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EUS-GUIDED RENDEZVOUS IS A VIABLE SALVAGE TECHNIQUE FOR FAILED BILIARY CANNULATION IN PATIENTS WITH ROUX-EN-Y GASTRIC BYPASS UNDERGOING BAE-ERCP

Kambiz Kadkhodayan, Sagar Pathak, Saurabh Chandan, Abdullah Abassi, Artur Viana, Maham Hayat, Mustafa A Arain, Natalie Cosgrove, Deepanshu Jain, Dennis Yang, Muhammad K Hasan, Shayan Irani.

Affiliations below.

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Abstract:
Background:
Biliary cannulation via balloon assisted-ERCP (BAE-ERCP) can be challenging. Patients with Roux-en-Y gastric bypass (RYGB) have amongst the lowest reported BAE-ERCP success rates when compared to other types of surgically altered anatomy. We explored the role of EUS-guided rendezvous (EUS-RV) as a rescue technique when BAE-ERCP fails.
Methods:
Consecutive patients with RYGB underwent BAE-ERCP for both benign and malignant indications. Amongst these, patient's that failed BAE-ERCP despite the use of conventional advanced biliary cannulation techniques, underwent EUS-RV if the ampulla could be reached.
Results:
A total of 43 consecutive patients with RYGB underwent BAE-ERCP. The procedure was successful in 30 patients (69.7 %). Amongst the 13 patients with failed ERCP, EUS-RV was performed in 5 patients. Technical success was achieved in all 5 patients (100%), thereby increasing the overall BAE-ERCP success to 35 patients (81.3 %). There were no major procedure related adverse events on immediate and 3 month follow up. The average total procedure time for failed BAE-ERCP followed by EUS-RV, was 129 min (range 47 – 205 min)
Conclusion:
EUS-RV in patients with RYGB has high technical and clinical success and can be a viable alternative to more invasive options when BAE-ERCP fails using traditional cannulation techniques.

Corresponding Author:
Dr. Kambiz Kadkhodayan, AdventHealth Orlando, Center for Interventional Endoscopy, 601 E. Rollins St., 32803-1489 Orlando, United States, kamkad@gmail.com

Affiliations:
Kambiz Kadkhodayan, AdventHealth Orlando, Center for Interventional Endoscopy, Orlando, United States
Kambiz Kadkhodayan, AdventHealth Orlando, Center For Interventional Endoscopy, Orlando, United States
Sagar Pathak, AdventHealth Orlando, Center for Interventional Endoscopy, Orlando, United States

[...]
Shayan Irani, Virginia Mason Medical Center, Gastroenterology and Hepatology, Seattle, United States

EUS-GUIDED RENDEZVOUS IS A VIABLE SALVAGE TECHNIQUE FOR FAILED BILLIARY CANNULATION IN PATIENTS WITH ROUX-EN-Y GASTRIC BYPASS UNDERGOING BALLOON ASSISTED ERCP

INTRODUCTION:

Global obesity rates continue to rise. It is estimated that approximately 50 % of adults in the United States will be either overweight or obese by 2030. [1] Roux-en-Y gastric bypass (RYGB) is the most commonly performed bypass operation for weight loss in the west. Rapid weight loss that follows RYGB, leads to an increased lifetime risk of choledocholithiasis. It is estimated that up to 1.2 % of patients with RYGB will develop choledocholithiasis and require ERCP during their lifetime. [2]

Currently available options for ERCP in patients with RYGB include, 1) laparoscopic assisted transgastric ERCP (LA-ERCP), 2) Balloon-assisted enteroscopy ERCP (BAE-ERCP) 3) interventional radiology rendezvous guidewire-assisted ERCP (RGA-ERCP) and 3) EUS-directed transgastric ERCP (EDGE). Each modality has its benefits and drawbacks, and the chosen approach often relies on locally available expertise and institutional guidelines. BAE-ERCP is often preferred in patients with uncomplicated biliopancreatic disease due to cost efficiency, ability to complete ERCP in a single setting, low adverse event rate and low rate of fistulas (gastro-gastric or gastro-cutaneous). This approach, however, can be technically challenging, requires additional training and can be time-consuming. [3]

Therapeutic success rates for BAE-ERCP are significantly lower (61-90%) in patients with RYGB when compared to other types of surgically altered anatomy such as hepaticojejunostomy (80-100%), and Billiroth II (100%). A common cause of failed BAE-ERCP (22%) in patients with RYGB, is the inability to obtain deep cannulation of the bile duct despite the use of advanced cannulation techniques such as double wire, pancreatic septotomy and pre-cut needle knife. [3,4]

EUS-guided rendezvous (EUS-RV) for deep biliary access was first described in 2004. With technological advancement, technique refinement and availability of specialized accessories, EUS-RV is now considered safe and highly efficacious for advanced biliary cannulation in patients with native anatomy who have both benign and malignant disease. [5,6] It is perhaps the perceived difficulty of EUS-RV in RYBG patients that has prevented its adoption as a technique for advanced biliary access. At our institution, patients with failed biliary cannulation using BAE-ERCP frequently undergo a staged or primary EDGE procedure. Alternatively, patients can be referred to interventional radiology for percutaneous drainage, or to surgery for bile duct exploration that is associated with increase in morbidity, cost and length of stay. We explored the role of EUS-RV as an advanced cannulation technique in patients with RYGB undergoing BAE-ERCP.

METHODS:

Design:

The study was conducted at a large tertiary referral center. Data regarding patient demographics, procedural details and follow up was prospectively collected from 2022 to 2024 using a prospective IRB approved protocol.

Patient Characteristics:

Consecutive patients with RYGB underwent BAE-ERCP for both benign and malignant indications. Amongst these, patient's that failed BAE-ERCP despite the use of conventional advanced biliary cannulation techniques, underwent EUS-RV if the ampulla could be reached and anatomy was favorable. All patients underwent BAE-ERCP using the Fujifilm short-type double-balloon enteroscope system (EI-580 BT).

EUS-Rendezvous (EUS-RV) Procedure Description:

After a determination of failed cannulation was made with BAE-ERCP, the billio-pancreatic limb was marked using a tattoo and the enteroscope was gradually withdrawn from the patient. Using a curvilinear echoendoscope (GF-UCT180, Olympus Medical Systems, Center Valley, PA), the left lobe of the liver was identified. After ensuring that the transducer was beyond the esophago-gastric junction (EGJ), a pre-flushed 19-gauge FNA needle (Expect, Boston Scientific, Marlboro, MA) was used to access segment 2 or segment 3 biliary radicles. Following a bilious aspiration to confirm an intraductal location, a 0.025-inch angled tip 450 cm guidewire (VisiGlide 2, Olympus Medical Systems, Center Valley, PA) was passed across the ampulla and coiled several times in the duodenum. The echoendoscope was then withdrawn whilst leaving the guidewire in place. The balloon assisted enteroscope was then re-introduced and advanced cautiously towards the ampulla using the previously placed tattoo as a guide. Using a standard sphincterotome, attempts were made to cannulate the CBD alongside the rendezvous wire (Fig 1). When this was not successful, the rendezvous wire was grasped with a forceps and pulled through the therapeutic channel of the enteroscope. A sphincterotome or cannula was then railroaded over the guidewire, across the ampulla into the CBD The rendezvous wire was subsequently withdrawn from the patient and re-loaded into the sphincterotome or cannula, thereby establishing stable biliary access. ERCP was then performed using standard BAE-ERCP methodology (Fig 2).

Outcomes Assessed:

Technical success was defined as completion of all EUS-RV procedure steps and obtaining deep cannulation of the CBD. Clinical success was defined as the ability to complete the

intended objective of the ERCP i.e. stone clearance, stent placement etc. Adverse events were graded as per the adverse events in GI endoscopy (AGREE) classification. [7] Serious AE's were defined as grade III or higher. All patients were followed prospectively for at least 3 months.

RESULTS:

A total of 43 consecutive patients with RYGB underwent BAE-ERCP. Amongst these, BAE-ERCP was successful in 30 patients (69.7%). Of the 13 patient's with failed BAE-ERCP, a total of 5 patients (male: 0, female: 5), age range 52 – 73 years, average BMI (23 kg/m2) underwent EUS-RV. EUS-RV was technically successful in all 5 patients (100%). Clinical success was achieved in all 5 patients (100%). After including the 5 EUS-RV patients, BAE-ERCP was successful in 35 patients (81.3%). There were no major procedure related adverse events. Two patients experienced mild abdominal pain that resolved within 12 hours with analgesics. All 5 patients were started on an oral diet the same day. On follow up 3 months later, there were no reports of delayed procedure related adverse events. The average total procedure time for failed BAE-ERCP followed by EUS-RV, was 129 min (range 47 – 205 min). (Table 1)

DISCUSSION:

The need for ERCP in patients with RYGB is expected to rise. Despite advances in technology and improvements in procedure technique, success rates BAE-ERCP in patients with RYGB continues to be lower than other types of surgically altered anatomy. [3,4] EUS-guided biliary access has the potential to safely augment biliary cannulation in RYGB but has traditionally been underutilized due to perceived technical difficulty and procedure time.

Our single center experience of 5 patients highlights the feasibility of EUS-RV biliary access in patients with RYGB that fail cannulation using conventional BAE-ERCP. In our patient cohort, the use of EUS-RV resulted in a notable increase in technical success from 69.7 % to 81.3 %, emphasizing the potential impact that EUS-RV may have on BAE-ERCP technical success rates.

EDGE was first described in 2014 as an alternative to BAE-ERCP in patients with RYGB. [8] There are no currently available randomized controlled trials that compare DBE-ERCP with EDGE, and the choice between the two largely depends on institutional preference and available expertise. While EDGE is generally considered safe for ERCP, potential drawbacks are accessory cost, the use of two separate or staged procedures for non-emergent indications, and gastro-gastric fistula formation that occurs in up to 31 % of patients. [9] At present, there is no expert consensus on a preferred approach. At our institution, patients with uncomplicated pancreaticobiliary disease undergo BAE-ERCP. If deep cannulation fails on the first attempt, patients generally undergo an EDGE procedure during a different setting. In rare instances, when the BAE-ERCP is aborted early, an EDGE procedure may be performed during the same setting. We explored EUS-RV as an advanced technique to rescue failed biliary cannulation and avoid additional procedures in carefully selected patients who had favorable anatomy for EUS-RV i.e. dilated intrahepatic ducts that were easily accessible from the gastric pouch and easy access to the ampulla with an enteroscope.

Our study has several limitations. First, we report a small sample size with a technical success rate that is higher than most reported literature on EUS-RV. Contributing factors may have been, 1) our highly selective patient choice. EUS-RV was not attempted in patients

without dilated ducts or sub-optimal EUS-access from the gastric pouch and, 2) the study was conducted at a large referral center where all the rendezvous procedures were performed by an advanced endoscopist (KK) with experience in interventional EUS techniques and altered anatomy ERCP. The results of this study may not be generalizable or applicable to routine clinical practice. Second, as with EUS-guided RV access in native anatomy, one must ideally have a plan for definitive transmural biliary drainage when accessing an obstructed intra-hepatic biliary system. We therefore selected only patients with dilated intrahepatic ducts who had easy EUS-guided access to the left intrahepatic ducts. Lastly, a noteworthy limitation of EUS-RV in RYGB patient's is that it is not a viable option when the ampulla cannot be reached with an enteroscope, this occurs in approximately 15 % of patients. [10]

CONCLUSION:

EUS-RV presents a viable and promising option when biliary cannulation fails during BAE-ERCP in carefully selected patients with RYGB. Our study demonstrates high technical and clinical success with EUS-RV, providing clinicians with a valuable alternative to more invasive and costly procedures such as EDGE or bile duct exploration. Although the procedure requires advanced technical expertise and is limited by factors such as the inability to reach the ampulla, when used in the right clinical setting, RUS-RV can rescue failed biliary cannulation potentially lower morbidity, cost and length of stay. Further studies with larger multicenter cohorts are required to validate these results and establish standardized protocols.

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Table 1. Patient characteristics

Patient No.	**Age**	**Sex**	**Indication for ERCP**	**BMI**	**ASA**
1	72	F	Choledocholithiasis CBD stricture	24.9	2
2	56	F	CBD Stricture	21.29	3
3	73	F	CBD stricture	23.94	2
4	52	F	Choledocholithiasis	26.6	2
5	67	F	Choledocholithiasis, Cholangitis	18.6	4

Table 2: Results

Patient No.	Reason for failed cannulation using BAE-ERCP	Cannulation alongside the rendezvous wire successful	EUS-R Technical Success	EUS-R Clinical Success	Major AE	Minor AE	Procedure time (min)
1	Failure to cannulate both CBD and PD.	N	Y	Y	N	Y	205
2	Failure to cannulate both CBD and PD	N	Y	Y	N	N	123
3	Repeated PD cannulation	Y	Y	Y	N	N	47
4	Repeated PD cannulation	Y	Y	Y	N	Y	140
5	Failure to cannulate both CBD and PD	N	Y	Y	N	N	130

Fig 1: Fig 1: fluoroscopy images demonstrating key steps of the EUS-RV procedure with the use of two wires i.e. biliary cannulation is achieved by cannulating alongside the rendezvous wire using a second wire. (a) failed deep cannulation of the bile duct, (b) EUS-guided cholangiogram demonstrating a small stone in the distal CBD, (c) antegrade guidewire passage across the papilla, (d) successful cannulation of the CBD alongside the rendezvous wire using a second guidewire, (e) biliary plastic stent placement after stone removal, (f) rendezvous wire removal.

Fig 2: fluoroscopy images demonstrating key steps of the EUS-RV procedure with the use of a single wire i.e. rendezvous wire is pulled through the channel of the endoscope and used for biliary cannulation. (a) failed deep cannulation of the bile duct, (b) EUS guided cholangiogram, (c) antegrade guidewire passage across the papilla, (d) successful cannulation of the CBD using the rendezvous wire. The wire is grasped with a forceps and pulled through the channel of the endoscope. A cannula is subsequently advanced over wire into the biliary tree and the guidewire is withdrawn from the patient. The wire is then reloaded into the cannula and advanced into the biliary tree. (e) balloon dilatation.