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Case Series

Case series: endoscopic management of benign biliary stricture

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ABSTRACT

Iatrogenic bile duct injury has caused increased incidence of biliary stricture, caused by various surgeries of open, laparoscopic cholecystectomy, and transplantation procedures. Several standard procedures have been suggested to minimalize biliary tract injury and the associated morbidity from bile leakage and stricture. Endoscopic retrograde cholangiopancreatography (ERCP) has an essential role in treating biliary strictures by relieving symptoms of jaundice and cholangitis. We analyzed three cases with complaints of jaundice, itchiness, and occasional redness all over the body. The first patient had previously undergone laparoscopic cholecystectomy bile duct exploration (LCBDE) followed by stone extraction. The second patient had jaundice all over the body for two weeks before being admitted to the hospital. The patient also had a reactive hepatitis B and a history of cholecystectomy five months ago. The third patient had jaundice all over the body for the last week before being admitted to the hospital. Previously, the patient had complaints of abdominal pain and normal abdominal ultrasound. Management of benign biliary stricture (BBS) using ERCP with ballooning and plastic stent placement is effective, although repeat treatment is needed several times every 3-4 months for 1.5-2 years. Complications during follow-up were not reported, and clinical improvement was reported.

Keywords: Biliary stricture, ERCP, Morbidity, Plastic stent

INTRODUCTION

Biliary stricture is a narrowing of the intrahepatic segment or extrahepatic biliary duct system that obstructs bile flow, resulting in proximal dilatation. This condition causes significant morbidity due to clinical and pathological complications resulting from biliary obstruction. Biliary stricture incidence has increased mainly in iatrogenic bile duct injury, leading to surgical treatment. Injuries related to bile duct surgery include thermal injury, scissors, ligatures, clips, acute inflammation, or adhesions with fibrosis characteristics.[1] In the last decade, one emerging treatment that has been widely used for BBS is the endoscopic treatment. In most cases, the effective treatment is endoscopic management with stricture dilatation and stenting; in addition, it is also the first-line treatment of BBS.[2]

Endoscopy procedure with drainage, dilatation with ballooning, and STENT placement is part of services in the digestive department that experienced an increased number of patients at Dr. Moewardi hospital for the past 2 years. In 2020, there were 43 patients who underwent endoscopic retrograde cholangiopancreatography (ERCP), consisting of 38 patients with STENT procedure, 3 patients with ballooning and stones evacuation, and 2 patients with sphincterotomy. While in 2021, the number increased to 63 patients who underwent the ERCP procedure (48 patients with STENT procedure, 9 patients with ballooning and stones evacuation, and 6 patients with sphincterotomy. Until the end of November

2022, 78 procedures have been reported (56 patients with STENT, 10 patients with ballooning and stones evacuation, and 4 patients with sphincterotomy). For the management of BBS, ERCP or a percutaneous approach is preferred over surgery since it has low invasiveness, is more patient-friendly and repeatable.[2]

Case 1

A 55-year-old male patient came to the digestive surgery department of Dr. Moewardi hospital with complaints of jaundice, itchiness, and occasional rashes all over the body and tea-colored cloudy urine. Symptoms were felt two months after a LCBDE followed by stone extraction. The patient had a history of multiple stones in the vesica fellea, cystic duct, and ductus choledocus. Other symptoms included weight loss, fever, nausea, vomiting, and weakness. Histories of needle use or blood transfusion were denied. On physical examination, there was tenderness in the right hypochondriac with jaundiced skin and the appearance of erythematous macular lesions on several parts of the body. Magnetic resonance cholangiopancreatography (MRCP) examination showed an extra-biliary lesion with regular margins in the hepatorenal recess, the size of which was associated with the remainder of the gall bladder, leading to a *biloma* image. There was a narrowing near the ampulla of vater, 0.32 cm right IHBD dilatation, 0.28 cm left IHBD (normal <0.2 cm), and no visible stones.

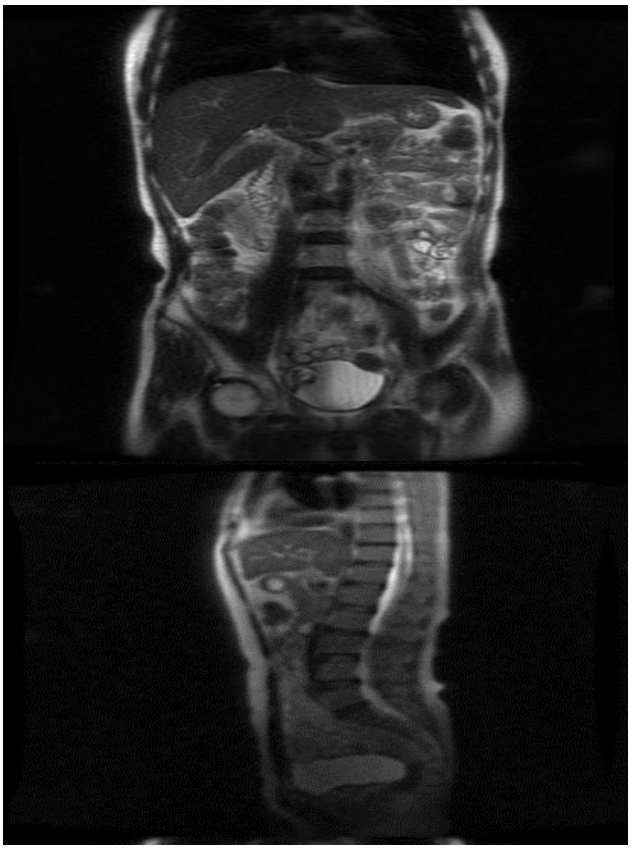

Figure 1: MRCP showed multiple sections of the abdomen evaluation.

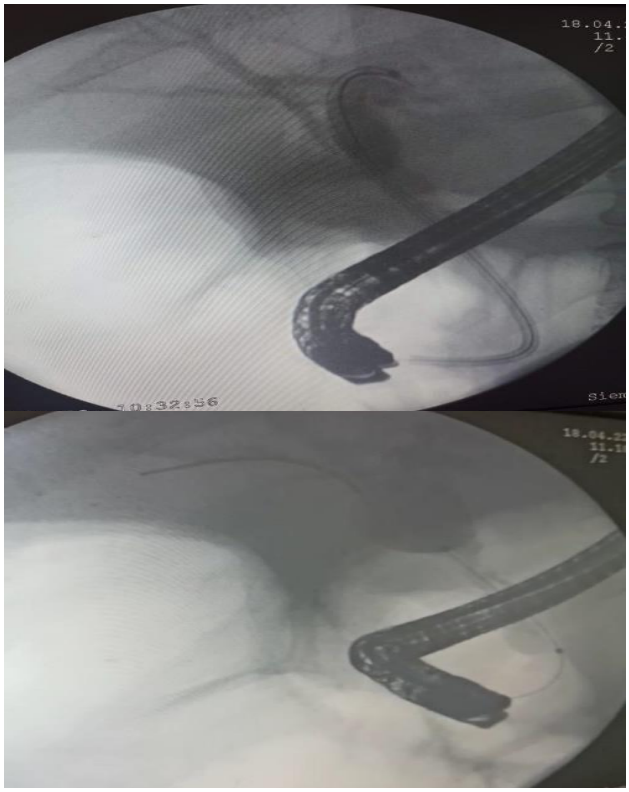

Figure 2: ERCP with ballooning and stent placement.

An ERCP procedure with the ampulla of vater cannulation after a successful cholangiography showed a strictured supraduodenal common bile duct (CBD). Widening of the stricture occurred when ballooning was performed. A 6-8 atm pressure was kept for 2 minutes in the CBD. Sphincterotomy was performed, followed by stricturoplasty with CME 10 (Serolymus eluting stent) Fr 12 Stent. Clinical evaluation and stent removal were then planned in 2 months. The clinical evaluation of post-CBD-stenting showed good results, as shown by improved symptoms of itchiness that began to disappear after 1 week and jaundice at 4 weeks. Blood examination 2 months post-CBD-stenting showed no abnormalities, normal liver function test, increased alkaline phosphatase by 153 u/l, increased total bilirubin by 1.27 mg/dl, direct bilirubin 0.76 mg/dl, and indirect bilirubin 0.51 mg/dl. ERCP was carried out after clinical evaluation; duodenoscopy identified the ampulla of vater, and stent removal was performed. Cholangiography showed a widening of the biliary duct and a narrowing of the CBD in the supra-duodenal region. Ballooning CRE 6-8 Fr 10 atm was conducted for 5 minutes. Widening of the stricture occurred following the ballooning.

Case 2

A 32-year-old man presented to the digestive surgery department of Dr. Moewardi hospital with chief complaint of jaundice all over the body for the last two weeks before being admitted. The patient had a reactive hepatitis B and a history of cholecystectomy 5 months

ago. Physical examination showed whole-body jaundice. Blood examination showed a mild increase in liver function (SGPT and SGOT) as well as total bilirubin (13.8 mg/dl), direct bilirubin (12.9 mg/dl), and indirect bilirubin (0.89 mg/dl). Ultrasound examination showed post-cholecystectomy with widened cystic duct following an open cholecystectomy, and normal size of the liver and pancreas.

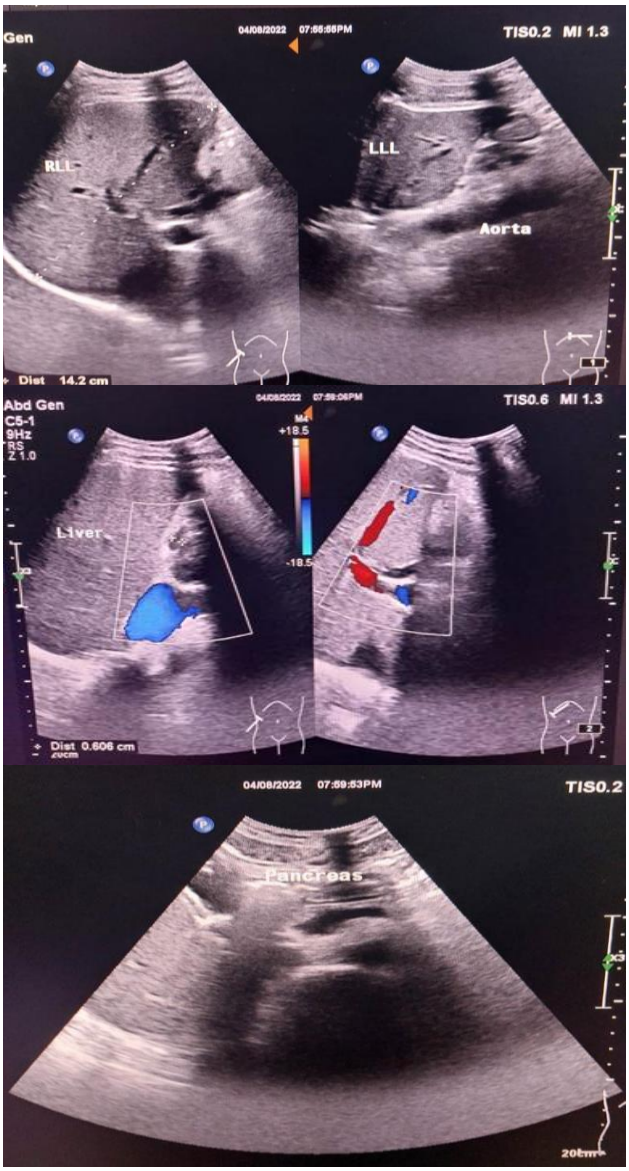

Figure 3: Ultrasound showed normal liver and pancreas size, no stones or gall bladder.

ERCP was performed, and the ampulla was identified through an endoscope. Cannulation was performed starting from the ampulla of vater. Aspiration of bile was performed; we also identified a narrowed common hepatic duct. Subsequently, dilation of the common hepatic duct with ballooning was performed. In the common hepatic duct, a 6-8 atm pressure was kept for 1 minute. A 9-cm-long 7 Fr biliary stent was inserted, and a smooth flow of bilirubin was identified.

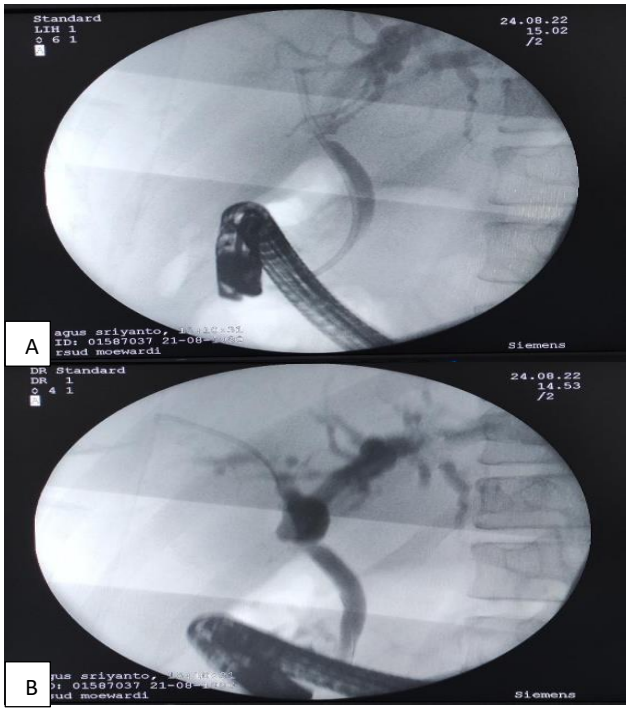

Figure 4 (A and B): Narrowing of common hepatic duct area and ballooning and stent placement in common hepatic duct.

Case 3

A 50-year-old male presented with complaints of jaundice all over the body, accompanied by itchiness and a history of epigastric and upper right abdominal pain. One week before admission, the patient had an ultrasound showing normal liver and pancreas results. The blood examination showed increased SGPT (136 mg/dl) and total bilirubin (38.76 mg/dl).

Figure 5: Ultrasound showed no identification of stones or masses.

ERCP was conducted for diagnosis and management. The results showed a narrowed common hepatic duct. Dilation of the common hepatic duct with ballooning was performed, with stent insertion afterwards. The pressure in the common hepatic duct area was kept at 6-8 atm for 30 minutes. The stent was 9 cm in length and 7 Fr biliary tunnel. The complaints had subsided on the third day, and the blood laboratory results returned to normal in the third week.

Figure 6 (A and B): Ballooning in the common hepatic duct and stent placement in the common hepatic duct.

DISCUSSION

Based on ERCP, the biliary stricture is a 1.5 mm diameter of stricture in the CBD and/or 1.0 mm in the hepatic duct within 2 cm of the main hepatic confluence.[3] ERCP is usually conducted to improve symptoms of jaundice and cholangitis. In BBS patients, it is also the first-line treatment. A guideline from the European society of gastrointestinal endoscopy (ESGE) reported a 90% possibility of multiple plastic stents insertions in benign strictures of the CBD. In postoperative biliary stricture patients, the reported post-stenting patency rate is up to 90%.[4]

In this case series, cases 1, 2, and 3 showed type 1 biliary stricture based on the Corlette-Bismuth classification, which defines a stricture in a low position of the bile duct. According to Strasberg's classification, this is a type A bile leak from the cystic duct or floor of the liver with no subsequent injury. The management of a biliary stricture may be conducted with a guiding wire using a balloon or bougie system. Balloon dilatation alone is considered inappropriate in the management of most cases. This is because post-ballooning scars can add to the traumatic effect with the development of new tissue.[5,8]

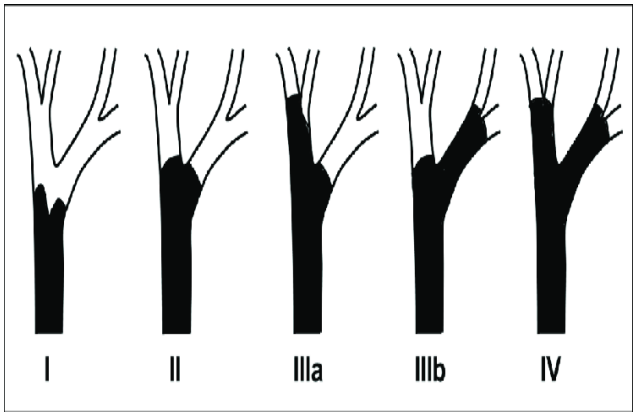

Figure 4: Corlette-Bismuth classification.[9]

For patients with bismuth I-II, the first choice is ERCP with dilatation and placement of multiple stents. Additional examinations may be beneficial to differentiate between benign and malignant strictures, including ERCP, intraductal ultrasonography (IDUS), intraductal forceps biopsy, and fine-needle aspiration biopsy. Based on several studies, IDUS may improve ERCP's accuracy to differentiate malignant and benign strictures by almost 90%.[10] MRCP was used in case 1, and abdominal ultrasound was used in cases 2 and 3 to analyze whether the mass was suspicious of malignancy. Prior to conducting ERCP, MRCP is very useful for planning treatments because it accurately defines the anatomy, site, and stenosis length of the biliary anatomy.[2,10]

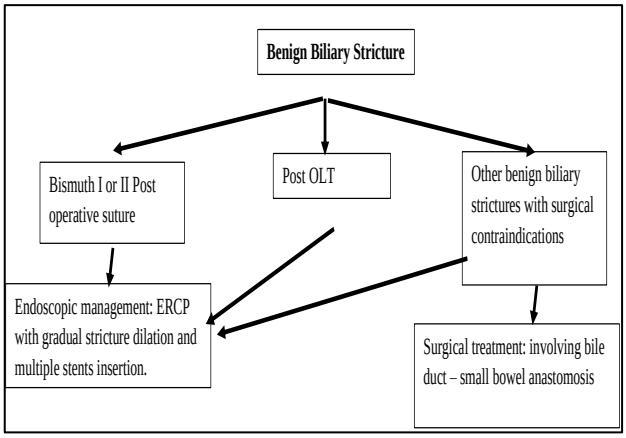

Figure 5: Flow-chart showing the management of BBS and use of ERCP.[2]

Several techniques are available to treat benign biliary structures with an endoscopy, including balloon dilation and stent placement, initial ballooning and dilatation

followed by one or more stent placements, or an FCSEMS. Using fluoroscopy for visualization, dilators can be passed over a guiding wire that traverses the stricture. The width of the bile duct near the stricture will determine the size of the dilator. The recommended duration of the dilatation of stricture is 30-60 seconds. In postoperative strictures and post-LCBDE or LC procedures, the stenosis tract may be asymmetric, angular, and heavily fibrous conditions. Guide-wire is selected in accordance with the morphology.[12] The commercially-available ERCP guide cables have different wire ends such as J-shaped, straight, tapered, or coiled. In this case, we used straight hydrophilic guide cables for the preferred type in the clinical setting.[6] To prevent migration, the balloon catheter is occasionally pulled or pushed to maintain a proper position. The balloon is inflated slowly with a pressure of 4-6 atm to achieve an effective dilation of the stricture/papilla. To achieve a properly stretched stricture, the inflation is kept for 15 seconds.[13]

The use of balloon dilatation followed by multiple stent placement is widely used. Mx et al divided the management of BBS with ERCP based on the cause. In cases 1, 2, and 3, dilation and placement of stents were carried out. The size of plastic stents varies from 1-18 cm, and the diameter is 1-12 French (Fr). In these three reported cases, we used a 10-Fr in diameter for the preferred BBS case to get bile flow, which is easily pushed because of the duodenoscopy. Straight plastic stents are widely used to confirm the anatomy of the biliary ducts and pancreas with anchoring side stents to prevent migration.[16]

Table 1: Endoscopic management recommendations for etiologies of benign biliary stricture.[19]

Conditions	Dilatation	≥1 plastic stent	FCSEMS
Chronic pancreatitis	-	+	+
Primary sclerosing cholangitis	+	-	-
Liver transplantation	-	+	+
Surgical injury	-	+	+
IgG cholangiopathy	-	+	-
Bilioenteric anastomosis	+	+	-

The use of plastic stents in these three cases was evaluated every three months. The recurrence rate for biliary stricture is approximately 20% after 3 months of plastic stent placement; this rate can be reduced by the replacement of the biliary stent with ERCP until complete resolution. Multiple stent replacement can reduce the recurrence rate of biliary strictures by up to 11%.[11] Biliary sphincterotomies are recommended to simplify repeat exchanges of the stent, placement of multiple plastic stents, and potentially re-hospitalization. Guide cables that are angled- or straight-ended are recommended for managing tight BBS. Deavere et al reported 187 patients with BBS due to chronic pancreatitis (CP), orthotopic liver transplantation (OLT), and biliary surgery. The follow-up in the study following a removal was 209 days. The resolution in patients with CP was 86%, OLT 68%, and post-cholecystectomy 100%. Overall, the resolution of the stricture occurred in 82%.[12] Stent placement was conducted following a balloon dilation (1-4 stents per patient, with an average of 1.6 stents placed together and an interval of 3 months exchange in 65 patients). Stents were placed for 14 months, and a follow-up was conducted for 28 months following stent removal. With ultrasound as a confirmation, the success rate was 69%, and normal liver function was also reported.[14,15]

CONCLUSION

Endoscopy is the first-line treatment for stricture-related surgeries (Bismuth I and II) (post laparotomy or laparoscopic, post-liver transplant, chronic pancreatitis that is difficult to treat), and for patients with other Benign biliary strictures. Ballon dilatation of benign biliary strictures followed by stent placement can effectively improve strictures.

In treating benign biliary strictures, therapeutic endoscopy is an essential treatment option. The management of biliary stricture using ERCP with a plastic stent and dilatation and ballooning is effective, although repeat procedures are needed several times every 3-4 months. Complications during follow-up were not reported, and clinical improvement was reported.

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Ethical approval: Not required

REFERENCES

1. Karanikas M, Bozali F, Vamvakerou V, Markos M, Zeinep TMC, Eleni E et al. Biliary tract injuries after lap cholecystectomy-types, surgical intervention and timing. Ann Transl Med. 2016;4(9):163.
2. Judah JR, Draganov PV. Endoscopic therapy of benign biliary strictures. World J Gastroenterol. 2007;13(26):3531-9.
3. Ferreira R, Loureiro R, Nunes N, António AS, Rui M, Marília C et al. Role of endoscopic retrograde cholangiopancreatography in the management of benign biliary strictures: What's new? World J Gastrointest Endosc. 2016;8(4):220-31.
4. Ma MX, Jayasekeran V, Chong AK. Benign biliary strictures: prevalence, impact, and management strategies. Clin Exp Gastroenterol. 2019;12:83-92.
5. Dumonceau JM, Delhaye M, Charette N, Farina A. Challenging biliary strictures: pathophysiological

features, differential diagnosis, diagnostic algorithms, and new clinically relevant biomarkers-part 1. Therap Adv Gastroenterol. 2020;13:1756284820927292.
6. Lillemoe KD, Melton GB, Cameron JL, Campbell KA, Talamini MA, Sauter PA et al. Postoperative bile duct strictures: management and outcome in the 1990s. Ann Surg. 2000;232(3):430-41.
7. Zoričić I, Soldo I, Simović I, Marko S, Branko B, Martin G et al. Common Bile Duct Stricture After Laparoscopic Cholecystectomy: Case Report. Acta Clin Croat. 2017;56(1):179-82.
8. Sicklick JK, Camp MS, Lillemoe KD, Melton GB, Yeo CJ, Campbell KA et al. Surgical management of bile duct injuries sustained during laparoscopic cholecystectomy: perioperative results in 200 patients. Ann Surg. 2005;241(5):786-92.
9. Karanikas M, Bozali F, Vamvakerou V, Markos M, Zeinep TMC, Eleni E et al. Biliary tract injuries after lap cholecystectomy-types, surgical intervention and timing. Ann Transl Med. 2016;4(9):163.
10. Ma MX, Jayasekeran V, Chong AK. Benign biliary strictures: prevalence, impact, and management strategies. Clin Exp Gastroenterol. 2019;12:83-92.
11. Costamagna G, Tringali A, Mutignani M, Perri V, Spada C, Pandolfi M et al. Endotherapy of postoperative biliary strictures with multiple stents: results after more than 10 years of follow-up. Gastrointest Endosc. 2010;72:551-7.
12. Hair CD, Sejpal DV. Future developments in biliary stenting. Clin Experim Gastroenterol. 2013;6:91-9.
13. Paranandi B, Oppong KW. Biliary strictures: endoscopic assessment and management. Frontline Gastroenterol. 2017;8(2):133-7.
14. Kassab C, Prat F, Liguori C, Meduri B, Ducot B, Fritsch J et al. Endoscopic management of post-laparoscopic cholecystectomy biliary strictures. Long-term outcome in a multicenter study. Gastroenterol Clin Biol. 2006;30(1):124-9.
15. Vitale GC, Tran TC, Davis BR, Vitale M, Vitale D, Larson G. Endoscopic management of postcholecystectomy bile duct strictures. J Am Coll Surg. 2008;206(5):918-23.
16. Ma MX, Jayasekeran V, Chong AK. Benign biliary strictures: prevalence, impact, and management strategies. Clin Exp Gastroenterol. 2019;12:83-92.

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