clinical experience

View Dr. Saeed's webinar to learn more about optimizing visibility and achieving hemostasis.

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Optimizing Visualization and Hemostasis During Endoscopy Using RDI™ Technology and The EndoClot® Polysaccharide Hemostatic System and Submucosal Injection System

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Introduction

Endoscopy facilitates direct visualization of the gastrointestinal (GI) tract and is unmatched for its utility as a minimally invasive diagnostic and therapeutic tool.[1-3] Unobstructed observation of the mucosa enables early detection and treatment of conditions such as cancer, ulcers, and polyps, and aids in the characterization of diseases including inflammatory bowel disease, celiac disease, and Barrett's esophagus.[1-3] During endoscopy, suboptimal visualization of the mucosa may not detect bleeding, a serious complication, resulting in longer procedure times, hospitalization, and higher costs of complications.[4] Bleeding is a major contributor to morbidity and mortality during GI procedures; estimated mortality rates for upper and lower GI bleeding range from 2% to 10%.[4-6]

The availability of the Olympus EVIS X1™ endoscopy system and its imaging technologies, such as Red Dichromatic Imaging (RDI™) technology, as well as innovations such as the EndoClot® Polysaccharide Hemostatic System (PHS) and Submucosal Injection System (SIS), enhance visibility of bleeding points and optimize hemostasis during endoscopy. "Using RDI technology during procedures such as peroral endoscopic myotomy (POEM) and endoscopic submucosal dissection (ESD) is a significant improvement to my initial incision and during dissection," said Ahmed Saeed, MD, D-ABOM, a gastroenterologist with HCA Midwest Health in Kansas City, Missouri. "I can see the blood vessels very clearly, so that helps prevent delays due to bleeding. Using EndoClot PHS, I can control bleeding while maintaining hemostasis, and using EndoClot SIS, I can create mucosal separation."

This article highlights the benefits of using RDI technology and EndoClot PHS and SIS to optimize visibility and identify bleeding points and deep blood vessels to maintain hemostasis during endoscopy.

EVIS X1™ Endoscopy System

The EVIS X1 endoscopy system includes the OEV321UH 4K ultra–high-definition LCD monitor, the CV-1500 video system center, the GIF-1100 gastroscope, and the CF-HQ1100DL/I colonoscope. The EVIS X1 endoscopy system combines several diagnostic and therapeutic innovations that assist physicians with optimizing efficiency and enhancing visualization and maneuverability during endoscopy.[7] As part of the featured technologies of the EVIS X1 CV-1500 video system center, RDI technology is designed to identify bleeding points quickly,[8] and when combined with EndoClot PHS, endoscopists can navigate the submucosal space to control bleeding.

Improved Visibility With RDI Technology

Successful hemostasis relies on clear visualization of the bleeding site, but locating the source of bleeding during endoscopy can be difficult and stressful for the endoscopist. RDI technology enhances the visibility of bleeding points within the mucosa and

of deep blood vessels during endoscopic procedures (Figure 1).[8,9]

RDI technology uses long wavelengths of light (green, amber, and red) to view surface patterns and blood vessels. These longer wavelengths penetrate more deeply into human mucosal tissue than short ones.[8] If the blood concentration is low, the amber light is barely absorbed, but if it is high, the amber light is highly absorbed, thus translating to an image in which deep blood vessels and bleeding points appear darker and more visible than the surrounding tissue or pooling blood. RDI technology leverages this capability to support the identification of vessels and application of hemostasis.[9]

RDI technology has 3 imaging modes[9]:

- **Mode 1**–designed for bleeding point observations to detect bleeding site and identify the flow area
- **Mode 2**–designed for deep blood vessel observation
- **Mode 3**–designed for superficial and deep blood vessel observation

These different modes allow the endoscopist to tailor the settings on the CV-1500 video system center to meet their clinical needs. From Mode 1 to Mode 3, there is an increased level of deep vessel enhancement. The image created using Mode 1 takes on an amber-colored hue and is designed for bleeding point targeting.[9] By decreasing the noise, Mode 1 helps to pinpoint the flow area to facilitate hemostasis during a bleeding episode. Mode 2 is designed for observation of deep-layer blood vessels and supports proactive navigation around the vasculature.[9] Mode 3 highlights both superficial and deep vessels in cases where the endoscopist requires visualization of vasculature at all levels; superficial vessels appear red, and deep vessels appear blue-green.[9]

During procedures such as ESD, endoscopic mucosal resection (EMR), and POEM, clear visualization of deep blood vessels helps physicians navigate around vasculature to minimize bleeding and other complications.[8] However, visualizing deep blood vessels may be challenging, especially in the submucosal space. RDI technology is designed to make deep blood vessels easy to see and has valuable applications in these cases.[8] "RDI technology Mode 2 is very good for identifying or scanning for blood vessels before making an incision," Dr Saeed said. "It helps during dissection to prevent cutting through a large blood vessel. If you don't see it well and you dissect fast, you can cut through it. For example, if I am doing an EMR, I use RDI technology Mode 2 while I am cutting to see the blood vessels even if they're deep, to avoid cutting them unintentionally and causing major delays and complications."

With RDI technology, high concentrations of blood (ie, blood spilling from an active bleed) appear darker than the surrounding mucosa, making it easy to locate the bleeding source and apply hemostasis. "In a pool of blood, it's really hard to differentiate where the bleeding is coming from," Dr Saeed said. "With RDI technology, I can see the blood vessel clearly. I can even see the puncture in the blood vessel. I think it's a great technology to help localize bleeding faster than just using normal high-definition white light."

Since the on-screen image appears amber when using RDI

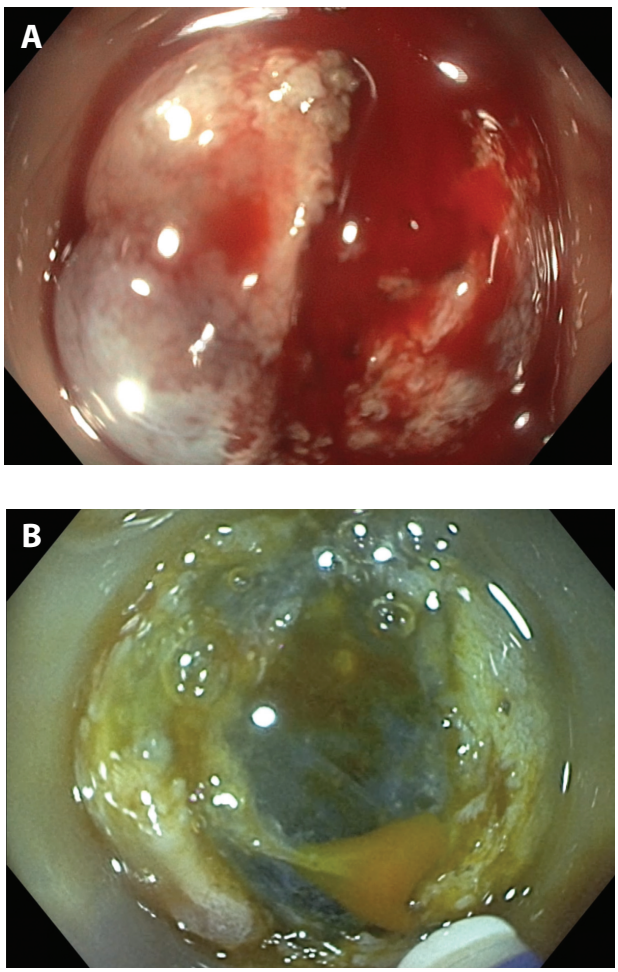

Figure 1. RDI™ technology enhances the visibility of a bleeding vessel.
(A) White light imaging; (B) RDI technology.
Images courtesy of Ahmed Saeed, MD, D-ABOM.

technology and mutes the red color of the blood, the application also may reduce stress on physicians and procedure time in cases of emergency bleeding.[8] "One of the major delays in ESD that decreases the efficiency of the procedure is bleeding, especially in locations like the rectum, the gastroesophageal junction, the esophagus, and the stomach. Those areas can bleed quickly, and it can be hard to localize the bleeding," Dr Saeed said. "RDI technology helps to locate the bleeding points immediately. I have been using it a lot for third-space endoscopy and ESD."

Figure 2. EndoClot® PHS controls bleeding in a gastrointestinal tumor in the jejunum.

Images courtesy of Ahmed Saeed, MD, D-ABOM.

Maintaining Hemostasis With EndoClot PHS and SIS

Hemostatic powders have been available for several years and are currently recommended by the American College of Gastroenterology as rescue therapy for active upper GI bleeding.[10] EndoClot PHS is an advanced powder hemostat composed of absorbable modified polymers (AMP® particles) derived from plant starch that provides clear visualization without a whiteout effect.[11] Applied as a white powder, EndoClot PHS transforms to a clear gel when it comes in contact with water and forms a matrix that absorbs water from the blood, resulting in clotting of the bleeding site and hemostasis.[11] To provide more control during delivery, EndoClot PHS is applied using continuous air pressure through a compressor, which prevents clogging.[11] It is indicated for use on its own or in combination with other conventional techniques, such as clips, for large and diffuse bleeds, including those occurring in peptic ulcers, post-biopsy, polypectomy, tumor bleeding, and after EMR and ESD (Figure 2).[11] EndoClot PHS can be used in the upper and lower GI tract at any time during a procedure.[11]

Conventional therapies may not be effective in managing bleeding in more complicated upper GI cases. "In ischemic ulcers, if there are several exposed blood vessels, multiple areas of bleeding, and ulceration, and you want to treat the bleeding, the options other than hemostatic powder would be cautery with several different tools, or mechanical with clips. In both situations, you're causing more damage because the clip is going to scrape through that ulcer," Dr Saeed said. "That tissue is not healthy, so the clip is not going to capture or hold that tissue. The other option is cautery. You can decrease the bleeding, but you're also causing more damage to the ulcer, and there are multiple areas where you need to apply it. That's more heat and more trauma. Hemostatic powders like EndoClot PHS work well here because you can cover a large surface area to control the bleeding. We know with ischemic ulceration that once circulation returns, it takes just a few days for the bleeding to stop, and healing happens very fast. You just need that temporary control which EndoClot PHS provides very well."

EndoClot SIS is also available as a submucosal injection to provide lift of polyps, adenomas, early-stage cancers, and lesions.[11] EndoClot SIS is comprised of the same materials as EndoClot PHS and can be injected to provide mucosal separation and facilitate polypectomy, EMR, ESD, or POEM.[11] Additionally, it does not leave an artifact that may cause abnormalities during pathologic investigations.[11,12] "What you want,

especially for procedures like ESD, is to have a good, large working space so you don't hit the muscle or cause complications, and that's what a lifting solution provides. There are different lifting solutions available in the market, but I believe that with EndoClot® SIS you get the maximum vertical lift, because it doesn't spread laterally; it's concentrated in one area," Dr Saeed said. "It continues giving you a vertical lift, and that's what you need to get the scope in that space to tunnel, for example, or you can get that large submucosal space to cut through without hitting the muscle."

Conclusion

Managing bleeds can be difficult during endoscopy, especially in areas of the GI tract with limited visibility. Using RDI™ technology, endoscopists can locate bleeding points when providing hemostatic treatment and potentially prevent complications during the procedure.

"During ESD or POEM, I believe RDI technology provides a significant improvement in my initial incision and while I'm doing dissection. I can identify the field very well, the depth of it, and see the muscle and the blood vessels very clearly," Dr Saeed said. When combined with EndoClot PHS and SIS, endoscopists can control bleeding while maintaining hemostasis and optimize mucosal separation when necessary. "I've used [EndoClot PHS] for several years, and it's easy to use and very user friendly. It doesn't clog up the screen—I can apply the product without interfering with the rest of the procedure," Dr Saeed said. By applying these capabilities during endoscopy, Dr Saeed recognizes the improvements in visibility to ensure that bleeding points are managed, and the procedure is not derailed by complications. "If you can have anything extra in your arsenal to help localize and treat bleeding, it will add more efficiency to your procedure. That includes RDI technology and EndoClot PHS and SIS," he said.

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Disclosure: Dr Ahmed Saeed is a paid consultant to Olympus Corporation of America. RDI™ technology is not intended to replace histopathological sampling as a means of diagnosis. EndoClot® PHS is only indicated for use in GI procedures and is not indicated for use in surgical or trauma applications.