible to retain a VCE capsule in the small bowel, or for the VCE capsule to obstruct at the point of an intestinal stricture, this risk is reported to be less
than 1%. While the capsule tends to be retained at the point of pathology, and therefore may well localize the source of the abnormality being investigated, this, of course, is unlikely to be the way in which the gastroenterologist would prefer to identify the lesion being sought. Capsule retention and obstruction should be rare occurrences if a patient’s history suggests a risk of intestinal stricture, such as in the case of Crohn’s disease or prior abdominal surgery. Such patients should undergo proper pre-VCE evaluation with an upper GI/small bowel contrast study. If this demonstrates a non-obstructive stricture or the possibility of one, a patency capsule should be administered to assure that a real VCE capsule would not become lodged at that location and result in an iatrogenic bowel obstruction. Other advantages VCE has over overtube-assisted deep enteroscopy include a high likelihood of visualization of the complete small intestine in a single procedure, lack of technical endoscopic skill necessary to administer the exam (although expert skill is necessary to interpret the images), potentially less physician-attended total procedure time, and lower overall cost. While both VCE and balloon enteroscopy techniques demonstrate a clinical yield of upwards of 60%, this yield is achieved with much less patient discomfort and risk and much less physician effort and time through VCE.

VCE does have disadvantages, or, more accurately, limitations, compared to overtube-assisted deep enteroscopy technologies, however. Most obviously, VCE possesses no therapeutic capability; any finding on VCE must be followed by deep enteroscopy if tissue acquisition or endoscopic therapy is indicated. Furthermore, VCE does not possess the capability to image with non-white light, to visualize more than once in more than one direction (such as one would do with an endoscope by moving the scope back and forth across an area to “examine and re-examine,” or to examine in a more detailed fashion by holding the scope still at the location of interest. Since the capsule can view only those areas to which peristalsis will carry it, an afferent Roux or Whipple limb of intestine or blind loop is highly unlikely to be visualized. Also, no directional control is offered to change the angle of view obtained by the VCE capsule. Furthermore, the capsule may “tumble” at any point, so that its view changes from “seeing what’s coming” to “seeing where it’s been.” Such diminished control of the visual field being obtained by the video capsule may limit the endoscopist’s ability to more precisely, completely, and accurately visualize and identify the morphology of a lesion detected by VCE.

Deep Enteroscopy and Endoscopic Therapy of Obscure Gastrointestinal Bleeding Etiologies

The development of overtube-assisted deep enteroscopy technologies has revolutionized the management of obscure GI bleeding. Particularly when paired up with the nearly non-invasive, extremely low-risk, and comparatively cost-efficient VCE, the ability to identify the source of obscure bleeding, specify its location, and treat the lesion—all endoscopically—has not only become a reality, but has all but become the standard approach to with work-up and management of OGIB.

There are two VCE systems marketed in the United States, made by two different manufacturers, each with dedicated hardware and software for image acquisition, viewing, and interpretation. Both systems work very well and have been well-received by operators. There are two overtube-assisted deep enteroscopy schema: balloon overtube-assisted deep enteroscopy and rotational (spiral) overtube-assisted deep enteroscopy. As for overtube-assisted deep enteroscopy, there are two platforms, each from a different manufacturer, that possess a distinct difference with some practical implications: one has a single-balloon overtube, and the other has both a balloon-tipped overtube and a balloon at the end of the endoscope for a double-balloon paradigm of enteroscope advancement. There is only one rotational overtube-assisted deep enteroscopy platform offered by a single manufacturer. This overtube accepts a standard deep enteroscope from any endoscope manufacturer. All three overtube-assisted deep enteroscope systems technically require a skilled assistant—usually a second endoscopist, trained nurse, or technical assistant—to participate actively in the performance of the procedure by assisting with overtube operation during enteroscope/overtube insertion and shortening maneuvers. Fluoroscopy is sometimes used, or at least kept available for use, to help guide enteroscope and overtube insertion and shortening in selected patients, and/or to effect deeper insertion of the enteroscope. In addition to diagnosis and treatment of OGIB, deep enteroscopy offers utility in the diagnostic and therapeutic management of IBD, various lesions such as polyps and masses identified on contrast radiography of the small intestine, post-surgical complications such as anastomotic complications, and foreign body retrieval.

The single-balloon enteroscope is available with a 2.8-mm accessory channel, so it will accept instruments up to 7 Fr in diameter. The double-balloon enteroscope is manufactured in two different sizes with 2 accessory channel diameters: 2.2 and 2.8 mm. The choice between single- and double-balloon deep enteroscopy platform is, in reality, largely institutionally dependent, with the decision frequently driven by which manufacturer outfits the remainder of the given endoscopy unit’s procedure suites. Whether or not a particular unit offers overtube-assisted deep enteroscopy services also depends on the availability of local operator interest, experience, expertise; an operator or group of endoscopists making a commitment to provide this service entails a certain amount of dedication, given the investment of time, effort, and technical skill required to undertake this procedure as part of a full-service VCE and deep enteroscopy program.

The major downsides of balloon enteroscopy techniques include relatively long procedure times, the need to perform...
both antegrade and retrograde approaches if the entire small bowel must be visualized via balloon enteroscopy, technical challenge and training necessary to perform the procedure adequately, and the need, in many instances, for an additional assistant to aid in operating the overtube, as well as the need for fluoroscopy and anesthesia support in some cases. Balloon enteroscopy cases with good visualization of the small bowel typically require 1-2 hours to complete, and some may require more time, particularly if therapy is undertaken during the procedure, or if the operator has less experience. Patients with prior abdominal surgery, with anastomoses or peritoneal adhesions, those with anastomotic strictures, or those with esophageal strictures may pose particular technical difficulty and increased risk of complications in overtube-assisted deep enteroscopy. Thankfully, major complications are uncommon, with rates of <1% to 5% quoted in the literature. Such risk is understandably higher when therapeutic interventions are added. Pancreatitis is reported, but is extremely rare.

Take-home message
VCE and overtube-assisted deep enteroscopy are highly complementary technologies that are the central components to a programmatic approach to OGIB and to the endoscopic diagnosis and treatment of a wide spectrum of intestinal disorders. Positive VCE findings frequently require deep enteroscopy for tissue acquisition and for the application of endoscopic therapy. Negative VCE findings in the setting of persistently strong clinical suspicion of intestinal pathology also often leads to further investigation with deep enteroscopy as the next diagnostic study of choice. In general, choosing VCE makes the most sense if the investigation being initiated is purely diagnostic, if a small intestinal stricture is unlikely or has been excluded with a patency capsule study, and radiologic studies, if appropriate, have been non-diagnostic. Push enteroscopy with a colonoscope is reasonable if the lesion in question is likely to be near or proximal to the ligament of Treitz or in the terminal ileum, as push enteroscopy is considerably easier technically, and less time consuming and effortful, than deep enteroscopy by any platform. A colonoscope also possesses a larger diameter accessory channel for device deployment and aspiration, and also may have useful features such as dial-in insertion tube stiffening capability or power flushing pump compatibility. Considering a quick repeat EGD or colonoscopy may also be a useful initial evaluation, particularly if these studies were not previously performed by you or by an endoscopist whose skills you are familiar with or trust.

REFERENCES