# ERCP IN GASTRIC BYPASS ANATOMY

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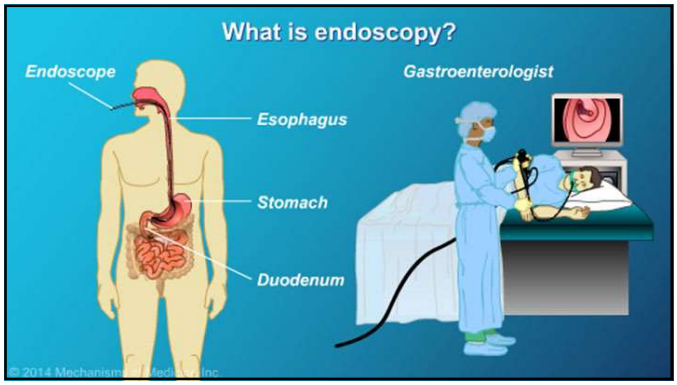
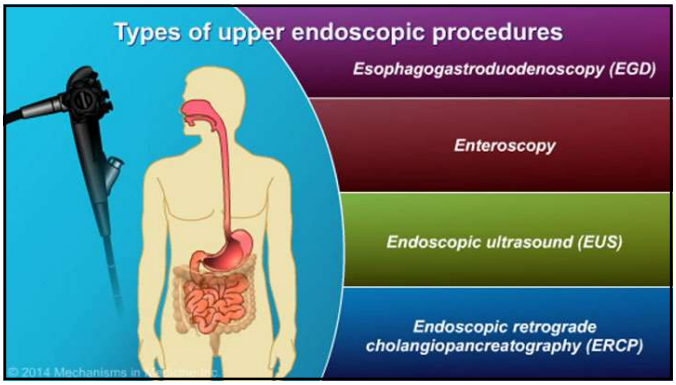
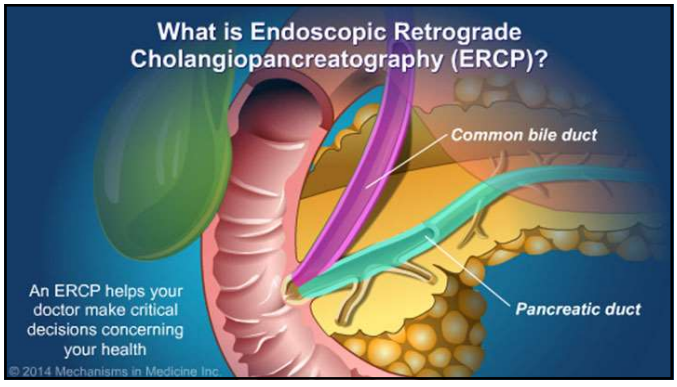
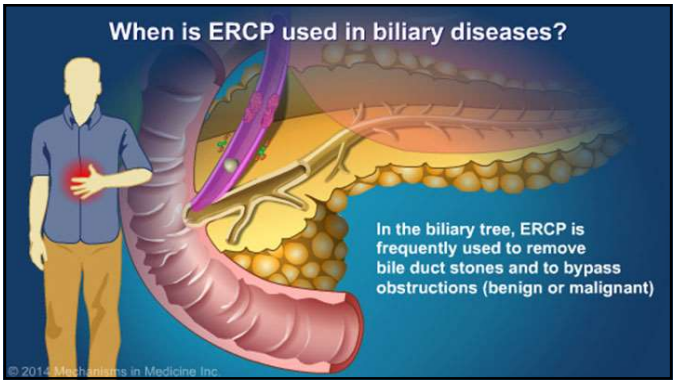
## Learning Objectives

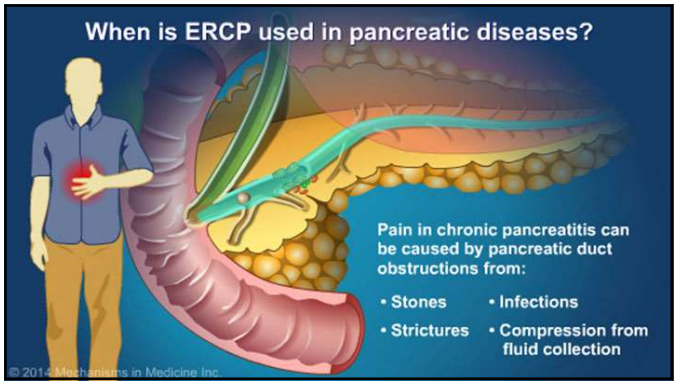
- Know thy anatomy.
- Team work = Dream work.




When is ERCP used in pancreatic diseases?
Pain in chronic pancreatitis can be caused by pancreatic duct obstructions from:
• Stones
• Infections
• Strictures
• Compression from fluid collection
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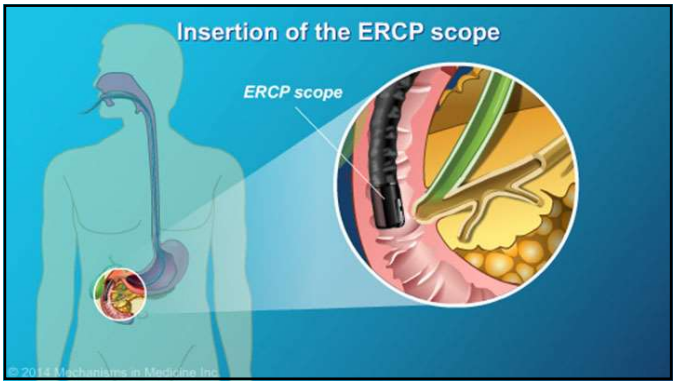
Insertion of the ERCP scope
ERCP scope
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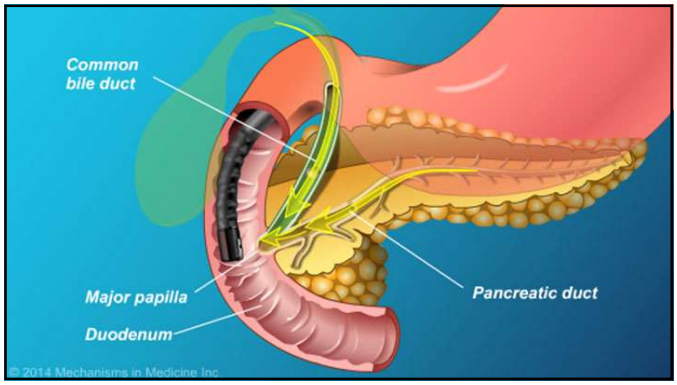
Common bile duct
Major papilla
Duodenum
Pancreatic duct
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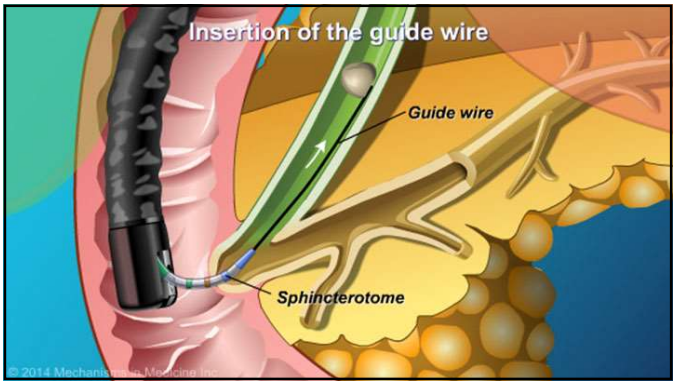
Insertion of the guide wire
Guide wire
Sphincterotome
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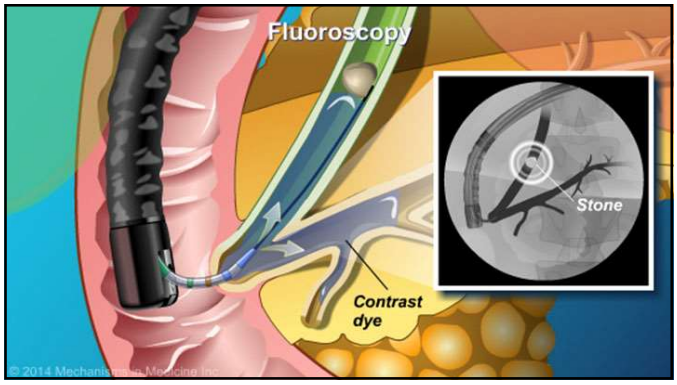
Fluoroscopy
Stone
Contrast dye
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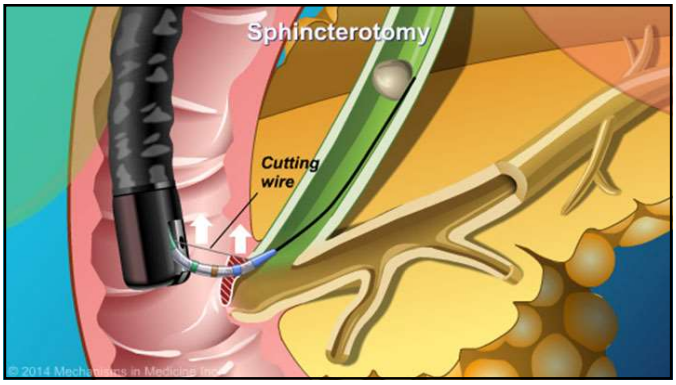
Sphincterotomy
Cutting wire
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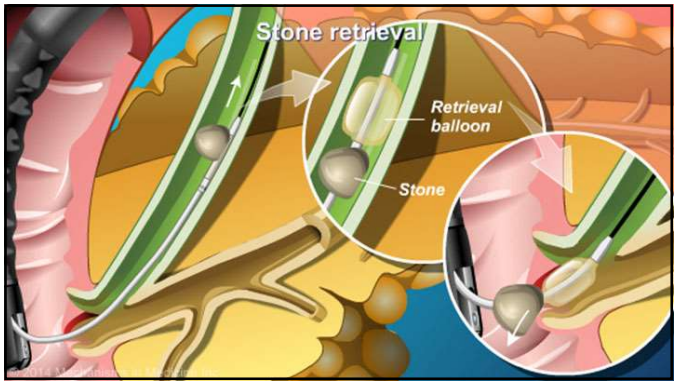
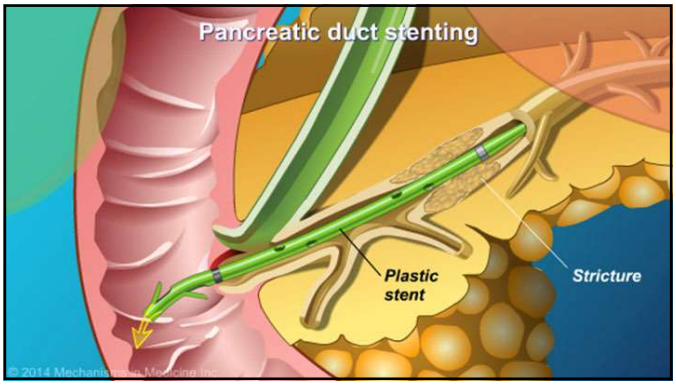
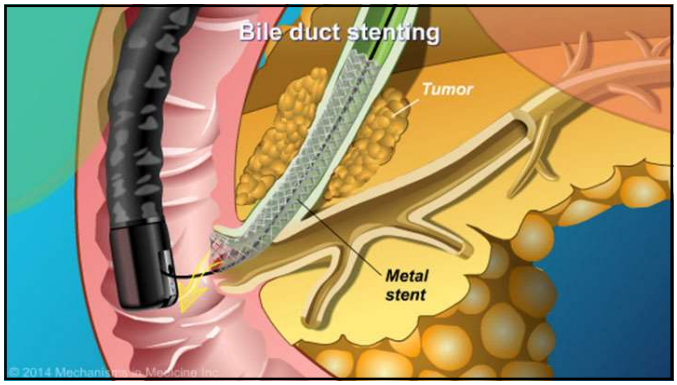
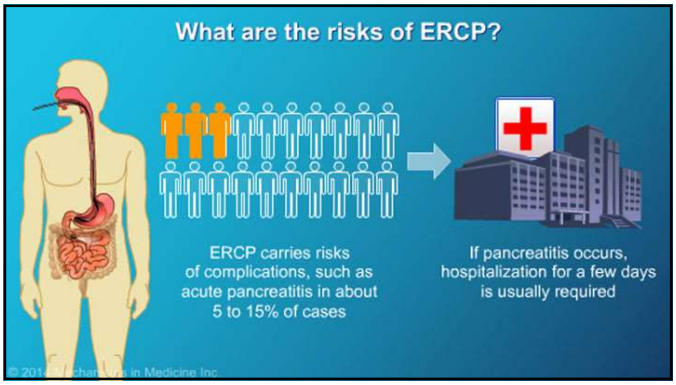


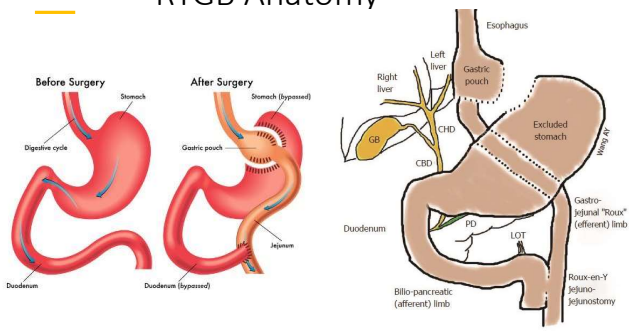




ERCP in Roux-en-Y Gastric Bypass Patients

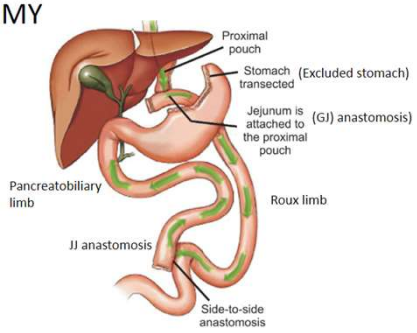
## BACKGROUND

- Over the recent years, obesity has emerged as a pandemic in the US and worldwide, contributing to about 400,000 deaths attributable to poor diet and physical inactivity.
- Although diet and lifestyle modifications are the initial approaches to obesity treatment, their modest outcomes have led to an increased interest in bariatric surgery.
- Multiple bariatric procedures such as gastric banding, sleeve gastrectomy, and Roux-en-Y-Gastric Bypass (RYGB) have emerged, of which, RYGB has superseded other bariatric procedures by 70%- 80%

## RYGB Anatomy



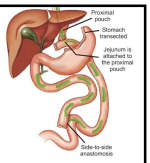

## RYGB ANATOMY




About 29%–36% of post bariatric patients develop gallstones,

and 13% develop gallbladder sludge within 6 months to 18 months after surgery.

## Challenges with RYGB anatomy



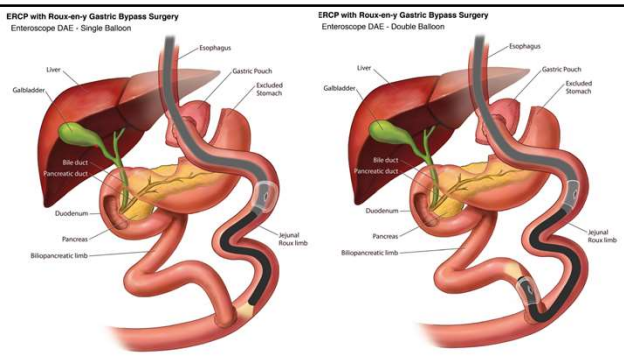
- Traverse the long roux limb (GJ anastomosis to the JJ anastomosis) then traverse the pancreatobiliary limb to reach the ampulla
- Negotiate small bowel angulations especially at the JJ anastomosis
- Selective cannulation of pancreatic/biliary duct with forward viewing scope (no elevator) and limited cannulation devices which are of appropriate length.
- Given long roux limb, we need overtube assisted enteroscopes, unlike Whipple surgery and RNY-HJ where ERCP can often be performed using a gastroscope or pediatric colonoscope.

## ERCP in RYGB Patients

- Device Assisted Enteroscopy (DAE-ERCP)
- Laparoscopic assisted ERCP (LA-ERCP)
- EUS guided transgastric ERCP (EDGE)

## Device Assisted Enteroscopy (DAE)

- Enteroscopes were designed and widely used for the diagnosis and treatment of small bowel diseases.
- This uses help of an inflatable balloon to sequentially reduce and pleat the small bowel over an enteroscope to bring the target closer to the endoscopist rather than relying on forward propulsion alone.
- These have been utilized to perform ERCP in RYGB patients.
  - Double Balloon Enteroscopy (DBE)
  - Single Balloon Enteroscopy (SBE)




## Double Balloon Enteroscopy and Single Balloon Enteroscopy

- DBE was first described in 2001 by Yamamoto et al. as a means of deep exploration of the small bowel.
- Five years later it was used to perform ERCP in RYGB patients [16].
- There is a long and short length DBE scope with lengths of 200 cm and 155 cm respectively, and a working channel of 3.2 mm.
- The shorter length of the latter scope allows for the use of standard ERCP devices, however, most places have the longer DBE scope.

## Double Balloon Enteroscopy and Single Balloon Enteroscopy

- Subsequently, the feasibility of performing ERCP in RYGB patients using the single balloon tip overtube was first reported in 2008.
- The SBE length is similar to the long DBE scope at 200 cm but with a working channel of 2.8 mm.

## Overtube Assisted Enteroscopy – ERCP

- In RYGB patients, a meta-analysis showed the following –
  - Rate of successful enteroscopy (all overtube assisted enteroscopies) – 75.3 % (95 % confidence interval [CI] 64.5 - 83.6)
  - Technical success OAE-ERCP – 64.8 % (95 %CI 53.1 - 74.9).
  - The pooled rate of adverse events was 8.0 % (95 %CI 5.2 - 12.2).
  - Rate of successful DBE – 83.5 % (95 %CI 68.3 - 92.2)
  - Technical success of DBE-ERCP – 72.5 % (95 %CI 52.3 - 86.4), respectively.

## Double Balloon Enteroscopy and Single Balloon Enteroscopy

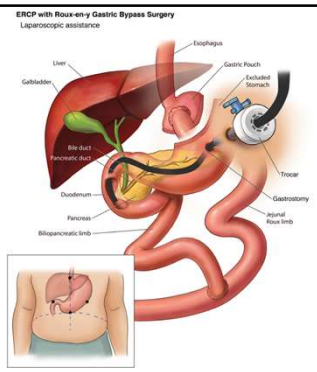
- Although DBE and SBE demonstrated higher success rate when compared to standard endoscopes, the success rates were more attributed to patients with short Roux limb with bilioenteric anastomosis and intact papilla (80%), compared to 58% with long Roux limb with intact papilla (p = 0.040)

## Alternative Access

- To achieve higher efficacy and success rates, a second technique called alternative access ERCP, was developed to provide the ability to use a standard duodenoscope and thereby the available standard ERCP accessories
  - Laparoscope-assisted ERCP (LA-ERCP)
  - EDGE procedure

## Laparoscope-Assisted ERCP

- LA-ERCP was first described in 2002.
- This procedure entails a laparoscope-assisted surgical port placement into the excluded stomach, followed by percutaneous passage of the duodenoscope via the lap port into the duodenum.
- This facilitates the use of standard accessories via the side viewing duodenoscope.




## Laparoscope-Assisted ERCP

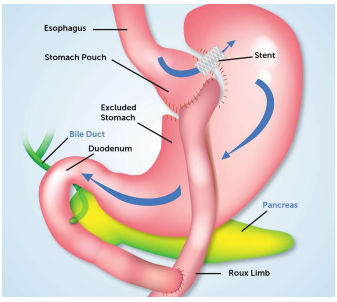
- A systematic review of 509 cases from 26 studies described the feasibility, safety and outcomes of LA-ERCP in patients with RYGB.
- The study reported 100% successful gastric access and 98.5% successful ductal cannulation.
- A large multicenter evaluation of 579 patients reported a median procedure time for LA-ERCP to be 152 mins, with median length of hospital stay of 2 days.
- In addition to the ERCP success rates, laparoscopic examination facilitates the diagnosis and treatment of adhesions and internal hernias which is a potential morbid complication seen with Roux-en-Y reconstruction.

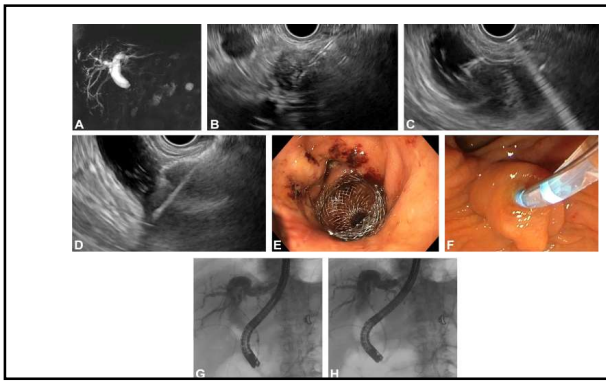
## Endoscopic ultrasound-directed transgastric ERCP (EDGE)

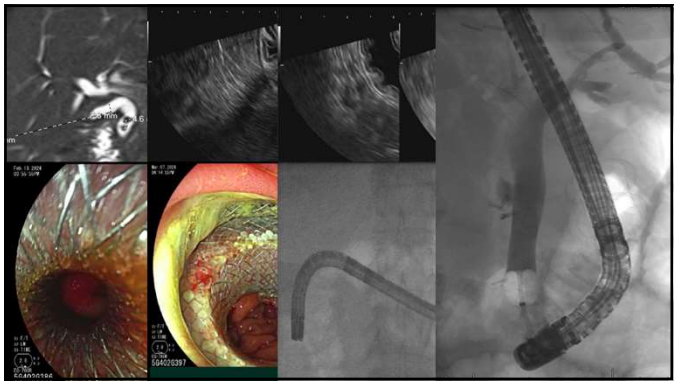
- With the advent of the lumen apposing metal stent (LAMS), Kedia et al. in 2014 described a case of a single stage EDGE procedure by creating an EUS-directed gastro-gastric fistula using the LAMS in RYGB patient to perform antegrade ERCP.
- This was the first report of an entirely endoscopic internal EDGE procedure that could be performed by a single team in a minimally invasive fashion at a single session.
- A follow up single-center case series by Kedia et al. on this internal EDGE technique showed successful EUS-directed gastrogastric (n = 4) and EUS-directed jejunogastric (n = 1) access in all 5 patients (technical success 100%) with the 15 mm diameter LAMS.

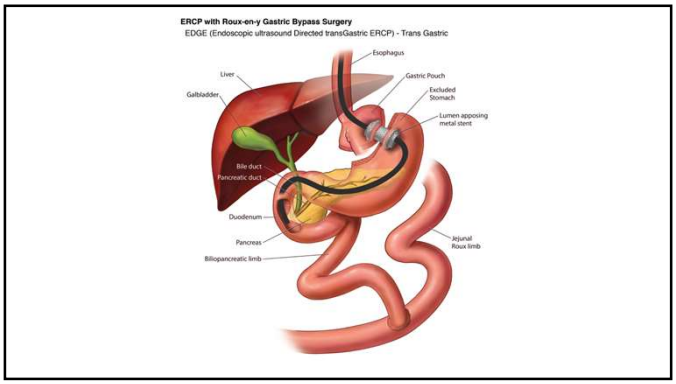
## Endoscopic ultrasound-directed transgastric ERCP (EDGE)

- Made possible with the advent of lumen apposing metal stent (LAMS).








## Endoscopic ultrasound-directed transgastric ERCP (EDGE)

- Single Session EDGE
- Double Session EDGE

## LAMS SITE FISTULA

- The outcomes of LAMS site fistula closure are of concern as it may be associated with the risk of weight regain in these high-risk patients.
- No significant weight changes were reported from the time of LAMS insertions to removal and fistula closure while LAMS was left in place after ERCP for an average of 20–82 days.
- Many modalities like APC, OTSC, endoscopic suturing, and double pigtail plastic stent have been described to close the EDGE access tract after ERCP.

## Endoscopic ultrasound-directed transgastric ERCP (EDGE)

- Multi-center study with 172 patients
  - Technical success of LAMS placement – 171/172 (99.4%)
  - Clinical success – 95%
  - Mean procedure time – 65 minutes.
  - Most common procedural complication – stent dislodgement.
  - Persistent fistula without attempt of endoscopic closure – approx. 30%
    - Amenable to endoscopic closure
    - Associated weight gain < 5 lbs in 60% of such patients.

## EDGE Vs Enteroscopy-Assisted ERCP

- A multicenter study by Bukhari et al. published in 2018 compared the outcomes and adverse events between EDGE and enteroscopy-assisted ERCP (e-ERCP) in RYGB patients.
- Out of 60 patients, 30 underwent EDGE and remaining 30 underwent e-ERCP (DBE in 19 and SBE in 11).
- Technical success was higher with EDGE when compared to e-ERCP (100% vs 60%, p < .001).
- Total procedure time and median length of hospitalization was significantly shorter with EDGE group (49.9 min vs 90.7 min, p < .001; and 1 vs 10.5 days, p = .02).
- Adverse event rate was similar in both the groups. (6.7% vs 10.0%, p = 1).
- No weight change was reported after EDGE at mean follow up of 209 days

## EDGE Vs LA-ERCP

- A multicenter retrospective study published in 2018 by Kedia et al. compared the outcomes between EDGE and LA-ERCP.
- A total of 72 patients were included in the study (29 in EDGE group and 43 in LA-ERCP).
- Technical (96.5% vs 100%, p = 0.40) and clinical (96.5% vs 97.7%, p = 1.0) success rates were similar in the EDGE and LA-ERCP groups.
- In LA-ERCP, 21 patients had gastrostomy tube closure during the same session, whereas in 22 it was closed later. There was no significant difference in the adverse event rates between the groups (24% vs 19% p = 0.57).
- EDGE had significantly shorter procedure time and length of stay compared to LA-ERCP (73 min vs 184 min p < 0.00001; and 0.8 d vs 2.65 d p < 0.00008).
- The overall weight change after EDGE at mean follow up of 28 weeks was - 6.6 lbs

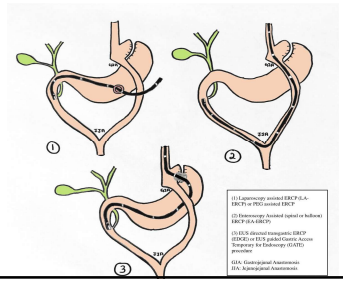
## EDGE Vs LA-ERCP

- A meta-analysis presented by Khan et al. at DDW 2018 comparing LA-ERCP to EDGE included 22 observational studies (18 LA-ERCP and 4 EDGE) with 941 patients (843 LAERCP and 98 EDGE).
- Technical and clinical success rates were similar in both the groups (98% vs 96% p = 0.07 and 96% vs 96% p = 0.84) without any significant difference in the adverse event rate (13% vs 10%, p = 0.32).
- However, pooled mean length of stay and procedure time were shorter with EDGE (1.1 vs 3.1 days and 43 min vs 166 min)

## Cost-Effectiveness

- In this day and age of healthcare economics, decreasing the cost and length of stay are very important factors to be kept in mind.
- In a cost-analysis model comparing laparoscopic assisted, enteroscopy-assisted, and EDGE-assisted ERCP approaches, EDGE was found to be more cost effective when compared to DAE-ERCP and LA-ERCP ($1431 vs $3147 and $9312).
- This was thought to be driven by the lack of need for the operating room and surgical supplies, and the associated costs.
- EDGE was also found to have the high total quality-adjusted life-years (QALY).

## ERCP in RYGB Patients



## CONCLUSION

- There is strong data in support of EDGE as an all-endoscopic, efficacious, safer and superior alternative in terms of cost and time and that can be performed as a single-session procedure using minimal resources.
- However, LA-ERCP can be considered in patients who need simultaneous cholecystectomy.
- Dedicated procedure billing codes are also needed to better code and bill for this procedure, taking into consideration all the morbidity benefits, patient convenience, and cost savings as compared to surgical alternatives.