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Successful interventional treatment of postoperative bile duct leakage after Billroth II resection by unusual procedure using double balloon enteroscopy

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Background:

Endoscopic treatment of advanced biliary disorders and their complications following surgical procedures is often difficult especially after Billroth II gastric resection. In such cases, endoscopic access to the papilla and neopapilla is often low, and access to the choledocho- or hepaticojejunostomy is often difficult.

Thus, percutaneous cholangiodrainage or re-operation is therefore indicated when endoscopic access to the papilla failed. But both of those methods are much more invasive and more likely to be followed by complications than use of a purely endoscopic approach.

Case Report:

The present case report describes endoscopic access to the papilla with both push enteroscopy and double-balloon enteroscopy (DBE, push-and-pull enteroscopy) in a female patient after Billroth II resection with bile leakage following cholecystectomy.

Successful closure of the bile duct fistula could be achieved via an unusual abdominal-biliary-jejunal cannulation way after several attempts of modern enteroscopy and in this way re-operation was avoided.

Conclusions:

Modern enteroscopy by experienced investigators using push-and-pull enteroscopes can provide access to the papilla even in complex postoperative anatomic rearrangements.

Push-and-pull enteroscopes offer a further option for successful cannulation of the papilla and therapeutic interventions via additional stabilization with balloons and the modern enteroscopic approach by push-and-pull enteroscopy appears to provide more patient comfort, requires less analgo-sedation and examination time and in cases with intra-abdominal drainage this external access may be used as an additional aid for exploration and intervention in complex individual cases with extremely difficult treatable bile duct injuries.

key words:

bile leakage • double-balloon-enteroscopy (DBE) • Billroth II • endoscopic treatment

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BACKGROUND

Endoscopic treatment of advanced biliary disorders and their complications (e.g. benign, malignant strictures, bile duct trauma, bile duct leakage etc) following surgical procedures is often difficult after Billroth II gastric resection, Whipple's operation or extensive resection of the small intestine. In such cases, endoscopic access to the papilla and neopapilla is often low (5–25%), and access to the choledochal or hepatojejunoanastomosis is often hampered by jejunal loops of different lengths, awkwardly positioned Braun's anastomoses or even by postoperative alterations (e.g. adhesions) [1–5].

Thus, percutaneous cholangiodrainage (PTCD) or re-operation is therefore indicated when endoscopic access to the papilla failed. But PTCD is regarded as much more invasive and more likely to be followed by complications than use of a purely endoscopic approach [6], especially in persons who have undergone Billroth II resection with a long afferent loop or a Roux-en-Y construction.

The present case report describes endoscopic access to the papilla with both push enteroscopy and double-balloon enteroscopy (DBE, push-and-pull enteroscopy) in a female patient after Billroth II resection with bile leakage following cholecystectomy. Successful closure of the bile duct fistula could technically only be achieved via an unusual abdominal-biliary-jejunal cannulation way after several attempts of modern enteroscopy and in this way re-operation was avoided.

CASE REPORT

A 79-year-old female patient was transferred from the surgical unit of an external hospital to the Department of Medicine 1 of the University Erlangen because of an overt persisting bile duct leakage after open cholecystectomy. Cholecystectomy was required to treat acute cholecystitis with choledocholithiasis, since endoscopic stone removal by gastroscope and side-viewing duodenoscope (ERCP) failed due to lack of access to the papilla after Billroth II resection. At admission, the patient presented with an intraabdominal drain secreting approximately 500 ml of bile per day, both into the abdominal cavity and externally via an easy-flow drainage.

At the time of admission the patient was awake and her cardiovascular system stable, but she presented with dementia. Her current schedule of medication was metoprolol 47.5 mg/d and thiamazol 10 mg/d. The physical examination revealed poor general health, a slightly adipose nutritional status; blood pressure was 110/80 mmHg with 100 heartbeats/min, body temperature 37.6°C. There was a vesicular respiratory sound and a respiration rate of 16/min. The abdomen was soft and free of tenderness or resistance. A well-healed median laparotomy scar was found after open cholecystectomy and normal peristaltic sounds in all quadrants. At the time of admission the woman had a bile collection bag due to persisting leakage in the right upper abdomen; an intra-abdominal drainage tube was still in place.

Laboratory tests showed the following values: CRP slightly elevated at 18 mg/l (<5 mg/l), GOT elevated at 77 U/l (<31 U/l), GPT 65 U/l (<34 U/l), cholestasis with Gamma-GT

Figure 1. Application of contrast medium during prograde enteroscopy based ERCP revealed an unobstructed bile duct system with a sharp V-form of the Ductus hepatocholedochus, making cannulation to proximal and intrahepatic bile ducts impossible. At this V-form of the bile duct a rapid formation of a large contrast medium depot (2.4×1.0 cm) was observed in vicinity of the abdominal drainage.

580 U/l (<38 U/l), alkaline phosphatase 674 U/l (53–141 U/l), bilirubin 1.5 mg/dl (<1.0 mg/dl, of which 0.7 mg/dl was direct bilirubin and 0.8 mg/dl indirect bilirubin).

Billroth II gastric resection had been carried out in 1982 because of peptic ulcer disease. Access to the Braun's anastomosis was achieved 20 cm distally from gastro-jejunal anastomosis (58 cm) by means of push enteroscopy (SIF Q140, Olympus, Japan) and the afferent loop with a further length of 42 cm could be traversed only by enteroscopy. At the first examination, the papilla was found at the end of the afferent loop at 120 cm depth, approximately 1.5 cm away from the unattached, closed end; however, the papilla could only be viewed tangentially. Following the difficult adjustment of focus on the papilla with a SIF Q140 push-enteroscope (Olympus, Japan), the papilla was explored with a catheter during prograde ERCP. Contrast medium was applied and showed an unobstructed bile duct system; however, the proximal common bile duct was clearly pulled out of shape in a V-shaped curve to the left (Figures 1 and 2 for a postoperative view). Contrast medium was clearly seen to emerge from the V-shaped bend of the bile duct approximately 3 cm proximally from the papilla, with rapid formation of a 2.4×1.0 cm large depot of contrast medium (Figure 1) nearby the surgically placed abdominal drainage. The surgically placed Robinson drainage tube laid since the time of cholecystectomy (postoperative day 68). Although the bile duct leakage could endoscopically be illustrated during prograde ERCP, it remained impossible to selectively cannulate the distal bile duct using the push enteroscope (SIF Q140, Olympus, Japan), since the bile duct tended to bend sharply at an angle of 90° along the course of the distorted bile duct's curve (Figures 1, 2). At the end of this unsuccessful examination, the afferent loop was marked with sterile ink (GI-Supply Co., sold by Mandel & Rupp Co., Erkrath, Germany).

A second attempt using a SIF Q140 push-enteroscope (Olympus, Japan) and a lateral-viewing enteroscope (TJF

Figure 2. While push enteroscopy was more inconvenient for the patient due to loop formation, push-and-pull enteroscopy (double balloon enteroscopy) provided more patient comfort, required less time to reach the papilla and allowed a tension free position of the endoscope for performing interventional ERC. Note, the single arrow is illustrating the V-shaped bile duct at the site of the leakage, and the double arrow highlights the surgically placed abdominal drainage from percutaneously.

Figure 3. Since enteroscopic cannulation to proximal and intrahepatic bile ducts failed due to the postoperatively changed V-form of the bile duct, an unusual cannulation way via the abdominal drainage was chosen. A flexible hydrophilic Terumo guidewire was advanced through the abdominal drain to the bile leakage, carefully rotated until the distal part of the bile duct could be reached and then carefully pushed out of the papilla into the afferent jejunal loop.

Figure 4. For intermittent closure of the bile duct leakage a Max Force 4 mm balloon was introduced through the abdominal drainage up to the leakage, allowing straightening of the V-form of the bile duct, resulting in an easier cannulation angle to finally reach proximal and intrahepatic bile ducts.

160, Olympus, Japan) failed and thus, a third examination was performed by push-and-pull-enteroscopy (DBE based ERC), since a balloon-assisted course of action held out the promise of greater stability for positioning the endoscope in relation to the papilla. Although it proved possible to cannulate the biliary system now for the first time, the insertion of a more rigid endoprosthesis failed at this moment.

At a second DBE based prograde, technically very demanding ERC (EN-450T5, Fujinon, Japan), it appeared initially again impossible to introduce more rigid instruments into the cranial parts of the bile duct due to postoperatively altered anatomy. Thus, in order to avoid an open re-operation, an unusual abdominal-biliary cannulation way was tried during enteroscopy and fluoroscopy by advancing a wire into the bile duct via the abdominal drain which was already in place (Figures 2, 3). Thereupon it was found that the position of the abdominal drain was apparently intraductal, since the passageway was immediately explorable with a flexible J-Terumo guidewire (Figure 3). The abdominal drain was therefore probed percutaneously with the flexible Terumo wire, making it possible to reach the distal common bile

duct and then to advance the Terumo wire into the intestinal passageway. This guidewire was then grasped with a biopsy forceps and pulled to the outside (Figure 3). While the Terumo guidewire was held in place at the abdominal drain, the ERC catheter was introduced endoscopically over the guidewire straight into the distal bile duct. Even then, however, it proved impossible to reach the cranial bile duct due to the disadvantageous vertical position in relation to the bile duct wall. A MaxForce balloon (4 mm) was then introduced percutaneously via the abdominal drain, advanced to the V-shaped pucker of the proximal common bile duct, and successfully plugged the bile duct leak (Fig. 4). Now at last, it was possible to advance the ERC catheter straight ahead and probe the cranial bile duct system, since the wire, when advanced in a straight line, “bounced” off the balloon which had plugged the leakage, and moved toward the hilus (Figures 4, 5). Finally, the bile duct system cranially to the hilus could be selectively reached, allowing insertion of a rigid Blackwire guidewire for stable position. Implantation of a 7 Fr double-pigtail prosthesis in segment II (Figure 5) for decompression of the biliary tract was achieved by using a 5 Fr nasobiliary probe as pusher.

Figure 5. After selective cannulation to segment II of the liver a more rigid Blackwire guidewire was inserted to gain a stable position and in the last step a 7Fr double pigtail endoprosthesis was implanted.

Interestingly, three days after implantation of the 7 Fr double-pigtail prosthesis, secretion of bile from the abdominal drain had already come to a full stop. The female patient remained unremarkable during all post-interventional examinations. Antibiotic therapy was discontinued after removal of the abdominal drain prior to the patient's release from our hospital.

DISCUSSION

Bile duct injury has been reported to be less common after open cholecystectomy (0.2–0.5%) than after laparoscopic cholecystectomy (0–2.7%) [7,8]. Small bile leaks are more commonly found after laparoscopic cholecystectomy (10–15%) and are in most cases clinically asymptomatic [9,13]. Large, clinically relevant leaks manifest as biliary fistulas, biliary ascites, peritonitis etc. and are potentially fatal if left untreated [10]. Although endoscopic treatment of bile duct leakage by performing papillotomy, insertion of nasobiliary probe or stent placement is deemed as first line therapy of choice [11,12], these interventions and the endoscopic approach may be technically very difficult or impossible in postsurgical patients with altered abdominal anatomy as described here in a female patient with injured bile duct and status after Billroth II resection with Roux-en-Y loop [4,5].

Although conventional endoscopy using gastroscope and side-viewing duodenoscope was repeatedly unsuccessful, enteroscopy with both a push enteroscope and a push-and-pull enteroscope was able to gain access to the papilla at 120 cm insertion depth, to illustrate the biliary tree and to recognize exactly the position of the bile duct trauma. In order to avoid open re-operation, several enteroscopic attempts had to be undertaken until a successful complex enteroscopic and radiological intervention using the intraabdominal drainage for an unusual bile duct cannulation could be performed. After cannulation of the injured bile duct via the abdominal drainage to the bile duct leakage and then to the afferent jejunal loop by a flexible guidewire, intermittent closure of the bile duct leakage was then required by a 4 mm Max Force balloon to achieve selective cannulation of the proximal and intrahepatic ducts. A permanent closure of this technically very demanding, V-shaped bile duct injury during prograde enteroscopy based ERC was finally achieved after insertion of a 7Fr double-pigtail endoprosthesis. As to our knowledge, the above mentioned unusual cannulation way via the abdominal drainage to the bile leakage and then through the papilla to the jejunum with intermittent closure of the bile leakage by a balloon

has not yet been described in the literature for treatment of bile duct injuries up to now.

Interestingly, push-and-pull enteroscopy provided a much better and more stable position at the papilla due to use of a balloon on the overtube and the enteroscope tip than push enteroscopy. By inflating the balloon on the tip of the enteroscope the very tangential position of the enteroscope in front of the papilla could sometimes be compensated, which allowed first successful guidewire cannulation. But apart from the postoperative endoscopic route to the papilla, the situation was much more complicated, however, by the V-shaped angle of the bile duct, the size of the leakage and the extremely unfavorable postoperative anatomy of the biliary system, requiring further innovative interventional steps like usage of the abdominal drainage as cannulation way, extraction of the guidewire out of the enteroscope, intermittent closure of the bile leakage from the external access by an appropriate high-pressure balloon allowing finally the permanent decompression of the biliary system with an effective endoprosthesis therapy.

CONCLUSIONS

This case report illustrates the following points: 1) Modern enteroscopy by experienced investigators using push-and-pull enteroscopes can provide access to the papilla even in complex postoperative anatomic rearrangements. 2) Push-and-pull enteroscopes offer a further option for successful cannulation of the papilla and therapeutic interventions via additional stabilization with balloons and 3) the modern enteroscopic approach by push-and-pull enteroscopy appears to provide more patient comfort, requires less analgo-sedation and examination time and 4) in cases with intra-abdominal drainage this external access may be used as an additional aid for exploration and intervention in complex individual cases with extremely difficult treatable bile duct injuries. Admission of such patients to experienced endoscopic centers for checking, examination and trying of conservative interventional endoscopic- or enteroscopic-radiological therapy is thus warranted before performing bile duct re-operation in such patients.

Concerning the proceeds and cost situation of the endoscopic therapy the effective amount for this therapy was 5287,91 € according to the german accounting system (DRG; primary/leading diagnosis: H41A). The comparable surgical therapy (open revision of the biliary tract and surgical placement of a stent) would have resulted in costs of 7165,57 € (primary/leading diagnosis: H05Z). Also the patient would

then have been exposed to the known surgical risk. All in all, endoscopic therapy represents a more conservative and more cost-effective method to treat complex postoperative bile duct leakage, most notably by use of modern enteroscopy in experienced centers.

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