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Revision of the common bile duct in a combined PTC/ERC approach – A case report

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ABSTRACT

INTRODUCTION AND IMPORTANCE: The endoscopic retrograde cholangiography (ERC) represents the standard treatment for choledocholithiasis. However, ERC in patients with previous gastrectomy and anastomosis is difficult due to altered access.

CASE PRESENTATION: In our case, we report on a patient with previous gastrectomy and Y-Roux-anastomosis suffering from choledocholithiasis. Operative revision with simultaneous cholecystectomy failed. In a combined procedure of percutaneous transhepatic cholangiodrainage (PTCD) and endoscopic cholangiography the stone removal of the common bile duct was finally successful.

CLINICAL DISCUSSION: There are some approaches for treatment of choledocholithiasis in pre-operated patients. However, prospective multi-center studies for complication and success rates are not available due to the rarity of such cases.

CONCLUSION: Interdisciplinary procedures seem to be the safest and most promising way to succeed in the treatment of choledocholithiasis in challenging cases.

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1. Introduction

Endoscopic retrograde cholangiography (ERC) with stone extraction is the recommended standard procedure for patients with choledocholithiasis. However, the treatment of choledocholithiasis in patients with former stomach surgery, e.g. gastrectomy, is still challenging. Operative revision of the bile duct is the therapy of choice if endoscopic extraction is not possible. Due to the decreasing incidence and increased complexity of this procedure complication and relapse rates are high [1]. If operative restoration fails or is not possible in critical ill patients, there are only few options left to treat choledocholithiasis. This work is a case report in accordance with the SCARE 2020 criteria [2].

2. Case report

An 81-year-old male non-smoking self-sufficient patient presented himself with fever and pain of the upper abdomen to the emergency room of an university medical center. Blood analysis revealed a biliary pancreatitis, imaging diagnostics (sonography, magnetic resonance cholangiopancreatography (MRCP)) con-

firmed choledocholithiasis. The patient's medical history revealed a case of stomach cancer which had been treated by gastrectomy and Y-Roux-reconstruction over 10 years ago. Further comorbidities were diabetes mellitus type 2, cardiac heart disease and atrial fibrillation with intake of anticoagulation medication (phenprocoumarole) as well as blood pressure medication (bisoprolol) and simvastatin (ASA-classification: 2). The family history was without any pathological findings. As a first approach, an experienced surgical endoscopist attempted to reach the bilio-digestive anastomosis via ERC. However, even with a longer colonoscope it was impossible to reach. As a next step, we decided on an operative exploration of the common bile duct with simultaneous cholecystectomy. Intraoperative cholangiography showed a filiform and a delayed contrast medium passage. The common bile duct was opened longitudinally and explored followed by the placement of a T-Drain and a cholangiography with a sufficient contrast medium passage by an experienced visceral surgeon. However, six days after the operation, we observed an elevation of cholestasis parameters. The subsequently performed cholangiography via the T-Drain revealed a pre-papillary obstruction of the common bile duct with suspected residual choledocholithiasis and insufficient passage into the duodenum (Fig. 1). This was confirmed by a second MRCP. An interventional radiologist performed a percutaneous transhepatic cholangiodrainage (PTCD) with placement of a blockable 8 French (F) pigtail drainage (Flexima™ biliary drainage catheter, Boston scientific). Subsequently, the drainage type was changed to a Münchner drainage (PerkuBil® Münchner drainage, Peter Pflug-

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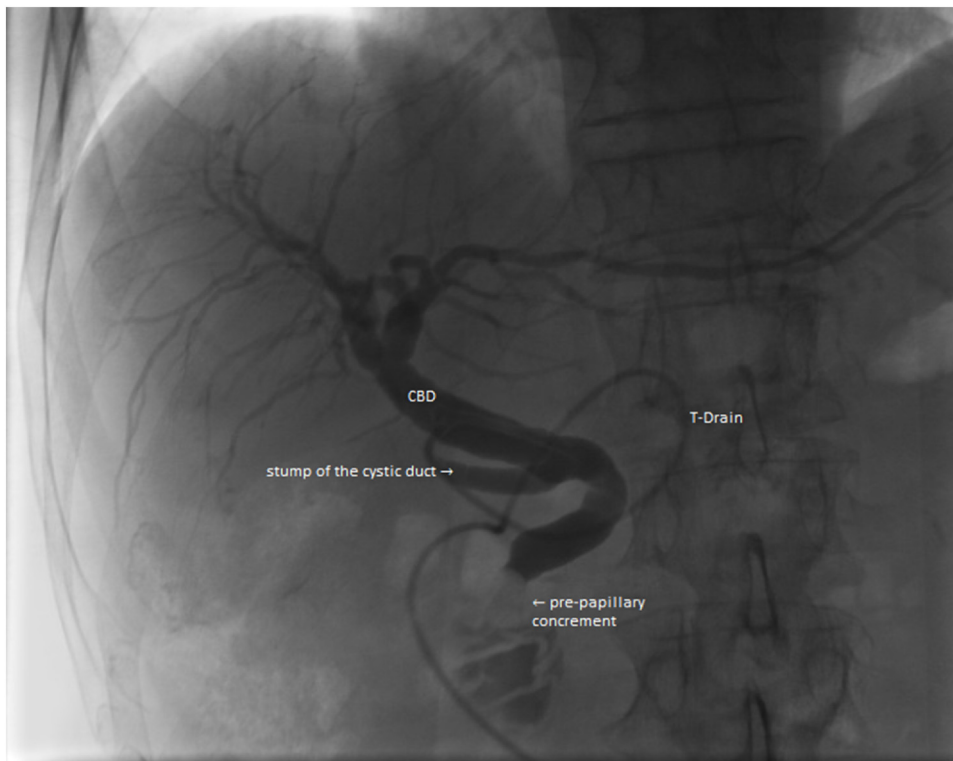


Fig. 1. Pre-papillary obstruction in the postoperative control. Six days after cholecystectomy and revision of the common bile duct (CBD) a cholangiography was performed via the inserted T-Drain and revealed a pre-papillary obstruction of the common bile duct due to persisting choledocholithiasis.

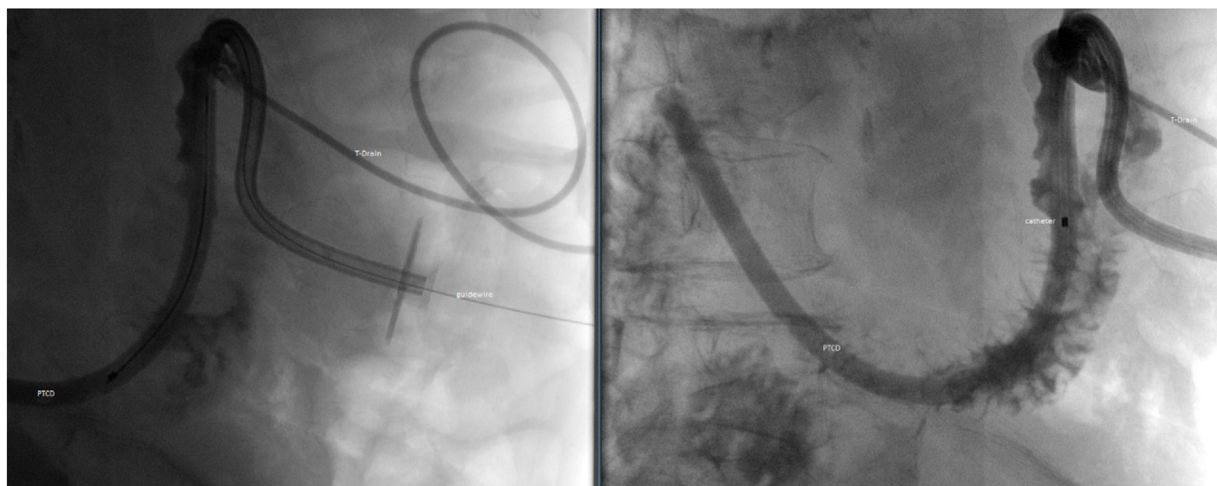


Fig. 2. Failure of stone removal by endoscopic cholangiography via the 16 F drainage due to steep angulation of the PTCD. Stone rescue was attempted by an endoscopic cholangiography via the placed 16 F drainage. A catheter was advanced along an inserted guidewire via the PTCD but was stuck because of a steep angulation of the PTCD.

beil GmbH Medizinische Instrumente, Zorneding/Germany) with gradual change to larger sizes: After six days, the 8 F drainage was replaced by a 12 F drainage and again changed to a 16 F drainage after two days. After another four days, the surgical endoscopist tried to remove the stone using endoscopic cholangiography via the 16 F drainage, but the procedure failed due to the angled course of the PTCD (Fig. 2). Following interdisciplinary discussion, the removal of the stone via the percutaneous access was planned using an endoscopic balloon catheter for choledocholithiasis treatment. Therefore, a 4 F wire-guided catheter (GLIDECATH® Hydrophilic Coated Catheter and GLIDEWIRE® Hydrophilic Coated

Guidewire, Terumo Interventional Systems) was advanced via the 16 F drainage into the duodenum. The GLIDEWIRE® was exchanged for a long stiff guidewire (Jagwire™ High Performance Guidewire, Boston scientific) so that after removing the catheter and the drainage percutaneous placement of the endoscopic balloon catheter for stone removal (Extractor™ Pro XL 12 mm/15 mm, Boston scientific) was possible in the common bile duct distal to the pre-papillary stone. With the inflated balloon the stone was forced into the duodenum via the major duodenal papilla. Fluoroscopic testing with contrast agent application showed a good drainage of the common bile duct into the duodenum without any

obstruction. The guidewire and the balloon catheter were removed and the percutaneous access was treated with soft tissue suture. The T-Drain was removed the following day. Hemoglobin and vital parameters were closely monitored on a general ward after the interventions. Monitoring on an intensive or intermediate care unit was not necessary. Following successful stone removal via interdisciplinary intervention by the interventional radiologist and the surgical endoscopist cholestasis parameters were declining and the patient could be discharged home without specific instructions.

As an early complication, the patient suffered from an episode of upper abdominal pain caused by severe obstipation 12 days post-interventional. As a long-term complication, the patient developed a mechanical ileus of the small intestine two months later. The intestinal obstruction was caused by a single adhesion in the right upper abdomen closely localized to the access tunnel of the former PTCD.

3. Discussion

ERC is the primary treatment for patients suffering from choledocholithiasis. In patients with physiological anatomy success rates of endoscopic stone removal are up to 100% [3]. However, the therapy of choledocholithiasis in patients with gastrectomy is challenging. Endoscopic sphincterotomy (EST) or balloon dilation (EBD) can be successful but are more difficult and associated with an increased risk of complications. A small study with patients who previously underwent a Billroth II gastrectomy showed reduced success rates of stone removal of 81% (for EBD) and 83% (for EST) with higher complication rates of 19% in patients treated with EBD and even 39% in those receiving EST [4]. Especially bleeding complications occurred significantly more often compared to patients with physiological anatomy (17% vs. 2%) [4]. Another small single-center study on patients with Roux-Y-anastomosis, mostly after bariatric surgery, suffering from choledocholithiasis showed a success rate of 86% by using a spiral enteroscopy ERC [5]. Reasons for failure were strictures of the Roux-Y-anastomosis, adhesions or a too long Roux limb [5]. The latter was also the reason for failure in our case. For a high technical success rate an experienced endoscopist is fundamentally essential, as complications like perforation of the afferent loop are less frequent with experienced endoscopists [6]. However, large multi-center trials are necessary to assess success rates and complications of ERC in patients with changed upper gastrointestinal anatomy.

Alternatively, the surgical approach with a laparotomic or laparoscopic revision of the bile duct, often combined with simultaneous cholecystectomy, should be considered. However, due to the advances in endoscopic techniques the rate of common bile duct explorations declined in the past years. In the United States the frequency of surgical common bile duct explorations in patients who received cholecystectomy decreased from 39.8% in 1998 to 8.5% in 2013, whereas stone extraction rates via ERC increased, respectively [7]. In addition, the results of surgical treatment are inferior to those of ERC with an observed failure rate of 23%, whereas complications (e.g. bile leak, wound infections, cardiac or respiratory complications) occurred in 24% [1]. This trend, however, leads inevitably to an impairment of the surgical ability managing choledocholithiasis in situations where ERC fails.

The percutaneous endoscopic stone extraction might represent another valuable option in patients with changed anatomy like after gastrectomy or pylorus stenosis. In a large retrospective study about patients with previous Billroth II gastrectomy or where endoscopic sphincterotomy had failed, the success rate was up to 100% [8]. Initially, the patients received PTCD and by repeated changes to larger drainage sizes the channel was expanded. Finally, a 15 F fiberoptic choledochoscope was inserted and the stone

was removed via a dormia basket or by lithotripsy in case of large stones (>12 mm) [8]. The average number of sessions to succeed was 1.3–1.6 for the common bile duct [8]. Technical difficulties were angulated biliary ducts or strictures of the biliary system. The most frequent complications were pain, fever, transient haemobilia, hemorrhage, liver abscesses or tract ruptures [8]. In our case, the angulation of the PTCD led to the failure of the endoscopic choledochography via the percutaneous drainage. After interdisciplinary discussion, we solved this problem by combining ERC- and PTCD-techniques. The interventional radiologist installed a stiffer guidewire via the PTCD, so that in the same session the surgical endoscopist could overcome the angulation of the PTCD with an endoscopic balloon catheter and was able to remove the pre-papillary stone. This case report illustrates that complicated cases of choledocholithiasis where the established methods failed require unusual concepts and especially a close collaboration of different specializations. Also, this case underlines that the treatment of choledocholithiasis in patients with altered gastrointestinal anatomy should take place in a medical center providing interventional radiology and experienced (surgical) endoscopists.

Frequent PTCD related complications are catheter dislodgement, biliovenous fistula, subcapsular biloma, transient haemobilia and moderate pain with an overall occurrence of 14.3% [9]. In our case, we observed pain and recurring obstipation as early complications. A connection to the performed procedure cannot be excluded but seems unlikely and is probably due to high patient age and dehydration. After two months, however, the patient developed a mechanical small bowel ileus caused by a single adhesion in the right upper abdomen. The localization of the adhesion corresponded with that of the access tunnel from the former PTCD suggesting the procedure to be causative for the adhesion. After reviewing the literature, we found no other cases of obstructive ileus following PTCD in adults. However, in pediatric patients who postnatally underwent a PTCD due to a congenital choledochal cyst relevant adhesions were observed after 2–3 months, when they were operated for hepatojejunostomy [10].

Another upcoming interdisciplinary option for choledocholithiasis treatment in patients with previous gastrectomy and Y-Roux-anastomosis is the transjejunal laparoscopic-assisted ERC with simultaneous cholecystectomy [11]. Although this might be a good option to discuss when an operation is planned it comes along with high surgery risks in seriously ill and elderly patients.

4. Conclusion

In the literature there are different approaches for the treatment of patients with altered upper abdominal anatomy suffering from choledocholithiasis, but these treatments often have elevated risks for failure and post-interventional complications. Our demonstrated case turned out to be rather complicated as all the commonly described procedures like surgical revision of the bile duct, ERC via the afferent loop or ERC via a placed PTCD failed. Finally, the interdisciplinary approach of interventional radiologic and endoscopic techniques led to a satisfactory outcome for the patient.

Declaration of Competing Interest

All authors declare that they have no conflicts of interest.

Sources of funding

There was no involvement of any study sponsors in the described Case Report.

Ethical approval

The manuscript describes a new method for stone removal of the common bile duct in patients with altered bilio-digestive anatomy. The method was developed in an interdisciplinary approach while treating a patient suffering from choledocholithiasis with altered bilio-digestive anatomy when all the known conventional methods had failed. This manuscript summarizes the clinical proceedings leading to a new method for treating choledocholithiasis in patients with altered bilio-digestive anatomy in terms of a *case report*. There is no Institutional review board (IRB) information included in the manuscript because the method was developed out of the necessity in the clinical daily routine to ensure that the suffering patient receives the required treatment. The method was not developed in the setting of a clinical trial. All treatments were in accordance with the national and international clinical standards. This study is exempt from ethical approval.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

No alterations of the patient's characteristics were necessary to protect the patient's anonymity.

Author contribution

Annabel Kleinwort, B.Sc.: acquisition of data, data analysis, interpretation of data, drafting the article.

Kim Rouven Liedtke, MD, B.Sc.: acquisition of data, revising the article critically for important intellectual content.

André Schreiber, MD: conception and design of the study, acquisition of data.

Rebecca Keßler, MD: conception and design of the study, acquisition of data, revising the article critically for important intellectual content, final approval of the version to be submitted.

Anne Glitsch, MD: conception and design of the study, acquisition of data, revising the article critically for important intellectual content, final approval of the version to be submitted.

Registration of research studies

Since there was no first time usage of a new device or surgical technique, registration was not appropriate.

Guarantor

Annabel Kleinwort, B.Sc.; Anne Glitsch, MD.

Provenance and peer review

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