World Journal of Clinical Cases

Submit a Manuscript: https://www.f6publishing.com

World J Clin Cases 2024 August 26; 12(24): 5613-5621

DOI: 10.12998/wjcc.v12.i24.5613

ISSN 2307-8960 (online)

CASE REPORT

Splenic subcapsular hematoma following endoscopic retrograde cholangiopancreatography: A case report and review of literature

Chen-Yu Guo, Yu-Xia Wei

Specialty type: Medicine, research and experimental

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

Peer-review model: Single blind

Peer-review report's classification

Scientific Quality: Grade B, Grade D

Novelty: Grade B, Grade C

Creativity or Innovation: Grade B, Grade C

Scientific Significance: Grade B, Grade C

P-Reviewer: Contini S; Moshref RH

Received: April 6, 2024

Revised: June 21, 2024

Accepted: June 27, 2024

Published online: August 26, 2024

Processing time: 95 Days and 22.9 Hours

Chen-Yu Guo, Yu-Xia Wei, Department of Gastroenterology, Inner Mongolia Autonomous Region Hospital of Traditional Chinese Medicine, Hohhot 010000, Inner Mongolia Autonomous Region, China

Chen-Yu Guo, Yu-Xia Wei, Graduate School, Inner Mongolia Medical University, Hohhot 010000, Inner Mongolia Autonomous Region, China

Corresponding author: Yu-Xia Wei, MD, Chief Physician, Department of Gastroenterology, Inner Mongolia Autonomous Region Hospital of Traditional Chinese Medicine, No. 11 Health Street, Xincheng District, Hohhot 010000, Inner Mongolia Autonomous Region, China.
weiyuxia2009@126.com

Abstract

BACKGROUND

Splenic injury following endoscopic retrograde cholangiopancreatography (ERCP) is a rare complication. The literature contains around 30 articles reporting various degrees of splenic injuries resulting from ERCP since the first report of splenic rupture after ERCP in 1989.

CASE SUMMARY

This report describes a case of splenic hematoma and stent displacement in a 69-year-old male patient who developed these conditions 7 days after undergoing ERCP and stenting. The patient had bile duct stenosis caused by a malignant tumor that was obstructing the bile duct. The diagnosis was confirmed by epigastric computed tomography and magnetic resonance cholangiopancreatography. The patient was successfully treated with percutaneous transhepatic cholangial drainage, endoscopic pyloric stent placement, and conservative management. The causes of splenic injury following ERCP are discussed.

CONCLUSION

ERCP has the potential to cause splenic injury. If a patient experiences symptoms such as abdominal pain, decreased blood pressure, and altered hematology after the procedure, it's important to be thoroughly investigated for postoperative bleeding and splenic injury.

Key Words: Endoscopic retrograde cholangiopancreatography; Gastroenterology; Splenic injury; Hematoma; Case report

Core Tip: There are several possible causes of abdominal pain and fever in patients who have undergone endoscopic retrograde cholangiopancreatography (ERCP). One of the potential complications that should not be overlooked is splenic injury. A clear diagnosis can be established based on laboratory and imaging examinations. It is important to closely monitor the patient's condition after ERCP and to promptly address any signs of discomfort.

Citation: Guo CY, Wei YX. Splenic subcapsular hematoma following endoscopic retrograde cholangiopancreatography: A case report and review of literature. *World J Clin Cases* 2024; 12(24): 5613-5621
URL: https://www.wjgnet.com/2307-8960/full/v12/i24/5613.htm
DOI: https://dx.doi.org/10.12998/wjcc.v12.i24.5613

INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP) is a frequently used diagnostic and therapeutic tool for pancreatobiliary disease[1]. Complications occur in 5%-10% of cases and may include pancreatitis, bleeding, and perforation[2]. Although rare, splenic injury has also been reported following ERCP. Our literature review found approximately 30 reported cases of splenic injury since the first case was reported in 1989[3]. Details of the first report and subsequent similar reports are shown in Table 1[3-30]. We describe a patient who developed a splenic hematoma after undergoing ERCP. The diagnosis was confirmed by objective imaging, and the condition was successfully treated using conservative methods.

CASE PRESENTATION

Chief complaints

A 69-year-old male patient presented to our clinic with complaints of jaundice, accompanied by nausea, lower abdominal distension, and pain.

History of present illness

The patient's symptoms started 1 week ago with no apparent trigger.

History of past illness

Three years ago, the patient was diagnosed with multiple tumors of the sigmoid colon and underwent laparoscopic sigmoidectomy. Pathology revealed multiple malignant tumors of the sigmoid colon. The patient subsequently underwent conventional chemotherapy.

One year ago, the patient exhibited occupying lesions in the intrahepatic bile ducts of the left outer lobe of the liver near the hepatic hilum. The patient subsequently underwent a left lobe hepatectomy and cholecystectomy.

Personal and family history

The patient reported no family history of malignant tumors and no history of smoking or drinking.

Physical examination

The patient's vital signs were as follows: Body temperature, 36.5 °C; heart rate, 80 bpm; respiratory rate, 20 breaths/min; and blood pressure, 103/77 mmHg. Additionally, there was a visible postoperative scar in the anterior midline of the abdomen, as well as abdominal and epigastric tenderness.

Laboratory examinations

Admission liver function tests showed the following: Alanine aminotransferase (ALT) 424.4 U/L, aspartate transaminase (AST) 210.9 U/L, glutamyl transferase (GGT) 1096 U/L, alkaline phosphatase (ALP) 259 U/L, total bilirubin 130.91 μmo1/L, direct bilirubin 71.71 μmol/L, and indirect bilirubin 59.2 μmol/L.

Imaging examinations

Abdominal ultrasound showed dilatation of the bile ducts in the liver. The duodenum was not peristaltic and metastasis was suspected in the duodenum and its periphery in the hepatic portal position.

Admission magnetic resonance cholangiopancreatography (MRCP) (Figure 1A) showed narrowing of the right hepatic duct was at the porta hepatis, which corresponded to a dilation of the intrahepatic bile duct in the right lobe of the liver. No dilatation or narrowing of the common hepatic duct or common bile duct was observed.

Table 1 Published reports on spleen injuries worldwide following endoscopic retrograde cholangiopancreatography

Ref.	Year	Age/gender	Comorbid conditions	Clinical manifestations	Onset after ERCP	Type of injury	Therapy
Trondsen *et al*[3]	1989	46/Female	Pancreatitis	ERCP, sphincterotomy	15 hours	Splenic capsular avulsion	Splenectomy
Pamudurthy *et al*[4]	2018	60/Female	Choledocholithiasis	ERCP, stenting	8 hours	Splenic rupture	Splenectomy
Grammatopoulos *et al*[5]	2014	64/Male	Obstructive jaundice, tumor	ERCP, stenting	6 hours	Splenic rupture	Splenectomy
Boustany *et al*[6]	2023	41/Female	Gallstone pancreatitis, cholecystectomy	ERCP, stenting	24 hours	Splenic subcapsular hematoma	Embolization
Polman *et al*[7]	2020	52/Male	Nil	ERCP, stenting	Immediately	Splenic laceration	Embolization
Montenovo *et al*[8]	2017	41/Female	Liver transplant	ERCP, sphincterotomy	8 hours	Splenic subcapsular hematoma	Splenectomy
Momani *et al*[9]	2018	44/Female	Sleeve gastrectomy	ERCP, sphincterotomy	A few hours	Splenic subcapsular hematoma	Conservative
Haneke *et al*[10]	2018	39/Male	Chronic pancreatitis	ERCP	6 days	Splenic abscess	Conservative
Lee *et al*[11]	2017	59/Female	Profound jaundice.	ERCP, replace stenting	4 hours	Peri-splenic hematoma	Conservative
Cebrián García *et al*[12]	2022	83/Male	Nil	ERCP, sphincterotomy	6 hours	Splenic rupture	Splenectomy
Lubikowski *et al*[13]	2020	31/Female	Hepatectomy, biliary leak	ERCP, stenting	Shortly	Splenic rupture	Splenectomy
Agarwal *et al*[14]	2022	63/Male	Jaundice	ERCP, sphincterotomy, stricturoplasty, stenting	4 days	Splenic hematoma	Embolization
Kingsley *et al*[15]	2001	54/Female	Chronic pancreatitis, hepatitis C, cirrhosis	ERCP, sent revision	24 hours	Splenic rupture	Splenectomy
Badaoui *et al*[16]	2002	42/Male	Cholecystolithiasis, Common bile duct dilation	ERCP	20 minutes	Splenic laceration	Conservative, surgery
Lewis *et al*[17]	1991	49/Female	Common bile duct stricture, pancreatic head tumor	ERCP, stenting, biopsy	9 hours	Avulsion of short gastric vessels	Splenectomy
Ong *et al*[18]	1991	55/Female	Common bile duct stricture, tumor	ERCP	48 hours	Intrasplenic hematoma	Splenectomy
Furman *et al*[19]	1993	63/Female	Common bile duct stricture	ERCP, papillotomy	Not reported	Splenic subcapsular hematoma; Splenic abscess, pancreatitis	Observation, abscess drained
Wu *et al*[20]	1993	57/Female	Pelvic surgery	ERCP, sphincterotomy	60 hours	Splenic capsular avulsion	Splenectomy
Lo *et al*[21]	1994	79/Male	Billroth I anastomosis	ERCP, papillotomy	48 hours	Splenic subcapsular hematoma	Observation,
Deist *et al*[22]	2003	52/Female	Prior abdominal surgery	ERCP, sphincterotomy	8 hours	Splenic rupture	Splenectomy
Zyromski *et al*[23]	2004	33/Female	Nil	ERCP, sphincterotomy	24 hours	Avulsion of short gastric vessels	Splenectomy
Dixon *et al*[24]	2004	38/Male	Chronic pancreatitis	ERCP	Immediately	Splenic capsular avulsion	Laparotomy
Cho *et al*[25]	2008	63/Female	Prior laparotomy	ERCP	18 hours	Splenic laceration	Splenectomy
Cortiñas Sáenz *et al*[26]	2010	82/Female	Cardiovascular disease	ERCP	Immediately	Splenic rupture	Splenectomy
Gaffney *et al*[27]	2012	48/Female	Common bile duct dilation, Chronic pancreatitis	ERCP, replace stent	6 days	Splenic subcapsular hematoma	Conservative
Paredes *et al*[28]	2013	39/Female	Cholecystectomy, adherent omentum	ERCP, sphincterotomy, stenting	1 hour	Splenic laceration	Splenectomy

Weaver *et al*[29]	2014	66/Male	Choledocholithiasis	ERCP	Overnight	Splenic subcapsular hematoma	Splenectomy
Ahmad *et al*[30]	2016	76/Male	Choledocholithiasis	ERCP, sphincterotomy	30 minutes	Splenic capsular avulsion	Splenectomy

ERCP: Endoscopic retrograde cholangiopancreatography.

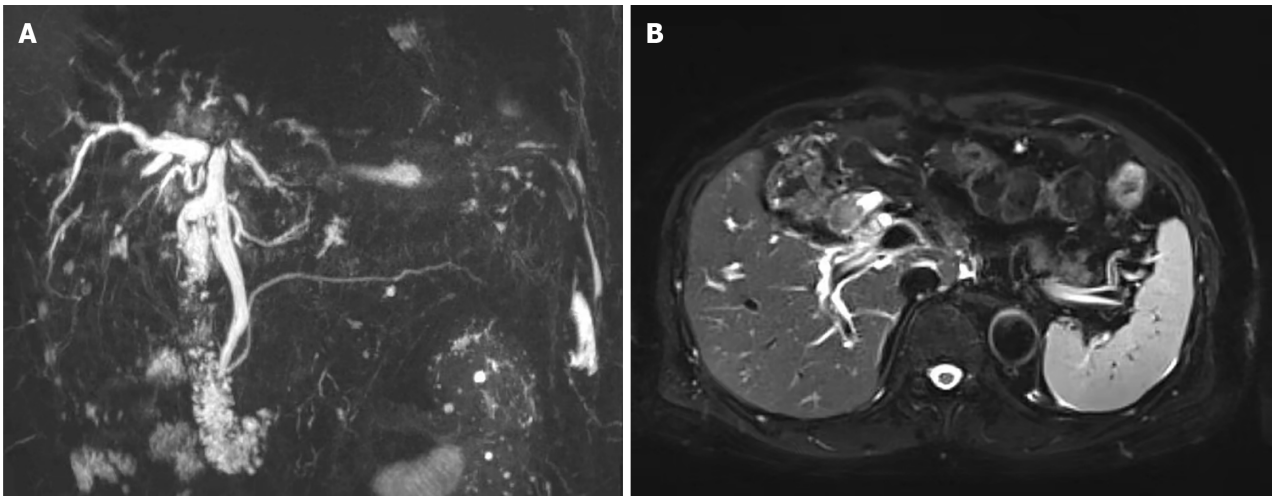

Figure 1 Admission magnetic resonance cholangiopancreatography and magnetic resonance imaging. A: Magnetic resonance cholangiopancreatography revealed a narrowing of the right hepatic duct at the porta hepatis; B: The spleen is morphologically normal with a homogeneous parenchymal signal.

Admission magnetic resonance imaging (MRI) of the upper abdomen (Figure 1B) revealed that the spleen was morphologically normal with a homogeneous parenchymal signal. Postoperative changes were observed in the liver and gallbladder. Additionally, there was limited stenosis of the right hepatic duct in the hilar region.

FINAL DIAGNOSIS

The patient was diagnosed with obstructive jaundice, liver tumor (metastasis of colon cancer), and liver insufficiency.

TREATMENT

In conjunction with the expert opinions of other hospitals, to ensure smooth bile drainage and prevent liver failure, the patient underwent ERCP and stent implantation 1 week after admission in our hospital. During the ERCP procedure, the lateral scope was passed smoothly under intravenous anesthesia in the prone position. The esophageal cardia entered the gastric cavity and it was difficult to pass the scope through the pylorus; thus, the anterior scope was replaced by a guide wire which was placed through the pylorus into the jejunum, and then the lateral scope was replaced by inserting a balloon through the guide wire, and repeated attempts were made to enter the descending portion of the duodenum. The balloon guidewire was removed and the main papilla was found on the medial side of the descending portion, which showed a papillary shape with a granular opening. The bile duct was difficult to intubate, the pancreatic duct was accessed, a pancreatic duct guide wire was left in place and the bile duct was visualized by re-accessing the bile duct and administration of contrast into the bile duct. The contrast agent used was iodixanol. The X-ray showed: Bile duct stenosis in the porta hepatis, dilatation of the left hepatic duct, and the right hepatic duct was not visualized. As the bile duct was difficult to intubate, the guidewire was repeatedly entered into the pancreatic duct several times, and in order to prevent ERCP pancreatitis, the papilla was incised to 0.4 cm with an incision knife and a pancreatic stent of 5F diameter and 5 cm length was placed through the pancreatic duct guidewire and pancreatic fluid was seen to drain. After placing an 8.5F diameter, 11cm long unilateral plastic wing stent through the bile duct guidewire, bile was seen to flow out and the operation was completed. Liver function test 24 hours after ERCP revealed ALT 175 U/L, AST 87 U/L, GGT 565 U/L, ALP 142 U/L, total bilirubin 83.9 μmo1/L, direct bilirubin 60.4 μmol/L, and indirect bilirubin 15.8 μmol/L. These indices had significantly improved compared to the previous values.

OUTCOME AND FOLLOW-UP

On the 7th day after ERCP, the patient had worsening abdominal pain, fever (38.7 °C), poor mental status, nausea, and vomiting, and a hematoma was seen under the palpated splenic hilum on computed tomography (CT) (Figure 2) and MRCP (Figure 3) of the upper abdomen, but the etiology of the disease was not yet clarified. In addition, biliary stent displacement and poor bile drainage were observed. Liver function tests showed an upward trend, and 7 days after ERCP liver function showed the following: ALT 134 U/L, AST 107 U/L, GGT 658 U/L, ALP 212 U/L, total bilirubin 126.8 μmo1/L, direct bilirubin 100.2 μmol/L and indirect bilirubin 26.6 μmol/L. Percutaneous hepatic puncture biliary drainage (PTCD) was performed, resulting in good drainage and the patient's jaundice gradually subsided. Abdominal pain and other symptoms significantly improved two days later.

Figure 2 Computed tomography scan revealed a hematoma in the spleen after endoscopic retrograde cholangiopancreatography.

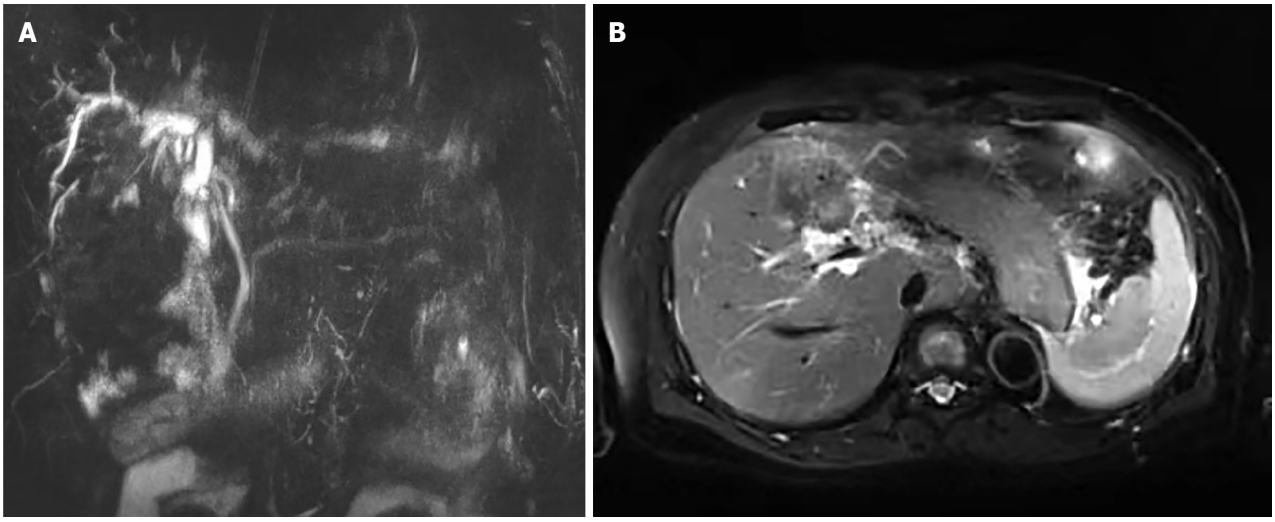

Figure 3 Magnetic resonance cholangiopancreatography and magnetic resonance imaging after endoscopic retrograde cholangiopancreatography. A: Biliary and pancreatic stents can be visualized and stent migration was considered based on the patient's elevated liver function; B: Magnetic resonance imaging revealed a hematoma in the spleen.

Twelve days after PTCD, the patient had no obvious discomfort. We planned to perform ERCP again to reposition the stent, remove the PTCD drain, and achieve intrahepatic biliary drainage. During the operation, a large mass was observed on the posterior wall of the gastric sinus and the greater curvature of the external pressure side. This caused a narrowing of the gastric sinus lumen and severe deformation of the pylorus, making it impossible to pass an endoscope. To address this, the operation mode was changed and endoscopic pyloric stent placement was performed (Figure 4). The stent was successfully positioned.

The patient's abdominal CT was reviewed 3 days before discharge (Figure 5), and the splenic hematoma had resolved. Subsequently, the patient attended our hospital every 3 months to have the PTCD drain changed and received radio-

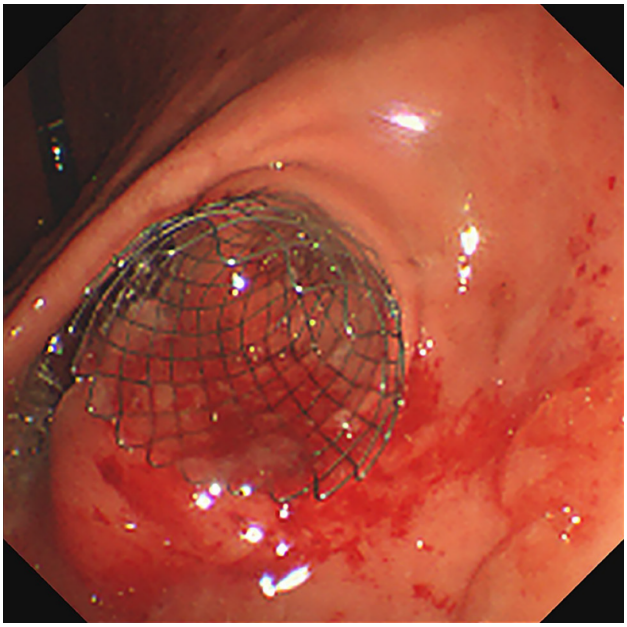

Figure 4 Endoscopic pyloric stent placement with minor intraoperative bleeding.

Figure 5 A computed tomography scan conducted before discharge showed that the splenic hematoma had disappeared.

therapy at the same time, The patient's abdominal CT was reviewed several times during the year, and the splenic morphology was normal.

DISCUSSION

ERCP is a vital tool for diagnosing and treating pancreatic and bile duct diseases. In this case, a tumor in the hepatic hilum was compressing the bile duct, causing obstructive jaundice. Stent placement *via* ERCP provided a palliative intervention. Postoperative complications, such as pancreatitis, perforation, and hemorrhage, are common[31,32]. Rare complications have also been reported internationally, such as death caused by air embolism[33], duodenal perforation due to biliary stent displacement[34], and hepatic hematoma[35]. It is important to note that these complications are infrequent. Splenic injuries include splenic subcapsular hematoma, splenic hematoma, splenic capsular avulsion, perisplenic hematoma, intrasplenic hematoma, splenic laceration, splenic rupture, splenic abscess, and short gastric vessel avulsion.

The risk factors for splenic injury after previous ERCP include calcification and fibrosis of the supporting ligaments, such as the splenocolic and gastrosplenic ligaments, which can cause decreased mobility of the viscera. These risk factors are particularly relevant for patients with cirrhosis and chronic pancreatitis. Excessive traction on the ligaments can result in splenic injury[4]. Abdominal adhesions can also develop after abdominal surgery[5,6]. If a patient experiences abdominal pain, decreased blood pressure or hematocrit, and hemodynamic instability after ERCP, it is important to

consider the possibility of splenic injury[7,8]. Depending on the severity of the injury, conservative management[9,10,11], splenectomy[8,12,13], or splenic artery embolization[6,7,14] may be employed to control bleeding after a splenic injury.

Our patient had stenosis of the pylorus and bile ducts due to compression by a hepatic tumor. The endoscope caused excessive traction or shear force when passing through the pylorus and bile ducts, which caused the greater curvature of the stomach to twist and led to splenic injury following excessive traction of the splenic colonic ligament. The patient underwent two major abdominal surgeries, including a left lobe hepatectomy and cholecystectomy. These procedures may have resulted in calcification of the peri-splenic ligament and vascular adhesions, which ultimately contributed to the splenic injury. The clinical symptoms of both biliary stent displacement and splenic haematoma can manifest as abdominal pain and fever, so the symptoms of patient on day 7 after ERCP may have been caused by both of these conditions. Stent displacement can be caused by excessive external compression or oblique vectorial compression resulting from a change in position. This reporte indicates that there is no correlation between stent displacement and splenic hematoma, suggesting that the latter does not cause stent displacement.

CONCLUSION

Splenic injury is a rare complication of ERCP that requires attention. The onset of symptoms can occur rapidly, within minutes, or may be delayed for up to a week. The severity and type of injury may also vary. Therefore, it is essential to be vigilant, conduct a careful investigation, and appropriately treat or manage patients who present with symptoms after ERCP to treat such complications.

ACKNOWLEDGEMENTS

When preparing this paper, invaluable guidance and assistance was received from my supervisor, Ms. Yu-Xia Wei. I would like to express my sincerest gratitude to her for her invaluable support.

FOOTNOTES

Author contributions: Guo CY collected clinical data on patients, searched for similar published cases, and wrote the paper; Wei YX designed the study, participated in endoscopic retrograde cholangiopancreatography, and supervised the writing of the paper. Both authors have read and approved the final manuscript.

Supported by Natural Science Foundation of Inner Mongolia Autonomous Region, No. 2024 LHMS08053.

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

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

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).

Country of origin: China

ORCID number: Chen-Yu Guo 0009-0002-7502-4392; Yu-Xia Wei 0009-0002-3789-7141.

Corresponding Author's Membership in Professional Societies: World Federation of Chinese Medicine Societies, No. B02414090161.

S-Editor: Qu XL
L-Editor: A
P-Editor: Zhao YQ

REFERENCES

1 **ElGeidie AA**. Single-session minimally invasive management of common bile duct stones. *World J Gastroenterol* 2014; **20**: 15144-15152 [PMID: 25386063 DOI: 10.3748/wjg.v20.i41.15144]

2 **ASGE Standards of Practice Committee**, Anderson MA, Fisher L, Jain R, Evans JA, Appalaneni V, Ben-Menachem T, Cash BD, Decker

GA, Early DS, Fanelli RD, Fisher DA, Fukami N, Hwang JH, Ikenberry SO, Jue TL, Khan KM, Krinsky ML, Malpas PM, Maple JT, Sharaf RN, Shergill AK, Dominitz JA. Complications of ERCP. *Gastrointest Endosc* 2012; **75**: 467-473 [PMID: 22341094 DOI: 10.1016/j.gie.2011.07.010]

3 **Trondsen E**, Rosseland AR, Moer A, Solheim K. Rupture of the spleen following endoscopic retrograde cholangiopancreatography (ERCP). Case report. *Acta Chir Scand* 1989; **155**: 75-76 [PMID: 2929211]

4 **Pamudurthy V**, Abraham RZ, Betlej T, Shah A, Kim D, Sasso B, Chacko A. Etiologies and risks of splenic decapsulation after endoscopic retrograde cholangiopancreatography: case report and literature review. *Endosc Int Open* 2018; **6**: E271-E273 [PMID: 29497686 DOI: 10.1055/s-0043-125145]

5 **Grammatopoulos A**, Moschou M, Rigopoulou E, Katsoras G. Splenic injury complicating ERCP. *Ann Gastroenterol* 2014; **27**: 177-178 [PMID: 24733368]

6 **Boustany A**, Kassab J, Ramahi N, Onwuzo S, Acar P, Asaad I. Splenic Subcapsular Hematoma After Endoscopic Retrograde Cholangiopancreatography. *ACG Case Rep J* 2023; **10**: e01052 [PMID: 37235003 DOI: 10.14309/crj.0000000000001052]

7 **Polman J**, Williams AC, Ruggiero G, DeWitt A. An Unexpected Complication of Endoscopic Retrograde Cholangiopancreatography with a Novel Treatment Approach. *Case Rep Gastroenterol* 2020; **14**: 604-608 [PMID: 33362447 DOI: 10.1159/000509737]

8 **Montenovo M**, Javed E, Bakthavatsalam R, Reyes J. Splenic Subcapsular Hematoma After Endoscopic Retrograde Cholangiopancreatography in a Liver Transplant Recipient: Case Report and Literature Review. *Exp Clin Transplant* 2017; **15**: 103-105 [PMID: 28004996 DOI: 10.6002/ect.2014.0234]

9 **Al Momani L**, Karar S, Shipley LC, Locke A, Swenson J. Endoscopic Retrograde Cholangiopancreatography-Induced Splenic Injury in a Patient With Sleeve Gastrectomy. *J Investig Med High Impact Case Rep* 2018; **6**: 2324709618779417 [PMID: 29977934 DOI: 10.1177/2324709618779417]

10 **Haneke T**, Widmer AJ, Metting A. Splenic abscess complicating endoscopic retrograde cholangiopancreatography. *Proc (Bayl Univ Med Cent)* 2018; **31**: 317-318 [PMID: 29904296 DOI: 10.1080/08998280.2018.1446891]

11 **Lee R**, Huelsen A, Saad N, Hodgkinson P, Hourigan LF. Splenic Injury Following Endoscopic Retrograde Cholangiopancreatography: A Case Report and Literature Review. *Case Rep Gastroenterol* 2017; **11**: 241-249 [PMID: 28559784 DOI: 10.1159/000468515]

12 **Cebrián García A**, Rico Arrastia A, González de la Higuera Carnicer B, Ruiz-Clavijo García D, Montón Condón S, Fernández-Urien Sainz I. Rupture of the spleen following endoscopic retrograde cholangiopancreatography. *Gastroenterol Hepatol* 2022; **45** Suppl 1: 92-94 [PMID: 33545243 DOI: 10.1016/j.gastrohep.2020.11.022]

13 **Lubikowski J**, Piotuch B, Przedniczek M, Sabadosh R, Wojcicki M. Looking for a cause of the spleen rupture following endoscopic retrograde cholangiopancreatography. *Eur J Gastroenterol Hepatol* 2020; **32**: 129-130 [PMID: 31790006 DOI: 10.1097/MEG.0000000000001554]

14 **Agarwal D**, Moonsamy P, Fernandez-Del Castillo C. Splenic Injury Following Endoscopic Retrograde Cholangiopancreatography - A Role for Angioembolization. *J Belg Soc Radiol* 2022; **106**: 74 [PMID: 36042787 DOI: 10.5334/jbsr.2843]

15 **Kingsley DD**, Schermer CR, Jamal MM. Rare complications of endoscopic retrograde cholangiopancreatography: two case reports. *JSLS* 2001; **5**: 171-173 [PMID: 11394431]

16 **Badaoui R**, Ouendo M, Delcenserie R, El Kettani C, Radji M, Ossart M. Injury to the liver and spleen after diagnostic ERCP. *Can J Anaesth* 2002; **49**: 756-757 [PMID: 12193500 DOI: 10.1007/BF03017461]

17 **Lewis FW**, Moloo N, Stiegmann GV, Goff JS. Splenic injury complicating therapeutic upper gastrointestinal endoscopy and ERCP. *Gastrointest Endosc* 1991; **37**: 632-633 [PMID: 1756925 DOI: 10.1016/s0016-5107(91)70872-9]

18 **Ong E**, Böhmler U, Wurbs D. Splenic injury as a complication of endoscopy: two case reports and a literature review. *Endoscopy* 1991; **23**: 302-304 [PMID: 1743138 DOI: 10.1055/s-2007-1010695]

19 **Furman G**, Morgenstern L. Splenic injury and abscess complicating endoscopic retrograde cholangiopancreatography. *Surg Endosc* 1993; **7**: 343-344 [PMID: 8351610 DOI: 10.1007/BF00725954]

20 **Wu WC**, Katon RM. Injury to the liver and spleen after diagnostic ERCP. *Gastrointest Endosc* 1993; **39**: 824-827 [PMID: 8293913 DOI: 10.1016/s0016-5107(93)70278-3]

21 **Lo AY**, Washington M, Fischer MG. Splenic trauma following endoscopic retrograde cholangiopancreatography (ERCP). *Surg Endosc* 1994; **8**: 692-693 [PMID: 8059310 DOI: 10.1007/BF00678569]

22 **Deist TJ**, Freytag A. [Splenic rupture after ERCP]. *Z Gastroenterol* 2003; **41**: 579-582 [PMID: 12806544 DOI: 10.1055/s-2003-39641]

23 **Zyromski NJ**, Camp CM. Splenic injury: a rare complication of endoscopic retrograde cholangiopancreatography. *Am Surg* 2004; **70**: 737-739 [PMID: 15328812]

24 **Dixon E**, Graham JS, Sutherland F, Mitchell PC. Splenic injury following endoscopic retrograde cholangiopancreatography: a case report and review of the literature. *JSLS* 2004; **8**: 275-277 [PMID: 15347118]

25 **Cho CL**, Yuen KK, Yuen CH, Chong LC, Chu RW. Splenic laceration after endoscopic retrograde cholangiopancreatography. *Hong Kong Med J* 2008; **14**: 145-147 [PMID: 18382023]

26 **Cortiñas Sáenz M**, Maldonado Hermosos G, Miota de Llama JI, Moreno Planas JM, Mayor López JC. [Rupture of the spleen following endoscopic retrograde cholangiopancreatography]. *Rev Esp Enferm Dig* 2010; **102**: 457-458 [PMID: 20617874 DOI: 10.4321/s1130-01082010000700016]

27 **Gaffney RR**, Jain V, Moyer MT. Splenic Injury and ERCP: A Possible Risk for Patients with Advanced Chronic Pancreatitis. *Case Rep Gastroenterol* 2012; **6**: 162-165 [PMID: 22679404 DOI: 10.1159/000337499]

28 **Paredes AH**, Williams AM, Vertrees AE, Womeldorph C. Splenic laceration following ERCP. *Endoscopy* 2013; **45** Suppl 2 UCTN: E221-E222 [PMID: 23945920 DOI: 10.1055/s-0033-1344021]

29 **Weaver JL**, Jones W, Miller KR. Life-threatening splenic rupture after endoscopic retrograde cholangiopancreatography. *Am Surg* 2014; **80**: E230-E231 [PMID: 25105376]

30 **Ahmad S**, Bragg D, Zaitoun AM, Lobo DN. A dangerous loop. *Clin Case Rep* 2016; **4**: 535-536 [PMID: 27190626 DOI: 10.1002/ccr3.563]

31 **Talukdar R**. Complications of ERCP. *Best Pract Res Clin Gastroenterol* 2016; **30**: 793-805 [PMID: 27931637 DOI: 10.1016/j.bpg.2016.10.007]

32 **Manoharan D**, Srivastava DN, Gupta AK, Madhusudhan KS. Complications of endoscopic retrograde cholangiopancreatography: an imaging review. *Abdom Radiol (NY)* 2019; **44**: 2205-2216 [PMID: 30809695 DOI: 10.1007/s00261-019-01953-0]

33 **Hauser G**, Milosevic M, Zelić M, Stimac D. Sudden death after endoscopic retrograde cholangiopancreatography (ERCP)--case report and literature review. *Medicine (Baltimore)* 2014; **93**: e235 [PMID: 25501087 DOI: 10.1097/MD.0000000000000235]

34 **Gromski MA**, Bick BL, Vega D, Easler JJ, Watkins JL, Sherman S, Lehman GA, Fogel EL. A rare complication of ERCP: duodenal perforation due to biliary stent migration. *Endosc Int Open* 2020; **8**: E1530-E1536 [PMID: 33140007 DOI: 10.1055/a-1231-4758]

35 **Sommariva C**, Lauro A, Pagano N, Vaccari S, D'Andrea V, Marino IR, Cervellera M, Tonini V. Subcapsular Hepatic Hematoma Post-ERCP: Case Report and Review of the Literature. *Dig Dis Sci* 2019; **64**: 2114-2119 [PMID: 31197631 DOI: 10.1007/s10620-019-05679-3]

Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA
Telephone: +1-925-3991568
E-mail: office@baishideng.com
Help Desk: https://www.f6publishing.com/helpdesk
https://www.wjgnet.com