Case Reports

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Snare-assisted precutting and dual-knife fistulotomy performed during difficult biliary cannulation in a patient with an ectopic papilla of Vater

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Abstract

Endoscopic retrograde cholangiopancreatography is widely used in the diagnosis and treatment of pancreatobiliary diseases; however, successful biliary cannulation is a prerequisite for this operation. We herein present a new method in a patient in whom cannulation was difficult. A 56-year-old man was admitted to the hospital with choledocholithiasis. Endoscopic retrograde cholangiopancreatography was performed, and duodenoscopy revealed that the patient's duodenal papilla was located at the initial part of the horizontal segment of the duodenum. Because of the ectopic location of the duodenal papilla, the guidewire could not be inserted into the biliary and pancreatic duct. Therefore, we performed a new method to resolve the problem of difficult cannulation. A polypectomy snare was used to excise the mucosa covering the surface of the intramural segment of the common bile duct, and a dual knife was used to form a fistula. A guidewire was then inserted through the stoma into the bile duct. After the procedure, the bile duct was successfully cannulated and the stones were removed. No complications occurred. This new method may be an alternative treatment to precutting for difficult biliary cannulation in patients with a protruded papilla of Vater.

Keywords

Difficult biliary cannulation, fistulation, endoscopic retrograde cholangiopancreatography, snare, dual knife, case report

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Introduction

Endoscopic retrograde cholangiopancreatography (ERCP) is commonly used for the diagnosis and treatment of pancreatobiliary disorders. When conventional biliary cannulation techniques are performed during ERCP, the failure rate is approximately 10%.[1,2] For operators who cannot correctly determine the appropriate location and depth of incisions, some advanced techniques for difficult cannulation, such as needle-knife precutting methods, may be challenging and associated with a high incidence of complications. To improve operability and reduce the risk of complications, we used a new method in a patient in whom intubation was difficult because of the presence of an ectopic duodenal papilla. To the best of our knowledge, this method has not been reported in the literature.

Case report

The present case is reported according to the CARE guidelines.[3] A 56-year-old man was admitted to the hospital because of acute right abdominal pain, fever, and vomiting. Four days prior, he had developed pain in the right upper abdominal quadrant that was accompanied by nausea and vomiting. He developed fever and chills with subsequent yellowish discoloration of the skin and sclera. His temperature was 39°C. His condition worsened; therefore, he decided to visit our hospital. The patient had no relevant medical or family history. Physical examination revealed yellowish discoloration of the skin and sclera and right abdominal tenderness. Blood tests revealed the following: white blood cell count, 18,450 cells/μL; aspartate aminotransferase, 204.9 U/L; alanine aminotransferase, 201.95 U/L; total bilirubin, 139.5 μmol/L; direct bilirubin, 107.49 μmol/L; gamma-glutamyl transpeptidase, 748.95 U/L; and alkaline phosphatase, 748.95 U/L. Epigastric magnetic resonance cholangiopancreatography showed low-level biliary obstruction, multiple stones in the lower part of the common bile duct, and dilatation of the common bile duct (Figure 1). The patient was diagnosed with choledocholithiasis. ERCP was performed, and duodenoscopy (TJF-260V; Olympus Medical Systems, Tokyo, Japan) revealed that the patient's duodenal papilla was located at the initial part of the horizontal segment of the duodenum. Because of the ectopic location of the duodenal papilla, it was difficult to adjust the papilla into the central field of endoscopic vision. Therefore, the guidewire could not be inserted into the biliary and pancreatic duct. In such cases, perforation and hemorrhage may occur if the endoscopist is not yet skilled in applying the needle-knife precutting technique and if the position, depth, or direction of the precut are incorrect. To avoid such complications, we used a new method to solve the problem of difficult cannulation after obtaining informed consent from the patient and his family. The procedure is described as follows.

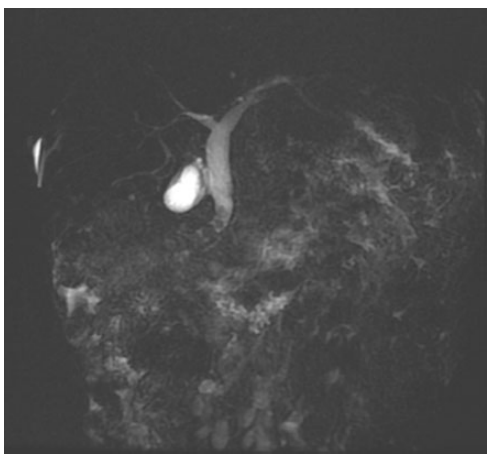

Figure 1. Epigastric magnetic resonance cholangiopancreatography showed low-level biliary obstruction, multiple stones in the lower part of the common bile duct, and dilatation of the common bile duct.

Step 1: Exposure of intramural segment of common bile duct

A polypectomy snare (Sensation™ Short Throw, 13 mm; Boston Scientific, Natick, MA, USA) was used to excise the mucosa covering the surface of the intramural segment of the common bile duct. The point of the incision was the most excessively protruding portion at the 11- to 12-o'clock position on the side of the oral-lateral part of the papilla. Before the incision was made, the papillotomy knife was used to touch the most excessively protruding part of the oral-lateral part of the papilla. The longitudinal cord-like structure beneath the surface mucosa could be felt on rolling. This movement was used to predict the course and position of the intramural segment of the common bile duct (Figure 2(a)). In a manner analogous to that used in polypectomy, the mucosa covering the surface was excised using a standard diathermy machine with the mode set to endo cut-I, effect 2, cutting duration 3, and cutting interval 3

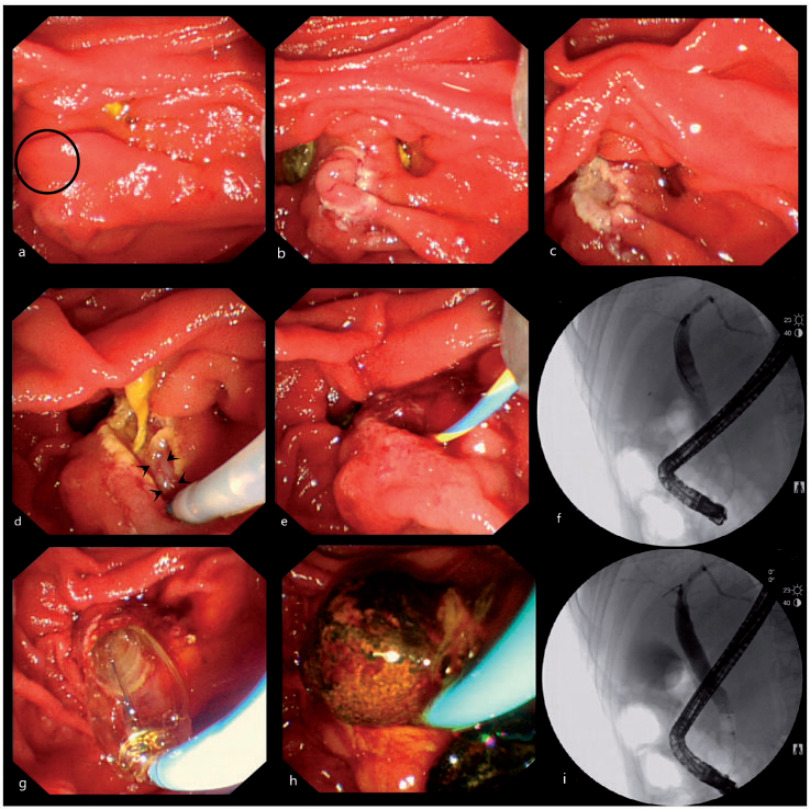

Figure 2. (a) The black circle marks the position of the intramural segment of the common bile duct. (b) The surface mucosa was excised with a polypectomy snare. (c) The surface mucosa was removed. (d) After sufficient air was injected into the intestinal cavity, a white longitudinal common bile duct was seen (black arrow). (e) The guidewire was inserted into the bile duct through the stoma. (f) Cholangiography showed four filling defects. (g) The common bile duct was dilated with a columnar balloon. (h) The stones were removed with an extraction balloon. (i) After successful extraction of the stones, cholangiography was performed again, revealing no filling defects.

(APC workstation 200S + APC2; Erbe Elektromedizin GmbH, Tübingen, Germany). The extent of the excision was approximately 5 mm (Figure 2(b), (c)). After the surface mucosa was removed and sufficient air was injected into the intestinal cavity, the white longitudinal common bile duct became visible (Figure 2(d)).

Step 2: Fistulation at intramural segment of common bile duct

A dual knife (KD-650L; Olympus Medical Systems) was used for electric resection to form a fistula in the highest part of the exposed common bile duct. Bile outflow was seen as soon as this was successfully done.

Step 3: Bile duct cannulation and removal of stones from stoma

A guidewire was then inserted through the stoma into the bile duct (Figure 2(e)). Examination after contrast injection showed a common bile duct dilatation of approximately 14 mm in diameter and four filling defects of approximately 8 to 12 mm in diameter (Figure 2(f)). The common bile duct was dilatated with a columnar balloon (MBD-0830-23; Micro-Tech (Nanjing) Co., Ltd., Nanjing, China), and the stones were removed with an extraction balloon (M00547100; Boston Scientific) (Figure 2(g), (h)). Cholangiography was repeated, and no filling defects were found (Figure 2(i)).

After the operation, a nasobiliary drainage tube was inserted to ensure that bile drainage was unobstructed. The serum amylase level was normal, and no postoperative pancreatitis occurred. The white blood cell count returned to normal after 48 hours. Liver function improved significantly. On postoperative day 2, radiography through the nasobiliary tube showed no filling defect in the intrahepatic and extrahepatic bile ducts or the gallbladder (Figure 3). No perforation, bleeding, or other complications occurred. On postoperative day 3, the nasobiliary drainage tube was removed and the patient was discharged.

Figure 3. Radiography through the nasobiliary tube showed no filling defect in the intrahepatic and extrahepatic bile ducts or the gallbladder.

Discussion

ERCP has always been an extremely crucial technology for the diagnosis and treatment of biliary and pancreatic diseases. Although this technology was developed more than 50 years ago, dealing with difficult cannulation is still a problem encountered by every ERCP operator. If bile duct cannulation is difficult during ERCP because of variations in the position or shape of the papilla, and even if advanced techniques such as the needle-knife precut method are used, there is still a certain rate of failure and a high risk of bleeding and perforation,[4,5] especially if the operator is inexperienced. When all techniques for ERCP fail, some authors suggest that endoscopic ultrasonography-guided biliary drainage should be used as a salvage procedure. However, this requires an additional skilled endoscopist who is experienced in interventional endoscopic ultrasonography.[6,7]

In the present case, the bile duct was difficult to cannulate because of an ectopic duodenal papilla. An operator lacking experience cannot accurately judge the position and depth of the incision. To improve operability and avoid the high risk of bleeding and perforation that may be caused by blind precutting of the papilla, we used a new method of snare-assisted precutting and dual-knife fistulotomy instead of needle-knife precutting. The bile duct was successfully intubated, and the stones were removed without complications.

This new method had the following advantages. First, snare polypectomy was used to remove the surface mucosa covering the intramural segment of the common bile duct. This technique has been widely used in the clinical resection of gastrointestinal polyps and other mucosal lesions. It is a proven and safe technique with which to remove the mucosa. Moreover, most endoscopists are proficient in this technique. However, attention should be paid when pulling the snare into the intestinal cavity during resection to avoid damaging the muscle layer and causing perforation. This is similar to the technique of snare polypectomy employed for gastrointestinal polyps. In addition, we do not recommend that the scope of resection is too large, as long as the common bile duct wall to be cut can be exposed. Second, the layers of structure were clear. After removing the overlying surface mucosa using a snare, the longitudinal common bile duct was fully exposed. Clear visualization of the layers of structure might help operators to appropriately determine the location and depth of incisions and achieve precise incision and fistulation. Therefore, for operators who cannot accurately determine the location and depth of incisions, this novel method may lower the risk of complications compared with blind needle-knife precutting. Third, the position of the snare incision was at the most excessively protruding part of the 11- to 12-o'clock position on the side of the oral-lateral part of the papilla. The intramural segment of the common bile duct was cut instead of the papilla to avoid damage to the papilla and the pancreatic duct. Avoiding thermal injury to the pancreatic duct can reportedly minimize the risk of pancreatitis.[8] According to the available literature, experts believe that the bile duct is positioned in the 11- to 12-o'clock direction of the ampulla of Vater[9] and that the intramural segment of the common bile duct is at the top of the ampulla of Vater.[10] Fourth, a dual knife was chosen for fistulation because its front end that comes out of the sheath is extremely short (2 mm in length). Therefore, the depth of the incision could be controlled to avoid damage to the posterior wall of the common bile duct. Especially when the bile duct has been exposed, we suspect that use of a dual knife may be safer than use of a needle knife. With respect to operability, the short tool bit allows the dual knife to be directly pressed onto the surface of the bile duct for incision. Moreover, because of the special design of the swelling tip, the dual knife can also hook and pull the bile duct to the intestinal cavity for incision; this cannot be performed by a needle knife. As in endoscopic submucosal dissection, a dual knife is superior to a needle knife in terms of operability. A dual knife with a non-adjustable tip length reportedly improves the ease of manipulation and allows precut papillotomies to be effectively and safely performed for biliary cannulation.[11] However, the reported method of dual-knife precut papillotomy is essentially the same as that of needle-knife precut papillotomy. Additionally, incorrect selection of the precutting site is associated with a risk of perforation. In the present case, a snare was initially used to remove the mucosa to avoid this problem. If the selected incision site is incorrect and no longitudinal bile duct structure is found, the precut

performed by the dual knife may be abandoned in a timely manner, and the wound may be closed with a metal clip. Therefore, compared with the direct use of a dual knife, the snare-assisted dual knife precutting can reduce the risk of perforation. Because of the precut of the intramural segment of the common bile duct, we suggest that this method be applied to a bulging papilla, but not to a small, flat papilla without oral protrusion or a papilla in a diverticulum.

The herein-described new method of snare-assisted precutting and dual-knife fistulotomy may be an alternative treatment to precutting for cases of difficult biliary cannulation. However, we suggest its use only in cases of difficult cannulation with a protruded papilla of Vater. Moreover, the safety and effectiveness of this new method need to be further verified through a study with a larger population.

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Author contributions

HL wrote the manuscript and collected the case details. BQ prepared the photographs. CMJ proofread and revised the manuscript. ZGW proposed the novel technique. All of the authors read and approved the final version of the manuscript.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

Ethics statement

This study was approved by the ethics committee of the Second Hospital of Dalian Medical University (Approval number: 2021105). Written informed consent was obtained from the patient for publication of this case report and accompanying images.

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References

1. Jang SI, Kim DU, Cho JH, et al. Primary needle-knife fistulotomy versus conventional cannulation method in a high-risk cohort of post-endoscopic retrograde cholangiopancreatography pancreatitis. *Am J Gastroenterol* 2020; 115: 616–624.
2. Bailey AA, Bourke MJ, Williams SJ, et al. A prospective randomized trial of cannulation technique in ERCP: effects on technical success and post-ERCP pancreatitis. *Endoscopy* 2008; 40: 296–301.
3. Gagnier JJ, Kienle G, Altman DG, et al. The CARE guidelines: consensus-based clinical case reporting guideline development. *Headache* 2013; 53: 1541–1547.
4. Nagai K, Katanuma A, Takahashi K, et al. A simple and novel marking method for correctly identifying the precutting direction to achieve safe and efficacious precut sphincterotomy (with video). *Endosc Int Open* 2019; 7: E3–E8.
5. Zou XP, Leung JW, Li YH, et al. Comparison of sequential pancreatic duct guidewire placement technique and needle knife precut sphincterotomy for difficult biliary cannulation. *J Dig Dis* 2015; 16: 741–746.
6. Baars JE, Kaffes AJ and Saxena P. EUS-guided biliary drainage: a comprehensive review of the literature. *Endosc Ultrasound* 2018; 7: 4–9.
7. Guo J, Giovannini M, Sahai AV, et al. A multi-institution consensus on how to perform EUS-guided biliary drainage for malignant biliary obstruction. *Endosc Ultrasound* 2018; 7: 356–365.
8. Mavrogiannis C, Liatsos C, Romanos A, et al. Needle-knife fistulotomy versus

needle-knife precut papillotomy for the treatment of common bile duct stones. *Gastrointest Endosc* 1999; 50: 334–339.
9. Testoni PA, Mariani A, Aabakken L, et al. Papillary cannulation and sphincterotomy techniques at ERCP: European Society of Gastrointestinal Endoscopy (ESGE) Clinical Guideline. *Endoscopy* 2016; 48: 657–683.
10. Park DH, Park SH, Kim HJ, et al. A novel method for estimating the safe margin and the adequate direction of endoscopic biliary sphincterotomy in choledocholithiasis with complications (with videos). *Gastrointest Endosc* 2006; 64: 979–983.
11. Liu F, Liu J and Li Z. New role of the dual knife for precut papillotomy in difficult bile duct cannulation. *Dig Endosc* 2013; 25: 329–332.