

Long Term Outcomes after Laparoscopic Assisted Trans-Gastric Endoscopic Retrograde Cholangiopancreatography

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ABSTRACT

Background: The gastric bypass is a commonly performed bariatric procedure. The stomach is divided into a small pouch as well as leaving a larger remnant that is bypassed by the gastrojejunal anastomosis. This makes access to the biliary system difficult as an endoscope cannot transverse the esophagus, roux limb, and biliopancreatic limb. Therefore, a transgastric approach (endoscopic retrograde cholangiopancreatography [t-ERCP]) through the abdominal wall and remnant stomach is necessary. This involves the surgical team providing access to the remnant stomach for the gastroenterologist to perform the t-ERCP. We have performed a number of these for biliary pathology that ranges from cancer to retained gallstones. We evaluated these patients with at least a 3-year follow-up to determine long term outcomes.

Methods: We conducted a chart review of patients who underwent a t-ERCP with at least a 3-year follow-up. We collected de-identified data including demographics, operative details, complications, and postoperative courses.

Results: There were 12 patients who underwent t-ERCP. Eleven patients had at least a 3-year follow-up with a mean follow-up of 68.1 months (excluding one death from pancreatic cancer). The most common pathology was benign biliary stricture (n=6), followed by retained gallstones (n=4), with one pancreatic cancer, and one

normal examination. Two patients still had epigastric pain at long term follow-up after 3 years.

Conclusion: T-ERCP is safe and efficacious with good long-term results.

Key Words: ERCP, Transgastric ERCP, Roux-en-Y gastric bypass, Laparoscopy, Transgastric, Common bile duct stones.

INTRODUCTION

The Roux-en-Y gastric bypass (RYGB) is the second most commonly performed metabolic and bariatric surgery (MBS) in the United States after the sleeve gastrectomy.¹ The RYGB involves dividing the stomach, which leaves a remnant that is not accessible by per-oral endoscopic techniques. This makes access to the remnant stomach difficult, but not impossible. It can still be accessed by interventional radiology, double balloon enteroscopy, or by a transgastric approach.² Open transduodenal sphincterotomy is another way to access the Sphincter of Oddi but is now rarely used.³ An additional way that it can be accessed is via a lumen apposing metal stent (LAMS) between the gastric pouch and gastric remnant.⁴ One of the most common reasons to access the remnant stomach is biliary pathology, whether calculous disease or neoplasms. Since an endoscopic retrograde cholangiopancreatography (ERCP) is not possible through an oral route after RYGB, these patients are uniquely suited for a trans-abdominal, transgastric approach. Previous studies have demonstrated good success rates of cannulation of the bile duct using this technique with acceptable low complication rates and good results.⁵⁻⁷ Transgastric ERCP (t-ERCP) has been well described in the literature regarding technique, indications, and outcomes; but there is a lack of published data on long-term outcomes.⁸⁻¹⁰

Abdominal pain after RYGB can have many causes besides biliary.^{11,12} These causes range from internal hernias, bowel obstructions, marginal ulcer formation, and intussusception. This can make the evaluation of

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abdominal pain in RYGB quite extensive, and may include imaging studies and even diagnostic laparoscopies. T-ERCP is an important technique to evaluate biliary causes of abdominal pain after RYGB. The long-term results after t-ERCP regarding biliary complications should be the same as a traditional ERCP; however, the laparoscopic abdominal portion of the procedure has the potential to cause a different set of complications. This was one of the reasons we decided to study this group of patients.

There are alternate methods to access the biliary tree at our institution, but our preferred method is t-ERCP. Despite successful t-ERCP, these complex patients can have persistent, chronic abdominal pain. Based upon our experience with patients in our practice, we decided to evaluate all of our patients who underwent t-ERCP with at least a 3-year follow-up. Our research question was: did the t-ERCP resolve their pain in the long-term?

METHODS

We conducted a retrospective chart review of patients who underwent a t-ERCP with at least 3-year follow-up at a single institution. A single bariatric surgeon performed the surgeries, and to our knowledge no other t-ERCPs were performed at the hospital during this time period. We collected de-identified data including demographics, indication for t-ERCP, operative details, and any follow-up symptoms. The de-identified data was entered into an Excel spreadsheet (Microsoft, Redmond WA), which was also used to perform basic statistical analysis. We used both the clinic and hospital electronic health records and reviewed follow-up visits. If the patient did not have a documented recent follow-up visit, at least 2 attempts were made to contact the patient by phone.

The t-ERCP was performed with a 12 mm camera port supra-umbilically, a 12 mm right upper quadrant working port and a 5 mm right subcostal port. A 15 mm port was placed subxiphoid and placed through a gastrostomy in the remnant stomach. The gastric wall was pulled up to the anterior abdominal wall with two stay sutures that were exteriorized. A bowel clamp was applied to the biliopancreatic limb and the ERCP was performed with CO₂. The gastrostomy site was closed with a stapler. Postoperative data was collected to include complications, length of stay, and pathology. This study was approved by our Institutional Review Board.

RESULTS

There were 12 patients who underwent t-ERCP over the period from 2012 to 2017. The reasons for t-ERCP

included retained common bile duct stones, biliary obstruction, dilated common bile ducts, elevated liver function tests, and suspected malignancy. There were no conversions to open operations. The mean length of stay was 2.8 days (range 0 – 9 days). The mean operative time was 66 min (range 45 – 87 min), and 3 different gastroenterologists were involved, but a single bariatric surgeon performed the laparoscopic portion of the procedure. Seven of the patients had a pre-operative magnetic resonance cholangiopancreatography and 3 had a computed tomography. There was one patient with no pre-operative imaging and one with an intra-operative cholangiogram. The most common finding on pre-operative imaging was biliary dilation. Patient characteristics and pre-operative imaging studies are listed in **Table 1**.

The average age of the patients was 44.8 years and there was one male patient. The mean time from RYGB to t-ERCP was 4.7 years, although one patient had it during the same hospitalization for a bile leak. At the time of t-ERCP, all patients had undergone cholecystectomy, had successful cannulation of the common bile duct, and had sphincterotomy performed. There were no postoperative complications from either the t-ERCP or the laparoscopic access. The most common pathology was benign biliary stricture (n=6), followed by retained gallstones (n=4), with one pancreatic cancer and one normal examination (**Table 2**). The patient with pancreatic cancer died within a year of her diagnosis. The mean follow-up was 68 months (excluding one death from pancreatic cancer). Two patients still had epigastric pain at long-term follow-up (**Table 2**).

Unrelated to the t-ERCP, 6 of the 11 surviving patients underwent additional procedures at later dates. These included a hiatal hernia repair, a revision of the gastrojejunal anastomosis for ulcer disease, and internal hernia repair, a foramen of Winslow internal hernia repair, an incisional hernia repair with mesh, and a diagnostic laparoscopy.

DISCUSSION

Our study on long-term outcomes after t-ERCP is the longest reported in the literature. Our main finding is that long-term results after t-ERCP are very good with > 80% of patients having resolution of their original problem, with some patients having persistent abdominal pain. We also had a 100% success rate in cannulating the duct and completing the ERCP. When considering gallstone disease, it is not surprising that the symptoms were resolved, but there

Table 1.

Patient Characteristics at the Time of Laparoscopic-Assisted Trans-Gastric Endoscopic Retrograde Cholangiopancreatography

Age at t-ERCP (SD)	44.8 (± 10.6)
BMI (SD)	29.6 (± 5.7)
Gender, n (%)	
Female	10 (83.3)
Male	2 (16.7)
Types of pre-operative imaging, n (%)	
Abdominal CT scan	3 (25)
Magnetic resonance cholangiopancreatography	7 (58.3)
Intraoperative cholangiogram	1 (8.3)
No imaging	1 (8.3)

t-ERCP, transgastric endoscopic retrograde cholangiopancreatography; SD, standard deviation; BMI, body mass index; CT, computed tomography.

Table 2.

Operative Characteristics of Laparoscopic-Assisted Trans-Gastric Endoscopic Retrograde Cholangiopancreatography and Long-Term Outcomes

Duration of operation, min (SD)	65.6 (± 15.8)
Length of stay, days (SD)	2.8 (± 3.1)
Length of follow-up, months (SD)	68.1 (± 18.5)
Symptom resolution	9 (81.8)
Epigastric pain	2 (18.2)

SD, standard deviation.

were also good results after benign biliary stricture and sphincter of Oddi dysfunction (SOD). Two of our patients with benign biliary stricture/SOD had recurrence of pain; a 47 year old female who developed epigastric pain at 92 months and a 41 year old female who had pain at 39 months. May et al. evaluated overall outcomes of laparoscopic-assisted ERCP after RYGB for SOD and found similar results. They found that at a follow-up of 21.4 months, 72.7% of patients reported complete symptom resolution.¹³ Our follow-up of 68 months confirms their results. The resolution of symptoms after t-ERCP compares favorably with the long-term results reported in the literature for standard ERCP.¹⁴

Other studies have demonstrated similar outcomes with this approach after RYGB. Banerjee et al. conducted a literature review on t-ERCP in patients with RYGB to better

define the technical approaches, success rates, and adverse events of the procedure. They found 26 studies to compare that accounted for 509 t-ERCP cases total. There was successful gastric access in 100% of cases as well as a 98.5% success rate in ductal cannulation. Adverse events were reported in 14% of cases and 80% of those were in relation to the gastrostomy creation itself and not the ERCP portion of the procedure. The most common of the gastrostomy related adverse events was wound infections at 3.7% and for the ERCP portion it was found to be post ERCP pancreatitis in 1.4%.⁸ The largest study in the literature, a meta-analysis by Aiolfi et al., had similar findings. They reviewed 13 papers that accounted for 931 procedures in 850 patients who had previous RYGB. Their aim was to examine the outcomes and better define the risk to benefit ratio of t-ERCP. The most common indications for t-ERCP in their review were biliary at 90% and pancreatic in 10%. Their results found that the pooled prevalence of t-ERCP success rate was 99% (95% confidence interval [CI] 98%–98%), t-ERCP related morbidity was 3.1% (95% confidence interval [CI] 1.0 – 5.8%), infectious complications were 3.4% (95% CI 1.7 – 5.5%), and overall morbidity was 14.2% (95% CI 8.5 – 20.8%).⁹

Although we chose to perform t-ERCP, surgeons that have the skill set and equipment could approach these patients with a laparoscopic common bile duct exploration. In the right hands, this is just as safe and effective as t-ERCP and does not require an additional team. Our preferred approach is t-ERCP because it does not violate the biliary system and does not require a choledochal scope, which is not available at our institution. An alternate way to access the biliary tree after RYGB is reported in the literature by Kedia et al. They used endoscopic ultrasound to identify the location of the remnant stomach, placed a LAMS between the gastric pouch and gastric remnant, and performed ERCP via this route.⁴ Their study included 5 patients. They reported that creation of the fistula with the LAMS was successful 100% of the time; however, ERCP was only able to be performed during the index procedure in 3 out of 5 cases. They did not report any adverse events of bleeding, perforation, peritonitis, or pancreatitis. The LAMS stent was left in place for at least 3 weeks for all 5 patients and the gastrogastric fistula was closed via endoscopic suturing. The study does not report any instances of weight gain. This study is the first published on the LAMS technique and does not comment on any long-term patient outcomes. This may eventually replace t-ERCP, but currently requires specialized equipment and skills. T-ERCP can be performed by any bariatric surgeon and a skilled

endoscopist. A percutaneous approach to a dilated biliary tree has been long described in the literature and is another viable option for these patients.¹⁵

Another important, but unrelated to t-ERCP, finding of this study is that 6 of the 11 surviving patients underwent additional operations. This is pertinent because although most of our patients had biliary pathology, they still had other sources of abdominal pain that need to be considered. Abdominal pain in a patient after RYGB can be very difficult to treat and recurrent or chronic abdominal pain is common.^{16–18} The patient may have vague symptoms of pain and no hard findings on pre-operative imaging. A combination of sociodemographic factors such as smoking, increased use of strong opioids, socioeconomic status, and postoperative complications have been linked to postoperative abdominal pain in RYGB. In addition, obesity-related comorbidities may be risk factors for chronic pain and pre-operative opioid use which is likely to worsen postoperative pain.¹⁹ Regardless of the risk factors, defining the etiology of chronic abdominal pain after RYGB and evaluating response to treatment remains difficult. Patients with chronic abdominal pain should be approached by a multidisciplinary team consisting of a psychologist, clinical dietician, bariatric surgeon, and if required, a pain management specialist. Depending on the characteristics and location of the pain the diagnostic workout should be done to evaluate for dumping syndrome, food intolerance, obstruction, inflammatory causes, pain syndromes, or neuropathic causes.²⁰ It is not uncommon for RYGB patients to undergo a second operation. A recent long-term study from Sweden showed a 28% re-operative rate after bariatric surgery.²¹ Our high rate of re-operation (6/11) in these patients probably just reflects the complexity of managing patients with altered gastrointestinal anatomy.

This study is subject to the limitations of a small series and the findings may not be generalizable to the bariatric population. The patients all followed up with their primary surgeon, but there may be a reporting bias as patients may not report other evaluations or even procedures performed by different physicians.

CONCLUSION

T-ERCP is safe and efficacious with good long-term results. Despite successful t-ERCP in all patients, over 50% went on to have another operation. Although t-ERCP is successful in resolving biliary causes of pain, these complex patients may experience other causes of abdominal pain.

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