



A novel teaching tool for visualizing the invisible bile duct axis in 3 dimensions during biliary cannulation (Compact Disc method)

Mamoru Takenaka, MD, PhD, Tomoe Yoshikawa, MD, Kosuke Minaga, MD, PhD, Kentaro Yamao, MD, PhD, Masatoshi Kudo, MD, PhD

Selective biliary cannulation is difficult to master, even in cases with normal papillae.¹ In the case of a papilla with a long oral protrusion (LOP), the difficulty is greatly increased.² In such cases, visualization of the invisible bile duct axis in 3 dimensions is required, but this is difficult to master, even for experienced endoscopists. Individual trainers must commit to developing their teaching skills³;

however, there is no dedicated teaching tool for this difficult task. Therefore, we developed a novel and simple teaching tool for visualizing the invisible bile duct axis in 3 dimensions, called the compact disc (CD) method.

First, the trainee must imagine that a number of CDs are lined up in the oral protrusion 3 dimensionally. In cases with a normal papilla, 1 CD is imagined. In contrast, in cases

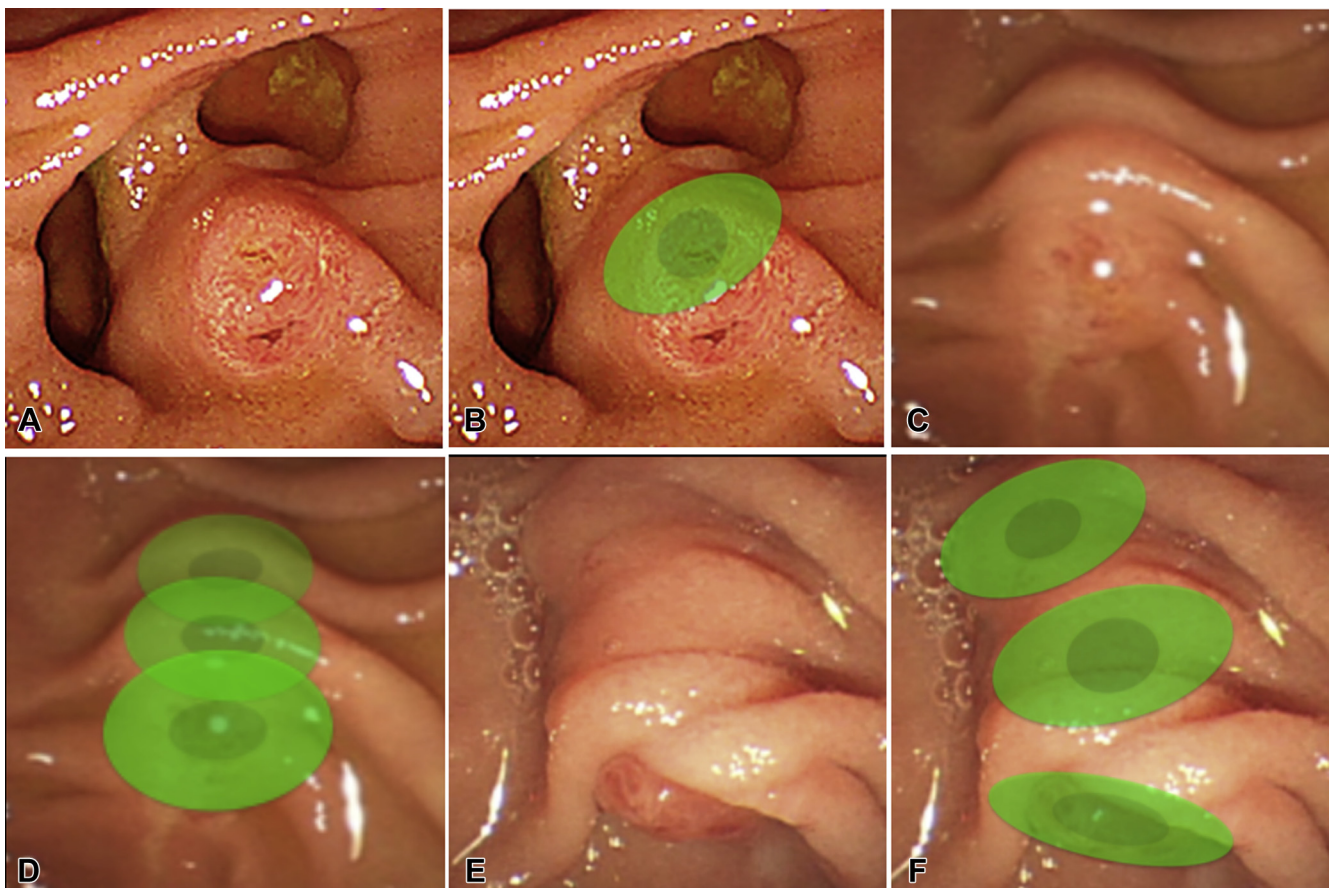


Figure 1. First, the trainee must imagine that a number of compact discs (CDs) are lined up in the oral protrusion 3 dimensionally. **A, B,** In cases with a normal papilla, 1 CD is imagined. **C–F,** In contrast, in cases of papilla with a long oral protrusion (LOP), several CDs are imagined. CDs were imagined in the horizontal direction of the several transverse folds of LOP.

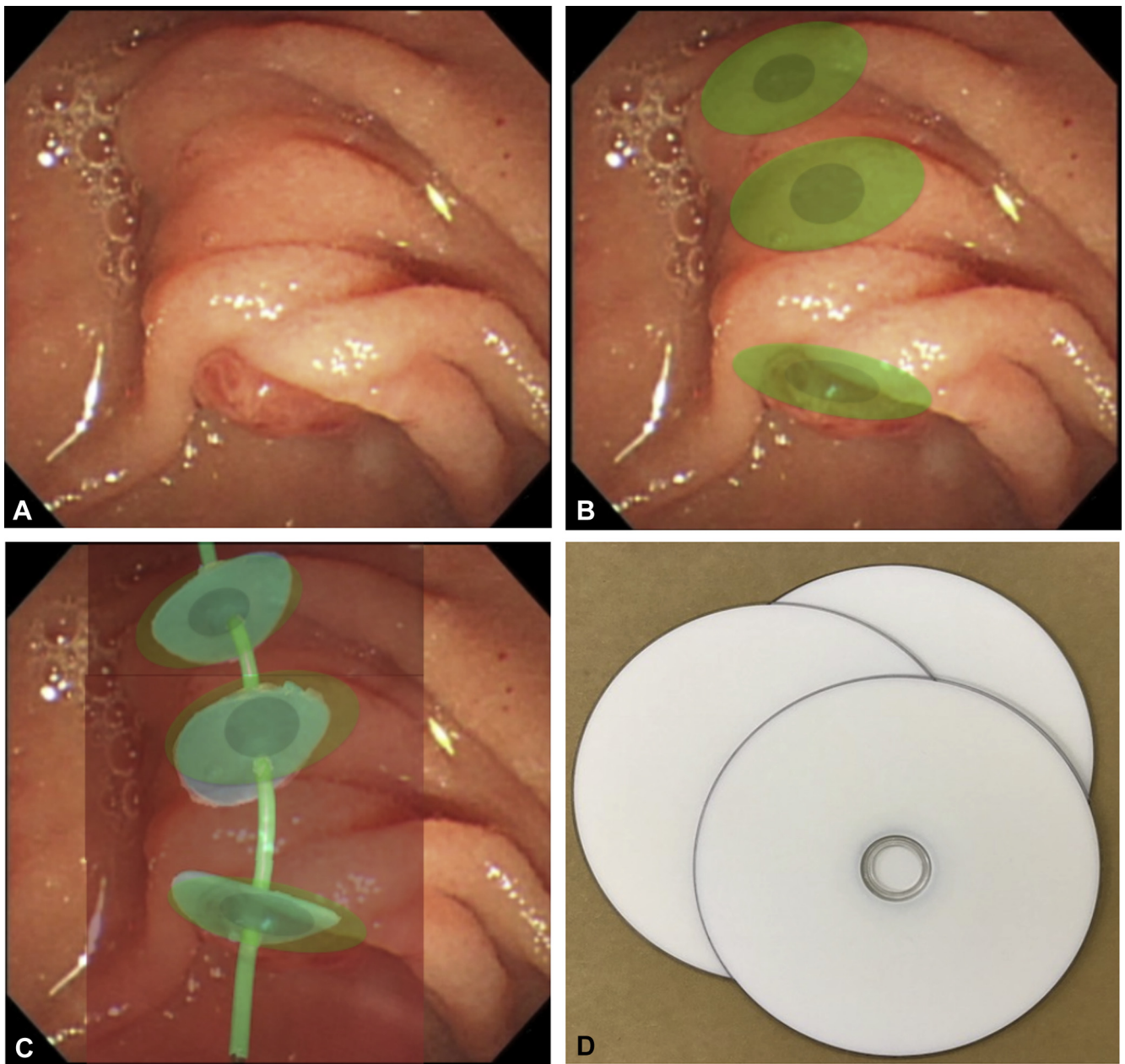


Figure 2. A-C, To form an image of the invisible bile duct, the trainee should imagine that a line runs through the center hole of each imagined compact disc (CD). D, In addition, the CDs should be imagined as slightly offset when viewed from the front of the papilla.

of papilla with a LOP, several CDs are imagined. CDs were imagined in the horizontal direction of the several transverse folds of LOP (Fig. 1). Next, to form an image of the invisible bile duct, the trainee should imagine that a line runs through the center hole of each imagined CD. In addition, the CDs should be imagined as slightly offset when viewed from the front of the papilla (Fig. 2). Manipulation of the

catheter through the center hole of each imagined CD is similar in movement to that during adjustment of the axis of the invisible bile duct in cases of LOP (Fig. 3). Typically, the trainee is only conscious of the hole in the papilla and not the bile duct axis. An experienced endoscopist, however, can recognize the nearby bile duct axis but cannot imagine the bile duct axis at the back. In contrast, experts

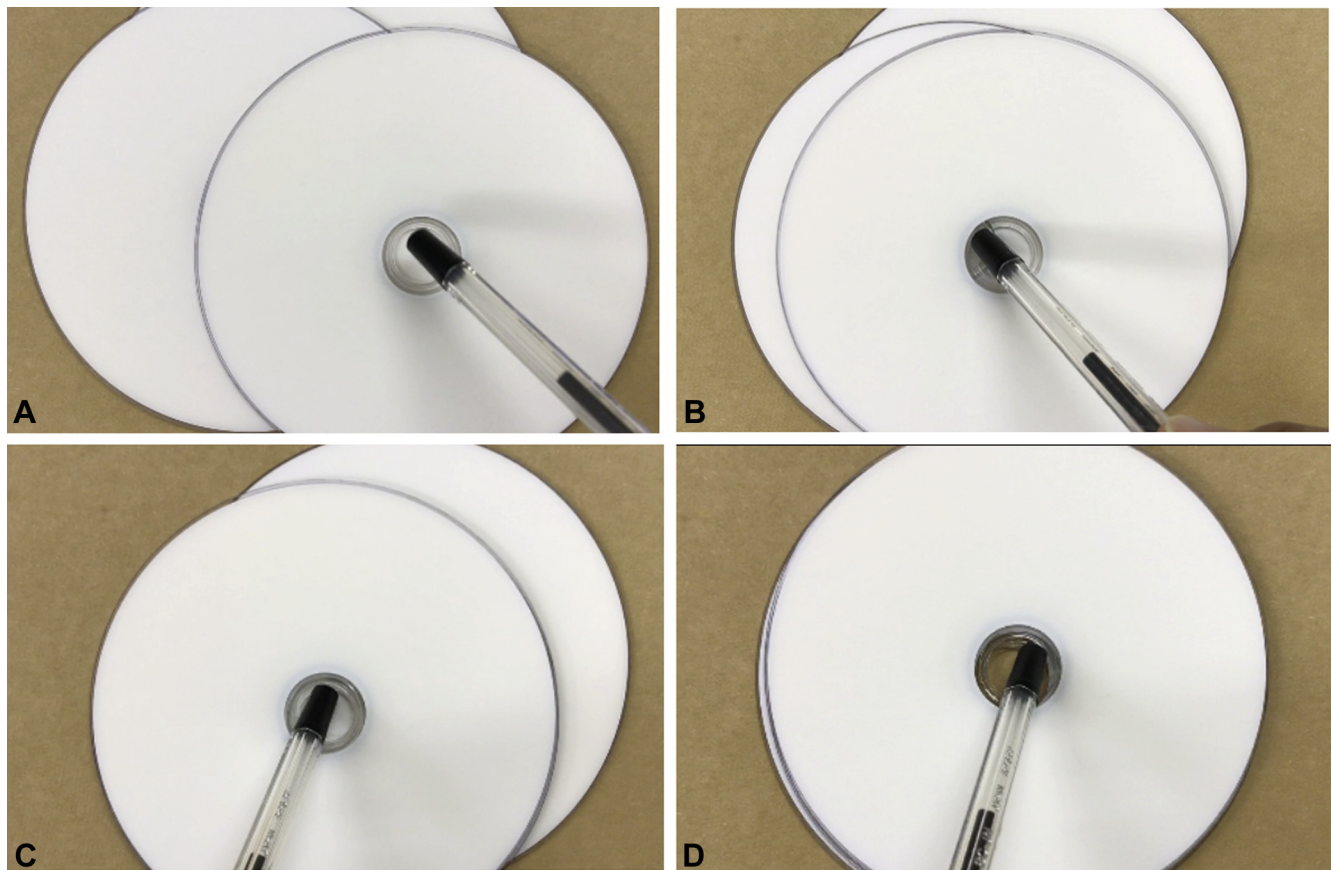


Figure 3. Manipulation of the catheter through the center hole of each imagined compact disc is similar in movement to that during adjustment of the axis of the invisible bile duct in cases of long oral protrusion.

can imagine the invisible bile duct axis at the back and adjust the bile duct axis by manipulating the catheter through the hole.

The endoscopist must manipulate the catheter slowly and gently through each CD center hole. If the endoscopist pushes the cannula with force, the bile duct axis of the LOP will bend easily. Likewise, when wire-guided cannulation is performed, the endoscopist must manipulate the guidewire (GW) slowly and gently through the hole of each imagined CD. If the endoscopist pushes with force, the guidewire can easily damage the bile duct (Figs. 4 and 5). The imagined invisible bile duct obtained by using the CD method can contribute to proper and gentle GW manipulation with wire rotation under fluoroscopy (Figs. 6 and 7). In addition, when performing endoscopic sphincterotomy, adjustment of the bile duct axis by the CD method allows for a safe incision direction.

In Video 1 (available online at www.VideoGIE.org), we show how to implement the CD method for biliary cannulation and endoscopic sphincterotomy, as well as its usefulness in providing feedback to trainees. Using the CD method, trainees master visualizing and adjusting the invisible bile duct axis in LOP cases by an accumulation of effective feedback.

In cases of papillae that are completely under a fold or are inside a diverticulum, imagining several CDs was impossible. However, it would be possible for trainees to understand that such papillae are difficult cases of biliary cannulation.

In summary, the CD method is very useful for visualizing the invisible bile duct in 3 dimensions and providing feedback for trainees. Because this method is simply based on imagining CDs, without words, it can be used in any country. Thus, the CD method is simple but should be considered as a novel and useful teaching tool for biliary cannulation.

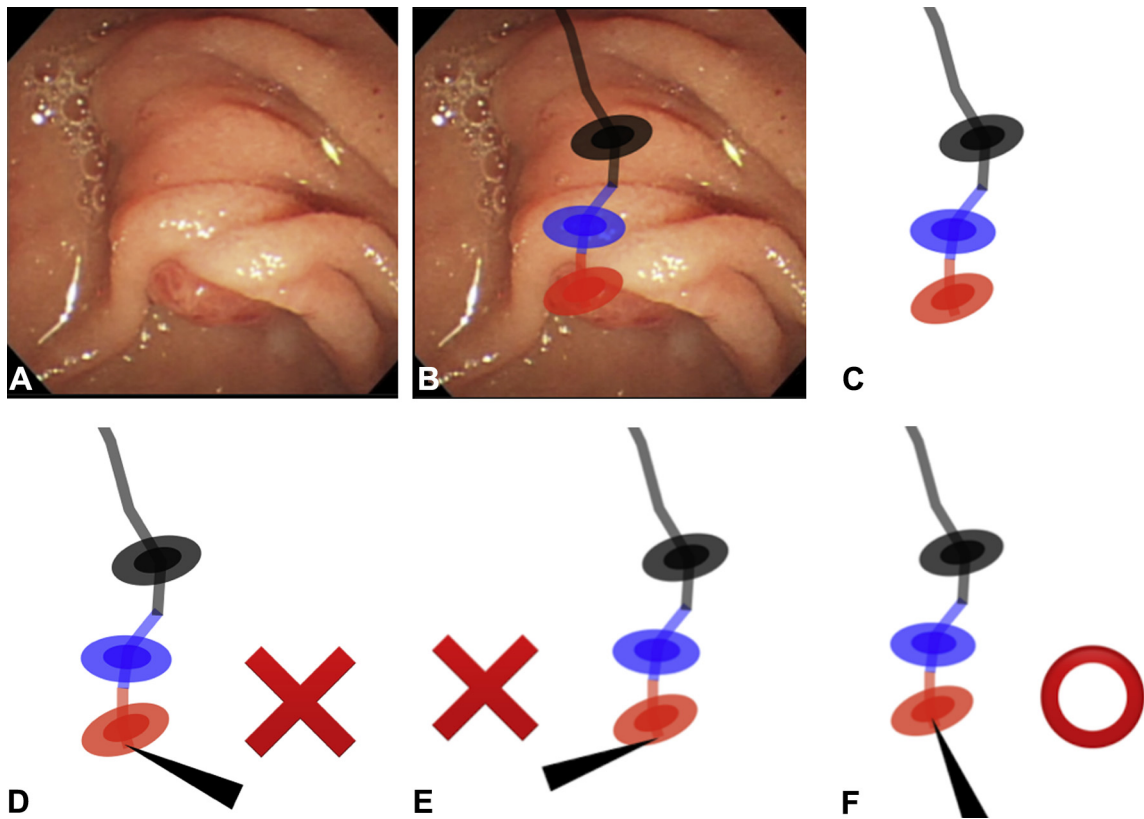


Figure 4. The compact disc (CD) method can be summarized using the following schema. **A-C**, First, the trainee must imagine that a number of CDs are lined up in the oral protrusion 3 dimensionally. CDs were imagined in the horizontal direction of the several transverse folds of the long oral protrusion. **D-F**, Next, the endoscopist should assume the proper endoscope position, such that the CD on the papilla and the catheter tip are face to face.

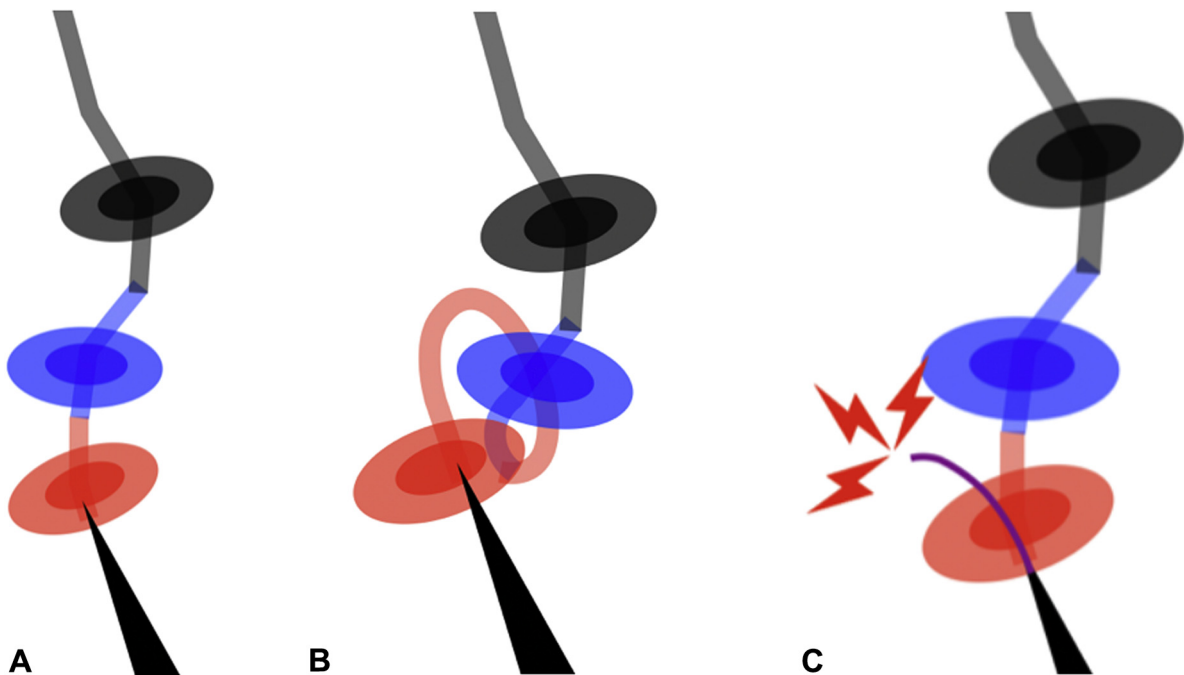


Figure 5. **A**, The endoscopist must manipulate the catheter slowly and gently through each compact disc (CD) center hole. **B**, If the endoscopist pushes the cannula with force, the bile-duct axis of the long oral protrusion will bend easily. When wire-guided cannulation is performed, the endoscopist must also manipulate the guidewire slowly and gently through the hole of each imagined CD. **C**, If the endoscopist pushes with force, the guidewire can easily damage the bile duct.

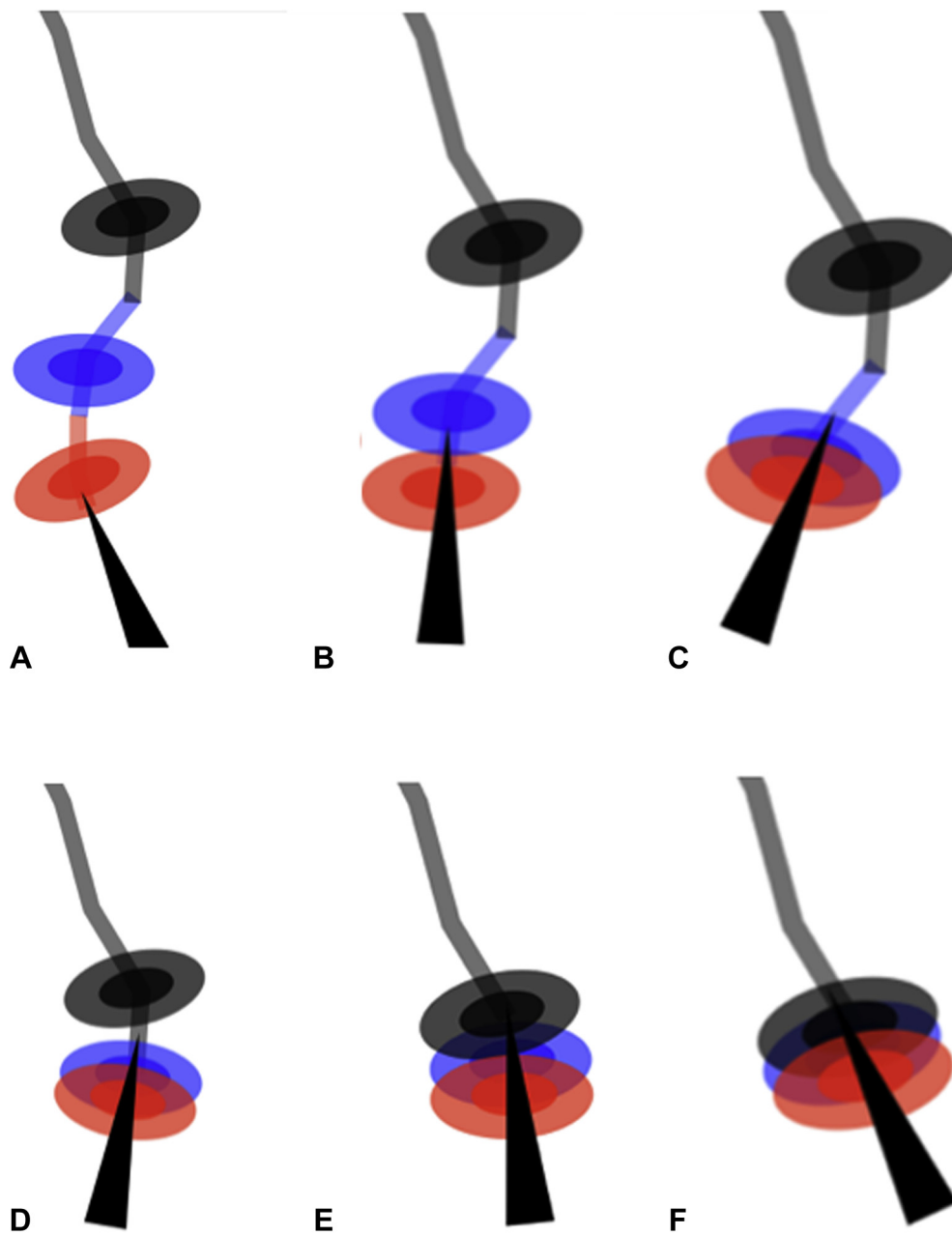


Figure 6. A-F, Manipulation of the catheter through the center hole of each imagined compact disc is similar in movement to that during adjustment of the axis of the invisible bile duct in cases of long oral protrusion.

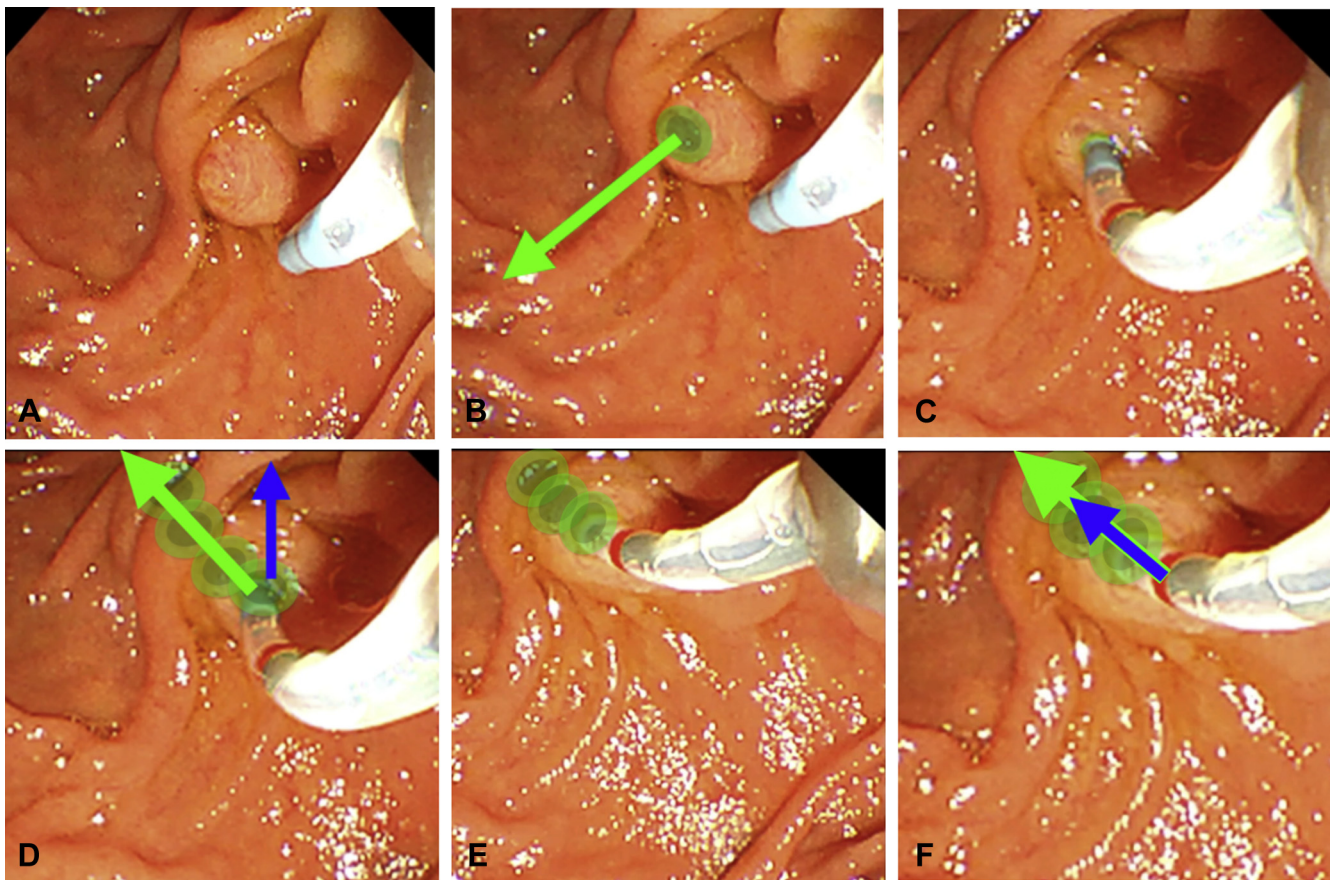


Figure 7. Feedback using the compact disc (CD) method. The endoscopist should assume the proper scope position, such that the CD on the papilla and catheter tip are face to face. Here, the CD on the papilla and catheter tip are not face to face (**A, B**). The endoscopist changed the endoscopic view, and the CD on the papilla and catheter tip are finally face to face. However, the imaginary line connecting the CDs in the oral protrusion clearly shows that the axis of the catheter and bile duct are not matched (**C, D**). The endoscopist changed the axis of the catheter to adjust the axis of the invisible bile duct in the oral protrusion, and selective deep biliary cannulation was successful (**E, F**).

DISCLOSURE

All authors disclosed no financial relationships.

Abbreviations: CD, compact disc; LOP, long oral protrusion.

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. Itoi T, Dhir V. EUS-guided biliary rendezvous: slow, hesitant, baby steps forward. *Gastrointest Endosc* 2016;83:401-3.
3. Waschke KA, Anderson J, Valori RM, et al. ASGE principles of endoscopic training. *Gastrointest Endosc* 2019;90:27-34.

Department of Gastroenterology and Hepatology, Kindai University Faculty of Medicine, Osaka-sayama, Japan.

Copyright © 2020 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/>).

<https://doi.org/10.1016/j.vgie.2020.04.015>