EUS-directed transgastric ERCP: A first-line option for ERCP following Roux-en-Y gastric bypass

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Over the past decade, there has been a striking rise in the worldwide prevalence of obesity. This obesity epidemic has been amplified in the United States (US), where approximately 40% of adults are now categorized as obese.[1] Bariatric surgery has been shown to be the most effective and long-lasting treatment for severe obesity and for management of obesity-related comorbidities and thus has become a mainstay of therapy for many of these patients.[2]

THE RISE OF BARIATRIC SURGERY

Over 1.9 million patients underwent bariatric surgery in the US between 1993 and 2016 alone, and Roux-en-Y gastric bypass (RYGB) is one of the most common bariatric surgical interventions performed in the USA.[3] Following RYGB, patients are at increased risk for gallstone disease, and ERCP is commonly requested in patients who develop choledocholithiasis.[4] However, ERCP following RYGB is technically challenging due to the long jejunal limb, which must be traversed to reach the jejunojejunal anastomosis and eventually the ampulla for biliary access. This anatomy almost always renders duodenoscopes inadequate for reaching the ampulla.[5] Acute jejunal angulation and jejunojejunal anastomotic stenosis may further limit endoscope advancement to the ampulla.[6]

TRADITIONAL OPTIONS FOR ERCP AFTER ROUX-EN-Y GASTRIC BYPASS-LABOR AND RESOURCE INTENSIVE

Specialized approaches have been used to accomplish ERCP in patients with RYGB anatomy. Two traditional approaches, which have been utilized for ERCP in RYGB patients, are single- and double-balloon enteroscopy and laparoscopy-assisted ERCP (LA-ERCP).[7]

Balloon enteroscopy-facilitated ERCP (BE-ERCP) in RYGB patients is safe, with reported adverse event rates in the 0%–8% range.[8] The balloon enteroscopy approach, utilizing the inflated balloon to anchor the overtube within the small intestine and overtube withdrawal to shorten and straighten the small intestine, is often successful in reaching the ampulla in RYGB patients. Once the ampulla is encountered, however, the small working channel size, forward-viewing orientation,

Access this article online
Quick Response Code:
Website: www.eusjournal.com
DOI: 10.4103/eus.eus_148_20

How to cite this article: Barakat MT, Adler DG. EUS-directed transgastric ERCP: A first-line option for ERCP following Roux-en-Y gastric bypass. Endosc Ultrasound 2021;10:151-3.

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Received: 2021-03-11; **Accepted:** 2021-05-01; **Published online:** 2021-06-16

and the extended length of the balloon enteroscope render cannulation challenging.[6] Reaching the ampulla is also often cumbersome and time-consuming. The complexity of cannulation with a balloon enteroscope is compounded by the lack of an elevator and limited ERCP accessories compatible with the length of a balloon enteroscope, with reported cannulation failure rates of up to 25%, even after reaching the ampulla.[9] Even when cannulation is accomplished, biliary endotherapy may be unsuccessful in up to 25% of patients due to limitations in accessories compatible with the balloon enteroscope length and working channel size.[7,9]

Another traditional approach for ERCP in RYGB patients, LA-ERCP, is performed in the operating room and requires the involvement of both therapeutic endoscopy and surgical specialty teams. LA-ERCP is generally accomplished by the placement of a 15-mm surgical surface port into the bypassed gastric remnant. In the same session, the duodenoscope is then advanced through this surgical port and into the second portion of the duodenum where the ampulla is accessed and ERCP is performed using standard devices. LA-ERCP is notable for a cannulation rate greater than 90% – a much higher rate of successful cannulation than BE-ERCP.[10] Therapeutic success rates are comparable to standard ERCP. These high cannulation and therapeutic success rates are attributable to the use of the duodenoscope and familiar therapeutic endoscopy devices used in standard native anatomy ERCP.[10] The adverse event rate is high relative to BE-ERCP, at 17.4%. LA-ERCP is associated with prolonged length of hospital stay and high cost of hospitalization. This may be, in part, due to challenges associated with coordination of surgical and endoscopy teams and resources.[11,12] LA-ERCP, while often highly successful, is both time- and resource-consuming. It is not uncommon for a single LA-ERCP to consume a half day of work, making it less appealing from the point of view of endoscopic efficiency.

EUS-GUIDED APPROACHES TO ERCP

Given the limitations of BE-ERCP and LA-ERCP for patients after RYGB, there was a hunger for a different, and more efficient, approach to ERCP in these patients. EUS-directed transgastric ERCP (EDGE), initially described in 2014, has emerged as the preferred approach among many therapeutic endoscopists performing ERCP in RYGB patients.[13] EDGE is generally a two-stage procedure that involves an initial endoscopy with EUS-guided placement of a lumen-apposing metallic stent (LAMS) to create a transluminal pathway from the gastric pouch or proximal jejunal efferent limb to the remnant stomach.[12] In a subsequent endoscopy session after the transluminal tract has matured, typically 2 weeks after the initial LAMS placement, ERCP is performed by advancing the duodenoscope through the LAMS, into the gastric remnant, and then to the duodenum where the ampulla is encountered.[12] In EDGE procedures, the duodenoscope can reach the ampulla via traversing a standard distance without navigating the small bowel limbs found in RYGB patients.

Similar to LA-ERCP, EDGE enables the use of a duodenoscope and standard therapeutic accessories to accomplish ERCP. Furthermore, EDGE is a purely endoscopic approach that does not require surgery and its associated logistical challenges. A meta-analysis recently reported a cannulation success rate of 95% for EDGE procedures and an adverse event rate ranging from 14% to 31%, comparable to LA-ERCP.[14] The most common adverse event encountered with EDGE was LAMS migration, which occurred in 13% of patients, generally during manipulation of the LAMS during duodenoscope advancement during ERCP.[14]

LAMS migration can be minimized by waiting the appropriate 2-week period between the placement of the LAMS and performance of ERCP, but this is not always possible and some patients with urgent indications (*i.e.*, cholangitis) can undergo EDGE in a single-stage procedure when necessary. Abundant lubrication of the duodenoscope has been reported as an approach to possibly reduce the risk of migration of the LAMS during the performance of EDGE in patients for whom a one-stage procedure is necessary.[15]

A theoretical concern in patients with a history of RYGB who undergo EDGE has been the risk for regaining weight postprocedure due to the presence of a persistent fistula across the LAMS tract from the gastric pouch to the excluded stomach. Weight gain has only been reported in one study to date, and the vast majority of studies attest to ongoing weight loss in RYGB patients following EDGE, presumably due to preferential flow of food through the Roux limb, rather than the fistulous tract even when a fistulous tract persists.[15-17]

Data surrounding EDGE to date must be cautiously interpreted because these data are largely derived from tertiary care medical centers and highly experienced endosonographers. EDGE may not be within the skill set of all practicing endosonographers.

That said, a recent systematic review and meta-analysis from our group dedicated to ERCP in patients following RYGB evaluated 1268 patients, with 124 who underwent EDGE, 939 who underwent LA-ERCP, and 205 who underwent BE-ERCP.[14] This study concluded that the technical and clinical success of EDGE in RYGB patients is superior to BE-ERCP and comparable to that of LA-ERCP in RYGB patients.[14] Given the similarity in success and adverse event rates of EDGE and LA-ERCP, the cost and invasiveness of the ERCP approaches become relevant. In both of these domains, EDGE is superior. EDGE is less expensive overall and notable for shorter hospital length of stay relative to LA-ERCP, and EDGE, a fully endoscopic approach, is far less invasive than LA-ERCP.[18]

On the spectrum of available approaches for performing ERCP in patients following RYGB, EDGE is associated with a safety profile comparable to the most successful approaches and carries the advantages discussed here. EDGE remains hampered by a limited number of practitioners, but this is changing. EDGE may also not be the ideal approach in unstable patients with ascending cholangitis, given its two-stage nature. Strong consideration should thus be given to elevating EDGE to a first-line approach for performing ERCP in patients with RYGB anatomy when an endoscopist with the appropriate skill set is available to perform the procedure.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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