

# World Journal of *Gastrointestinal Surgery*

*World J Gastrointest Surg* 2023 June 27; 15(6): 1007-1261



**OPINION REVIEW**

- 1007 Diverticulitis is a population health problem: Lessons and gaps in strategies to implement and improve contemporary care  
*Stovall SL, Kaplan JA, Law JK, Flum DR, Simianu VV*

**REVIEW**

- 1020 Distal pancreatectomy with or without radical approach, vascular resections and splenectomy: Easier does not always mean easy  
*Bencini L, Minuzzo A*

**MINIREVIEWS**

- 1033 Endoscopic ultrasound-guided portal pressure gradient measurement in managing portal hypertension  
*Lesmana CRA*
- 1040 Robotic surgery in elderly patients with colorectal cancer: Review of the current literature  
*Teo NZ, Ngu JCY*
- 1048 Median arcuate ligament syndrome often poses a diagnostic challenge: A literature review with a scope of our own experience  
*Giakoustidis A, Moschonas S, Christodoulidis G, Chourmouzi D, Diamantidou A, Masoura S, Louri E, Papadopoulos VN, Giakoustidis D*
- 1056 Surgical complications of oncological treatments: A narrative review  
*Fico V, Altieri G, Di Grezia M, Bianchi V, Chiarello MM, Pepe G, Tropeano G, Brisinda G*

**ORIGINAL ARTICLE****Basic Study**

- 1068 Impact of interstitial cells of Cajal on slow wave and gallbladder contractility in a guinea pig model of acute cholecystitis  
*Ding F, Guo R, Chen F, Liu LP, Cui ZY, Wang YX, Zhao G, Hu H*

**Retrospective Cohort Study**

- 1080 Fascia- vs vessel-oriented lateral lymph node dissection for rectal cancer: Short-term outcomes and prognosis in a single-center experience  
*Zhao W, Wang ZJ, Mei SW, Chen JN, Zhou SC, Zhao FQ, Xiao TX, Huang F, Liu Q*
- 1093 Prognostic value of 11-factor modified frailty index in postoperative adverse outcomes of elderly gastric cancer patients in China  
*Xu ZY, Hao XY, Wu D, Song QY, Wang XX*

**Retrospective Study**

- 1104** Long-term outcomes and failure patterns after laparoscopic intersphincteric resection in ultralow rectal cancers  
*Qiu WL, Wang XL, Liu JG, Hu G, Mei SW, Tang JQ*
- 1116** Predictors for success of non-operative management of adhesive small bowel obstruction  
*Ng ZQ, Hsu V, Tee WWH, Tan JH, Wijesuriya R*
- 1125** Preoperative albumin-bilirubin score is a prognostic factor for gastric cancer patients after curative gastrectomy  
*Szor DJ, Pereira MA, Ramos MFKP, Tustumi F, Dias AR, Zilberstein B, Ribeiro Jr U*
- 1138** Ability of lactulose breath test results to accurately identify colorectal polyps through the measurement of small intestine bacterial overgrowth  
*Li L, Zhang XY, Yu JS, Zhou HM, Qin Y, Xie WR, Ding WJ, He XX*
- 1149** Treatment outcome analysis of bevacizumab combined with cyclophosphamide and oxaliplatin in advanced pseudomyxoma peritonei  
*Zhang Y, Zhao X, Gao C, Lin LY, Li Y*
- 1159** Surgical management of duodenal Crohn's disease  
*Yang LC, Wu GT, Wu Q, Peng LX, Zhang YW, Yao BJ, Liu GL, Yuan LW*
- 1169** Influences of dexmedetomidine on stress responses and postoperative cognitive and coagulation functions in patients undergoing radical gastrectomy under general anesthesia  
*Ma XF, Lv SJ, Wei SQ, Mao BR, Zhao XX, Jiang XQ, Zeng F, Du XK*
- 1178** Dissimilar survival and clinicopathological characteristics of mucinous adenocarcinoma located in pancreatic head and body/tail  
*Li Z, Zhang XJ, Sun CY, Li ZF, Fei H, Zhao DB*

**SYSTEMATIC REVIEWS**

- 1191** Gallbladder perforation with fistulous communication  
*Quiroga-Garza A, Alvarez-Villalobos NA, Muñoz-Leija MA, Garcia-Campa M, Angeles-Mar HJ, Jacobo-Baca G, Elizondo-Omana RE, Guzman-Lopez S*

**META-ANALYSIS**

- 1202** Efficacy of transanal drainage tube in preventing anastomotic leakage after surgery for rectal cancer: A meta-analysis  
*Fujino S, Yasui M, Ohue M, Miyoshi N*

**CASE REPORT**

- 1211** Percutaneous transhepatic cholangial drainage-guided methylene blue for fistulotomy using dual-knife for bile duct intubation: A case report  
*Tang BX, Li XL, Wei N, Tao T*

- 1216** Optimal resection of gastric bronchogenic cysts based on anatomical continuity with adherent gastric muscular layer: A case report  
*Terayama M, Kumagai K, Kawachi H, Makuuchi R, Hayami M, Ida S, Ohashi M, Sano T, Nunobe S*
- 1224** Intrahepatic cholangiocarcinoma in patients with primary sclerosing cholangitis and ulcerative colitis: Two case reports  
*Miyazu T, Ishida N, Asai Y, Tamura S, Tani S, Yamade M, Iwaizumi M, Hamaya Y, Osawa S, Baba S, Sugimoto K*
- 1232** Massive bleeding from a gastric artery pseudoaneurysm in hepatocellular carcinoma treated with atezolizumab plus bevacizumab: A case report  
*Pang FW, Chen B, Peng DT, He J, Zhao WC, Chen TT, Xie ZG, Deng HH*
- 1240** Bedside ultrasound-guided water injection assists endoscopically treatment in esophageal perforation caused by foreign bodies: A case report  
*Wei HX, Lv SY, Xia B, Zhang K, Pan CK*
- 1247** Modified stomach-partitioning gastrojejunostomy for initially unresectable advanced gastric cancer with outlet obstruction: A case report  
*Shao XX, Xu Q, Wang BZ, Tian YT*
- 1256** Small bowel diverticulum with enterolith causing intestinal obstruction: A case report  
*Wang LW, Chen P, Liu J, Jiang ZW, Liu XX*

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The primary aim of *World Journal of Gastrointestinal Surgery* (*WJGS, World J Gastrointest Surg*) is to provide scholars and readers from various fields of gastrointestinal surgery with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

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**INDEXING/ABSTRACTING**

The *WJGS* is now abstracted and indexed in Science Citation Index Expanded (SCIE, also known as SciSearch®), Current Contents/Clinical Medicine, Journal Citation Reports/Science Edition, PubMed, PubMed Central, Reference Citation Analysis, China National Knowledge Infrastructure, China Science and Technology Journal Database, and Superstar Journals Database. The 2022 Edition of Journal Citation Reports® cites the 2021 impact factor (IF) for *WJGS* as 2.505; IF without journal self cites: 2.473; 5-year IF: 3.099; Journal Citation Indicator: 0.49; Ranking: 104 among 211 journals in surgery; Quartile category: Q2; Ranking: 81 among 93 journals in gastroenterology and hepatology; and Quartile category: Q4.

**RESPONSIBLE EDITORS FOR THIS ISSUE**

Production Editor: Rui-Rui Wu, Production Department Director: Xiang Li, Editorial Office Director: Jia-Ru Fan.

**NAME OF JOURNAL**

*World Journal of Gastrointestinal Surgery*

**ISSN**

ISSN 1948-9366 (online)

**LAUNCH DATE**

November 30, 2009

**FREQUENCY**

Monthly

**EDITORS-IN-CHIEF**

Peter Schemmer

**EDITORIAL BOARD MEMBERS**

<https://www.wjgnet.com/1948-9366/editorialboard.htm>

**PUBLICATION DATE**

June 27, 2023

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**PUBLICATION ETHICS**

<https://www.wjgnet.com/bpg/GerInfo/288>

**PUBLICATION MISCONDUCT**

<https://www.wjgnet.com/bpg/gerinfo/208>

**ARTICLE PROCESSING CHARGE**

<https://www.wjgnet.com/bpg/gerinfo/242>

**STEPS FOR SUBMITTING MANUSCRIPTS**

<https://www.wjgnet.com/bpg/GerInfo/239>

**ONLINE SUBMISSION**

<https://www.f6publishing.com>



## Percutaneous transhepatic cholangial drainage-guided methylene blue for fistulotomy using dual-knife for bile duct intubation: A case report

Bing-Xi Tang, Xin-Li Li, Ning Wei, Tao Tao

**Specialty type:** Gastroenterology and hepatology

**Provenance and peer review:** Unsolicited article; Externally peer reviewed.

**Peer-review model:** Single blind

**Peer-review report's scientific quality classification**

Grade A (Excellent): A  
Grade B (Very good): 0  
Grade C (Good): C  
Grade D (Fair): 0  
Grade E (Poor): 0

**P-Reviewer:** Tsutsumi K, Japan; Yildiz K, Turkey

**Received:** January 25, 2023

**Peer-review started:** January 25, 2023

**First decision:** February 21, 2023

**Revised:** March 14, 2023

**Accepted:** April 17, 2023

**Article in press:** April 17, 2023

**Published online:** June 27, 2023



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### Abstract

#### BACKGROUND

Difficult bile duct intubation is a big challenge for endoscopists during endoscopic retrograde cholangiopancreatography (ERCP) procedure. We report a case of percutaneous transhepatic cholangial drainage (PTCD)-guided methylene blue for fistulotomy using dual-knife for bile duct intubation.

#### CASE SUMMARY

A 50-year-old male patient had developed obstructive jaundice, and ERCP procedure need to be performed to treat the obstructive jaundice. But intubation cannot be performed if the duodenal papilla cannot be identified because of previous surgery for a perforated descending duodenal diverticulum. We used PTCD-guided methylene blue to identify the intramural common bile duct before dual-knife fistulotomy, and bile duct intubation was successfully completed.

#### CONCLUSION

The method that combining methylene blue and dual-knife fistulotomy to achieve bile duct intubation during difficult ERCP is safe and effective.

**Key Words:** Percutaneous transhepatic cholangial drainage; Bile duct intubation; Endoscopic retrograde cholangiopancreatography; Methylene blue; Case report

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**Core Tip:** We report a case of difficult bile duct intubation during endoscopic retrograde cholangiopancreatography (ERCP) procedure. We introduce the clinical features, findings of ERCP, and response to treatment in this male patient.

**Citation:** Tang BX, Li XL, Wei N, Tao T. Percutaneous transhepatic cholangial drainage-guided methylene blue for fistulotomy using dual-knife for bile duct intubation: A case report. *World J Gastrointest Surg* 2023; 15(6): 1211-1215

**URL:** <https://www.wjgnet.com/1948-9366/full/v15/i6/1211.htm>

**DOI:** <https://dx.doi.org/10.4240/wjgs.v15.i6.1211>

## INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP) has currently become an essential diagnostic and treatment method for pancreatobiliary diseases. However, the failure rate of routine bile duct intubation during ERCP is 10% [1,2]. Methylene blue can be used to identify the duodenal papilla for bile duct intubation [3], and dual-knife fistulotomy is an effective and safe method for accessing the bile duct [4]. We combined these two methods in a patient undergoing surgery for a perforated descending duodenal diverticulum.

## CASE PRESENTATION

### Chief complaints

A 50-year-old male patient with developed jaundice was transferred to our outpatient service in October 2022.

### History of present illness

The patient underwent surgery for a perforated descending duodenal diverticulum. He had duodenal diverticulum resection, partial small bowel resection, cholecystostomy, and jejunostomy. After the cholecystostomy tube was removed, obstructive jaundice appeared to develop.

### History of past illness

In medical history the patient alleged healthy and denied a history of heart illness and inspiratory illness.

### Personal and family history

From the patient's medical history, we precluded a history of allergies, asthma, and alcoholism. His father and mother had no hereditary diseases and were all healthy.

### Physical examination

On admission we performed a physical examination on the patient, and the result revealed yellow staining of the skin and sclera, but there were no enlarged superficial lymph nodes. There were no abnormal cardiopulmonary and abdominal examinations.

### Laboratory examinations

Laboratory results revealed that the blood count of the patient was normal, the patient's renal function, carcinoembryonic antigen, cancer antigen 125, cancer antigen 19-9, carcinoembryonic antigen, and alpha-fetoprotein values were also normal. Liver fibrosis test of the patient was normal, and the levels of immunoglobulins immunoglobulin (Ig) A, IgM, and IgG were also normal. As for the levels of serum type III procollagen, type IV collagen, laminin, and hyaluronic acid, all normal. But the liver function was abnormal and total bilirubin was 130.8  $\mu\text{mol/L}$ , direct bilirubin was 98.5  $\mu\text{mol/L}$ , and indirect bilirubin was 32.3  $\mu\text{mol/L}$ .

### Imaging examinations

Postoperative cholecystostomy tube imaging (Figure 1) revealed slight dilation of the common bile duct and a small amount of contrast agent flowing into the duodenum.



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Figure 1 Transcholecystostomy imaging showing slight common bile duct dilation.

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## FINAL DIAGNOSIS

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The patient was diagnosed as obstructive jaundice.

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## TREATMENT

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The patient was discharged after PTCO drainage. The daily drainage volume was 2500-2800 mL but the PTCO drainage tube could not be clamped outside of the hospital. ERCP was performed for internal drainage in the bile duct. During ERCP procedure, descending duodenal scarring was observed and the papilla could not be identified after repeated attempts (Figure 2A). Similarly, no ectopic papilla was observed. Insertion of a PTCO tube into the duodenum *via* a guidewire was attempted but we could not insert the guidewire into the common bile duct after repeated adjustments (Figures 2B and C). After injecting a combination of ioversol and methylene blue (Jichuan Pharmaceutical Group Co. LTD, Jiangsu Province, China) *via* the PTCO tube, pale blue-colored duodenal scar protrusions were observed, which were identified as the intramural common bile duct (Figure 2D). We used a dual-knife (KD-650 L; Olympus Medical Systems) to perform layer-by-layer resection. As a result, large amount of ioversol and methylene blue could be seen flowing out (Figure 2E and F). After routine intubation of the stoma was successful, an 8.5 Fr × 5.0 cm plastic stent was inserted and patent ioversol and methylene blue flow was observed (Figure 2G-I).

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## OUTCOME AND FOLLOW-UP

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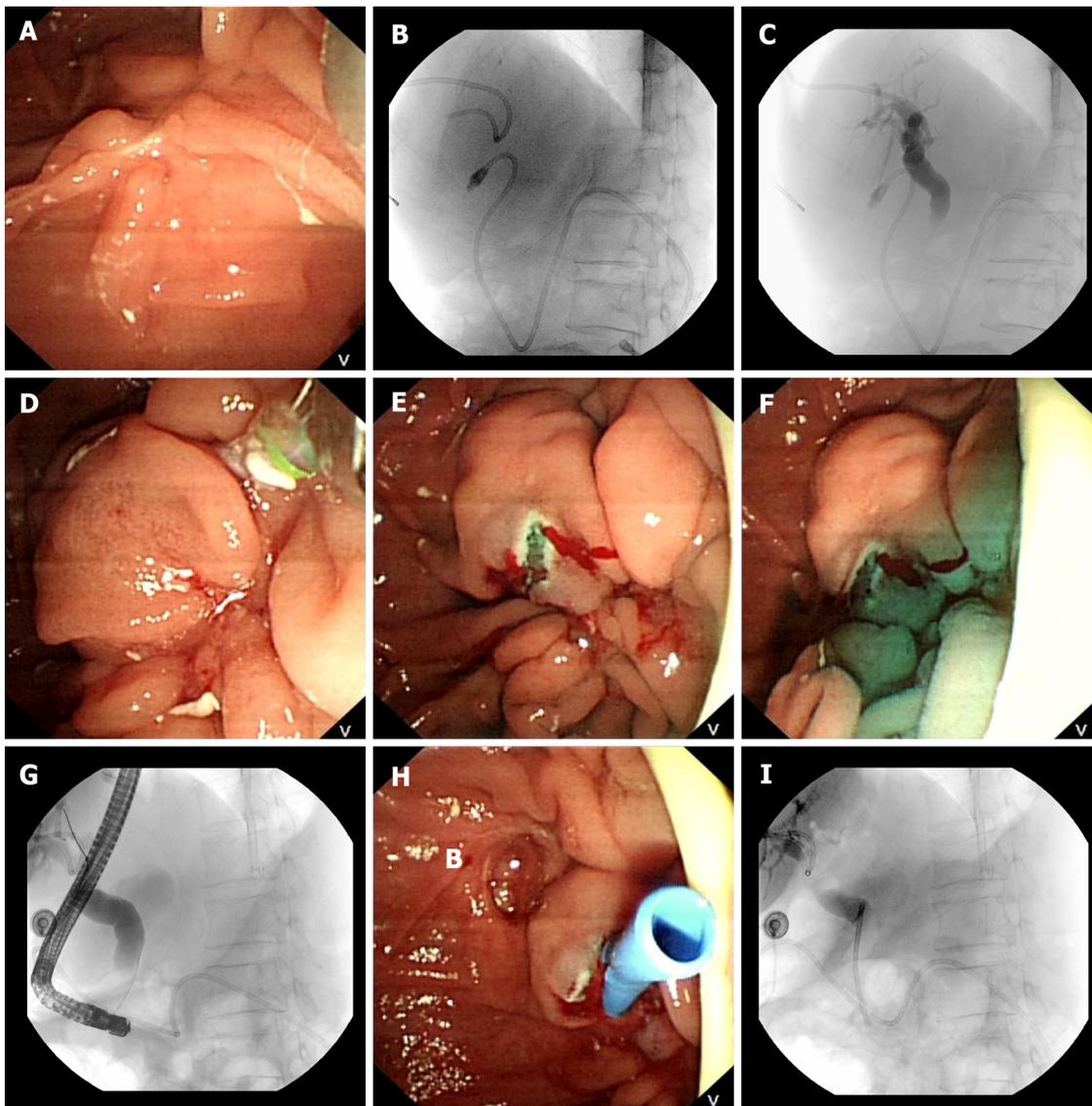
After the endoscopic procedure, the patient's jaundice and liver function was relieved after 3 wk. Laboratory tests performed in December 2022 revealed that total bilirubin, direct bilirubin and indirect bilirubin was 31.8 μmol/L, 18.9 μmol/L, and 12.9 μmol/L respectively. Until November 2022, the patient was still undergoing follow-up.

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## DISCUSSION

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A possible explanation for the increasing success rate of ERCP procedures is attributed to the excellent ERCP supporting facilities concerning ultrasonography and duodenoscopic viewing, and the application of adjunctive intubation methods to increase intubation success, reduce complications, and alleviate patient pain[5]. However, questions such as how the native papilla or biliopancreatoenteric anastomosis can be identified and cannulated were still challenging for endoscopists. The position of the native papilla in surgically altered anatomy differs greatly from that in the normal anatomy[5].



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**Figure 2 Treatment.** A: Repeated failed attempts to identify the duodenal papilla, a small amount of contrast agent entered the duodenum; B and C: Repeated attempts at guidewire insertion through the percutaneous transhepatic cholangial drainage (PTCD) tube failed; D: mixture of ioversol and methylene blue was injected via the PTCD tube; E: Dual-knife was used for layer-by-layer resection. Pale blue-colored protrusions, which were considered to be the intramural common bile duct, can be seen at the duodenal scar; F: A large amount of methylene blue flowed out after dual-knife resection; G: Common bile duct dilation was observed on endoscopic retrograde cholangiopancreatography imaging; H: Insertion of an 8.5 Fr × 5.0 cm plastic stent; I: A large amount of ioversol and methylene can be seen flowing out.

From the disease history we concluded that surgery was the cause of the obstructive jaundice in this case. As for the treatment of obstructive jaundice, ERCP has a lower incidence of complications and shorter hospital stays and a lower cost than other methods such as PTCD.

During ERCP, the duodenal papilla is usually identified using endoscope landmarks, such as an oral protrusion, duodenal folds, and a small belt formed by the anal columns. Occasionally, the duodenal papilla cannot be identified. Since our patient had undergone perforated descending duodenal diverticulum surgery, the duodenal papilla could not be located. After PTCD guidewire insertion failed, methylene blue was injected into the PTCD tube and visible protrusions in the intramural common bile duct were visualized as blue surfaces. This technique improved visualization of the intramural common bile duct and reduced the risk of complications due to inaccurate intramural common bile duct identification. After visualizing the position of common bile duct, we selected a dual-knife for fistulotomy because the front end of the dual-knife's sheath was as short as 2 mm. The short knife tip of the dual knife can be directly applied to the mucosal surface to improve control of the incision depth and prevent injury to the posterior sphincter wall of the common bile duct. Therefore, dual-knife is safer than needle knife in our experience. Due to the unique design of the expansive tip, dual-knife can also be used to hook the bile duct to the intestinal cavity for incision, which cannot be achieved with needle knife[7]. We combined methylene blue tracer and dual-knife fistulotomy to successfully complete bile duct

intubation and insert a plastic stent in the patient's bile duct. This enabled internal bile drainage.

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## CONCLUSION

The combined use of methylene blue tracer and dual-knife incurs a lower risk and is effective method to achieve bile duct intubation during difficult ERCP.

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## FOOTNOTES

**Author contributions:** Tang BX performed the endoscopic retrograde cholangiopancreatography procedure and wrote the manuscript; Tao T designed the research study; Li XL and Wei N helped collecting medical data; all authors have read and approve the final manuscript.

**Informed consent statement:** Informed written consent was obtained from the patients for the publication of this report and any accompanying images.

**Conflict-of-interest statement:** The authors declare that they have no conflict of interest.

**CARE Checklist (2016) statement:** The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

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**S-Editor:** Chen YL

**L-Editor:** A

**P-Editor:** Wu RR

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