

Single Case

Migration of a Common Bile Duct Stone into the Main Pancreatic Duct due to Catheter Manipulation during Endoscopic Retrograde Cholangiopancreatography

Toji Murabayashi Haruka Nakamura Shinya Sugimoto

Department of Gastroenterology, Ise Red Cross Hospital, Ise, Japan

Keywords

Migrate · Choledocholithiasis · Endoscopic retrograde cholangiopancreatography · Pancreatitis · Gallstone

Abstract

Introduction: We report the first case of a choledocholithiasis migrating into the main pancreatic duct (MPD) due to catheter manipulation during endoscopic retrograde cholangiopancreatography (ERCP). **Case Presentation:** A 57-year-old woman complaining of vomiting was diagnosed with acute cholangitis and pancreatitis due to choledocholithiasis. During ERCP, the stone migrated from the papilla into the MPD due to the pushing motion of the catheter. However, the ERCP session was completed after biliary sphincterotomy without intervention in the MPD because the migration was not noticed. The migrated stone became apparent on computed tomography the following day. The second ERCP revealed the stone measuring 5 mm in the MPD. After pancreatic sphincterotomy, a pancreatic stent was placed, which improved the obstructive pancreatitis. **Conclusion:** Endoscopists performing ERCP should be aware of this rare but serious complication.

© 2024 The Author(s).

Published by S. Karger AG, Basel

Introduction

A common bile duct stone (CBDS) impacted in the papilla of Vater is usually treated with emergency endoscopic retrograde cholangiopancreatography (ERCP) [1–3]. Although a CBDS impacted in the orifice of the papilla can theoretically migrate into the main pancreatic duct

Correspondence to:
Toji Murabayashi, murabayashitoji@m2.gmob.jp

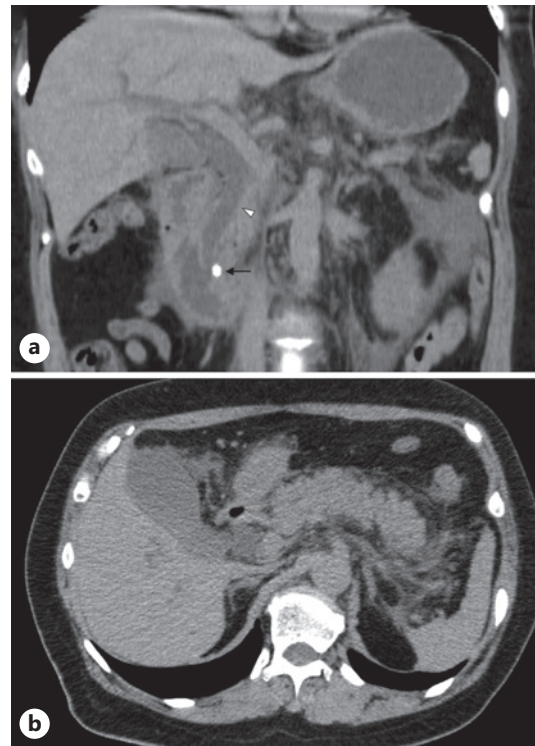


Fig. 1. CT images on admission. **a** Coronal view. **b** Axial view. **a** A calcified stone (arrow) measuring 6 mm is observed in the papilla of Vater. Dilatation of the common bile duct is observed (arrowhead). **b** Diffuse swelling of the pancreas and peripancreatic inflammation are observed. No dilation of the MPD is observed.

(MPD) due to catheter manipulation during ERCP, this phenomenon has not been previously reported to our knowledge. Herein, we report the first case of a CBDS migrating into the MPD due to catheter manipulation during ERCP, which aggravated acute pancreatitis. Moreover, we describe two important clinical implications regarding a CBDS impacted in the papilla. The CARE Checklist has been completed by the authors for this case report, attached as supplementary material (for all online suppl. material, see <https://doi.org/10.1159/000538009>).

Case Report

A 57-year-old woman without a history of drinking was referred to our hospital after presenting with vomiting for a week. She had a history of partial mastectomy for breast carcinoma 4 years prior and had undergone periodical surveillance with the administration of anastrozole. At surveillance computed tomography (CT) scan, a gallstone was identified 1 year prior to this admission. On physical examination, she had a body temperature of 37.8° and mild tenderness of the entire abdomen. Laboratory tests showed leukocytosis (white blood cell count, 18,060/ μ L) and elevated serum levels of hepatobiliary enzymes (aspartate aminotransferase, 133 U/L; alanine aminotransferase, 357 U/L; γ -glutamyl transpeptidase, 569 U/L; alkaline phosphatase, 239 U/L; total bilirubin, 5.3 mg/dL), amylase (1,899 U/L), and C-reactive protein (3.1 mg/dL). A CT scan revealed a stone measuring 6 mm in the papilla of Vater; dilation of the common bile duct, the disappearance of the stone from the gallbladder; acute pancreatitis, and absence of chronic pancreatitis and MPD dilation (Fig. 1). Emergency ERCP was performed to remove the CBDS, which had led to acute cholangitis (moderate grade [1]) and pancreatitis by obstructing the bile duct and MPD. At ERCP, the papilla was swollen and red owing to CBDS impaction at the orifice of the papilla (Fig. 2a, b). After a guidewire was unintentionally inserted into the MPD a few times using a wire-guided cannulation technique, biliary cannulation was achieved by directly pushing a catheter (ERCP catheter; MTW Endoskopie, Düsseldorf, Germany) in the direction of the bile duct

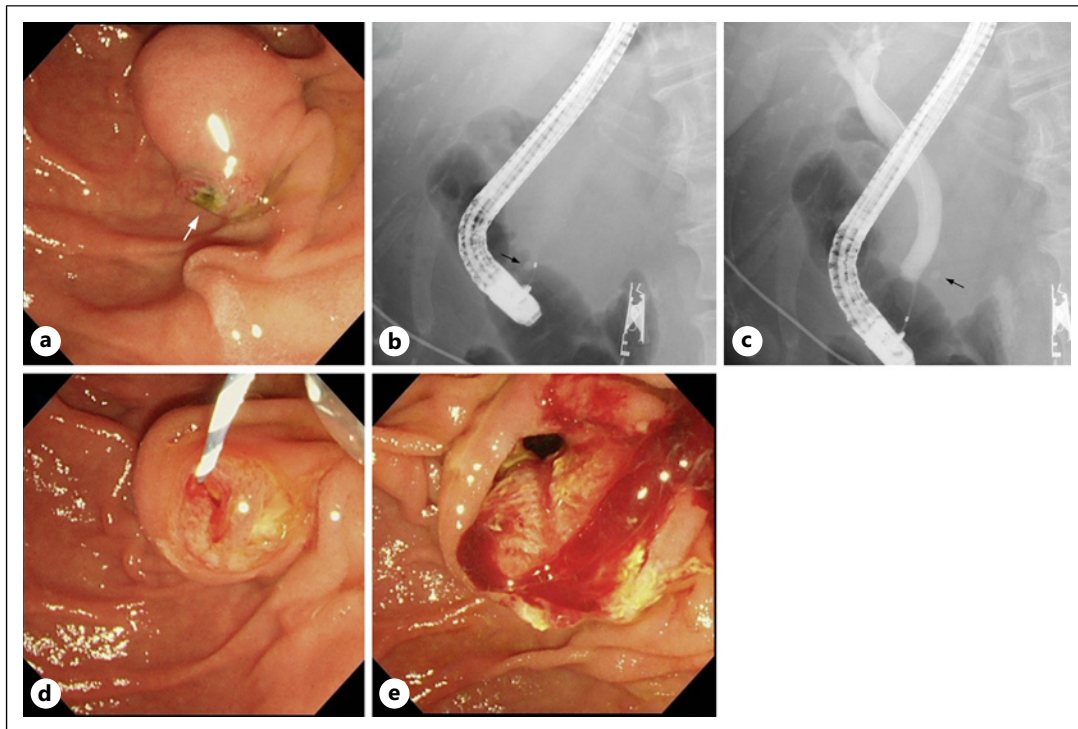


Fig. 2. Endoscopic and fluoroscopic images obtained during the first ERCP. **a** An endoscopic image showing the swollen and reddish papilla of Vater. The edge of the stone is visible (arrow). **b** A fluoroscopic image obtained during biliary cannulation. A calcified stone (arrow) measuring 5 mm is observed in the papilla of Vater. **c** A cholangiogram showing no filling defects. A calcified stone (arrow) measuring 5 mm is observed in the MPD. **d** An endoscopic image showing the papilla of Vater after biliary cannulation. The guidewire inserted into the bile duct is observed, and the edge of the stone is invisible. **e** An endoscopic image showing a well-opened biliary orifice in the papilla after an endoscopic sphincterotomy.

without advancement of the guidewire. Although the edge of the CBDS was endoscopically invisible in the papilla after biliary cannulation, cholangiography revealed no filling defects in the bile duct (Fig. 2c, d). A retrospective comparison of the fluoroscopic images before and after cannulation revealed that a calcified stone measuring 5 mm had moved into the MPD from the papilla of Vater (Fig. 2b, c). This suggested that the CBDS had migrated into the MPD due to the pushing motion of the catheter. However, because stone migration could not be realized during the ERCP session, stone removal was attempted by applying sweep procedures to the bile duct using a balloon catheter after biliary endoscopic sphincterotomy (EST). The moment of CBDS discharge into the duodenum could not be endoscopically observed during repeated sweep procedures. The session was completed without intervening with the MPD.

Her general condition gradually deteriorated with persistent oliguria and abdominal pain after ERCP; thus, contrast-enhanced CT was performed on the evening of the next day. The CT scan revealed a stone measuring 6 mm in the MPD with upstream dilation, no dilation of the bile duct, and evidence of deterioration of pancreatitis compared with the findings of the previous day (Fig. 3). The migration of the CBDS into the MPD became apparent after confirming the CT findings. A second ERCP was performed the next morning. Pancreatography revealed a stone measuring 5 mm in the MPD, whereas cholangiography showed no filling defects in the bile duct (Fig. 4b, c). Pancreatic sphincterotomy was performed, followed by the placement of a pancreatic stent with an internal flap (Geenen, 5 Fr×7 cm; Cook Medical

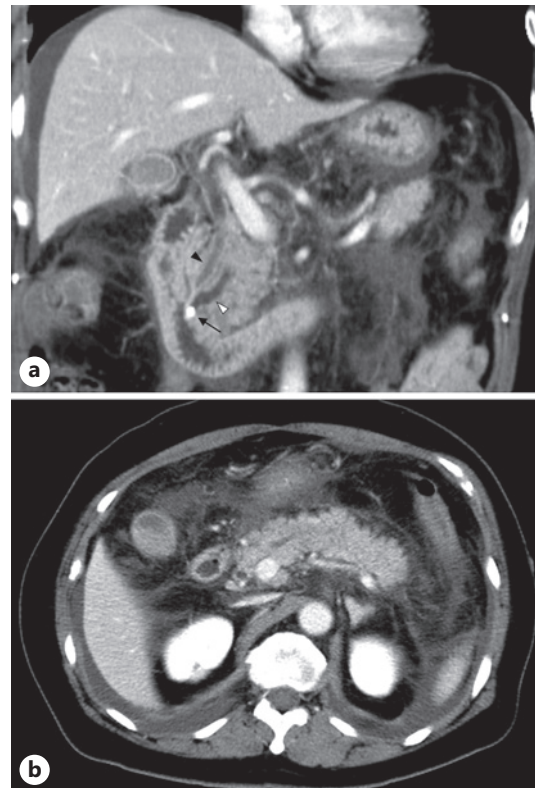


Fig. 3. Contrast-enhanced CT images obtained in the evening on post-admission day 1. **a** Coronal view. **b** Axial view. **a** A calcified stone (arrow) measuring 6 mm is observed in the MPD with upstream dilation (white arrowhead). No dilation of the common bile duct is observed (black arrowhead). **b** Diffuse swelling of the pancreas and peripancreatic inflammation are observed.

Japan, Tokyo, Japan) to relieve the MPD obstruction (Fig. 4d, e). Acute pancreatitis improved rapidly after the placement of the pancreatic stent. Subsequently, a third ERCP was performed 4 weeks later for complete MPD clearance. Pancreatography revealed that the MPD stone had spontaneously passed through the intestine within the 4-week period.

Discussion

Herein, the stone was termed CBDS because its origin was speculated to be the biliary tract rather than the MPD based on the following three findings: (1) no history of alcohol use, (2) no findings of chronic pancreatitis on CT, and (3) a history of gallstones on CT. The migration of the CBDS from the orifice of the papilla into the MPD occurred because the CBDS was pushed up in the direction of the bile duct due to the motion of the catheter during the first ERCP. When pushing a CBDS impacted in the papilla using a catheter, it usually moves into the bile duct and not into the MPD, probably because the MPD diameter is small. Such movement of the CBDS into the bile duct is not important because subsequent CBDS removal after EST can be easily performed. In contrast, the migration of CBDS into the MPD can be a serious complication resulting in severe obstructive pancreatitis because there is no routine intervention for the MPD, as in our case.

This case has two important clinical implications. First, when a CBDS in the papilla is missing on a subsequent cholangiogram after biliary cannulation or during the sweep procedure using a basket/balloon catheter, it is essential to consider the possibility of stone migration into the MPD. Second, primary precut papillotomy using a needle knife, without applying the standard biliary cannulation technique, may be the best strategy to avoid pancreatic migration of CBDS impacted in the papillary orifice. Zheng et al. [4] reported the efficacy and safety of primary needle knife precut papillotomy without applying the standard

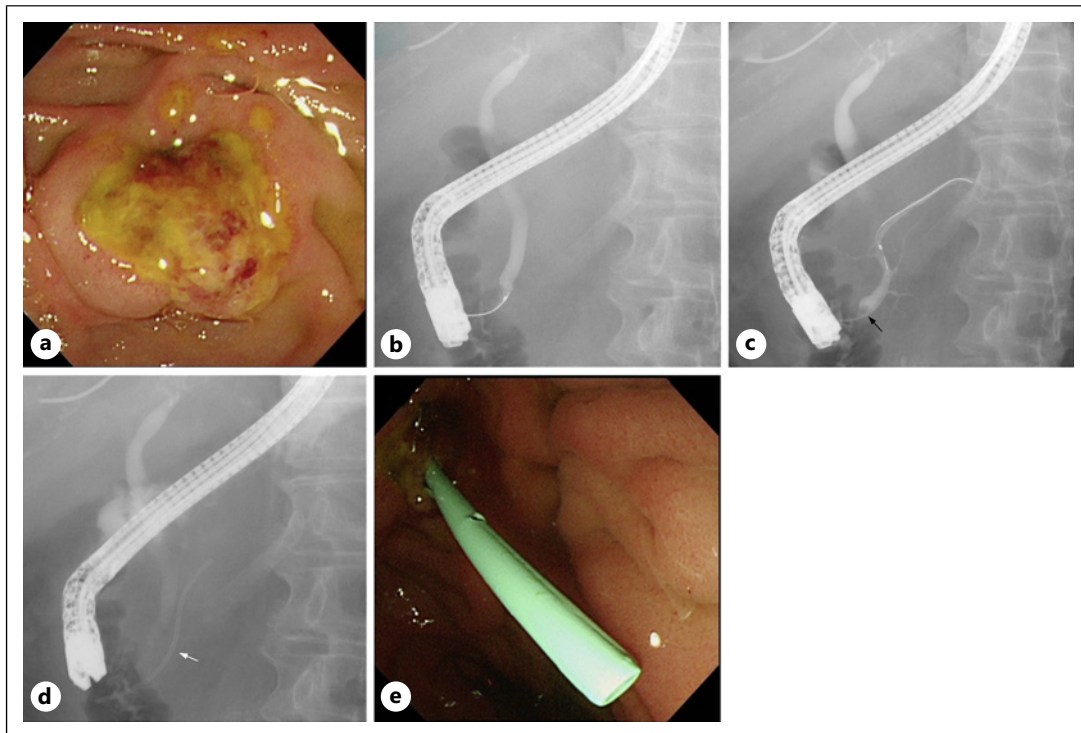


Fig. 4. Endoscopic and fluoroscopic images obtained during the second ERCP 2 days after the first procedure. **a** An endoscopic image showing the papilla of Vater. Stones were not visible in the papilla of Vater. The biliary orifice is opened. **b** A cholangiogram showing no filling defect. **c** A pancreatogram showing a filling defect measuring 5 mm (arrow). **d** A fluoroscopic image after successful pancreatic stent placement (arrow). **e** An endoscopic image showing the pancreatic stent.

biliary cannulation technique in cases of CBDS impacted in the papilla. They reported that the method was more effective in cases of CBDS impacted at the papillary orifice (technical success rate, 100%; mean operating time, 3.4 min).

Five cases of spontaneous CBDS migration into the MPD have been previously reported [5–9]. All of them were spontaneous migrations of CBDS before cholangiopancreatography and not migrations due to catheter manipulation during ERCP, as in our case.

In conclusion, we report the first case of a CBDS migrating into the MPD due to catheter manipulation during ERCP, which aggravated acute pancreatitis. Endoscopists performing ERCP should be aware of this rare but serious complication.

Statement of Ethics

All procedures were performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. Institutional Review Board ethics approval was not required in accordance with local guidelines. Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

No funding was received in relation to this study.

Author Contributions

Toji Murabayashi: conceptualization, data curation, formal analysis, investigation, methodology, resources, software, validation, visualization, writing – original draft, and writing – review and editing. Haruka Nakamura: data curation and investigation. Shinya Sugimoto: supervision.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

References

- 1 Mukai S, Itoi T, Baron TH, Takada T, Strasberg SM, Pitt HA, et al. Indications and techniques of biliary drainage for acute cholangitis in updated Tokyo Guidelines 2018. *J Hepatobiliary Pancreat Sci.* 2017;24(10):537–49.
- 2 ASGE Standards of Practice Committee; Buxbaum JL, Abbas Fehmi SM, Sultan S, Fishman DS, Qumseya BJ, et al. ASGE guideline on the role of endoscopy in the evaluation and management of choledocholithiasis. *Gastrointest Endosc.* 2019;89(6):1075–105.e15.
- 3 Manes G, Paspatis G, Aabakken L, Anderloni A, Arvanitakis M, Ah-Soune P, et al. Endoscopic management of common bile duct stones: European Society of Gastrointestinal Endoscopy (ESGE) guideline. *Endoscopy.* 2019; 51(5):472–91.
- 4 Zheng M, Liu X, Li N, Li WZ. Emergency endoscopic needle-knife precut papillotomy in acute severe cholangitis resulting from impacted common bile duct stones at duodenal papilla. *Dig Liver Dis.* 2018;50(3):267–70.
- 5 Safrany L, Cotton PB. A preliminary report: urgent duodenoscopic sphincterotomy for acute gallstone pancreatitis. *Surgery.* 1981;89(4):424–8.
- 6 Venu RP, Toouli J, Geenen JE, Stewart ET, Hogan WJ. Migrating common bile duct stones. *Dig Dis Sci.* 1981; 26(10):949–53.
- 7 Shapiro MJ, Alexander AJ, Andrus CH. Gallstones in the pancreatic duct: endoscopic retrograde pancreatographic demonstration. *J Clin Gastroenterol.* 1990;12(4):454–6.
- 8 Targarona E, Guevara C, Pros I, Bagur C, Novell F, Bordas J, et al. Gallstone migration to the pancreatic duct. An unusual finding in acute gallstone pancreatitis. *Hepatogastroenterology.* 1992;39(1):76–8.
- 9 Chaparala RP, Patel R, Guthrie JA, Davies MH, Guillou PJ, Menon KV. Solitary main pancreatic ductal calculus of possible biliary origin causing acute pancreatitis. *JOP.* 2005;6(5):445–8.