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【 CASE REPORT 】

Endoscopic Biliary Intervention Using Traction Devices for Periampullary Diverticulum

Ryuji Inoue[1], Hiroshi Kawakami[2,3], Yoshimasa Kubota[2,3] and Tessin Ban[2,3]

Abstract:
We describe the case a 92-year-old woman who was admitted to our hospital with choledocholithiasis and periampullary diverticulum (PAD). Due to PAD, clear visualization of the ampulla of Vater could not be obtained. Although selective bile duct cannulation was difficult, a 7-Fr plastic stent was placed during the first session. Fifteen days later, endoscopic retrograde cholangiopancreatography was retried using traction devices, and the papilla became visible. Endoscopic sphincterotomy and stone extraction were performed without any complications. The application of traction devices in endoscopic submucosal dissection may be a promising technique in cases in which endoscopic biliary intervention is difficult due to PAD.

Key words: periampullary diverticulum, traction devices, endoscopic biliary intervention, endoscopic clip, choledocholithiasis

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Introduction

Periampullary diverticulum (PAD) is a duodenal mucosal outpunching defined as herniation of the mucosa or submucosa that occurs via a defect in the muscle layer within an area of 2-3 cm around the papilla (1). PAD is a risk factor for failed selective bile duct cannulation (SBDC) (2). The papilla may be unidentifiable within the diverticulum, floppy on the edge of the diverticula, and sometimes hidden by a mucosal fold. Recently, various endoscopic devices and techniques have been developed to improve the success rates of endoscopic biliary intervention in patients with PAD (1). We herein describe the first case in which a patient with choledocholithiasis and PAD was successfully treated by endoscopic biliary intervention with the use of traction devices was who underwent; two types of endoscopic clips were applied for endoscopic submucosal dissection (ESD).

Case Report

A 92-year-old woman was admitted with fever and upper abdominal pain. Abdominal computed tomography revealed choledocholithiasis (Fig. 1). She had one common bile duct stone of 10.9 mm in diameter. On the next day of admission, endoscopic retrograde cholangiopancreatography (ERCP) was conducted. During ERCP, PAD was found and located at the edge of the diverticulum, and it was difficult to obtain a front view of the ampulla of Vater (Fig. 2). We performed SBDC using wire-loaded cannulation. A standard duodenoscope (JF-260V, Olympus, Tokyo, Japan), an ERCP catheter (01 20 21 1, MTW Endoskopie, Wesel, Germany), a bendable catheter (PR-233Q, Olympus), and guidewire (0.035 inch, 450 cm; XEMEX ENTRY, ZEON Medical, Tokyo, Japan) were used for SBDC, which was performed within 25 minutes (Fig. 3a). Although SBDC was achieved, we could not perform endoscopic sphincterotomy because of poor visualization of the papilla and because we considered that it would place a burden on the heart and respiratory function. A 7-French plastic stent was placed in the end of the bile duct (Fig. 3b). On hospital day 15, a duodenoscope (JF-260V, Olympus) was used while ERCP was performed with the traction device method. We attempted to perform endoscopic sphincterotomy (EST) and endoscopic stone ex-

[1]Department of Internal Medicine, Kushima Municipal Hospital, Japan, [2]Division of Gastroenterology and Hepatology, Department of Internal Medicine, Faculty of Medicine, University of Miyazaki, Japan and [3]Department of Gastroenterology and Hepatology, Division of Endoscopy, Center for Digestive Disease, University of Miyazaki Hospital, Japan
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Correspondence to Dr. Hiroshi Kawakami, hiropon@med.miyazaki-u.ac.jp

traction using traction devices. The first endoscopic clip (S-O clip; ZEON Medical) was attached to the duodenal mucosa on the anal side of the papilla (Fig. 4a). The second endoscopic clip (ZEOCLIP; ZEON Medical) was then applied to the loop part of the first endoscopic clip and attached to the contralateral duodenal mucosa (Fig. 4b). As a result, good visualization of the papilla was obtained (Fig. 4c and d). After extracting the biliary stent, SBDC was achieved within 2 minutes (Fig. 5a). Subsequently, EST was performed after successful stone extraction (Fig. 5b-d). Finally, the procedure was accomplished by cutting the loop part of the S-O clip with a disposable high-frequency knife (Fig. 6a and b). There were no subsequent complications.

Discussion

To our knowledge, this is the first report of SBDC following stone extraction using traction devices for PAD. PAD is reported to be common and seen in up to 20% of patients undergoing ERCP (3-5). PAD is further divided by the relative position of the papilla, whether the papilla is situated outside the diverticulum or inside the diverticulum (intradiverticular). PAD is a major cause of failed ERCP, and the presence of PAD is reportedly responsible for 24.6% of unsuccessful ERCPs performed in patients younger than 75 years of age and 46.1% of those who are 75 years of age or older (3). Endoscopic biliary cannulation is more challeng-

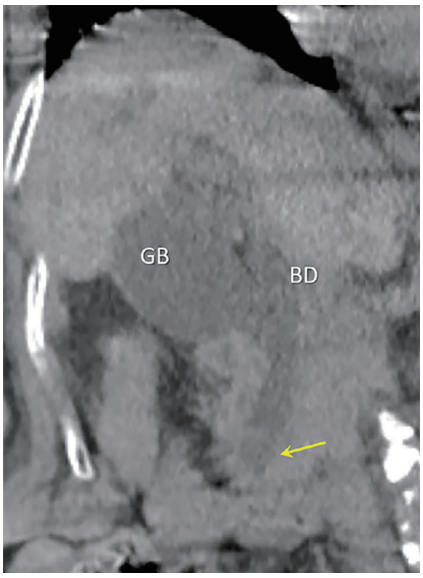

Figure 1. **A computed tomography scan showing choledocholithiasis (arrow). BD: bile duct, GB: gallbladder**

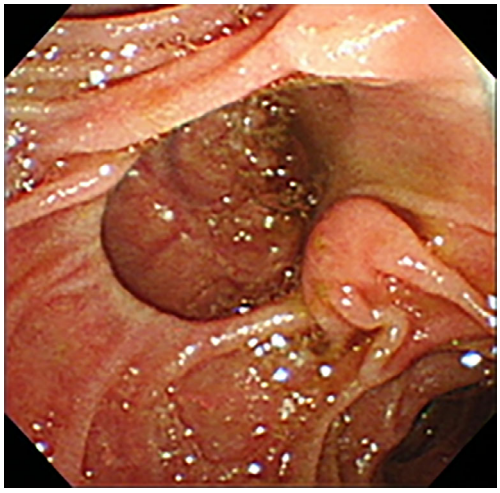

Figure 2. **An endoscopic image showing periampullary diverticulum. Clear visualization of the papilla could not be obtained.**

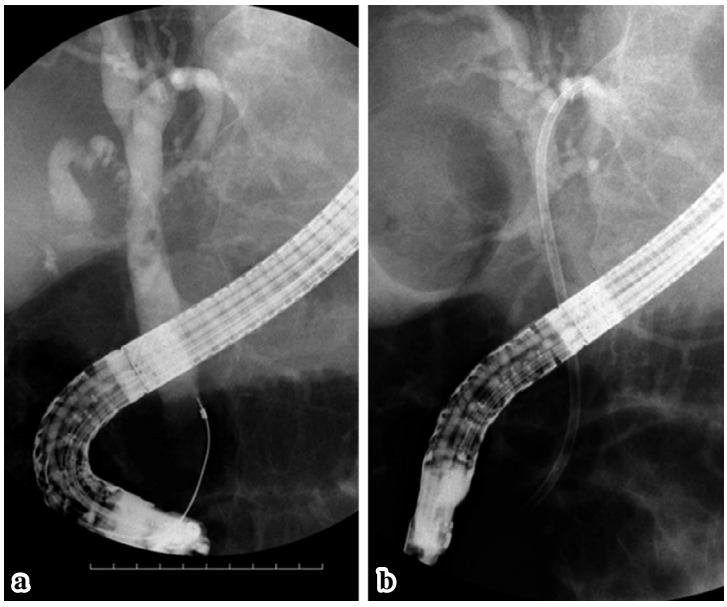

Figure 3. **a) A radiograph showing a common bile duct stone after selective bile duct cannulation. b) A radiograph showing biliary stent placement.**

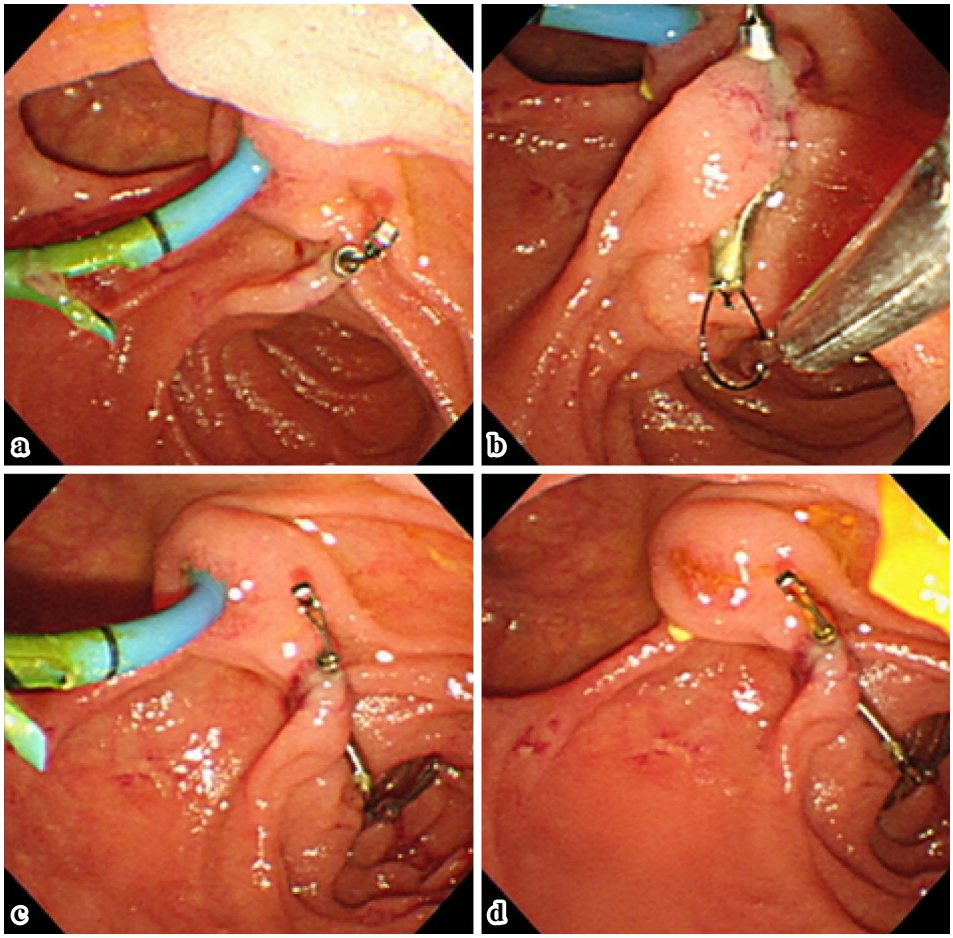

Figure 4. **a) An endoscopic image showing attachment of the S-O clip (ZEON Medical) to the duodenal mucosa on the anal side of the papilla. b) An endoscopic image showing the application of the ZEOCLIP (ZEON Medical) to the loop part of the S-O clip. c) An endoscopic image showing the attachment of the ZEOCLIP (ZEON Medical) to the contralateral duodenal mucosa. Improved visualization of the papilla is obtained. d) An endoscopic image showing clear visualization of the papilla after the extraction of the biliary stent.**

ing in patients with an intradiverticular papilla (4). To achieve successful biliary cannulation in such patients, various endoscopic devices and techniques have been developed, including wire-guided cannulation, pancreatic guidewire technique, pancreatic stent placement, saline solution injection, the clip and snare lifting technique, endoscopic clip assistance, the use of an ERCP cannula or a sphincterotome and endobiliary forceps (*i.e.*, two-devices in one-channel method), reversed guidewire method, double endoscope method, cap-assisted cannulation, entrance of the duodenal diverticulum, balloon dilation of the narrow diverticular neck (1, 4-21), and percutaneous transhepatic biliary drainage-guided (22) and recently, the endoscopic ultrasonography-guided rendezvous technique (23). Today, ESD is becoming established as a standard treatment technique (24). Various methods have been developed to obtain moderate traction in ESD, which is a key for safe and successful dissection. The S-O clip is a clip combined with a spring was developed for the purpose of pulling lesions in arbitrary directions and obtaining moderate traction for ESD (24, 25). When used in the actual ESD procedure, the S-O clip is clipped to the specimen, and the ZEOCLIP is used to clip the loop part of the S-O clip with the mucosa at a distance of 4-5 cm on the opposite side of the lesion (24, 25). We applied this technique in a case of PAD in which endoscopic biliary intervention was difficult due to poor visualization of the papilla as a result of PAD. Traction devices (*e.g.*, the S-O clip and ZEOCLIP) have the following merits: i) they can be manipulated under a duodenoscope, ii) their traction force is adjustable, and iii) they do not interfere with the instrumental channel of the scope; however, the potential to cause mucosal injury is a possible disadvantage. This technique enabled us to tow the ampulla in the opposite direction from the duodenum, resulting in clear visualization of the papilla, and facilitating successful EST and stone extraction without any complications. For this technique, careful operation of devices and meticulous attention are required to reduce the damage to the duodenal mucosa caused by the attachment of clipping devices.

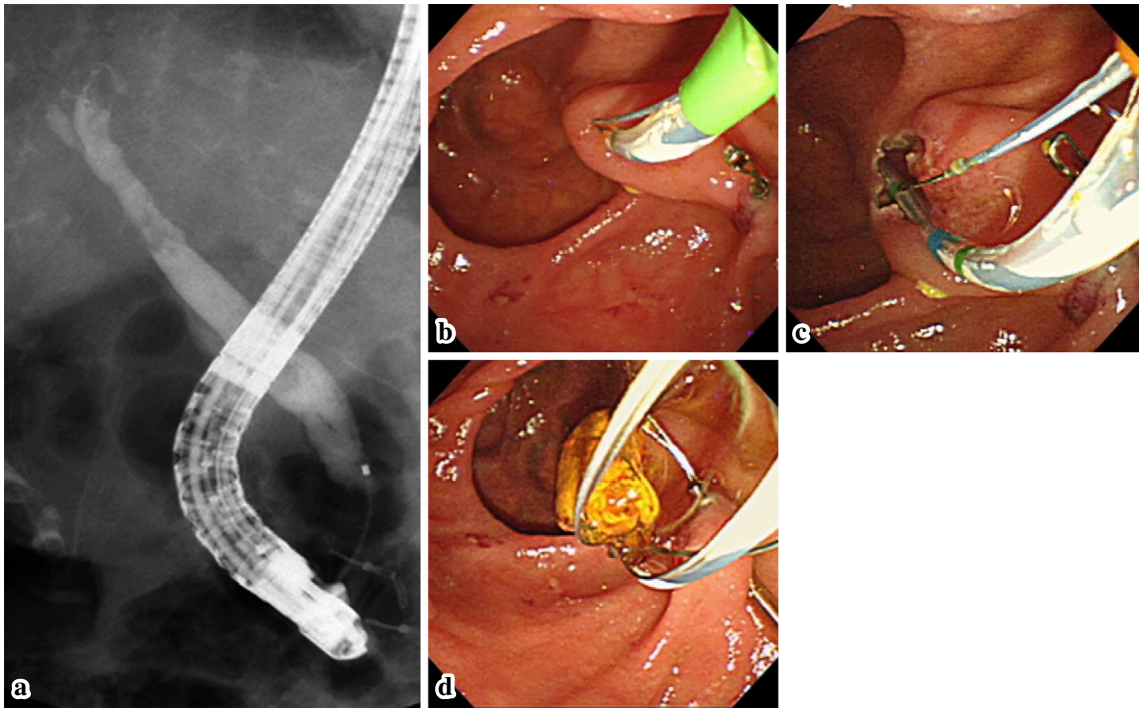

Figure 5. **a) A radiograph showing selective bile duct cannulation after adjusting the catheter to the bile duct axis using traction devices. b) An endoscopic image showing the papilla after selective bile duct cannulation. c) An endoscopic image showing the papilla after endoscopic sphincterotomy. d) An endoscopic image showing successful stone extraction using a basket catheter after endoscopic sphincterotomy.**

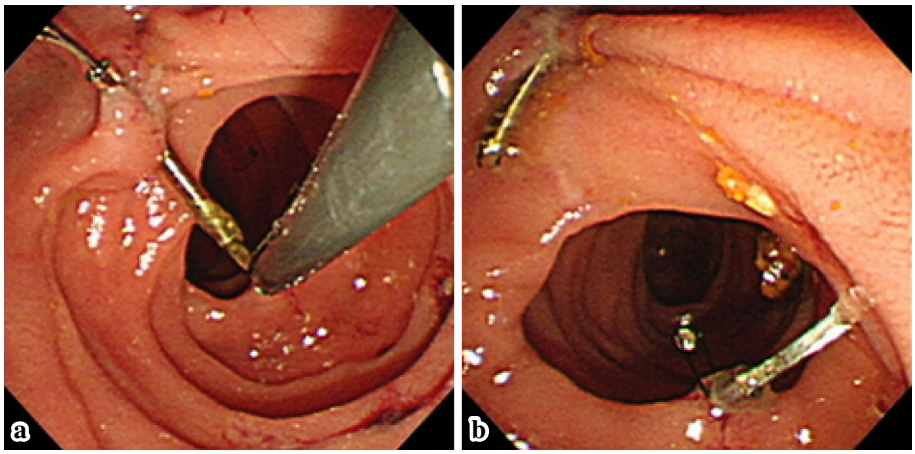

Figure 6. **a) An endoscopic image showing detachment manipulation of the loop part of the S-O clip (ZEON Medical) with a disposable high-frequency knife. b) An endoscopic image showing complete detachment of the loop.**

Conclusion

The towing technique using endoscopic traction devices may be a simple and promising technique for cases in which ERCP is difficult due to PAD.

The authors state that they have no Conflict of Interest (COI).

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