Colonic diverticular perforation by a migrated biliary stent
A case report with literature review
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Abstract
Rationale: Plastic endobiliary stents, after endoscopic retrograde cholangiopancreatography, can get spontaneously dislocated from the common bile duct and migrate into the distal bowel. Most migrated biliary stents are removed with the passing of stool. However, migrated biliary stents can cause bowel perforation, albeit rarely, and surgical intervention may be required. Recently, we observed a colonic diverticular perforation caused by a migrated biliary stent, and we have reported this case with a review of the literature.

Patients concerns: A 74-year-old man presented with severe right lower quadrant pain after biliary stent insertion 1 month ago.

Diagnoses: Abdominal computed tomography revealed perforation of the proximal ascending colon by the migrated biliary stent, combined with localized peritonitis.

Interventions: Emergency diagnostic laparoscopic examination revealed penetration of the proximal ascending colon by the plastic biliary stent, and right hemicolecctionomy was performed.

Outcomes: On pathological examination, colonic diverticular perforation by the biliary stent was confirmed. The patient was discharged without any additional complications.

Lessons: Endoscopic retrograde cholangiopancreatography endoscopists must always be cautious of the possibility of stent migration in patients with biliary stents in situ. In cases of biliary stent dislocation from the common bile duct in asymptomatic patients, follow-up with serial, plain abdominal radiographs, and physical examination is needed until confirmation of spontaneous passage through stool. In symptomatic cases suggesting peritonitis, abdominal computed tomography scan confirmation is needed, and early intervention should be considered.

Abbreviations: CBD = common bile duct, CT = computed tomography, ERCP = endoscopic retrograde cholangiopancreatography, RLQ = right lower quadrant.

Keywords: biliary stent, bowel perforation, endoscopic retrograde, endoscopic retrograde cholangiopancreatography

1. Introduction
Endoscopic biliary stents have been widely used for internal biliary drainage during endoscopic retrograde cholangiopan-
aminotransferase levels of 85 IU/L, alkaline phosphatase levels of 156 IU/L, and gamma-glutamyl transferase levels of 1010 IU/L. Abdominal computed tomography (CT) revealed multiple CBD stones with bile duct dilation. ERCP was performed to remove the CBD stones, followed by endoscopic retrograde biliary drainage with a 10 Fr x 7 cm straight-type plastic stent inserted into the CBD to control acute suppurative cholangitis (Fig. 1). The patient was discharged without early complications. One month later, he presented with severe right lower quadrant (RLQ) pain. Physical examination revealed tenderness in the RLQ area with rebound tenderness. Laboratory findings revealed white blood cell counts of 8700/µL, hemoglobin levels of 14.5 g/dL, total bilirubin levels of 1.1 mg/dL, aspartate aminotransferase levels of 19 IU/L, alanine aminotransferase levels of 11 IU/L, alkaline phosphatase levels of 53 IU/L, gamma-glutamyl transferase levels of 99 IU/L, and C-reactive protein levels of 12.5 mg/dL. On plain abdominal radiography, the migrated biliary stent was found in the distal bowel (located in the RLQ)

![Figure 1](image1.png)

**Figure 1.** (A) Large amount of pus drained through the papilla. (B) After removal of the common bile duct (CBD) stone, a straight type plastic biliary stent inserted into the CBD to control acute suppurative cholangitis.

![Figure 2](image2.png)

**Figure 2.** On abdominal radiography, the migrated endobiliary stent (arrow) is noted in the right lower quadrant area.

![Figure 3](image3.png)

**Figure 3.** Abdominal computed tomography (CT) shows perforation of the proximal ascending colon with localized peritonitis by a migrated biliary stent.
Clinical features of colon perforation by migrated plastic biliary stent.

| Study                  | Age/sex | Risk factor          | Indication for ERCP                   | Type of biliary stent | Time to migration | Location of perforation | Treatment               |
|------------------------|---------|----------------------|---------------------------------------|-----------------------|------------------|------------------------|------------------------|
| D’Costa 1994[8]        | M/73    | N/A                  | CBD cancer                            | N/A                   | N/A              | Sigmoid                | Surgery                |
| Buty 1996[8]           | F/86    | Diverticulosis       | Pancreas head cancer with CBD invasion| N/A                   | N/A              | Sigmoid                | Sigmoidectomy          |
| Schaafsma 1998[8]      | F/77    | Diverticulosis       | Acute cholangitis with CBD stone      | Straight              | 6 mo             | Sigmoid                | Surgery                |
| Lenzo 1998[8]          | F/82    | Diverticulosis       | Acute cholangitis with CBD stone      | Straight              | 4 wks            | Sigmoid                | Surgical primary closure|
| Ståkson 2000[22]       | M/86    | N/A                  | Acute cholangitis with CBD stone      | Straight              | 2 yrs             | Sigmoid                | Surgical primary closure|
| Figueiras 2001[7]      | M/47    | N/A                  | Chronic pancreatitis with distal      | Straight              | 3 mo             | Sigmoid                | Removal through        |
| Klein 2001[14]         | F/70    | Diverticulosis       | CBD stone                             | Straight              | 3 yrs             | Sigmoid                | Surgery                |
| Elliott 2003[26]       | F/80    | N/A                  | Acute cholangitis with CBD stone      | Straight              | 4 mo             | Sigmoid                | Hartmann procedure     |
| Diller 2003[26]        | F/58    | Diverticulosis       | Post-LT bile duct structure           | Straight              | 1 mo             | Sigmoid                | Sigmoidectomy          |
| Welhelm 2003[22]       | F/85    | Diverticulosis       | CBD stone                             | Straight              | 5 mo             | Sigmoid                | Endoscopic removal     |
| Anderson 2005[25]      | F/80    | Diverticulosis       | CBD stone                             | Straight              | 3 mo             | Sigmoid                | Rectal resection       |
| Namdar 2005[26]        | F/65    | N/A                  | Post-cholecystectomy bile leakage     | Straight              | 1 mo             | Sigmoid                | Endoscopic removal     |
| Bagul 2010[32]         | F/79    | Diverticulosis       | Post-cholecystectomy bile duct structure | Straight              | 3 mo             | Sigmoid                | Endoscopic removal     |
| Jaffeby 2011[29]       | F/82    | Diverticulosis       | Post-cholecystectomy bile duct leakage| Straight              | 3 mo             | Sigmoid                | and clip closure        |
| Lankisch 2011[25]      | F/65    | N/A                  | Pancreas head cancer with CBD invasion| Straight              | 2 wks             | Sigmoid                | Surgery                |
| Malgras 2011[25]       | 73 y/o  | Diverticulosis       | Pancreas head cancer with CBD invasion| Straight              | 15 d             | Sigmoid                | Hartmann procedure     |
| Wagemakers 2011[25]    | F/76    | Diverticulosis       | CBD stone                             | Straight              | 15 d             | Sigmoid                | Sigmoidectomy          |
| Alcado 2012[25]        | M/73    | Diverticulosis       | CBD stone with benign biliary stricture| Straight              | 15 d             | Sigmoid                | Endoscopic removal     |
| Jones 2013[25]         | M/66    | N/A                  | Post-op CBD structure                 | Straight              | 3 mo             | Cecum                  | Endoscopic removal     |
| Mady 2013[25]          | M*      | Diverticulosis       | Pancreas head cancer with CBD invasion| N/A                   | 4 wks            | Sigmoid                | Hartmann procedure     |
| Virgilio 2013[25]      | Case 1, F | Diverticulosis    | CBD stone                             | N/A                   | N/A              | Sigmoid                | Hartmann procedure     |
|             | Case 2, F | Diverticulosis    | CBD stone                             | Straight              | N/A              | Sigmoid                | Endoscopic removal     |
| Chittelborough 2014[5] | M/73    | Diverticulosis       | Acute cholangitis with CBD stone      | Straight              | 3 mo             | Sigmoid                | Hartmann procedure     |
| Chou 2017[25]          | F/85    | N/A                  | Acute cholangitis with CBD stone      | Straight              | 1 mo             | Sigmoid                | Endoscopic removal     |
| Siaperas 2017[25]      | F/75    | Diverticulosis       | Post-op CBD structure                 | Straight              | 1 mo             | Sigmoid                | Hartmann procedure     |
| Riccanti 2019[25]      | F/79    | Diverticulosis       | CBD stone                             | Straight              | 4 wks            | Sigmoid                | Hartmann procedure     |
| Marcos 2020[25]        | F/65    | N/A                  | Chronic pancreatitis with distal biliary stricture | Straight              | 1 yr             | Sigmoid                | Surgical primary closure|
| Pengemá 2021[25]       | F/66    | N/A                  | Chronic pancreatitis with distal biliary stricture | Straight              | 4 d              | Appendix                | Appendectomy           |
| Tao 2021[25]           | M/54    | N/A                  | Acute cholangitis with CBD stone, biliary pancreatitis | Straight              | 3 mo             | Sigmoid                | Sigmoidectomy+cystotomy |
| Current case           | M/74    | Diverticulosis       | Acute supplicative cholangitis with CBD stone | Straight              | 1 mo             | Proximal ascending     | Rt. hemicolectomy      |

CBD = common bile duct, ERCP = endoscopic retrograde cholangiopancreatography, F = female, LT = liver transplantation, M = male, N/A = not available.

* Age, not available.

3. Discussion

Biliary stent migration can occur in 5% to 10% of patients with endoscopic biliary stenting. The risk factor for biliary stent migration from the CBD to the distal bowel has not yet been established. In a retrospective cohort study, biliary plastic stent migration occurred more frequently in benign biliary strictures than in malignant biliary strictures. Distal migration was associated with long stents, and proximal and postcholecystectomy strictures, whereas proximal migration was associated with short stents, and distal and non-postcholecystectomy strictures. Migrated plastic biliary stents in the large intestine, which have passed through the narrow diameter of the small intestine, rarely cause symptoms. Colon perforations due to migrated plastic biliary stents are very rare. The sigmoid colon was the most commonly involved segment. Bowel perforation by a dislocated endobiliary stent was associated with structural bowel abnormalities or variations, such as postoperative bowel adhesion, diverticulosis, hernia, or stricture.
The detailed clinical features of the colon perforation cases by distal migrated biliary stents are summarized in Table 1. A total of 30 cases of colon perforation, including the current case, were identified. Most cases were associated with colonic diverticulum (20 out of 30 cases), and the most commonly involved colonic segment was the sigmoid colon (25 sigmoid colon, 1 cecum, 1 ascending colon, 1 splenic flexure, 1 rectum, 1 appendix). A total of 22 cases required surgical treatment, and 8 patients recovered by medical treatment without surgery.

In conclusion, we report a case of perforation of the proximal ascending colon caused by a migrated biliary stent. ERCP endoscopists must always be cautious of the possibility of stent migration in patients with biliary stents in situ. In cases of biliary stent dislocation from the CBD in asymptomatic patients, follow-up with serial, plain abdominal radiographs and physical examination is needed until confirmation of spontaneous passage through stool. In symptomatic cases suggesting peritonitis, abdominal CT scan confirmation is needed, and early intervention should be considered.

**Author contributions**

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