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NEW CONCEPT

Temporary Trans-gastric Stent Deployment Over a 20 French Gastrostomy for Single-Stage Endoscopic Retrograde Cholangiopancreatography After Gastric Bypass

Gianfranco Donatelli[1] · Fabrizio Cereatti[1,2] · Andrea Spota[1,3] · Thierry Tuszynski[1] · David Danan[1] · Jean-Loup Dumont[1]

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Abstract

Introduction Treatment of pancreato-biliary disorders after gastric bypass is challenging due to altered anatomy. Several techniques have been proposed to overcome this condition; however, none has emerged as the gold standard treatment. Furthermore, a decision-making algorithm evaluating when and why apply one technique over another is still lacking.

Objectives To describe a novel trans-gastric approach to allow endoscopic retrograde cholangiopancreatography (ERCP) in Roux-en-Y gastric bypass (RYGB) anatomy soon after prior laparoscopic cholecystectomy (LC) and to propose a decision-making algorithm for selection of the most suitable technique according a tailored approach.

Setting Private hospital.

Methods Between January and March 2020, patients with Roux-en-Y gastric bypass anatomy referred to our tertiary center to undergo ERCP after recent laparoscopic cholecystectomy were retrospectively evaluated. A 20 french (Fr) gastrostomy was performed during cholecystectomy. A single-stage ERCP was carried out by means of temporary trans-gastric stent deployment over a 20 Fr gastrostomy.

Results A total of 5 patients (mean age 41; mean body mass index 48.3) were enrolled. ERCP was performed after an average of 2 days from surgery. Technical and clinical success was achieved in 100%. No adverse events occurred. Spontaneous closure of the gastrostomy after its bedside removal was observed in all cases.

Conclusions Our approach allows to perform a single-stage ERCP in RYGB patients, early after LC, with no need of any other re-interventions. Any surgeon facing unexpected biliary disorders, during LC, can easily perform a 20 Fr gastrostomy thus allowing the patient to undergo early ERCP without any delay.

Keywords Gastrostomy · SEMS · ERCP · RYGB · CBD stones · Laparoscopic cholecystectomy

Introduction

Laparoscopic Roux-en-Y gastric-by-pass (RYGB) is one of the most commonly performed bariatric procedures worldwide [1]. Both morbid obesity and rapid weight loss are known risk factors for development of gallstone and choledocolithiasis. It has been reported that up to 36% [2] patients develop gallstone after RGBY and, that 5.3% patients with choledocholithiasis will require pancreato-biliary interventions [3]. Furthermore, morbid obesity can also lead to an increased incidence of pancreato-biliary cancers [4]. However, RYGB anatomy makes endoscopic retrograde cholangiopancreatography (ERCP) technically difficult. Single-stage LC with CBD exploration (CBDE) is feasible and superior to ERCP + LC in terms of technical success and length of hospital stay. Aforementioned technique requires high expertise, longer procedural time, and instruments availability [5]. Therefore, in daily practice, a 2-stage LC and ERCP (pre- or post-LC) is still commonly practiced. This is

✉ Gianfranco Donatelli
donatelligianfranco@gmail.com

[1] Unité d'Endoscopie Interventionnelle, Hôpital Privé des Peupliers, Ramsay Santé, 8 Place de l'Abbé G. Hénocque, 75013 Paris, France

[2] Gastroenterologia ed Endoscopia Digestiva ASST Cremona, Cremona, Italy

[3] Scuola di Specializzazione in Chirurgia Generale, Università degli studi di Milano, Milan, Italy

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mainly related to inadequate training in minimally invasive techniques, lack o technical support for efficient, and safe CBDE, and surgeons inexperience with complex biliary pathological conditions [6].

Percutaneous trans-hepatic cholangiography (PTC) is effective to guarantee biliary drainage and stone extraction even in RYGB anatomy. However, it is burdened with a rate of AEs up to 6.8%, namely bleeding, hemoperitoneum and cole-peritoneum, cholangitis, CBD, or duodenal perforation [7]. Moreover, dilation of the papilla is needed prior stone removal thus potentially increasing the risk of post-procedural pancreatitis [8]. Finally, technical success is low for multiple or large stones [7].

Several endoscopic approaches have been proposed to allow ERCP after RYGB: device-assisted (enteroscope) ERCP (DAE-ERCP) [9], laparoscopic-assisted ERCP (LA-ERCP) [10], or EUS-guided trans-gastric ERCP (EDGE) [11]. Unfortunately, none of aforementioned approaches has emerged as the gold standard because each of them presents some drawbacks. The aim of this study is to describe a novel technique for single-stage ERCP, early after laparoscopic cholecystectomy (LC), in patients underwent RYGB for morbidity obesity by means of temporary trans-gastric (TG) stenting across a 20 French (Fr) gastrostomy placed during cholecystectomy. This approach could be useful whenever an expert endoscopist is not available within the bariatric center. Besides, we propose decision-making algorithms to choose the most suitable technique for ERCP after RYGB.

Materials and Methods

A retrospective review of consecutive patients with RYGB undergoing ERCP after recent LC was performed. All patients underwent LC in a peripheral hospital where there was no availability of an expert endoscopist and were subsequentely referred to our center to undergo ERCP. The study had IRB approval. Informed consent was obtained from all patients. Patients were referred to our unit from 1 to 5 days (average 2 days) after index LC. Indications for ERCP were lithiasis of common bile duct (CBD) or biliary leak. CBD stones were diagnosed intra-operatively by means of trans-cystic cholangiography but CBD surgical exploration was never performed. Therefore, during LC, a 20 French catheter was inserted by the surgeon through a small gastrostomy (LG). Standard surgical technique was used to perform laparoscopic gastrostomy (LG) [12]. The gastrostomy was performed on the anterior wall of the angular region and the gastric wall was fixed to the abdominal wall (Fig. 1). ERCP was always performed in an interventional endoscopic suite with patient under general anesthesia. Pre-procedural antibiotic prophylaxis (Cefazoline 2Gr ev) was administered.

The procedural steps were (i) placement of a long guide wire in the stomach trough the trans-gastric catheter; (ii) if present, deflation of the balloon at the inside tip and over-the-wire removal of the catheter; (iii) over-the-wire percutaneous deployment of a fully covered self-expandable metal stent – 80 × 24 mm (FCSEMS) (Hanarostent, Seoul, South Korea) iv) anchorage of the external end of the stent with a Kocher forceps to avoid intraluminal dislodgement of the stent; (v) manual and hydrostatic balloon dilation of the stent up to 20 mm in order to allow easy crossing with a therapeutic duodenoscope. (TJF160VR/180 V/190 V Olympus, Tokyo, Japan) (Fig. 2).

Duodenoscopy was performed during the same session by an experienced endoscopist (GD > 500 ERCP/year).

CBD stones were extracted with standard devices and technique (Fig. 3). A biliary leak of the cystic stump was managed with sphincterotomy and removal of a small residual stone with no need of stent deployment. After endoscopy, TG FCSEMS was removed and a 20 Fr percutaneous endoscopic gastric tube (PEG) was inserted through the gastrostomy (Fig. 4). The PEG was removed 3 days after ERCP without

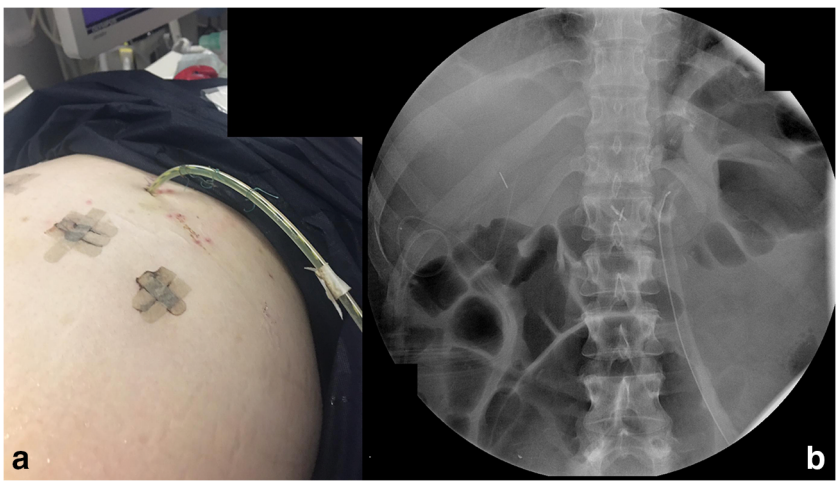

Fig. 1 **a** Laparoscopic gastrostomy with a 20 Fr catheter placed at the end of laparoscopic cholecystectomy. **b** Plain abdominal x-ray showing 20 Fr gastrostomy catheter in the gastric remnant

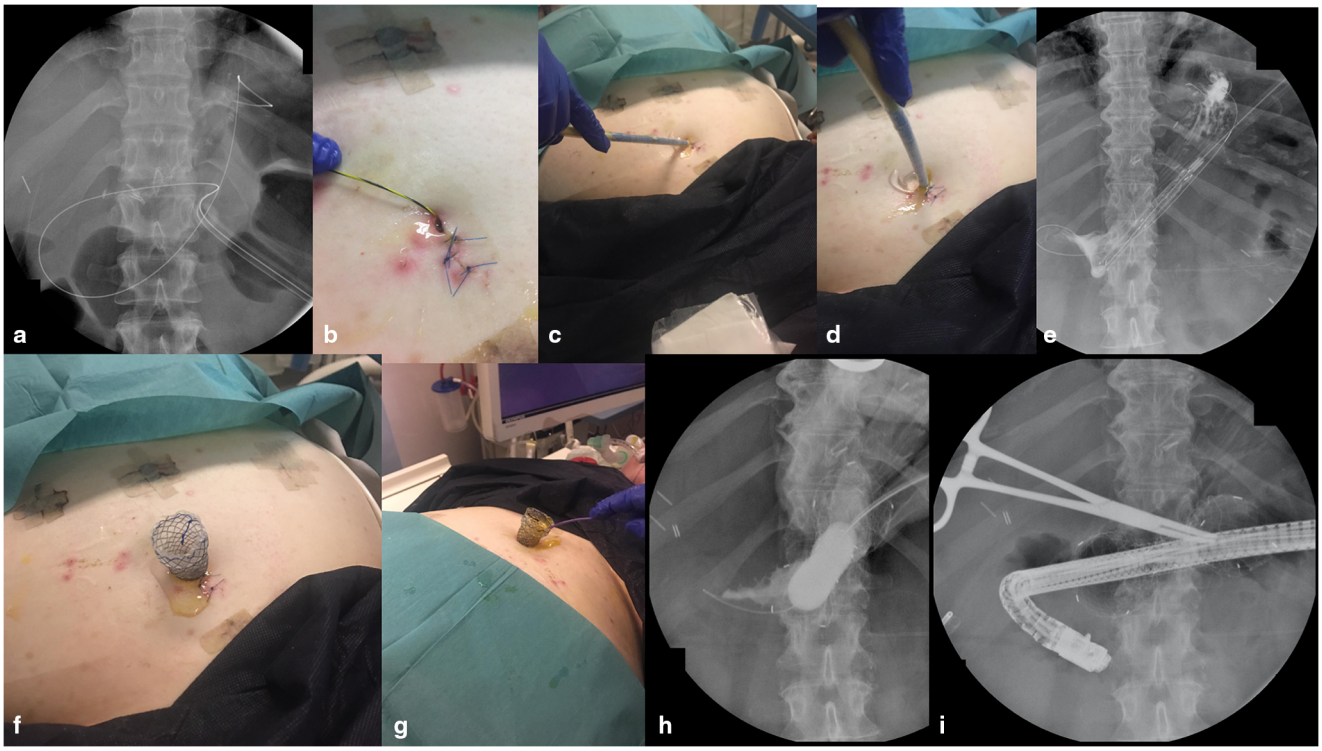

Fig. 2 **a**, **b** Insertion of a 450-cm long guidewire within the gastric cavity across the 20 Fr gastrostomy under fluoroscopic control. **c**, d, **e**, and **f** Over-the-wire deployment of a fully covered self-expandble metal stent (80 × 24 mm). **g**, **h** Hydrostatic balloon dilation of the FCSEMS up to 20 mm. **i** Anchorage of the stent with a Kocher forceps and performance of a trans-gastric ERCP with easy access to the ampullary region

any surgical closure of the access site. Medical examination was performed at 1 week and 1 month to confirm spontaneous closure of the gastrostomy.

Results

From January to March 2020, 5 patients were enrolled in the study. Study population consisted of 5 female with an average age of 41 years (SD ± 8.9) and an average body mass index (BMI) of 48.3 (SD ± 5.4). All patients had a previous RYGB performed at an average timespan of 17 months (SD ± 30.5) before index LC, whereas ERCP was carried out after a mean period of 2 days [1–5] after LC. Indications for LC were symptomatic cholelithiasis in 2 cases and acute cholecystitis in the remaining 3 cases. Two patients underwent elective LC, whereas 3 subjects had an urgent LC. LCs were performed with a standard technique and none of them were converted to

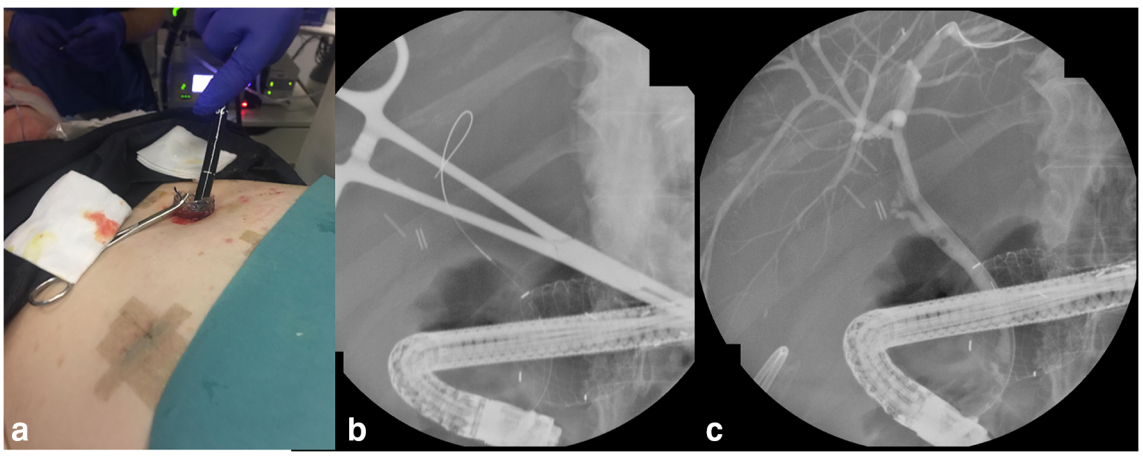

Fig. 3 **a** Endoscopic retrograde cholangiography across temporary trans-gastric SEMS deployed over 20 Fr gastrostomy, performed at index LC in a patient with RYGB. **b** Selective guidewire cannulation of the common bile duct. **c** Cholangiography showing a small leak of the cystic stump coupled with the evidence of a small stone at its confluence with the common bile duct

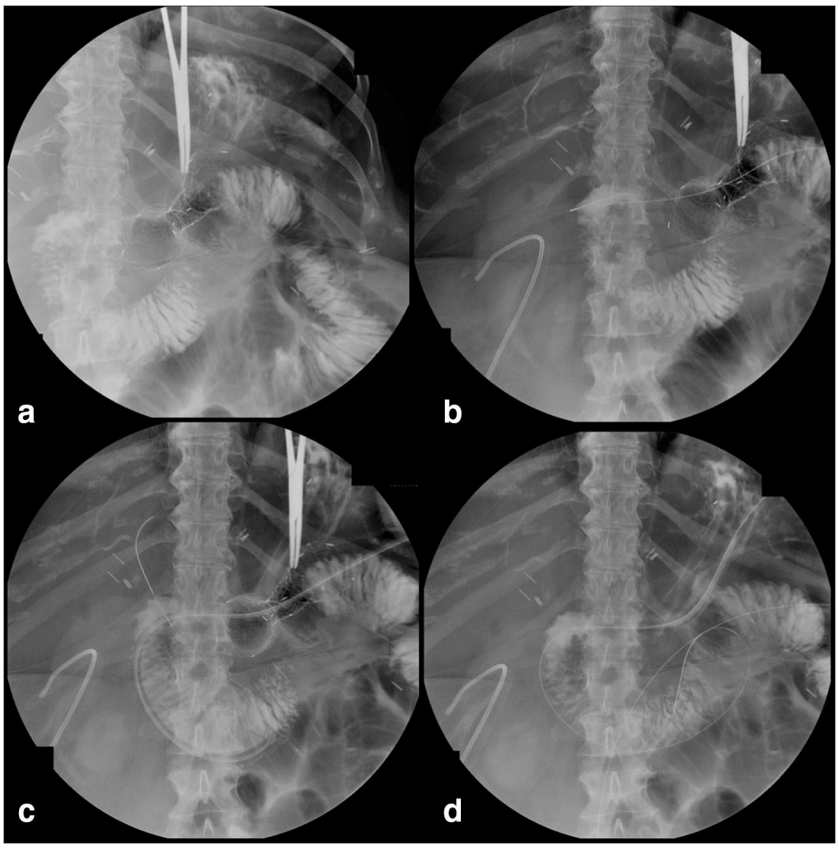

Fig. 4 **a** Fluoroscopy highlighting FCSEMS correctly in place at the end of ERCP. **b**, **c** Insertion of a 450-cm long guidewire across the stent. **d** Over-the-wire placement of a 20 Fr catheter with the gastric cavity in order to allow early endoscopic re-interventions if needed

open surgery. Only 1 patient had an external drainage. Intraoperative cholangiography (IOC) was performed in 4 out 5 patients. IOC failed in one procedure due to inability to laparoscopically insert the cannula within the cystic stump. Surgical common bile duct exploration was never performed. In all cases, a 20 Fr catheter was left inside the gastric cavity. This approach was agreed between referring surgeons and the endoscopist as a "salvage" technique in case of technical difficulties during LC.

No adverse events (AE) related to LC or LG occurred except for a small biliary leak. Such AE was suspected during LC due to the presence of strong adhesions and diffuse peritonitis. Therefore, in this case, the surgeon placed an external drainage under the liver. Drainage output dropped the day after ERCP and it was removed 2 days after ERCP.

The mean operative time of endoscopic procedure was 42 min (SD 11). Percutaneously trans-gastric stenting and dilation was uneventfully as well as therapeutic ERCP procedures (sphincterotomy and extraction of stones). Neither pneumoperitoneum nor post-ERCP pancreatitis (PEP) were reported. The PEGs were all removed after three uneventful days from ERCP as a bedside procedure and without surgical closure. Spontaneous closure of the gastrostomy access was confirmed in all case at 1 month of follow-up. No bleeding or leak was observed during the follow-up and no infection of port site occurred. At a mean follow-up of 54 days (SD ± 29.9) all patients are asymptomatic with normal liver function chemistry tests showing an appropriate weight loss (Table 1).

Discussion

RYGB is known to be a valid and safe bariatric procedure allowing permanent weight loss. However, rapid weight loss is a risk factor for development of gallstone and choledocholithiasis, most probably due to increased bile cholesterol saturation. Moreover, RYGB induce gallbladder hypomotility due to duodenal bypass thus further increasing the risk of gallstone formation [13].

Prophylactic cholecystectomy during RYGB is not indicated in asymptomatic patients [14, 15]. However, up to 10% [16, 17] of patients underwent to RYGB will need to undergo LC, and 6.5% will need CBD exploration [18].

Several techniques are currently available to manage pancreato-biliary disorders after RYGB.

DAE-ERCP requires specific instruments and proper endoscopic training. Overall technical success is low, ranging in literature from 60 to − 73% [13, 19]. The reasons for such a low technical success are length of the Roux-en-Y limb (not more than 150 cm in length) and forward viewing endoscope and absence of the elevator. Moreover, a long length and narrow diameter of the scope reduces the possibility to use

Table 1 Results of the study

	Sex	Age	BMI	Previous RYGB (months)	Timespan LC/ERCP (days)	Indication for LC	ERCP procedure time (minutes)	Follow-up (days)	AE
1	F	29	41.5	1	1	Acute cholecystitis	25	30	None
2	F	44	56.2	3	2	Symptomatic cholelithiasis	58	44	None
3	F	49	46.1	2	1	Acute cholecystitis	36	38	None
4	F	51	52.8	78	5	symptomatic cholelithiasis	45	113	None
5	F	32	44.9	1	1	Acute cholecystitis	46	45	None
Average		*41*	*48.3*	*17*	*2*		*42*	*54*	
SD ±		*8.9*	*5.4*	*30.5*	*2*		*11*	*29.9*	

BMI, body mass index; *RYGB*, Roux-en-Y gastric bypass; *LC*, laparoscopic cholecystectomy; *ERCP*, endoscopic retrograde cholangiopancreatography; *AE*, adverse event; *SD*, Standard Deviation

proper accessories. Furthermore, rate of PEP seems to be higher due to difficult cannulation [13]; and if the patient needs multiple ERCPs, such approach becomes very cumbersome. Currently, further developments are mandatory to improve the success rate of DAE-ERCP.

Endoscopic ultrasound-guided anterograde management of biliary stones after RYGB with trans-gastric puncture of the left liver has been described with a reported technical success of 67% [20]. This technique has the same disadvantage of PTC: technical difficulties in case of non-dilated intra-hepatic ducts, need to papilla dilation instead of sphincterotomy, inability to remove stones from the cystic duct, reduced success rate for bigger stones, and risk of bile leak at the puncture site.

More recently, EDGE has emerged as an interesting and valid approach to allow ERCP after RYGB [6]. It consists in performing an EUS-guided temporary anastomosis through the gastric pouch or jejunal limb with the excluded gastric remnant by means of lumen apposing metal stent deployment (LAMS) allowing subsequent ERCP with a standard duodenoscope [21]. EDGE has a high technical success rates ranging from 90 to 100% and a low rate of AE [7, 22]. In most cases, EDGE requires a two-stage approach; ERCP during the same session is feasible but coupled with a much higher risk of LAMS dislodgement/migration.

LA-ERCP consists in the introduction of the duodenoscope in the excluded stomach across a trans-gastric trocar during LC. Success rate ranges from 98 to 100% [5]. LA-ERCP showed no differences in AEs rate compared to standard ERCP. This approach has demonstrated to be effective and safe; however, it requires a close collaboration between surgeons and endoscopists with both teams coordinating in order to be in the same operating room at the same time.

An interesting comparative study evaluating cost-effectiveness of EDGE compared to LA-ERCP and DAE-ERCP highlighted a better performance of EDGE for management of biliary disorder after RYGB [22]. Sensitivity analysis demonstrated that this conclusion was robust to changes in important model parameters [23]. However, timespan of index surgery RYGB was not reported.

Standard surgical gastrostomy (SSG) with a 36 fr tube during LC in order to allow delayed trans-gastric ERCP has been described [14, 17, 24]. .Reported technical success rate reached 100% of cases. The technique requires to wait 3–4 weeks before attempting ERCP in order to allow gastrostomy maturation and safe dilations prior ERCP. Bleeding and gastric perforation has been described in literature after gastric port dilation [13], most probably due to suboptimal gastrostomy maturation. Finally, surgical closure of the gastrostomy is always needed at the end of endoscopic treatment.

In this study, we propose a trans-gastric ERCP across a temporary FCSEMS deployed during the same endoscopic session, over a 20 Fr gastrostomy tube placed during prior LC. Our technique may appear similar to any trans-gastric approach; however, it has some advantages over other approaches. Firstly, it allows to perform ERCP early after surgery. We reported a time span from index LC and ERCP ranging from 1 to 5 days. This is because the use of a FCSEMS across the gastrostomy permits to dilate the tract without waiting its maturation and simultaneously reducing the risk of pneumoperiteoneum, whereas "standard" trans-gastric ERCP requires a maturation period of the gastrostomy 4 to 6 weeks [13, 14]. Even with EDGE, most authors advise to wait some days before attempting ERCP in order to reduce the risk of LAMS dislodgement [15, 16]. Secondly, the FCSEMS is removed at the end of the ERCP and a 20 Fr catheter is inserted and kept in place for 2–3 days in order to guarantee an easy access if endoscopic re-intervention is needed. After this period, the gastrostomy tube is removed as a bedside procedure. LA-ERCP does not allow endoscopic re-interventions in case of post-procedural late ERCP-related AE, whereas EDGE requires repeated session to remove LAMS. The rate of spontaneous fistula closure after LAMS removal has been reported in literature as high as 76.7% of cases after a mean period of 6–8 weeks [8].

However, several techniques may be necessary to achieve definite fistula closure. Pigtail plastic stent deployment [16], argon plasma coagulation of the fistula [15], Over-the-Scope clipping or closure with a suturing device have been described in literature. These added endoscopic sessions could therefore increase overall costs of EDGE [6]. Even if some study [23] reported no weight regain after persistence of small chronic fistula the actual effect of EDGE on BMI has not yet been thoroughly evaluated. Furthermore, EDGE is not yet well accepted from patients and surgeons because it temporary reverses the metabolic effect of RYGB. "Creating a new gate" to the excluded stomach is not well seen especially if RYGB was recently performed or the patient is still losing weight.

Our technique does not require closure of the gastrostomy due to the small diameter of the gastric tube used and lack of consolidation of the tract, whereas failure of gastrostomy closure may be present in case of SSG that require bigger tubes (36 Fr) and tract consolidation.

Our approach allows to perform a single-stage ERCP in RYGP patients early after LC with no need of any other re-interventions. One limitation of our technique is that the surgeon has to decide the need for a subsequent ERCP during the LC in order to perform LG. Moreover, our approach cannot be applied if the need of ERCP arises after the end of the LC. However, any surgeon facing unexpected biliary disorders during LC, if not able to personally manage them, (lack of expertise in advanced hepatobiliary surgical maneuvers or lack of specific devices) can easily perform a 20 Fr gastrostomy thus allowing the patient to undergo early ERCP without any delay. Moreover, leaving the 20 Fr gastric tube in place for two 3 days after ERCP allows to manage any "day after" AE.

Considering the growing evidence that bariatric surgical procedure can be safely done in secondary hospitals [25] and that institutional requirements for accreditation from the European Chapter of International Federation for the Surgery of Obesity and Metabolic Disorder (IFSO-EC) do not demand mandatory availability of an expert endoscopist, our technique could be helpful to guarantee early biliary access in altered anatomy patients underwent to surgical treatment in peripheral hospitals.

Adequate management of hepato-bilio-pancreatic disorders after RYGB is of paramount importance but it may be very challenging. It requires a multidisciplinary approach with the different techniques adapted always to the experience of the bariatric surgeon and the co-working endoscopist. The "ideal"

Table 2 Pros and cons of the available approaches for the management of hepato-bilio pancreatic disorders in patients with Roux-en-Y gastric bypass

Technique	Pros	Cons
PTC	-No access port	-AEs at site puncture (bleeding, leak) -No dilation of intra haptic ducts -Impossibility to perform sphincterotomy -Pancreatitis for balloon papilla dilation -Day after AE management -2 procedures
DAE-ERCP	-No access port -1 procedure	-Requirement of special scopes -Inability to use standard devices (SEMS) -Difficult cannulation (forward view and lack of elevator) -Longer procedural time -Endoscopic expertise -Failure if afferent limb > 150 cm -Risk of perforation of anastomosis site
EDGE	-No access port -Pure endoscopic procedure	-Delay to perform ERCP (maturation of fistula site) -G-G/J-G fistula closure -More than 2 procedures in order to check fistula closure
LA-ERCP	-Exploration of the abdominal cavity -Single-stage (LC + ERCP) procedure	-Availability of the endoscopist in the OR -Day after AE management
TG-ERCP (Janeway)	-Cholecystectomy at the same time of closure of the site access -Day after AE management	-Delay due to Janeway confection (maturation o f the port access) -Need for surgery to close the access port 3 procedures
TG/ERCP (SEMS and 20 Fr gastrostomy)	-Cholecystectomy and ERCP in the same period -No maturation of the site access -Day after AE management -No need of surgery to close the access port	-2 procedures - Need to "plan" subsequent ERCP during LC

PTC, percutaneous trans-hepatic cholangiography; *DAE-ERCP*, device-assisted enteroscopy ERCP; *EDGE*, endoscopic ultrasound-directed trans-gastric ERCP; *LA-ERCP*, laparoscopy-assisted ERCP; *TG-ERCP*, trans-gastric ERCP; *G-G/J-G*, gastro-gastric/jejunal-gastric

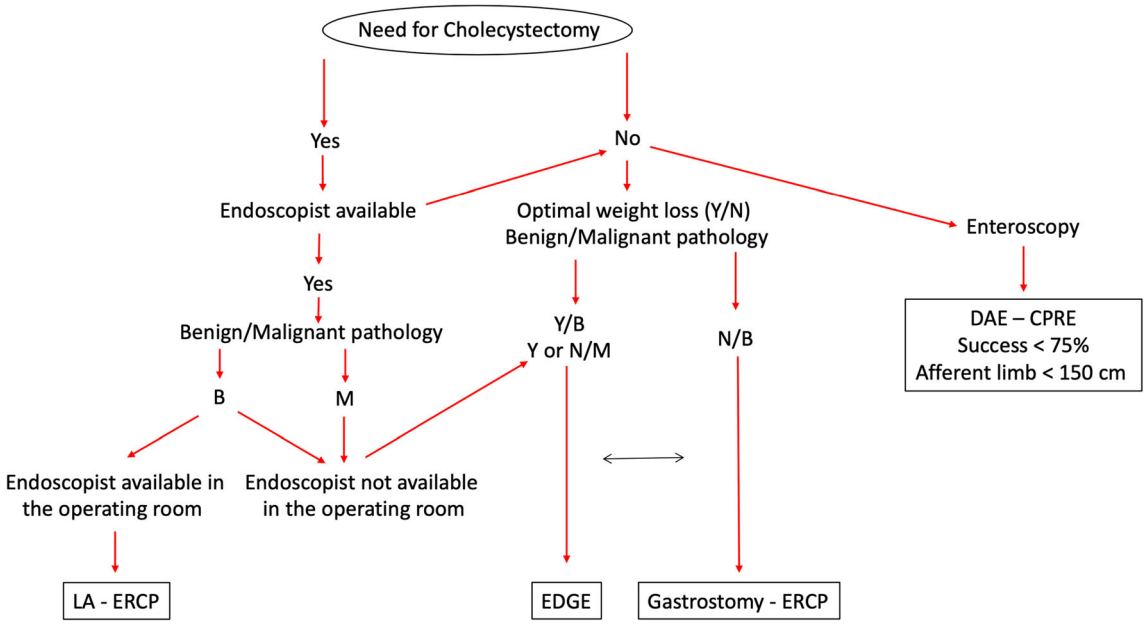

Fig. 5 Flowchart proposing a decision-making algorithm for the selection of the most suitable approach according to the following variables: (i) need for cholecystectomy, (ii) endoscopist availability, (iii) etiology (benign vs. malignant), and (iv) achieved weight loss (Y, Yes; N, No; B, benign; M, malignant; DAE-ERCP, device-assisted enteroscopy ERCP; EDGE, endoscopic ultrasound-directed trans-gastric ERCP; LA-ERCP, laparoscopy-assisted ERCP)

technique should be a single-stage minimally invasive procedure requiring a single operator. Each technique has its specific pros and cons (Table 2). The choice of the most suitable approach should be tailored according the following variables: previous cholecystectomy, endoscopist availability, etiology (benign vs. malignant—the latter potentially requiring multiple re-interventions), delay from index RYGB and urgency of the intervention. In our practice, we perform all the aforementioned techniques choosing each time the most proper one according to a tailored approach. We propose a decision-making algorithm that may help to choose the most suitable technique for ERCP after RYGB considering the different variables involved (Fig. 5).

Author's Contribution Gianfranco Donatelli: performed endoscopic procedure, managed patients, analyzed data, wrote the paper and performed critical revision of the manuscript for important intellectual contents, and made the final manuscript.

Fabrizio Cereatti, Andre Spota: analyzed data, wrote the paper, and performed critical revision of the manuscript.

Thierry Tuszynsky, David Danan, Jean-Loup Dumont: managed patients and performed critical revision of the manuscript.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Human and Animal Rights All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

References

1. Angrisani L, Santonicola A, Iovino P, et al. IFSO worldwide survey 2016: primary, endoluminal, and revisional procedures. Obes Surg. 2018;28:3783–94.
2. Shiffman ML, Sugerman HJ, Kellum JM, et al. Gallstone formation after rapid weight loss: a prospective study in patients undergoing gastric bypass surgery for treatment of morbid obesity. Am J Gastroenterol. 1991;86:1000–5.
3. Nagem RG, Lazaro-da-Silva A, de Oliveira RM, et al. Gallstone-related complications after Roux-en-Y gastric bypass: a prospective study. Hepatobiliary Pancreat Dis Int. 2012;11:630–5.
4. Calle EE, Rodriguez C, Walker-Thurmond K, et al. Overweight, obesity, and mortality from cancer in a prospectively studied cohort of U.S. adults. N Engl J Med. 2003;348:1625–38.
5. Singh AN, Kilambi R. Single-stage laparoscopic common bile duct exploration and cholecystectomy versus two-stage endoscopic stone extraction followed by laparoscopic cholecystectomy for patients with gallbladder stones with common bile duct stones: systematic review and meta-analysis of randomized trials with trial sequential analysis. Surg Endosc. 2018;32(9):3763–76. https://doi.org/10.1007/s00464-018-6170-8.
6. Helton WS, Ayloo S. Technical aspects of bile duct evaluation and exploration: an update. Surg Clin North Am. 2019;99(2):259–82. https://doi.org/10.1016/j.suc.2018.12.007.
7. Milella M, Alfa-Wali M, Leuratti L, et al. Percutaneous transhepatic cholangiography for choledocholithiasis after laparoscopic gastric

bypass surgery. Int J Surg Case Rep. 2014;5(5):249–52. https://doi.org/10.1016/j.ijscr.2014.03.003.
8. Weinberg BM, Shindy W, Lo S. Endoscopic balloon sphincter dilation (sphincteroplasty) versus sphincterotomy for common bile duct stones. Cochrane Database Syst Rev. 2006;4:CD004890.
9. Emmett DS, Mallat DB. Double-balloon ERCP in patients who have undergone Roux-en-Y surgery: a case series. Gastrointest Endosc. 2007;66(5):1038–41. https://doi.org/10.1016/j.gie.2007.06.056.
10. Bowman E, Greenberg J, Garren M, et al. Laparoscopic-assisted ERCP and EUS in patients with prior Roux-en-Y gastric bypass surgery: a dual-center case series experience. Surg Endosc. 2016;30(10):4647–52. https://doi.org/10.1007/s00464-016-4746-8.
11. Ngamruengphong S, Nieto J, Kunda R, et al. Endoscopic ultrasound-guided creation of a transgastric fistula for the management of hepatobiliary disease in patients with Roux-en-Y gastric bypass. Endoscopy. 2017;49(6):549–52. https://doi.org/10.1055/s-0043-105072.
12. Bankhead RR, Fisher CA, Rolandelli RH. Gastrostomy tube placement outcomes: comparison of surgical, endoscopic, and laparoscopic methods. Nutr Clin Pract. 2005;20:607–12.
13. Tønnesen CJ, Young J, Glomsaker T, et al. Laparoscopy-assisted versus balloon enteroscopy-assisted ERCP after Roux-en-Y gastric bypass. Endoscopy. 2020; https://doi.org/10.1055/a-1139-9313.
14. Dorman RB, Zhong W, Abraham AA, et al. Does concomitant cholecystectomy at time of Roux-en-Y gastric bypass impact adverse operative outcomes? Obes Surg. 2013;23(11):1718–26.
15. Warschkow R, Tarantino I, Ukegjini K, et al. Concomitant cholecystectomy during laparoscopic Roux-en-Y gastric bypass in obese patients is not justified: a meta-analysis. Obes Surg. 2013;23:397–407.
16. Altieri MS, Yang J, Nie L, et al. Incidence of cholecystectomy after bariatric surgery. Surg Obes Relat Dis. 2018;14(7):992–6.
17. Weiss AC, Inui T, Parina R, et al. Concomitant cholecystectomy should be routinely performed with laparoscopic Roux-en-Y gastric bypass. Surg Endosc. 2015;29(11):3106–11. https://doi.org/10.1007/s00464-014-4033-5.
18. Sneineh MA, Harel L, Elnasasra A, et al. Increased incidence of symptomatic cholelithiasis after bariatric Roux-en-Y gastric bypass and previous bariatric surgery: a single center experience. Obes Surg. 2020;30(3):846–50. https://doi.org/10.1007/s11695-019-04366-6.
19. Arapis K, Donatelli G, Tammaro P, et al. Janeway gastrostomy for trans-gastric ERCP: an emergency alternative method to access the excluded structures. Obes Surg. 2018;28(9):2916–7. https://doi.org/10.1007/s11695-018-3349-.
20. Weilert F, Binmoeller KF, Marson F, et al. Endoscopic ultrasound-guided anterograde treatment of biliary stones following gastric bypass. Endoscopy. 2011;43(12):1105–8. https://doi.org/10.1055/s-0030-1256961.
21. Ahmed AR, Husain S, Saad N, et al. Accessing the common bile duct after Roux-en-Y gastric bypass. Surg Obes Relat Dis. 2007;3(6):640–3. https://doi.org/10.1016/j.soard.2007.06.004.
22. Bukhari M, Kowalski T, Nieto J, et al. An international, multicenter, comparative trial of EUS-guided gastrogastrostomy-assisted ERCP versus enteroscopy-assisted ERCP in patients with Roux-en-Y gastric bypass anatomy. Gastrointest Endosc. 2018;88(3):486–94. https://doi.org/10.1016/j.gie.2018.04.2356.
23. Tyberg A, Nieto J, Salgado S, et al. Endoscopic ultrasound (EUS)-directed transgastric endoscopic retrograde cholangiopancreatography or EUS: mid-term analysis of an emerging procedure. Clin Endosc. 2017;50:185–90.
24. James HJ, James TW, Wheeler B, et al. Cost-effectiveness of endoscopic ultrasound-directed transgastric ERCP compared with device-assisted and laparoscopic-assisted ERCP in patients with Roux-en-Y anatomy. Endoscopy. 2019;51:1051–8.
25. Morgan DJ, Ho KM. A comparison of bariatric surgery in hospitals with and without ICU: a linked data cohort study. Obes Surg. 2016;26:313–20.