



**The application of texture and color enhancement imaging  
in transpapillary biliary cannulation**

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Complete List of Authors:	Toyonaga, Haruka; Teine Keijinkai Hospital, Center for Gastroenterology Kin, Toshifumi; Teine-Keijinkai Hospital, Center for Gastroenterology Hayashi, Tsuyoshi; Teine Keijinkai Hospital, Center for Gastroenterology Takahashi, Kuniyuki; Teine-Keijinkai Hospital, Center for Gastroenterology Katanuma, Akio; Teine-Keijinkai Hospital, Center for Gastroenterology
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TXI Final 3.mp4	

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24 January 2022

Peter D. Siersema, MD, PhD

Editor-in-Chief

*Endoscopy*

Subject: Submission of an E-video article

Dear Dr. Siersema,

On behalf of all the authors, I would like to ask you to consider our manuscript titled, **“The application of texture and color enhancement imaging in transpapillary biliary cannulation”** for publication in *Endoscopy* as a video article.

Recently, the efficacy of image-enhanced endoscopy (IEE) has been widely reported in the management of gastrointestinal tract lesions; however, there are few reports on pancreatobiliary lesions. The novel tool, texture, and color enhancement imaging (TXI; Olympus, Tokyo, Japan), was launched in 2020; herein, we report the usefulness of TXI in biliary cannulation.

We believe that the findings described in this article will be of special interest to the readers of *Endoscopy*. We confirm that this article has not been published elsewhere, and is not under consideration in whole or in part by another journal.

Dr. Toyonaga conceptualized the study and drafted the manuscript. Dr. Toyonaga, Dr.

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6 Kin, Dr. Hayashi, Dr. Takahashi, and Dr. Katanuma conducted the endoscopic  
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8 examinations and treatment. Dr. Takahashi and Dr. Katanuma supervised the case,  
9  
10 helped draft the manuscript, and made intellectual revisions to the manuscript. All  
11  
12 authors have read and approved the final version of the manuscript.  
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17 Dr. Katanuma received honoraria as a lecture fee from Olympus Co., Tokyo, Japan. The  
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19 authors have no conflicts of interest to declare.  
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24 Thank you for considering our manuscript. We look forward to hearing from you.  
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28 Sincerely,  
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30 Haruka Toyonaga, MD  
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32 Center for Gastroenterology, Teine-Keijinkai Hospital  
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34 1-40-1-12 Maeda, Teine-ku, Sapporo 006-8555, Japan  
35

36 Tel.: +81-11-681-8111; Fax: +81-11-685-2967  
37

38  
39  
40 [E-mail: toyonaga.pc@gmail.com](mailto:toyonaga.pc@gmail.com)  
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**The application of texture and color enhancement imaging in transpapillary biliary cannulation**

Haruka Toyonaga, Toshifumi Kin, Tsuyoshi Hayashi, Kuniyuki Takahashi, and Akio Katanuma

Center for Gastroenterology, Teine Keijinkai Hospital, Hokkaido, Japan

**Brief Explanation (295 words)**

The efficacy of image-enhanced endoscopy (IEE) has been widely reported in the management of gastrointestinal tract lesions [1-3]; however, the efficacy of IEE has not been well discussed in the pancreatobiliary field. Recently, a novel IEE tool called texture and color enhancement imaging (TXI; Olympus, Tokyo, Japan) was launched. TXI has two modes: mode 1, which enhances brightness, texture, and color contrast, and mode 2, which enhances brightness and texture [4]. Herein, we report the usefulness of TXI in biliary cannulation (Video 1).

Case 1 was a 79-year-old woman who underwent endoscopic retrograde cholangiopancreatography (ERCP) for cholangitis. The flat-shaped papilla was located in the periampullary diverticula. The orifice of the bile duct was unclear under white

light imaging (WLI); however, TXI mode 2 enhanced the brightness and texture of unevenness on the surface of the papilla, leading to the clear recognition of the orifice (Fig. 1). Finally, biliary cannulation was achieved without pancreatic ductal intervention.

Case 2 was an 81-year-old man with advanced pancreatic cancer who underwent ERCP for malignant distal biliary obstruction. The scope position was unstable due to duodenal invasion of the tumor, and use of the transpapillary biliary approach was challenging. Thus, we performed precutting using a precut needle knife (NeedleCut 3V KD-V441M; Olympus, Tokyo, Japan). Upon the observation of the incised surface of the papilla under TXI mode 1, a hole opening on the sphincter muscle suggesting the orifice of the bile duct was well recognized (Fig 2). Successful biliary cannulation was achieved by the insertion of the ERCP catheter into the hole.

The identification of the papilla orifice is important for transpapillary biliary intervention. TXI enhances the difference in the structure of the papilla, leading to an easier understanding of the papilla orifice. Therefore, TXI can aid in biliary cannulation, especially in cases with an unclear biliary orifice.

## References

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**Figure legends**

**Figure 1**

Although the orifice of the bile duct was unclear under white light imaging (WLI), texture and color enhancement imaging (TXI) mode 2 (texture and brightness enhanced) allowed clear recognition of the orifice.

**Figure 2**

After precutting, the bile duct orifice was more clearly recognized under TXI mode 1 (texture, brightness, and color enhanced) than with WLI.

**Video legend**

Texture and color enhancement imaging (TXI) provides enhanced images, as the function amplifies minute visible changes. TXI may help in recognizing the structure

around the papilla during biliary cannulation.

### Video subtitles

The flat-shaped papilla was located in the periampullary diverticula.

The orifice of the bile duct was unclear under white light imaging (WLI).

Then, we observed the papilla under texture and color enhancement imaging (TXI) mode 2.

Because TXI mode 2 enhanced brightness and texture of unevenness on the surface of the papilla, the orifice of the papilla was identified easily.

Finally, successful biliary cannulation was achieved without pancreatic ductal intervention.

Transpapillary biliary drainage was attempted to the case with advanced pancreatic cancer.

However, the scope position was unstable due to the duodenal invasion.

After the pancreatic guidewire placement, the biliary cannulation was still challenging.

Thus, we performed precutting using a precut needle knife.

On the observation of the incised surface under WLI, the orifice of the bile duct was difficult to be detected.

Then, we observed the papilla using TXI mode 1 (texture, brightness, and color enhanced).

A hole opening on the sphincter muscle suggesting the orifice of the bile duct orifice was well identified.

Finally, biliary cannulation was successfully achieved by the insertion of the ERCP catheter to the hole.



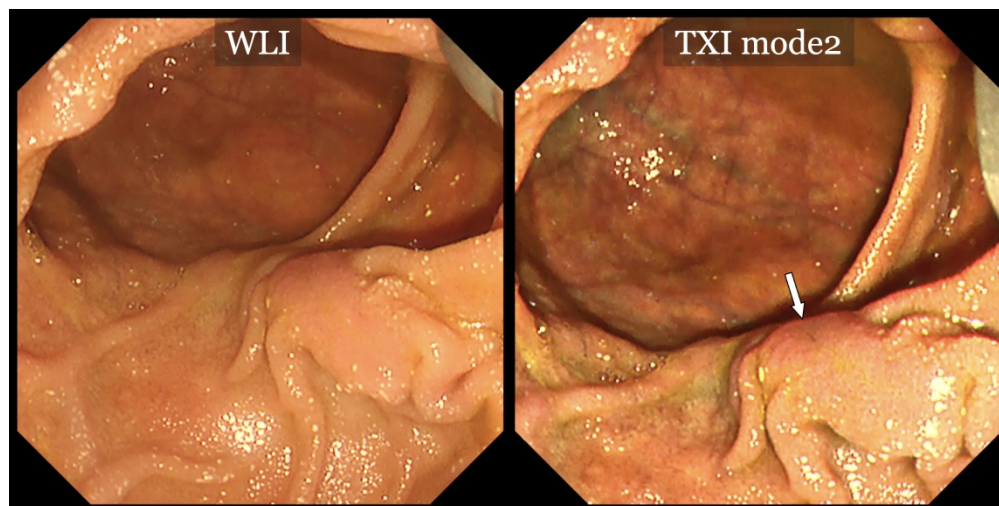


Figure 1: Although the orifice of the bile duct was unclear under white light imaging (WLI), texture and color enhancement imaging (TXI) mode 2 (texture and brightness enhanced) allowed clear recognition of the orifice.

508x255mm (144 x 144 DPI)

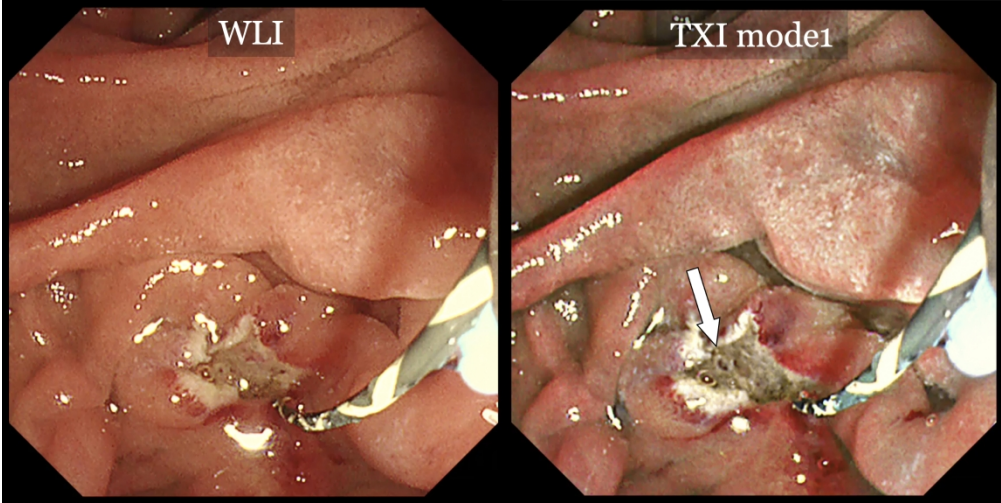
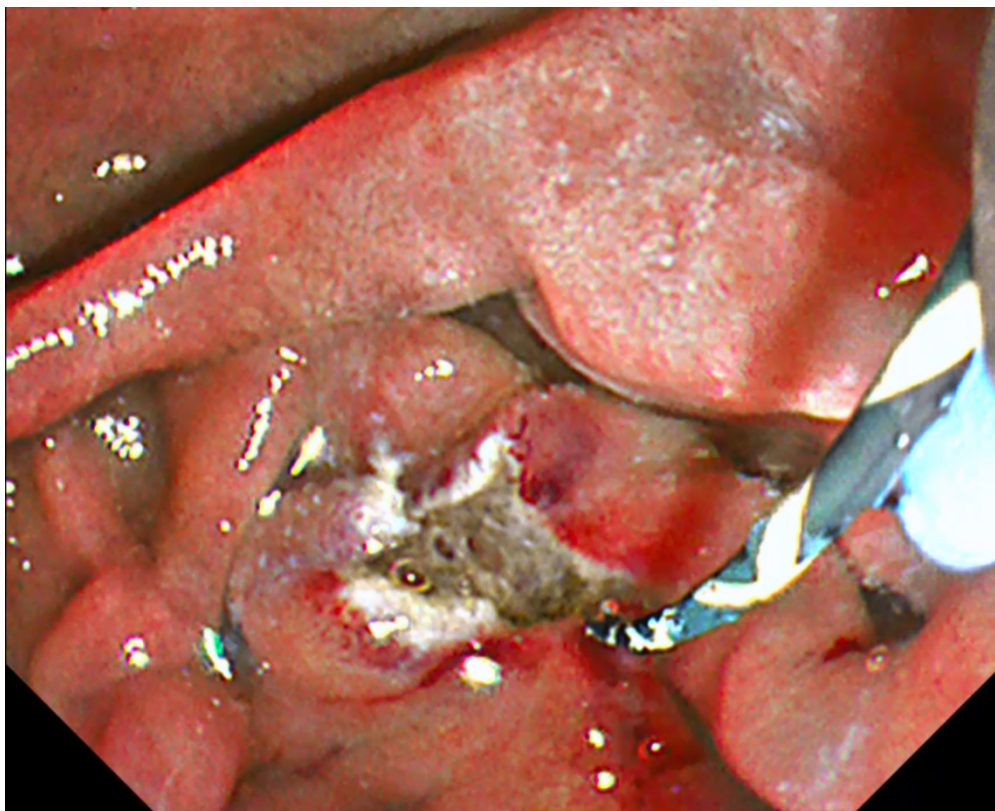


Figure 2: After precutting, the bile duct orifice was more clearly recognized under TXI mode 1 (texture, brightness, and color enhanced) than with WLI.

505x254mm (144 x 144 DPI)



Video Image: Texture and color enhancement imaging (TXI) provides enhanced images, as the function amplifies minute visible changes. TXI may help in recognizing the structure around the papilla during biliary cannulation.

285x230mm (144 x 144 DPI)