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BRIEF COMMUNICATION

Laparoscopy-Assisted Trans-Gastric Rendez-vous for the Treatment of Common Bile Duct Stones in Patients with Prior Roux-en-Y Gastric Bypass

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Abstract
Background Common bile duct (CBD) stones in a Roux-en-Y gastric bypass (RYGB) represent a major challenge for ERCP due to long-limb anatomy. Trans-gastric approach has been proposed but entails high ERCP-related risks. Laparoscopy assisted trans-gastric rendez-vous (LATG-RV) is a one-step procedure that may lower the risks of these patients.
Methods We describe our initial experience in four patients with past history of RYGB and CBD stones.
Results All patients underwent LATG-RV and had successful CBD stone clearance. Postoperative course was uneventful with normal amylase levels. Average procedure time was 105 min and postoperative stay 2 days.
Conclusion LATG-RV is a safe and effective procedure for the clearance of CBD stones in RYGB patients. It may have fewer complications and shorter operative time than regular trans-gastric ERCP.

Keywords Gastric bypass · Choledocolithiasis · Rendez-vous · Trans-gastric ERCP · Common bile duct stones

Introduction

Obesity has experienced an epidemic growth worldwide during the last decades. In the USA, obesity prevalence is over 30 % and forecasts suggest a prevalence over 40 % for the year 2030 [1]. Bariatric surgery is the best available option for weight loss and the resolution of comorbidities. A Roux-en-Y gastric bypass remains one of the most commonly performed procedures [2].

Rapid weight loss following the gastric bypass is associated with up to 35 % of gallstone formation [3]. Ten to 18 % of those undergoing cholecystectomy for gallstones also have common bile duct (CBD) stones

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representing a major challenge in patients with Roux-en-Y anatomy [4]. Multiple options for the management of these patients have been proposed, but the final therapeutic decision relies on the availability of experts in laparoscopic, endoscopic, or interventional radiology procedures.

The duodenoscope is the ideal instrument for endoscopic retrograde cholangiopancreatography (ERCP) because of its lateral vision and elevator system. However, per-oral ERCP in Roux-en-Y anatomy patients is a challenging procedure with a success rate of 33–67 %. This success rate is even lower in patients with long Roux-en-Y limbs as gastric bypass patients [5]. Laparoscopy assisted trans-gastric (LATG) ERCP has the advantage to perform the laparoscopic cholecystectomy at the same time and also to explore the abdomen for internal hernias, a frequent cause of recurrent abdominal pain in Roux-en-Y gastric bypass (RYGB) patients [6].

ERCP has high success in CBD stones clearance, but it entails well-known and potentially fatal risks. Pancreatitis, bleeding, retroperitoneal perforation, and even tension pneumothorax have been reported in LATG-ERCP. Precut was one of the major technical risk factors [7, 8].

Trans-cystic guided cannulation of the papilla (rendez-vous procedure) has been proposed to increase selective cannulation and reduce ERCP complications. In a recent randomized study, rendez-vous procedure had a higher selective cannulation rate and reduced ERCP-related pancreatitis when compared to the regular two-stage approach [9].

For RYGB patients, most reports perform direct access to the papilla in trans-gastric ERCP and a few perform percutaneous-assisted cannulation [5, 7, 8]. To our knowledge, we present the first case series of LATG rendez-vous for the access of the CBD in these patients.

Methods

Patients

Retrospective study that included all patients with CBD stones and previous RYGB (2–8 years before admission) who presented in our institution between 2014 and 2016. We regularly screen for gallstones and perform selective cholecystectomy in all patients undergoing bariatric surgery. These patients were stone free at the time of the RYGB. Roux limb length was 100–150 cm in all patients.

A CBD stone assessment was performed by magnetic resonance cholangiopancreatography (MRCP) or ultrasonography and then confirmed by intraoperative trans-cystic cholangiography.

Description of the Procedure

Patients were placed on the operating room in a Lloyd-Davies modified supine position; pneumoperitoneum was established and four trocars were installed. A general exploration of the Roux-en Y anatomy was performed and internal hernias were ruled out. The hepatocystic triangle was dissected in a regular fashion; the cystic duct was identified and clipped proximally. The cystic artery was clipped and cut, and the gallbladder was dissected partially out of the liver bed in its proximal 2/3. This is an important step since endoscopic insufflation can diminish the view for this dissection after ERCP is performed.

The cystic duct was partially cut and a trans-cystic cholangiography was done. If CBD stones were identified, LATG rendez-vous was performed. A purse-string suture was placed in the gastric antrum 5–8 cm proximal to the pylorus. The gastrotomy was created and a 15 mm laparoscopic port was inserted in the gastric remnant and secured with the purse string (Fig. 1). The duodenoscope was advanced into the duodenum, and the papilla was identified. Then the laparoscopic surgeon advanced a 0.035 in. radiopaque hydrophilic guide wire through the partially opened cystic duct until it appeared in the papilla (Fig. 1). This guide wire was then recovered with a Dormia basket through the duodenoscope working channel and extracted by the endoscopist.

A sphincterotome was then advanced over the guide wire into the scope working channel and then into the duodenal papilla by the endoscopist. The wire guides the sphincterotome into the CBD avoiding the pancreatic duct cannulation. Sphincterotomy and CBD clearance were performed in a regular fashion. Gastrotomy was closed with a two-layer interrupted intracorporeal suture. The cystic duct was then clipped and the cholecystectomy completed (an edited video of the full procedure is provided, VIDEO 1).

Results

Four patients were identified in the retrospective analysis. Average age was 51 years old and ASA score was 2 or 3. Mean time from the RYGB to the rendez-vous procedure was 4 years (range 2–8 years). (Table 1).

Three patients presented with abdominal pain to the emergency department and were diagnosed with cholelithiasis and choledocholithiasis, one of them presented with cholangitis. Average CBD stone size was 6 mm; three patients had multiple CBD stones.

The last patient was admitted for elective laparoscopic cholecystectomy with normal liver tests and CBD diameter. Operation was uneventful but she developed abdominal pain on PO day 2. MRCP revealed two residual CBD stones (5 mm).

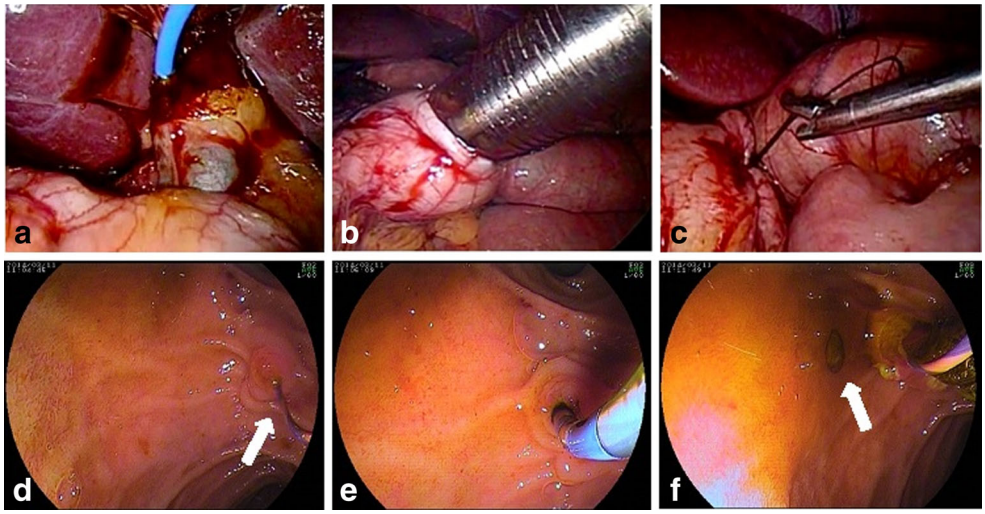

Fig. 1 Laparoscopy-assisted trans-gastric rendez-vous. Laparoscopic phase: **a** Cystic duct cannulation and guide wire installation. **b** Transgastric 15-mm trocar placement fixed with purse-string suture. **c** Laparoscopic gastrorraphy. Endoscopic phase: **d** The hydrophilic guide wire inserted through cystic duct appears in the papilla to assist the sphincterotome cannulation (*arrow*). The guide wire is grabbed with a dormia basket and extracted through the scope working channel by the endoscopist. **e** The sphincterotome is advanced over the guide wire into the scope working channel and then into the duodenal papilla for sphincterotomy. **f** Endoscopic bile duct clearance is performed in a regular fashion (*arrow*: biliary stone)

All patients underwent LATG rendez-vous; the papilla was cannulated with the described procedure and the CBD selectively assessed. No precut was needed. Stone extraction was performed with a Dormia basket or balloon. Cholangiography confirmed stone clearance in all cases. Average operative time was 105 min (range 70–150).

Patients stay NPO after the procedure, and the next day, they started a clear-liquid diet for 24–48 h if they didn´t have abdominal pain or nausea. Then they had a light diet for 1–2 weeks. Pain was managed with NSAIDs.

Postoperative course was uneventful; no pancreatitis or enzyme elevation was noted. Patients were discharged in postoperative day 2–4; stays longer than 2 days were due to management of comorbidities (one patient stayed 3 days because of difficult blood pressure control and the other stayed 4 days because of iv. antibiotics for cholangitis).

Discussion

There is a growing population of patients worldwide that have undergone a RYGB for morbid obesity. Up to 35 % of these patients will require a cholecystectomy for gallbladder stones, and a few may have choledocholithiasis or other CBD complaints [3]. However, routine cholecystectomy is not indicated in laparoscopic bariatric procedures [10]. The management of CBD stones is especially difficult in long Roux-en-Y limbs [5].

Multiple options have been purposed for the management of these patients:

1. *Per-Oral ERCP*: In experienced hands, overall success rates are around 67–90 %, and it is notably lower in long-limb patients [11, 12]. The use of double balloon

Table 1 Patient demographics and procedure time and morbidity

Patient demographics					Average
Patient #:	1	2	3	4	
Gender	Male	Female	Female	Male	50 %
Age	44	54	55	52	51
ASA score	2	3	3	2	2.5
Time from RYGB to ERCP (years)	3	8	2	4	4.2
Procedure					Average
Total procedure time (minutes)	150	80	70	120	105
Postoperative stay (days)	3	4	2	2	2.7
Morbidity	No	No	No	No	No
Largest CBD stone (mm)	6	6	5	8	6

enteroscopes has also been described to assess the gastric remnant in RYGB patients with success rates of 60–80 % [5, 13].

2. *Laparoscopic CBD exploration*: It is a one-stage procedure for cholelithiasis and choledocholithiasis. In high volume centers, it has similar morbidity and shorter hospital stay than conventional ERCP [14]. However, long term results to rule out CBD strictures are lacking especially in high-risk thin bile ducts.
3. *Trans-gastric ERCP*: It is one of the most frequently performed procedures in long Roux-en-Y limbs. All the reported series with this procedure used regular blind ERCP cannulation and described long operative times (3–4 h) [15]. Serious ERCP-related complications (retroperitoneal perforation with precut and pancreatitis) have been described [7, 8].
4. *Percutaneous management*: A gastrostomy is created percutaneously in the radiology or endoscopy suite. After maturation and dilatation, it can be used to access the duodenum with standard duodenoscopes [16]. It has the advantage that procedures can be repeated as needed but has the disadvantages of gastrostomy care and that it cannot be used for emergency procedures since maturation time is often long. Trans-hepatic access has also been described [17].

The term rendez-vous (from the French word, meeting) means the meeting of a guide wire passed through the cystic duct with the duodenoscope. This allows the sphincterotome to cannulate the papilla retrogradly guided through the trans-cystic wire, avoiding Wirsung cannulation [18].

This procedure helps ERCP success even in difficult cases (duodenal diverticula, low patient compliance, etc.…) since blind cannulation and precut are avoided [19]. The main complication of ERCP is acute pancreatitis, mostly related to inadvertent cannulation of the pancreatic duct and to the repeated trauma to the papilla during blind cannulation. Rendez-vous procedure guides the sphincterotome to the CBD reducing cannulation attempts and avoiding precut and miss-cannulation of the pancreatic duct [9, 20].

Rendez-vous procedure can be done open or laparoscopically and has demonstrated to reduce post-ERCP pancreatitis, decrease hospital stay, and increase selective cannulation in a randomized study [9]. Another advantage is that the laparoscopic cholecystectomy can be done in the same procedure lowering hospital costs [19]. This procedure is the best therapeutic option for high-risk ERCP patients such as young women, patients with altered anatomy, and patients with thin CBD; it is therefore the standard of care in our institution.

The main limitation of the LATG rendez-vous is that it requires the coordination and free availability of an endoscopist and the laparoscopic surgeon in the same operating room.

We present our initial experience in four RYGB patients with CBD stones. All stones were cleared through selective guided cannulation of the CBD and no complications were noted. Operative time for this initial experience was shorter than the other reported series using regular ERCP cannulation [15]. We understand the limitation of reporting a small series, but literature regarding this topic is also limited to small groups of patients. To our knowledge, this is the first case series of rendez-vous procedure for long-limb RYGB patients.

Conclusion

Laparoscopy-assisted trans-gastric rendez-vous appeared to be a safe and effective procedure for the clearance of bile duct stones in patients with previous RYGB. This technique should replace, when possible, the regular blind endoscopic cannulation of the papilla in LATG-ERCP in patients with Roux-en-Y anatomy.

Compliance with Ethical Standards

Founding Information This study was founded by our Department of Gastrointestinal Surgery, Pontificia Universidad Católica de Chile.

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

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

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