



# Usefulness of texture- and color-enhancement imaging for identifying the bleeding point in a patient with post–endoscopic sphincterotomy bleeding

Yuki Tanisaka, MD, PhD, Masafumi Mizuide, MD, PhD, Akashi Fujita, MD, PhD, Rie Shiomi, MD, Takahiro shin, MD, Dai Hirata, MD, Kei Sugimoto, MD, Shomei Ryozaawa, MD, PhD

## INTRODUCTION

Endoscopic sphincterotomy has been one of the established procedures to perform stone extraction or self-expandable metallic stent placement across the papilla.<sup>1,2</sup> We present a case of post–endoscopic sphincterotomy bleeding, in which the bleeding point was successfully identified using texture- and color-enhancement imaging (TXI) equipped in a new-generation image-enhanced endoscopy processing system.

## NEW-GENERATION IMAGE-ENHANCED ENDOSCOPY PROCESSING SYSTEM

EVIS X1 (Olympus Marketing, Tokyo, Japan) is the new-generation endoscopy processing system with new technologies of TXI and red dichromatic imaging (RDI) (Fig. 1). The principle of TXI has been reported as follows<sup>3</sup>: input image in white-light imaging is divided into a texture component and a base component with a brightness. After each is properly processed, the 2 segmented images are synthesized and result in TXI; this improves the observation of lesions. It has been reported that TXI facilitated identification of the orifices of the pancreatic and bile ducts after endoscopic papillectomy<sup>4</sup> and the orifice of a pancreaticojejunal anastomosis in a patient with a pancreaticojejunal anastomotic stricture after pancreaticoduodenectomy.<sup>5</sup> TXI would also contribute to identifying vessels during third-space endoscopy and advanced resection techniques such as endoscopic submucosal dissection and peroral endoscopic myotomy. RDI uses red, amber, and green narrow-band light to visualize deep blood vessels in orange and yellow, and it supports

the procedure by creating blood vessel contrasts. RDI makes it possible to visualize the bleeding point as darker yellow, especially in cases of active bleeding.<sup>6</sup> Narrow-band imaging (NBI), which is useful to evaluate the submucosal vessel pattern, is also available. The light used in this endoscopy processing system is an LED (light-emitting diode); therefore, the imaging quality of NBI has been improved compared to the previous one, which used a xenon lamp.

## CASE PRESENTATION

A 61-year-old woman was referred to our hospital for obstructive jaundice because of unresectable pancreatic cancer. Therefore, the patient underwent biliary drainage. Cholangiography revealed distal bile duct stricture. Subsequently, endoscopic sphincterotomy was performed, followed by fully covered self-expandable metallic stent placement (Fig. 2). There was no bleeding during endoscopic sphincterotomy.

The following day, the patient presented with tarry stools; therefore, endoscopic examination was performed because post–endoscopic sphincterotomy bleeding was suspected (Video 1, available online at [www.videogic.org](http://www.videogic.org)). A new-generation image-enhanced endoscopy system (EVIS X1) was used for examination. Upon reaching the papilla, fresh blood was observed. However, no active bleeding was observed, so the bleeding point could not be detected on white-light imaging (Fig. 3). Therefore, we switched to TXI to identify bleeding points such as vessels. A visible vessel



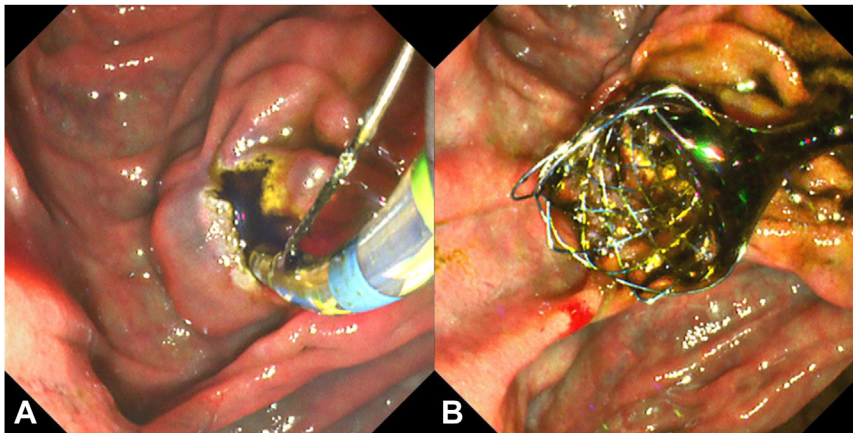
**Figure 1.** The new-generation endoscopy system with new technologies of texture- and color-enhancement imaging and red dichromatic imaging.

*Abbreviations:* NBI, narrow-band imaging; RDI, red dichromatic imaging; TXI, texture- and color-enhancement imaging.

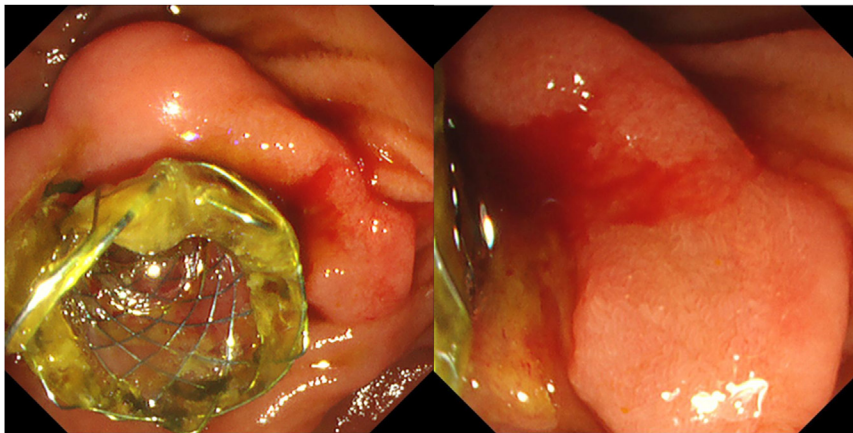
Copyright © 2023 American Society for Gastrointestinal Endoscopy. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>). 2468-4481

<https://doi.org/10.1016/j.vgie.2023.02.013>

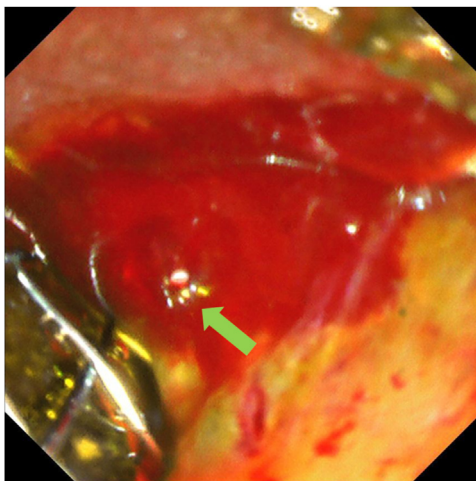
Department of Gastroenterology, Saitama Medical University International Medical Center, Saitama, Japan.



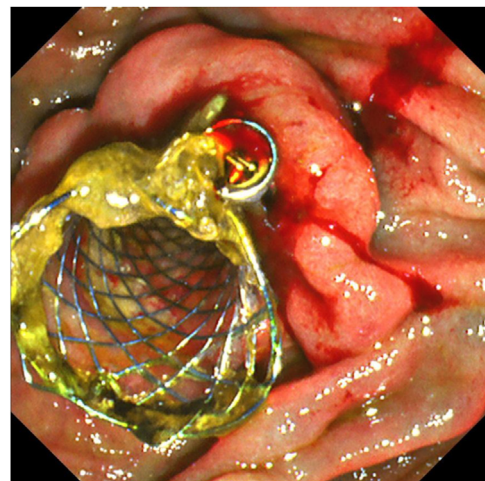
**Figure 2.** Endoscopic findings. **A**, Endoscopic sphincterotomy is performed. **B**, Fully covered self-expandable metallic stent placement is performed.



**Figure 3.** Endoscopic findings. Fresh blood is observed. However, no active bleeding is observed, so the bleeding point cannot be detected on white-light imaging.



**Figure 4.** Endoscopic finding. A visible vessel (*green arrow*) is identified on texture- and color-enhancement imaging.



**Figure 5.** Endoscopic finding. Endoscopic hemostasis is successfully achieved using a hemostatic clip.

was identified (Fig. 4). After identifying the visible vessel, we rinsed it with water. However, there was no additional active bleeding, so, as a result, the endoscopic finding on TXI showed no change. Subsequently, endoscopic hemostasis was performed using a hemostatic clip (SureClip; Micro-Tech Co, Ltd, Nanjing, China) (Fig. 5). We rinsed with water and confirmed that no further bleeding occurred. Hence, we found that complete hemostasis could be achieved. Although the bleeding site in this case was far from the orifice of the pancreatic duct, it is important to ensure whether the pancreatic duct is involved in clipping.

RDI has been reported to be useful in a patient with active bleeding after sphincterotomy because it visualized the bleeding site in darker yellow,<sup>7</sup> but it did not work in our case because the active bleeding was not seen. The vessel protruded compared with the surrounding area, and it was identified on TXI. TXI can aid endoscopic hemostasis even when there is no active bleeding, particularly in the identification of visible vessels.

## DISCLOSURE

*The authors disclosed no financial relationships.*

## ETHICAL APPROVAL

*This report was approved by the research ethics committee of the Saitama Medical University International*

*Medical Center on January 18, 2022 (approval number 2021-203).*

## ACKNOWLEDGMENT

We thank Editage ([www.editage.com](http://www.editage.com)) for English-language editing.

## REFERENCES

1. ASGE Training Committee; Jorgensen J, Kubiliun N, Law JK, et al. Endoscopic retrograde cholangiopancreatography (ERCP): core curriculum. *Gastrointest Endosc* 2016;83:279-89.
2. Ryozaawa S, Itoi T, Katanuma A, et al. Japan Gastroenterological Endoscopy Society guidelines for endoscopic sphincterotomy. *Dig Endosc* 2018;30:149-73.
3. Sato T. TXI: texture and color enhancement imaging for endoscopic image enhancement. *J Healthc Eng* 2021;2021:5518948.
4. Tanisaka Y, Mizuide M, Fujita A, et al. Texture and color enhancement imaging facilitates the identification of pancreatic and bile duct orifices after endoscopic papillectomy. *Endoscopy* 2023;55:E22-3.
5. Tanisaka Y, Mizuide M, Fujita A, et al. Use of texture and color enhancement imaging to identify the pancreatic duct orifice in a patient with a pancreaticojejunal anastomotic stricture. *Endoscopy* 2023;55:E88-9.
6. Fukuda S, Sakamoto T, Suzuki H, et al. Utility of red dichromatic imaging for identifying the bleeding point in endoscopic hemostasis of colonic diverticular bleeding. *VideoGIE* 2022;7:149-51.
7. Inoue T, Ibusuki M, Kitano R, et al. Usefulness of red dichromatic imaging for post-endoscopic sphincterotomy bleeding. *Endoscopy* 2022;54:E778-9.