

Transgastric Endoscopic Retrograde Cholangiopancreatography for the Management of Biliary Tract Disease after Roux-en-Y Gastric Bypass Treatment for Obesity

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Abstract Roux-en-Y gastric bypass (RYGB) is an effective treatment for morbid obesity. However, it may lead to diseases of the bilio-pancreatic tract. We evaluated transgastric endoscopic retrograde cholangiopancreatography (ERCP) for managing common biliary tract diseases in patients that underwent RYGB treatment for obesity. This prospective study was conducted between 2003 and 2010 at three medical institutions. We included 23 patients with a mean body mass index of 28.2 kg/m² after RYGB treatment. ERCP was performed in all patients to manage biliary tract diseases within 9 to 27 months (mean 16.3 months) of RYGB surgery. The gastrotomy was conducted through the anterior wall of the greater curve of the excluded stomach. A duodenoscope was introduced in the direction of the ostomy to perform the ERCP with sphincterotomy. All patients underwent an ERCP and papillotomy without incident. Ten patients underwent

simultaneous cholecystectomy. A total of 17 gallstones were removed. The average gastrotomy duration was 92.69 min; the average hospital stay was 2 days. One patient had mild acute pancreatitis that resolved clinically. There was no mortality. Laparoscopy-assisted transgastric ERCP was feasible and safe for patients after RYGB. The necessary equipment is available in most bariatric surgery centers.

Keywords Bariatric surgery · Gastric bypass ·
Cholelithiasis · ERCP · Laparoscopy ·
Transgastric surgery

Introduction

In response to the obesity pandemic, bariatric surgery has become the gold standard for treating morbid obesity. In the last 10 years, Roux-en-Y gastric bypass (RYGB) has been the surgical technique of choice [1]. At present, approximately 140,000 of these procedures are carried out each year in the USA [1].

In patients with morbid obesity, the gallstone incidence is three to four times greater than in the general population [2]. Weight loss after RYGB predisposes the patient to the occurrence of gallstones, particularly in the first year. Up to 52 % of patients that undergo RYGB may be diagnosed with gallstones. Endoscopic retrograde cholangiopancreatography (ERCP) is considered the first line treatment for choledocholithiasis [3–5]. However, conventional access to the major ampulla is more difficult in this group of patients due to the tortuosity of the jejunum [6–8]. Considering the exponential increase in RYGB procedures and the related etiology of gallstones, attention has been focused on potential options for accessing the major ampulla [4].

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One potential option is to use laparoscopy for direct access to the excluded stomach. The aim of this study was to describe a technique for laparoscopic transgastric access, evaluate its feasibility in accessing the major ampulla, and perform ERCP in patients with biliary tract diseases after RYGB treatment for obesity.

Materials and Methods

This was an uncontrolled, prospective study that included 23 consecutive patients who had previously undergone laparoscopic RYGB. All patients developed benign complications of the biliary tract and were referred to ERCP.

Patient Characteristics

The majority of patients were female (19/23). The average age was 35.3 years. The mean body mass index (BMI) of the patients after bariatric surgery was 28.2 kg/m²; the average time elapsed between the RYGB and ERCP procedures was 16 months (Table 1). Some patients (10/23) were submitted to laparoscopic cholecystectomy as part of the same procedure (Fig. 1).

Table 1 Patient characteristics, including demographics, BMI, and time elapsed between bariatric surgery (RYGB) and ERCP

Patient no.	Age (years)	Gender	CVL trans operat.	BMI (kg/m ²)	Time between RYGB and ERCP (months)
1	35	W	Yes	33.1	9
2	29	W	Yes	29.8	13
3	33	W	No	25.4	21
4	31	M	Yes	29.1	10
5	36	W	No	30.3	16
6	42	M	No	27.8	17
7	32	W	No	31.7	11
8	28	W	No	22.4	23
9	31	W	No	28.3	19
10	27	W	Yes	29.2	13
11	44	W	No	24.1	22
12	29	M	Yes	31.3	14
13	34	W	No	30.2	15
14	39	M	Yes	31.2	26
15	28	W	No	24.3	20
16	33	W	No	29.3	17
17	38	W	Yes	26.4	20
18	44	W	Yes	27.6	27
19	32	W	No	25.6	16
20	37	W	Yes	27.5	12
21	31	W	No	30.1	8
22	47	W	No	28.6	15
23	52	W	Yes	25.5	12
	35.30	19F/4M	13N/10Y	28.2	16.34

W women, M men, RYGB gastric bypass Roux-en-Y, CVL laparoscopic cholecystectomy, BMI body mass index, ERCP endoscopic retrograde cholangiopancreatography

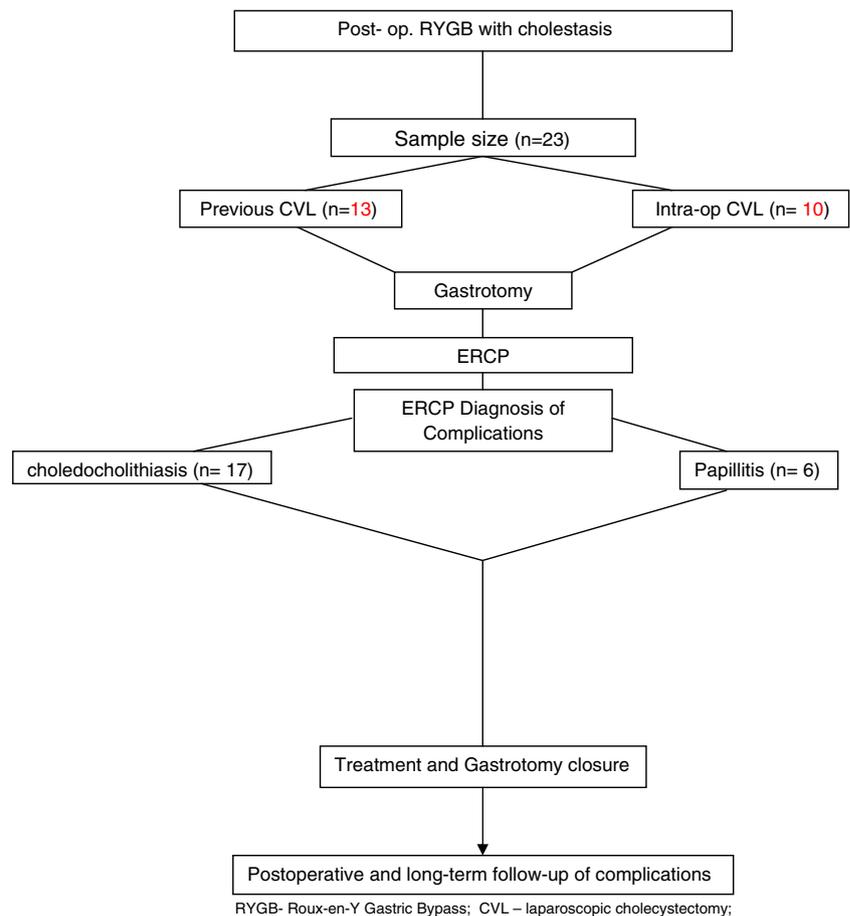
Technique: Anesthesia and Procedure

The ERCP procedure was performed with an Olympus® TJF-130 video duodenoscope with Boston Scientific/Micro invasive (Natick, MA, USA) and Wilson-Cook (Winston Salem, NC, USA) accessories. The standard laparoscopy was performed with 18-mm disposable trocars (Ethicon Endo-Surgery® Inc.) and three permanent surgical trocars. All procedures were conducted systematically under general anesthesia. All patients received antibiotic prophylaxis with first generation cephalosporin.

Laparoscopic access was achieved by first establishing a closed pneumoperitoneum with a Veress needle and then making four incisions. We inserted a 10-mm umbilical trocar for vision, a 12-mm trocar on the anterior axillary line in the left sub-costal region, and a 5-mm trocar in the right sub-costal region. The duodenoscope was introduced via a 15-mm trocar in the left sub-costal region. After identifying and dissecting any adherences on the anterior wall, gastrotomy was performed with a purse-string suture on the greater curve of the excluded stomach at a distance of 4 to 6 cm from the pylorus.

The duodenoscope was passed through the gastrotomy and progressed through the pylorus as far as the duodenal papilla (Figs. 2 and 3). The traditional method used for

Fig. 1 Flow chart showing the study sequence



papillotomy was performed for cannulation and treatment of the biliary and pancreatic ducts. We employed radioscopy and conventional accessories, including the cannula, a guide wire, an extractor balloon, and a basket. After conclusion of the ERCP, the gastrotoomy was closed in two planes with 3-0 prolene sutures. The trocars were removed under laparoscopic vision, and the incisions in the skin were sutured.

Statistical Analysis

The statistical analysis was performed with the Statistical Package for Social Science (SPSS Inc., Chicago, IL, USA, release 16.0.2, 2008). The results of quantitative variables

were presented as the mean \pm SD. Categorical variables were expressed as proportions (relative frequency).

Results

This prospective study evaluated a series of 23 patients that were treated with laparoscopic-assisted ERCP. The procedure resulted in a 100 % success rate (Table 2). The most common clinical pathology found was choledocholithiasis. The diagnosis was confirmed by magnetic resonance cholangiopancreatography, computed tomography (CT), and ultrasound scans. All 23 patients received an ultrasound

Fig. 2 The ERCP procedure. Introduction of the gastrotoomy duodenoscope; schematic drawing of access to the duodenum through the excluded stomach; endoscopic view via cannulation of the papilla

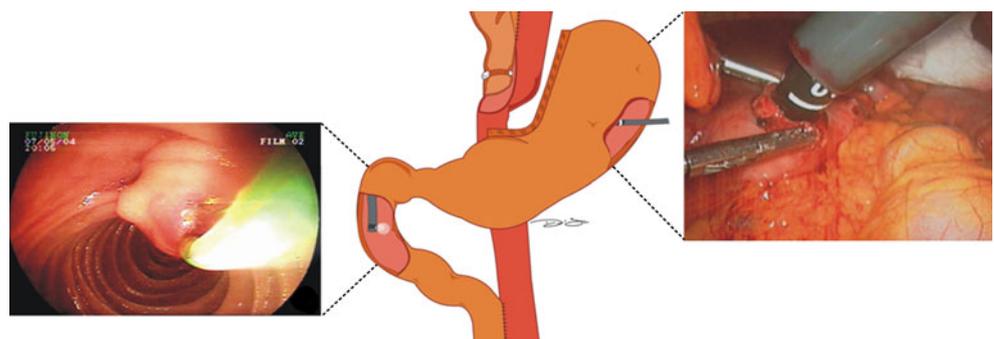


Fig. 3 Laparoscopic images of the sequence. *Left*—laparoscopic gastrostomy, *middle*—endoscopic gastrostomy route, *right*—gastrostomy closure



scan of the abdomen, but only four received a CT scan and magnetic resonance cholangiopancreatography.

In all cases, the ERCP procedure was concluded without intraoperative complications. Seventeen patients had common bile duct stones which were removed by sphincterotomy with laparoscopic-assisted ERCP. The papilla was swollen in six cases. Only one patient presented mild acute pancreatitis after ERCP, and that patient recovered uneventfully. In two patients who underwent cholecystectomy, antegrade catheterization of the cystic duct with a 0.035" guide wire allowed exteriorization of the wire through the papillary orifice and identification of the flat major ampulla. A needle-knife precut sphincterotomy was then executed over the exteriorized guide wire.

The mean duration of the procedure was 92.69 min and the mean period of hospitalization was 2 days. All 23 patients exhibited normal clinical results, laboratory results, and ultrasonographs of the biliary ducts at 3 and 6 months after the procedure (Fig. 1).

Discussion

Due to the large number of RYGB operations for treating obesity, laparoscopic approaches for ERCP are becoming more frequently reported. The interaction between the surgeon and the endoscopist is fundamental for the success of this procedure [9].

Table 2 Results of the ERCP procedure

Patient no.	Clinical indication	US findings	ERCP findings	Intervention	Surgical time (min)	Hospitalization (days)
1	CDL	Dilatation BT	CDL	SP + BSR	134	3
2	CDL	Dilatation BT	CDL	SP + BSR	142	3
3	CDL	Dilatation BT	CDL	SP + BSR	128	2
4	Cholecystitis	Dilatation BT	Papillitis	SP	125	2
5	CDL	Dilatation BT	CDL	SP + BSR	110	2
6	Obst. jaundice	Dilatation BT	Papillitis	SP	92	3
7	CDL	CDL	CDL	SP + BSR	85	2
8	Obst. jaundice	BT normal	Papillitis	SP	94	2
9	CDL	CDL	CDL	SP + BSR	78	2
10	CDL	CDL	CDL	SP + BSR	88	2
11	Obst. Jaundice	Dilatation BT	Papillitis	SP	55	2
12	Cholecystitis	Dilatation BT	Papillitis	SP	75	2
13	Cholecystitis	CCC	Papillitis	SP	60	2
14	Cholecystitis	CCC	CDL	SP + BSR	72	2
15	CDL	CDL	CDL	SP + BSR	67	2
16	CDL	Dilatation BT	CDL	SP + BSR	87	2
17	Cholecystitis	CCC	CDL	SP + BSR	80	1
18	Cholecystitis	CCC	CDL	SP + BSR	90	1
19	CDL	Dilatation BT	CDL	SP + BSR	45	1
20	CDL	CCC	CDL	SP + BSR	105	4
21	CDL	Dilatation BT	CDL	SP + BSR	120	3
22	CDL	Dilatation BT	CDL	SP + BSR	110	2
23	CDL	Dilatation BT	CDL	SP + BSR	90	2
	14/CDL	13/dilat. BT	17/CDL	17/SP + BSR	92.69	2.13

CDL choledocholithiasis, CCC cholecystitis, CVL laparoscopic cholecystectomy, BT biliary tract, SP sphincterotomy, Obst. jaundice obstructive jaundice, BSR bile duct stone removal

Due to the length of the afferent loop, ballooned enteroscopes and pediatric colonoscopes have been employed to carry out oral ERCP in patients after RYGB [10]. Wright et al. described ERCP in a gastric bypass that principally used forward-facing endoscopes [11]. Mosler et al. reported massive subcutaneous emphysema after an attempted ERCP with a pediatric colonoscope in a patient that previously underwent RYGB [12]. Two major limitations to the oral approach for a ERCP after RYGB are the sparse availability of adequate accessories for the execution of procedures on the papilla and the inverted position of the major ampulla [13].

In this series, the transgastric laparoscopic approach with a duodenoscope was 100 % successful in locating and examining the papilla. This was comparable to the results achieved by Nguyen et al. [14]. The first description of the transgastric approach was reported by Schapira et al. in 1975 [15]. Ceppa et al. treated 10 patients after RYGB with transgastric laparoscopic ERCP. Of those, five were diagnosed with biliopancreatic disease, and four (80 %) underwent a papillotomy with successful results [16]. Matlock et al. used a laparoscopic approach with a gastrotomy in 10 patients diagnosed with biliopancreatic disease after RYGB. They achieved 100 % success in the catheterization of the biliary tract [17].

In the present study, all patients underwent sphincterotomy with no serious complications. Lopes et al. presented a series of nine patients after RYGB who were treated with laparoscopic transgastric endoscopy. They reported a 90 % success rate in catheterization and a 100 % success rate for the sphincterotomy. Moderate pancreatitis occurred in two patients and intra-operative pneumothorax in one patient; all three complications were immediately resolved [18]. In this study, we observed one case of mild pancreatitis that was resolved clinically. Patel et al. presented a series of eight patients who had been treated for obesity with RYGB. Of those, six received open surgery and two received laparoscopy. The latter two patients subsequently underwent gastrotomy and transgastric ERCP with a 100 % success rate and no complications [9].

As expected, choledocholithiasis was the most common clinical diagnosis in the present series. Access to the biliopancreatic tract with laparoscopic assistance has been shown to be both safe and highly successful in patients after RYGB. The use of standard endoscopic equipment facilitates the procedure and also enables direct evaluation of the abdominal cavity for treating internal hernias or adhesions [18]. The complications described in other series were within acceptable limits. Despite the inherent risk involved in anesthesia and laparoscopic surgery, no mortality has been reported. The disadvantages of this approach are the need for a larger surgical/endoscopic team, the relatively long period required for execution, and consequently the higher cost [9, 13, 18].

Conclusion

This series of cases demonstrated that transgastric endoscopic retrograde cholangiopancreatography was feasible and safe for the management of biliary tract disease in patients treated with Roux-en-Y gastric bypass for obesity.

Conflict of Interest All contributing authors declare that they have no conflicts of interest.

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