Laparoscopic-assisted transgastric endoscopic retrograde cholangiopancreatography for management of choledocolithiasis after mini-gastric bypass surgery

Mohammed Matar[a], Mahmoud Zakaria[a], Mohammed El Kady[b]

[a]Department of General Surgery, Ain Shams University, Cairo, [b]Department of Gastroenterology and Hepatology, Theodor Bilharz Research Institute, Giza, Egypt

Correspondence to Mohamed Mattar, MD, FACS, Department of General Surgery, Ain Shams University, Cairo, 653666, Egypt. Mob: 01000121033; fax: 0236598899; e-mail: moh.x.matar@hotmail.com

Received 1 April 2019
Accepted 17 April 2019

The Egyptian Journal of Surgery 2019, 38:558–562

Background
Gallstones commonly form after bariatric surgery owing to rapid weight loss. Choledocolithiasis is one of the dangerous sequelae of gallstones. Mini-gastric bypass (MGBP) excludes the biliary tree from traditional evaluation and treatment with endoscopic retrograde cholangiopancreatography (ERCP). This prevents ERCP to be done through the normal route.
Objective
To assess the feasibility and outcome of laparoscopic-assisted transgastric ERCP in patients with choledocolithiasis after MGBP for extraction of common bile duct (CBD) stones.
Patients and methods
A retrospective study was conducted on 15 patients who had gallstones discovered in the CBD after MGBP in five bariatric centers. Overall, 750 participants (BMI $>35\,kg/m^2$) were observed after undergoing MGBP over 2 years, and 10 of them were included in the study after being diagnosed with primary CBD stones and presented with jaundice during a period of 2 years after surgery. All patients were hospitalized, and gallstones were extracted laparoscopically through a transgastric approach except for two patients.
Results
Of 15 patients, 11were managed laparoscopically, and gallstones were extracted successfully. Four patients were converted to open surgery, but the scope was still used in three of them to extract the stones, and the last one underwent open CBD exploration.
Conclusion
Laparoscopic-assisted transgastric ERCP is an effective and safe way of management of choledocholithiasis in post-MGBP patients.

Keywords:
bariatric surgery, choledocholithiasis, common bile duct stone, gallstones, mini-gastric bypass

Egyptian J Surgery 38:558–562

1110-1121

Introduction

Obesity has become a major health problem all around the world [1]. It has been found to be related to many chronic diseases, including diabetes, hypertension, dyslipidemia, and sleep apnea [2].

Despite lifestyle modification, diet, and pharmacotherapy are different modalities used to manage obesity, bariatric surgery has proved to be one of the most effective methods of managing obesity and its comorbidities on the long term, especially when the BMI exceeds $35\,kg/m^2$ [3,4]. Bariatric surgery is now a gold standard in the management of morbid obesity with different types of procedures, with thousands of patients operated upon annually [5]. It helps patients lose weight, improve their quality of life, and reduce their obesity-related health problems in a cost-effective way [5,6].

Obesity compared with nonobesity in general is associated with higher prevalence of cholelithiasis, cholecystitis, pancreatitis, and cholecystectomies [7]. Although the risk of gallstone formation increases eight folds in patients with BMI more than $40\,kg/m^2$, it also increases five folds in patients who underwent bariatric surgery compared with normal population (~30% of postbariatric surgery patients experience choledocholithiasis) [8,9].

Rapid weight loss and other physiological changes that occur in the body after bariatric surgery cause cholelithiasis mainly owing to hypersaturation of bile with cholesterol and decreased motility of the

 DOI: 10.4103/ejs.ejs_69_19

gallbladder. Moreover, division of hepatic branch of the vagus nerve may be a cause of cholelithiasis as well [10].

Mini-gastric bypass (MGBP) has risen over the past years to become one of the accepted operations for management of obesity. It leads to alteration of anatomy. Cholelithiasis may be induced in 30% of cases following MGBP, which may be complicated by choledocolithiasis. This presents a technical challenge in management owing to difficulty in using endoscopic retrograde cholangiopancreatography (ERCP) after altering the anatomy with the MGBP [11].

Laparoscopic-assisted transgastric endoscopic retrograde cholangiopancreatography (LATERCP) is one of the approaches used to manage choledocholithiasis after MGBP surgery.

Objective

In our study, we aimed at assess the feasibility and outcome of LATERCP in patients with choledocolithiasis after MGBP for extraction of common bile duct (CBD) stones.

Patients and methods

This retrospective study was held in five bariatric centers in Egypt. The study was enrolled on patients who had MGBP between June 10, 2016, and July 10 2018. A total of 750 MGBP patient records were reviewed, and patients who experienced choledocolithiasis and jaundice after MGBP were recruited. Patients were examined by laboratory investigations of total bilirubin, direct bilirubin, and alkaline phosphatase. They were all assessed by ultrasound. Overall, 15 patients were found to have choledocolithiasis, of which 10 patients had cholelithiasis as well, and the rest had removed the gallbladder before or during the MGBP. All 15 patients were included and the outcomes of their procedures were recorded and studied. The end points of the study were the success of cannulation of the CBD and the extraction of the stone. A written informed consent was obtained from all patients before inclusion in the study. They were all offered the conventional open surgery as an alternative. Patients were informed about the purpose of the study, the benefits, the risks, and the adverse effects associated with the surgical intervention.

Operative technique

We followed almost the same technique in all patients. We had to change ports placement in patients who needed concomitant cholecystectomy. All procedures were performed under general anesthesia. Ports were inserted as follows: 5-mm port at the xiphisternum for liver retraction, 12-mm visiport 5 cm above umbilicus, 15-mm port at the left midclavicular line just below the costal margin, 5-mm port at the right midclavicular line in level with the visiport and 10 cm away from umbilicus, and a 5-mm port at the left anterior axillary line. An orogastric bougie of 42 F is inserted at the beginning of the procedure to decompress the stomach and to be used for examining the integrity of the stomach by the end of the procedure. Exploration of the abdomen followed by dissection of adhesions around the remnant stomach was done using Ligasure. Gallbladder was removed by the standard technique if the patient did not have previous cholecystectomy. Then, a gastrostomy was performed about 5 cm away from the pylorus, and a purse string was done using vicryl sutures to encircle the endoscope when inserted. The duodenoscope was introduced through the left 15-mm port on the left midclavicular line below the costal margin and directed to pass through the antral gastrostomy opening. The scope was introduced further to reach the duodenum and papilla followed by selective cannulation of the CBD through the papilla and dye injected. CBD stones were visualized, and sphincterotomy was done to allow extraction of stones. CBD was cleared from stones using extraction balloon, and no stents were inserted. Re-injection of dye was done to make sure extraction of all stones from CBD before withdrawal of the scope and closure of gastrostomy using vicryl sutures. Leakage test with methylene blue was done, and no drain is inserted.

Postoperative follow-up

All patients were advised to ambulate as early as possible. The duration of the surgical procedure, duration of hospital, complications, and relief of jaundice were recorded. They all received postoperative ceftriaxone for 3 days and were prescribed ursodeoxycholic acid for 6 months as prophylaxis for formation of stones. They were instructed to resume fluids after 24 h postoperatively after doing a contrast study. On discharge, patients were counseled to resume their dietary regimens as before surgery. Data collected were recorded and subjected to statistical analysis.

Results

From June 10, 2016, to July 10, 2018, a total of 15 patients (female : male=8 : 7) were included. The mean age was 39.75±5.43 years. The mean calculated BMI at

the time of operation was 35.62±4.51 kg/m^2. Time that passed for patients to develop choledocolithiasis had a mean of 7.32±3.11 months. Highest BMI was 42.43 kg/m^2. Operative time had a mean of 55.1 ±14.23 min. Length of hospital stay ranged from 1 to 4 days. Patients were followed up for 6 months afterward (Table 1).

LATERCP was offered to the 15 patients; 11 procedures were successfully completed laparoscopically, and four procedures were converted to open surgery because of dense adhesions in two patients, bleeding in one patient, and failure of cannulation in one patient. In those patients, endoscope was still used to complete the procedure after control of bleeding or dissection of adhesions upon open conversion. Open CBD exploration was avoided in those cases to avoid its related complications. The only case that needed CBD exploration was the case of failed ampullary cannulation owing to dense adhesions at the level of the ampulla. Interestingly, we found out that only two patients of the 15 were offered ursodeoxycholic acid after their primary MGBP. None of our patients had ERCP-related pancreatitis or perforation, and we had no mortalities at 30 days postoperatively (Table 2).

Table 1 Perioperative patients' descriptive data

Patients' data (*N*=15)	Mean±SD	Minimum	Maximum
Age (years)	39.75±5.43	27.00	49.00
Time since MGBP (months)	7.32±3.11	4.30	13.00
BMI (kg/m^2)	35.62±4.51	29.79	42.43
Total bilirubin (mg/dl)	6.43±2.22	4.51	9.33
Direct bilirubin (mg/dl)	4.89±1.33	3.72	8.78
Length of stay (days)	1.92±1.15	1	4
Operative time (min)	55.10±14.23	30	87
Sex [*n* (%)]			
Male		7 (46.6)	
Female		8 (53.3)	

MGBP, mini-gastric bypass.

Table 2 Perioperative data

Perioperative data	Number of patients of the study group (*N*=15) [*n* (%)]
Previous cholecystectomy	5 (33.33)
Patients put on ursodeoxycholic acid after MGBP	2 (13.33)
Concomitant cholecystectomy with LATERCP	10 (66.66)
Conversion to open procedure	4 (26.66)
Complications related to gastric access	0 (0)
Successful ERCP with ampullary cannulation	14 (93.33)
Difficult adhesions	2 (13.33)
Bleeding	1 (6.66)
Failure of ampullary cannulation	1 (6.66)
ERCP-related pancreatitis	0 (0)
ERCP-related perforation	0 (0)
Procedure-related mortality	0 (0)

ERCP, endoscopic retrograde cholangiopancreatography; MGBP, mini-gastric bypass.

Discussion

Bariatric surgeries may be a major cause of rapid weight loss and subsequent formation of gallstones and choledocholithiasis especially, within the period of 12–18 months postoperatively. In 2005, Caruana *et al.* [12] reported that gallstone formation after gastric bypass is mostly asymptomatic, so prophylactic cholecystectomy should not be adopted routinely.

MGBP is considered to be one of those surgeries that alter the anatomy of the digestive tract, leading to difficulty in management of biliary tract diseases. Therefore, so many techniques have been proposed over the years to manage CBD stones after bypass surgeries [13].

Literature review has revealed many alternatives of management of biliary diseases like LATERCP, open bile duct exploration, or even percutaneous transhepatic cholangioscopic lithotomy. Baron and Vickers described creating a gastrostomy to make the gastric remnant accessible. This was followed by ERCP through this gastrostomy [14]. Later, double balloon-assisted endoscopic retrograde cholangiopancreatography (DBERCP) was introduced and allowed examination of the entire small bowel. However, comparing both techniques revealed more effectiveness in accessing the pancreaticobiliary tree with the ERCP via gastrostomy in patients after bypass surgeries. This was hindered by delay in gastrostomy maturation and relevant higher complications rate [15].

On 2014, Baron *et al.* [16] performed percutaneous endoscopic gastrostomy and placed self-expandable metal stents to allow immediate transgastric ERCP. Moreover, Schreiner and colleagues showed that laparoscopy-assisted ERCP was more effective than DBERCP in gastric bypass patients where biliopancreatic limb is 150 cm or longer. In patients where biliopancreatic limb is less than 150 cm, DBERCP should be considered as the first line of management [17]. Of course, this would be difficult to apply in patients who underwent MGBP.

Another technique was tried by Mrtinez-Baena *et al.* [18], laparoscopic CBD exploration followed by antegrade biliary stenting for CBD stones, and was found to be effective and safe.

Lee and colleagues also tried percutaneous transhepatic cholangioscopic lithotomy as an alternative therapy for patients with biliary stones who are not fit for surgery or those who underwent gastrectomy. They found that it was an easy, safe and useful technique in the management of CBD stones, especially that it allowed direct visualization of the stones. However, it had limitations such as having a long duration of procedure, difficulty in extracting large stones owing to lack of sphincterotomy and decreased likelihood of complete CBD clearance in cases of multiple stones. So, in many center, it was preserved for patients who were unfit for conventional endoscopic procedures [19].Our experience in the management of choledocolithiasis and jaundice during the 2-year period after MGBP has led us to the fact that the use of LATERCP is very beneficial and we could manage to solve the problem in eleven out of 15 patients laparoscopically. We believe that it should be adopted especially in patients who are planned for concomitant laparoscopic cholecystectomy. We still do not believe that routine cholecystectomy should be performed with the primary MGBP unless there is simultaneous cholelithiasis detected by symptoms and ultrasound.

Our technique was very simple and did not need advanced equipment. We managed to introduce the scope in 11 patients out of 15 laparoscopically, and even when four patients were converted to open, we could manage to still introduce the scope in three of them to complete the procedure without the need for CBD exploration. We also did this within around an hour of time. It is an easy and not time consuming procedure. We failed to introduce the scope and cannulate the papilla in one case only due to extensive adhesions after previous open cholecystectomy which caused a distorted papilla. Although not many literature studies discuss this technique after MGBP, our results are still consistent with the few studies we found. All patients were prescribed to continue on ursodeoxycholic acid daily for 6 months after LATERCP and were all followed up for 6 months after surgery, and no reported case of cholelithiasis was found in them. Of course, we need to perform more procedures on a larger number of patients, but the primary results are encouraging and promising. We will also try to improve the long-term follow-up of the patients.

We believe that surgeons providing bariatric surgeries should be aware of LATERCP as a means of biliary system clearance in cases of choledocolithiasis as those patients are vulnerable to formation of stones even if they undergo cholecystectomy. The need for LATERCP is increasing as the number of patients getting MGBP and Roux en Y bypass is increasing, which necessitates all surgeons to be aware of the procedure.

Conclusion

A group of post-MGBP patients is expected to develop CBD obstruction and will require management. LATERCP is a feasible and easy-to-learn single-step technique that could be used to manage such patients as an alternative to transoral ERCP.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1 Doll S, Paccand F, Bovet P. Body mass index, abdominal adiposity and blood pressure: consistency of their association across developing and developed countries. Int J Obes Relat Metab Disord 2002; 26:48–57.

2 Field AE, Coakley EH, Must A. Impact of overweight on the risk of developing common chronic diseases during a 10-year period. Arch Intern Med 2001; 161:1581–1586.

3 Lau DC, Morrison KM, Kramik IM. Obesity Canada clinical practice guidelines expert panel. CAMJ 2007; 176:S1–S13.

4 Clquitt JL, Pickett K, Loverman E. Surgery for weight loss in adults. Cochrane Database Syst Rev 2014; 8:CD003641.

5 Buchwald H, Oien DM. Metabolic/bariatric surgery Worldwide 2008. Obes Surg 2009; 19:1605–1611.

6 Adams TD, Gress RE, Smit SC. Long-term mortality after gastric bypass surgery. N Eng J Med 2007; 357:753–761.

7 Torgerson JS, Lindroos AK, Naslund I. Gallstones, gall bladder disease and pancreatitis: cross-sectional and 2-year data from the Swedish Obese Subjects (SOS) and SOS reference studies. Am J Gastroenterol 2003; 98:1032–1041.

8 Grover BT, Kothari SN. Biliary issues in the bariatric population. Surg Clin North Am 2014; 94:413–425.

9 Jonas E, Marsk R, Rasmussen F, Freedman J. Incidence of postoperative gallstone disease after antiobesity surgery: population-based study from Sweden. Surg Obes Relat Dis 2010; 6:54–58.

10 Shiffman ML, Sugerman HJ, Kellum JM, Brewer WH, Moore EW. Gallstone formation after rapid weight loss: a prospective study in patients undergoing gastric bypass surgery for treatment of morbid obesity. Am J Gastroenterol 1991; 86:1000–1005.

11 Frederiksen NA, Tveskov L, Helgstrand F, Naver L, Floyd A. Treatment of common bile duct stones in gastric bypass patients with laparoscopic transgastric endoscopic retrograde cholangiopancreatography. Obes Surg 2017; 27:1409–1413.

12 Caruana JA, McCabe MN, Smith AD, Camara DS, Mercer MA, Gillespie JA. Incidence of symptomatic gallstones after gastric bypass: is prophylactic treatment really necessary? Surg Obes Relat Dis 2005; 1:564–567.

13 Richardson JF, Lee JG, Smith BR, Nguyen B, Pham KP, Nguyen NT. Laparoscopic transgastric endoscopy after Roux-en-Y gastric bypass: case series and review of the literature. Am Surg 2012; 78:1182–1186.

14 Baron TH, Vickers SM. Surgical gastrostomy placement as access for diagnostic and therapeutic ERCP. Gastrointest Endosc 1998; 48:640–641.

15 Dapri G, Himpens J, Buset M, Vasilikostas G, Ntounda R, Cadiere GB. Video laparoscopic transgastric access to the common bile duct after Roux-en-Y gastric bypass. Surg Endosc 2009; 23:1646–1648.

16 Baron TH, Song LM, Ferreira LE, Smyrk TC. Novel approach to therapeutic ERCP after long limb Roux en Y gastric bypass surgery using transgastric self-expandable metal stents: experimental outcomes and first human case study. Gastrointest Endosc 2012; 75:1258–1263.

17 Schreiner MA, Chang L, Gluck M. Laparoscopy-assisted versus balloon enteroscopy-assisted ERCP in bariatric post-Roux-en-Y gastric bypass patients. Gastrointest Endosc 2012; 75:748–756.

18 Mrtinez-Baena D, Parra-Membrives P, Diaz-Gomez D, Lorente-Herce JM. Laparoscopic common bile duct exploration and antegrade biliary stenting: leaving behind the Kehr tube. Rev Esp Enferm Dig 2013; 105:125–130.

19 Lee JH, Kim HW, Jeon UB. Usefulness of percutaneous transhepatic cholangioscopic lithotomy for removal of difficult common bile duct stones. Clin Endosc 2013; 46;65–70.