Choosing the best endoscopic approach for post-bariatric surgical leaks and fistulas

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- Bariatric and metabolic surgery (BMS) remains the most effective and durable therapy for weight loss and improvement of associated comorbidities.

- Unsurprisingly, the number of bariatric surgeries performed has grown progressively worldwide. In 2019, about 256000 BMS were performed in the United States.

- The most performed procedure is laparoscopic sleeve gastrectomy (LSG) followed by Roux-en-Y gastric bypass (RYGB), and revisional surgery.

- With the increasing number of BMS, familiarity with management of procedure related complications is increasingly important for endoscopists.

- Although rare, especially in referral centers, complications can occur, such as leaks and fistulas.
- Traditionally, leaks and fistulas were treated with surgery. However, surgical management of these defects is usually challenging and has been associated with high morbidity and mortality rates.

- Less invasive approaches are preferred, when possible, to reduce associated morbidity. Endoscopic therapies play an essential role in the management of leaks and fistulas.
- Several endoscopic devices and techniques, with different mechanisms of action have been developed, with considerable clinical success for what is often morbid and refractory disease.

- Leaks usually occur after surgery and are often located at the suture (staple) line and/or anastomosis, while fistulas are mainly caused by untreated leaks.
- The causes of transmural defects after BMS are related to several factors, including the patient related risk factors and technical risk factors.

- Patient related risk factors for transmural defects include high body mass index, age, smoking, alcohol use, malnutrition, and other related comorbidities [*e.g.*, type 2 diabetes mellitus (T2DM)].

- Technical risk factors include mechanical or ischemic insults, both of which contribute to a mechanism of high intraluminal pressure that overcomes the integrity of the tissue.

- Meticulous surgical technique, with careful attention to tissue handling and inadvertent excessive tension on anastomoses, luminal narrowing, suturing/stapling ischemic areas, and torsion of blood vessels or organs is mandatory to avoid undesirable outcomes such as downstream stenosis, leaks, and fistulas. Additionally, stapling failure is also a cause of BMS leaks.

CLASSIFICATION

- Leaks and fistulas can be classified based on several parameters, including time of onset and location.
- The definition of acute *vs* chronic leaks and fistulas varies between 30 and 45 d in the literature (acute < 30-45 d and chronic > 30-45 d).

- We use the classification described in the international LSG consensus, which classified the defects into acute (< 7 d), early (between 7 d and 6 wk or 45 d), late (between 6 wk or 45 d and 3 mo or 90 d), and chronic (> 3 mo or 90 d).

- Up to 20% of acute and early leaks and fistulas become late and chronic leaks and fistulas, mainly when the defect is untreated.

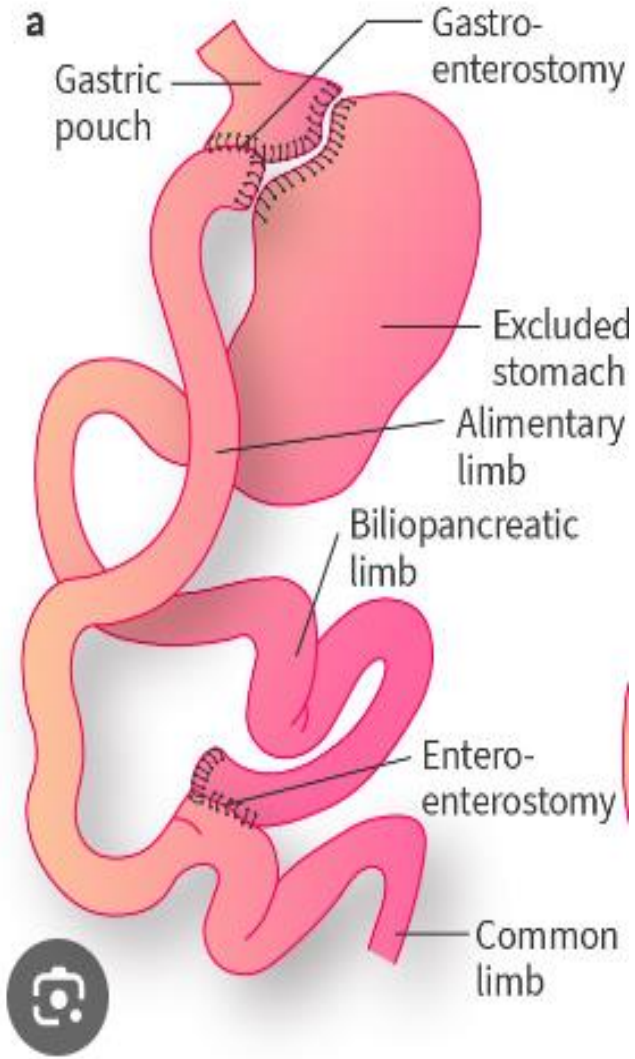
de Moura DTH, de Moura EGH, Neto MG, Jirapinyo P, Teixeira N, Orso I, Quadros LG, Amorim A, Medeiros F, Neto DR, de Siqueira Neto J, Albano A, de Sousa LH, Almeida D, Marchetti IA, Ivano F, de Lima JHF, Falcão M, Thompson CC. Outcomes of a novel bariatric stent in the management of sleeve gastrectomy leaks: a multicenter study. *Surg Obes Relat Dis* 2019; **15**: 1241-1251

- Based on the location, post-RYGB leaks are classified into Type I to VI.

The locations include:

- The gastric pouch (Type I), GJA (Type II), blind jejunal stump (Type III), jejunojejunal anastomosis (Type IV), excluded stomach (Type V), and the blind stump of the biliopancreatic limb (Type VI).

- The first three topographies are easily accessible by endoscopy and can be treated with endoscopic techniques, unlike the others.



- LSG leaks mostly occur at the level of the angle of His due to poor vascularization (more than 90% of the cases) but can also occur in the distal body and antrum.

- Both locations can be treated with an endoscopic approach.

PRINCIPLES OF TREATMENT

- First, unstable patients must be clinically stabilized, including fluid resuscitation, packed blood cells transfusion when indicated, and administration of vasoactive drugs if necessary.

- Infectious source control including intravenous antibiotic therapy and drainage must be performed to control sepsis.

- Drainage can be performed surgically, percutaneously by image guidance, or endoscopically.

- For unstable patients with peritonitis and free infected fluid in the cavity, surgical lavage and drainage, with or without defect repair, is the preferred approach.

- Nutrition is also key for defect healing and is often neglected as most patients are kept nil *per* os initially. Therefore, enteral or parenteral nutrition should be introduced as early as feasible.

- Enteral nutrition is the preferred option, through a nasoenteral feeding tube placed distal to the defect.

- Defect related factors must be treated to achieve successful closure, such as dilation of downstream stenosis, and foreign body removal (staples, suture, and drains, *etc.*).

Functional Stenosis Precipitating and Propagating Leaks

- Downstream stenosis is frequently seen at the level of the incisura angularis or in the proximal stomach when a SG is performed in a patient with a prior laparoscopic adjustable gastric band.
- Aggressive dilation of downstream stenosis using large pneumatic balloons (Wilson-Cook or Boston Scientific) can be performed to further reduce intraluminal gastric pressure.
- The balloons are 8- to 10-cm long and range from 30 to 40 mm in diameter, though dilation should rarely exceed 35 mm. These dilations are performed with the endoscope side-by-side to the balloon (as opposed to dilating a GJ anastomotic stricture, which would be performed with TTS balloons), such that endoscopic and fluoroscopic views can be maintained throughout the dilation process.

Functional Stenosis Precipitating and Propagating Leaks

- Fluoroscopy is recommended (though not mandatory) to ensure the distal aspect of the balloon has not inadvertently crossed the pylorus.
- The balloon should be inflated to 20 psi for 1–3 minutes, and reinspection should be performed to assess for a tear.
- Dilations can be performed as early as 2 weeks after surgery.
- For stenosis at the incisura angularis that does not respond adequately after 2–3 dilations (each being performed 2–4 weeks apart) and to a maximum diameter of 35 mm, an alternative technique (FCSEMS)should be employed.

- After clinical stabilization, endoscopic evaluation is recommended.
- The endoscopist must communicate with other specialty teams and review the operative report thoroughly before performing the initial endoscopic evaluation.
- The role of endoscopy in the management of leaks and fistulas includes both diagnosis and treatment.
- Early diagnosis and endoscopic management are key for success, with closure efficacy as high as 90% when defects are treated within 3 wk of surgery and about 70% after this period.
- Endoscopic treatment of leaks is associated with higher rates of successful closure when compared to fistulas.

- Despite the lower efficacy of endoscopic treatment for chronic leaks and fistulas compared to acute and early transmural defects, it should be attempted exhaustively before referral for definitive surgical treatment as surgery is often challenging and associated with more morbidity.

- In this setting, the most commonly proposed revision surgeries are fistulojejunostomy, conversion of LSG to RYGB (without gastrectomy), and total/near total gastrectomy with esophagojejunal anastomosis.

- Direct surgical repair of the fistula site is not effective and not advised.

ENDOSCOPIC MANAGEMENT

- Endoscopic evaluation of leaks must be performed under carbon dioxide insufflation or underwater to reduce the risk of pneumoperitoneum or pneumomediastinum, especially when there is no external drainage.
- Careful endoscopic assessment is essential to avoid wall rupture of a contained collection.
- The procedure can be performed in the operating room, endoscopy suite, or at the bedside. The endoscopy suite is preferable due to its lower costs when compared to the operating room and greater resources when compared to the bedside.
- However, for unstable patients, the operating room or at bedside in an intensive care unit may be preferred.

- General anesthesia with orotracheal intubation to reduce the risk of aspiration during fluoroscopy is advised, especially in the initial evaluation.

- General anesthesia often allows a more detailed inspection of the transmural defect, including defect size, fistula path, and presence of extraluminal collection.

ENDOSCOPIC TECHNIQUES

- Endoscopic therapies utilize several mechanisms of action and can be classified into closure, covering, and draining techniques.
- Closure techniques include clips [through-the-scope clips (TTSC) and cap mounted clips], endoloop, endoscopic suture, and tissue sealants/glues.

- Despite some studies reporting successful closure of leaks and fistulas using the widely available and simple-to-place TTSC, sometimes combined with endoloop, this technique requires robust and healthy tissue around the defect for successful primary closure.

- Therefore, this approach is not effective in closing leaks and fistulas and should not be recommended.

- **de Moura DTH**, Sachdev AH, Thompson CC. Endoscopic Full-Thickness Defects and Closure Techniques. *Curr Treat Options Gastroenterol* 2018; **16**: 386-405

- Covering techniques utilize cardiac septal defect occluders (CSDO) or self-expandable metal stents (SEMS), including conventional (esophageal) stents and custom (bariatric) stents.

- Closure and covering techniques do not allow internal drainage; thus, external drainage is required when an associated collection or intracavitary infected fluid is identified.

- Endoscopic drainage techniques include endoscopic vacuum therapy (EVT), endoscopic internal drainage (EID) with double pigtail stent (DPS), and septotomy.

Cap-mounted clips

- Cap-mounted clips are usually referred to as over the scope clips (OTSC®, Ovesco Endoscopy GmbH, Tübingen, Germany) as this is the commercial name of the first cap mounted clip.
- However, it is important to state that the name OTSC® is trademarked and other devices are available.

- Cap mounted clip use is increasing due to its benefits compared to the TTSC, including the ability to close leaks and fistulas as it can approximate a larger volume of tissue.

- The device is placed into the distal tip of the endoscope and deployment is similar to band ligation, a procedure widely performed by endoscopists, helping to shorten the learning curve. It can only be used in defects smaller than 20 mm.

Cap-mounted clips





Cap-mounted clips

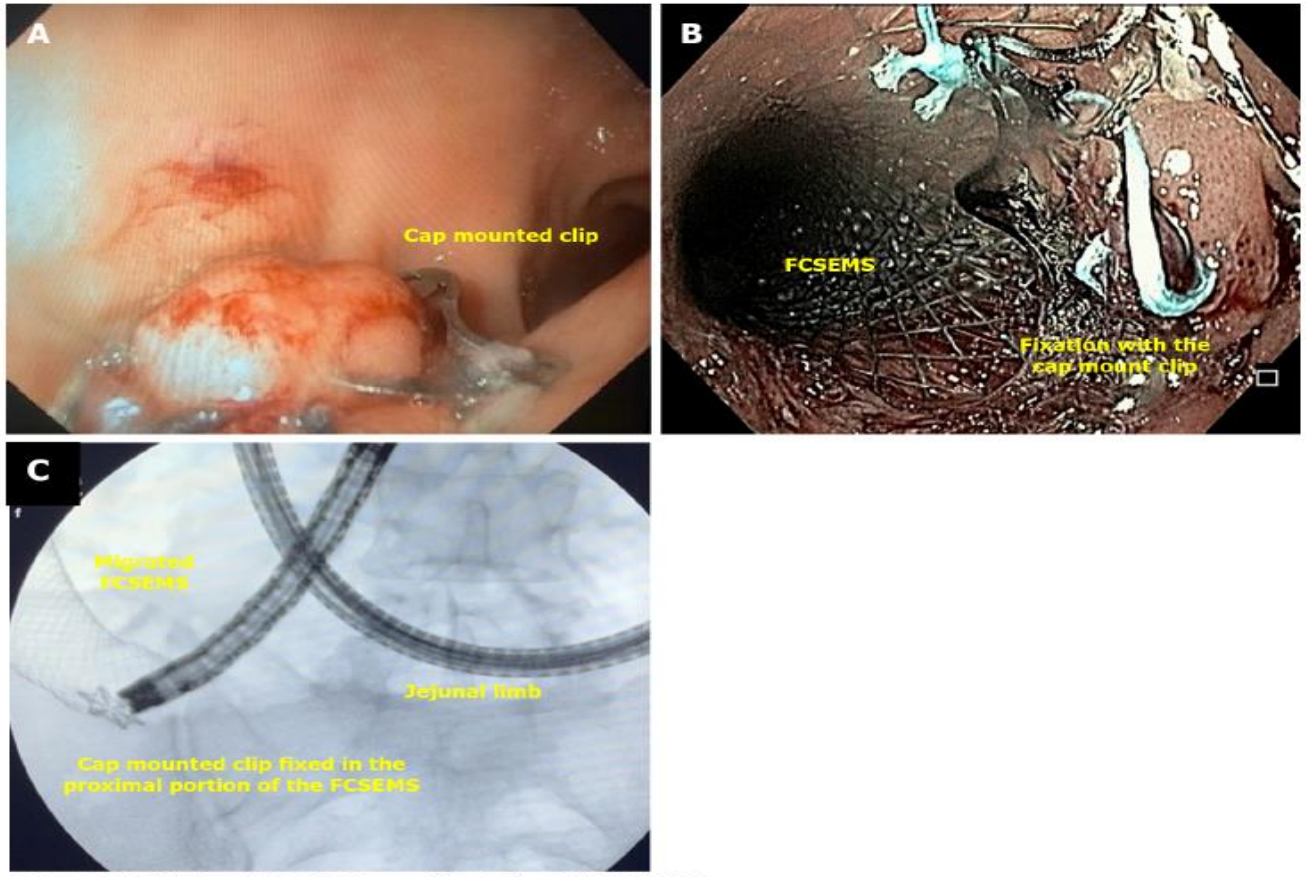
- A meta-analysis including 73 patients from 9 studies evaluating cap-mounted clips for treatment of leaks and fistulas after LSG, including both acute and chronic defects showed a clinical success rate of 63.5% when used as a single therapy and 86.3% when combined with other therapies.

- Cap-mounted clips can be used in patients with small orifices without undrained associated collection and always combine with other therapy.

- Additionally, cap-mounted clips can be used for stent fixation.

- **Shoar S**, Poliakin L, Khorgami Z, Rubenstein R, El-Matbouly M, Levin JL, Saber AA. Efficacy and Safety of the Overthe-Scope Clip (OTSC) System in the Management of Leak and Fistula After Laparoscopic Sleeve Gastrectomy: a Systematic Review. *Obes Surg* 2017; **27**: 2410-2418

Cap-mounted clips



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Figure 4 Cap-mounted clip. A: Cap-mounted clip for an acute leak (orifice < 2 cm) in the staple line after laparoscopic sleeve gastrectomy in a stable patient with external drainage; B: Cap-mounted clip used for stent fixation; C: Enteroscopy to remove stent after migration due to cap mounted clip fixation failure. FCSEMS: Fully covered self-expandable metal stents.

Tissue sealants/Glues

- Tissue sealants and glues include fibrin glue, acellular matrix biomaterial (SurgiSIS® – Cook Medical, Winston-Salem, North Carolina, United States), and cyanoacrylate.
- These materials are primarily used to close fistulous tracts and are usually used as an adjunctive therapy.
- Despite the closure effect of both glues and tissue sealants, the last group also play a role in tissue healing.
- Fibrin glue induces a cellular response, extracellular matrix formation and neovascularization, while acellular matrix biomaterial induces fibroblast proliferation.
- Although these techniques have a well-established safety profile, reported clinical success is variable and multiple applications are usually required.

Tissue sealants/Glues

- Clinical success is related to the characteristics of the leak or fistula, including defect site, chronicity, and size.

- The best indication for tissue sealants and glues are GI-cutaneous fistulas, with thin tract and low output and always combined with additional therapies.

- Tissue sealants and glues can be delivered *via* endoscopic or percutaneous tract, facilitating the procedure.

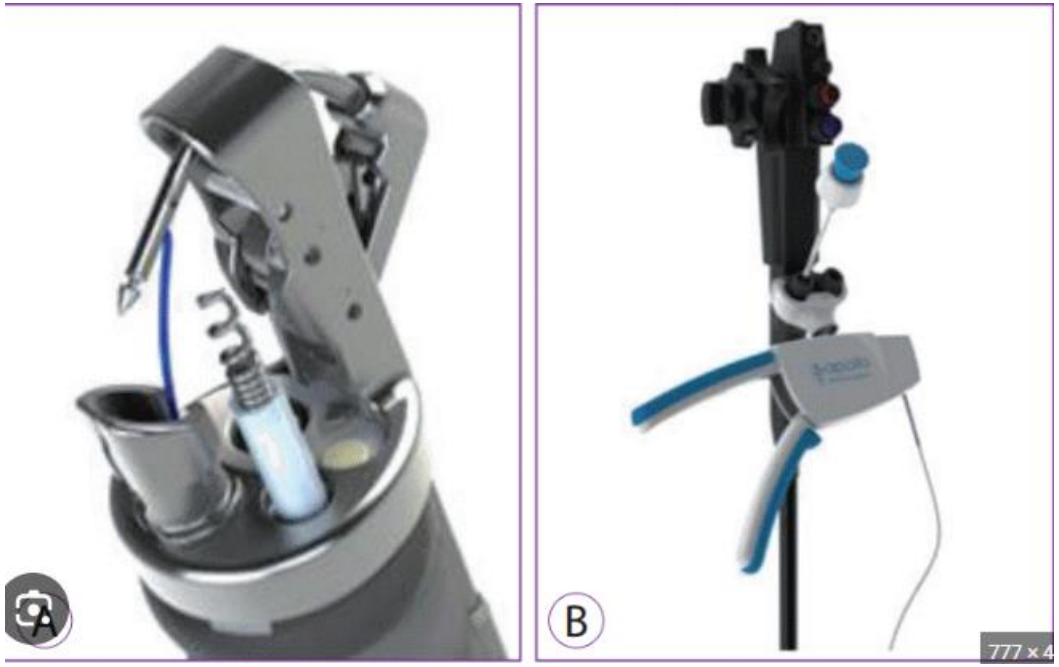
- Cytology brushing or ablation of the epithelialized (chronic) tract to induce granulation is recommended.

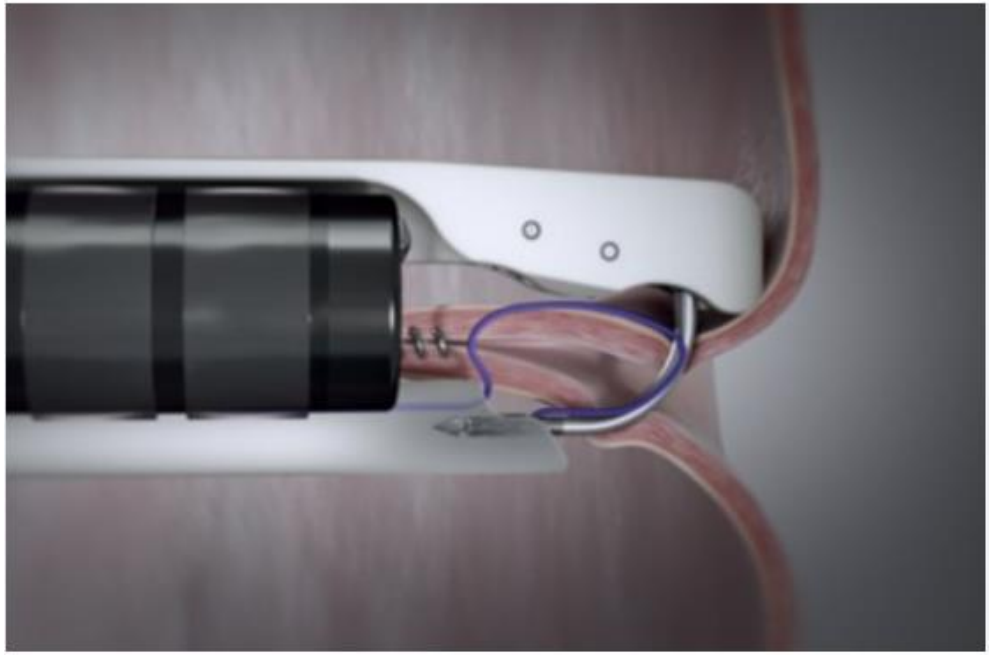
Endoscopic suturing

- Endoscopic suturing allows for full-thickness closure.
- However, similar to TTSC, any type of suturing (surgical or endoscopic) needs robust and healthy tissue around the defect for primary closure.
- Therefore, this technique is not effective in closing most leaks and fistulas and should not be recommended.
- In a multicenter study evaluating fistula closure by endoscopic suturing, 56 patients underwent the procedure with 100% technical success. Despite the high technical success, only 22.4% of patients achieved clinical success at one year follow-up.
- Additionally, endoscopic suturing is expensive in most countries and requires specialized training.
- The only use of endoscopic suturing is as an adjunctive therapy, for example to fix a stent aiming to reduce the risk of migration.

- **Mukewar S**, Kumar N, Catalano M, Thompson C, Abidi W, Harmsen W, Enders F, Gostout C. Safety and efficacy of fistula closure by endoscopic suturing: a multi-center study. *Endoscopy* 2016; **48**: 1023-1028

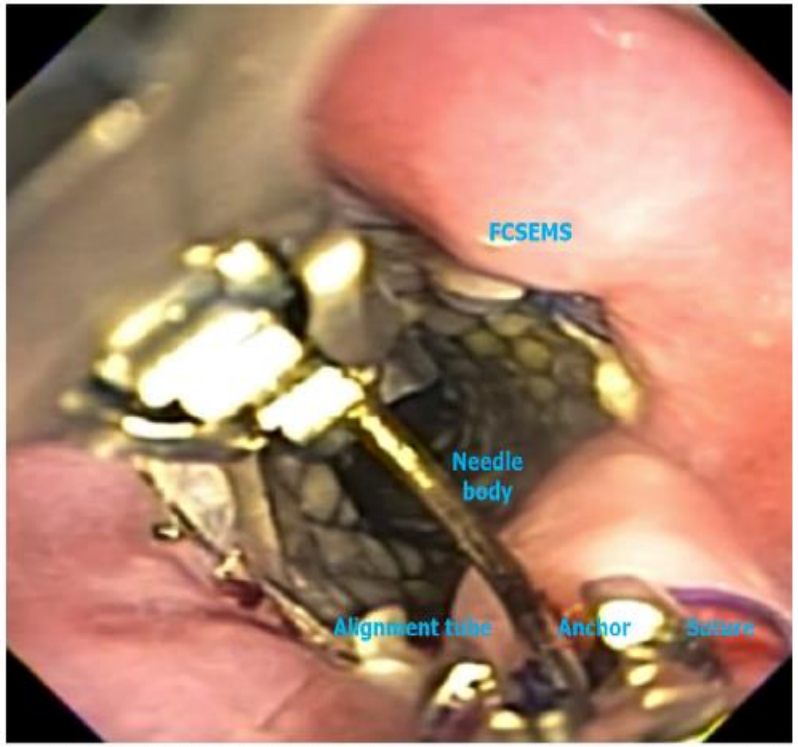
Endoscopic suturing





Endoscopic suturing

Figure 6 Endoscopic suturing for stent fixation placed in the distal esophagus of a patient with an early leak after Roux-en-Y gastric bypass. FCSEMS: Fully covered self-expandable metal stents.



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Self-expandable metal stents

- SEMS are the most used technique for the treatment of post-bariatric surgical leaks and fistulas worldwide and is recommended by the American Society for Metabolic and Bariatric Surgery in a position statement from 2015.

- SEMS are widely available, easy to place and usually with a low cost.

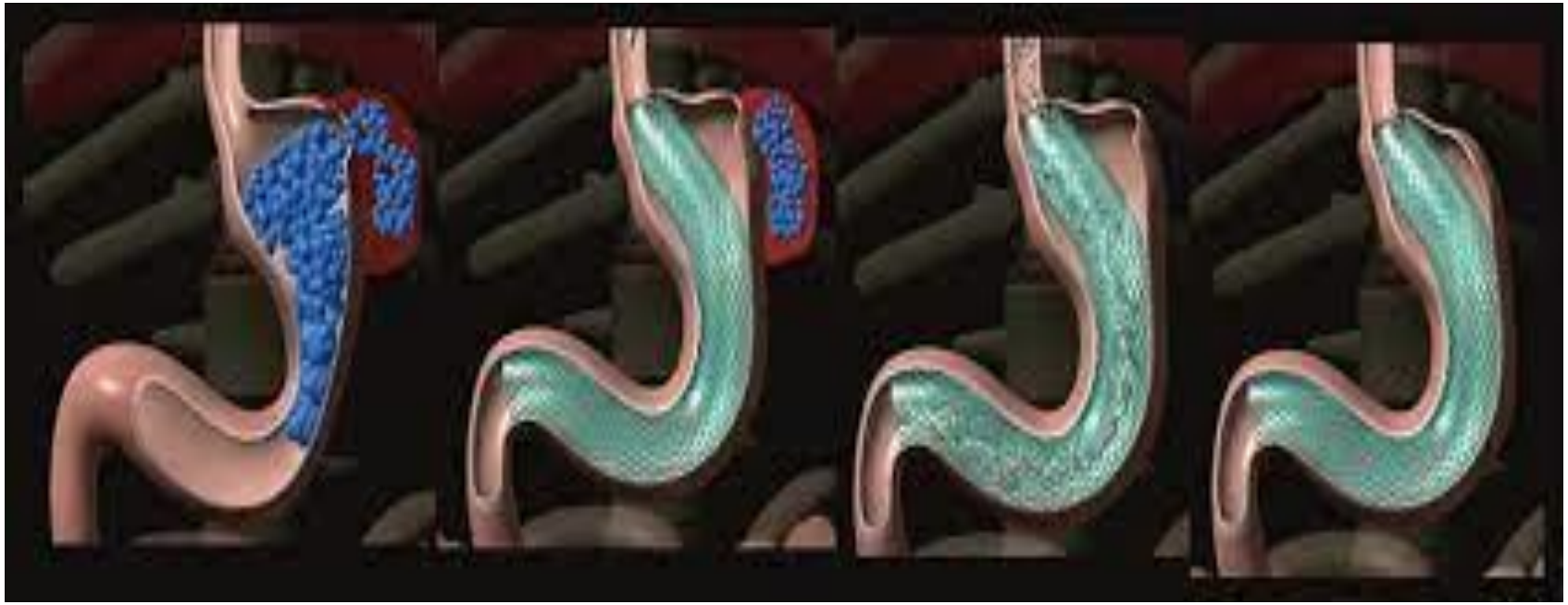
- SEMS are indicated for acute and early leaks and should be avoided in late and chronic defects and late stenosis due to reduced efficacy and increased AE rates, especially migration.

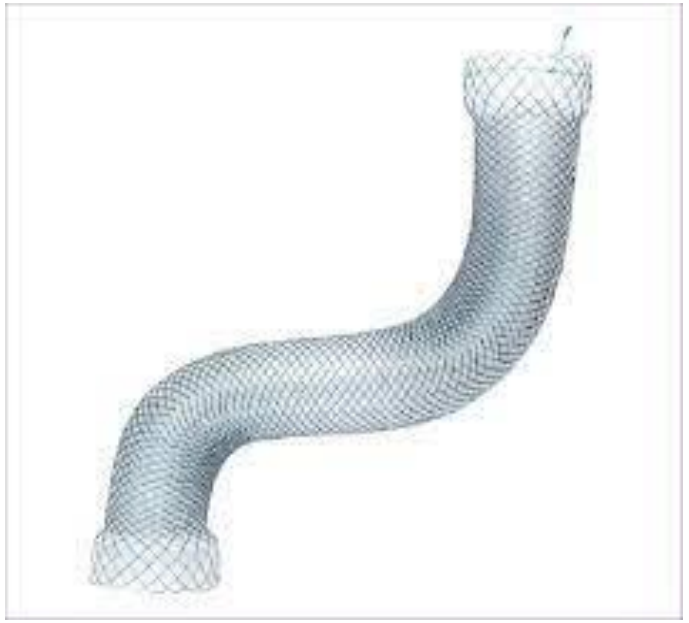
- The American Gastroenterology Association suggests the use of SEMS for leaks and fistulas earlier than 6 wk, preferably in defects < 10 mm.

Self-expandable metal stents

- Despite satisfactory efficacy in acute and early leaks as shown in a recent meta-analysis (RYGB: 76.1% and LSG: 72.8%), high migration rates (RYGB: 30.5% and LSG: 28.2%) must be considered, as an urgent surgery due to device migration may be catastrophic.

- It is important to remember that SEMS placement requires drainage of any associated collections before or promptly after stent placement.
- Choosing the correct SEMS facilitates successful therapy. Fully-covered SEMS (FCSEMS) are easy to remove but have a high rate of migration.
- Fixation of the FCSEMS with suturing, cap mounted clips or the nasal bridle technique is recommended.







Self-expandable metal stents

- On the other hand, partially-covered SEMS (PCSEMS) are associated with low rates of migration, with challenging removal, particularly after 3 wk due to tissue ingrowth.
- Nevertheless, some groups argue that the PCSEMS may be better than the FCSEMS as tissue ingrowth prevents leakage between the esophageal wall and the stent.
- In cases of stent removal failure, several rescue techniques may be used such as the stent in stent technique, ablation and/or endoscopic resection of the tissue ingrowth.

Self-expandable metal stents

- Recently, due to the non-negligible migration rate of the esophageal SEMS, novel models of stents (longer and with a larger diameter) have been developed, focused on the gastric sleeve anatomy.
- In a retrospective multicenter study, 37 patients with early and acute post-LSG leaks were treated with the 24-cm length customized bariatric stent showing similar efficacy and migration rates reported with conventional esophageal SEMS.
- However, more severe AEs were reported, including two urgent surgeries due to stent migration, esophageal perforation, contained gastric perforation, and symptoms such as pain and gastroesophageal reflux.

Self-expandable metal stents

- post-pyloric position was associated with high rates of migration and prepyloric position with more stent related symptoms.

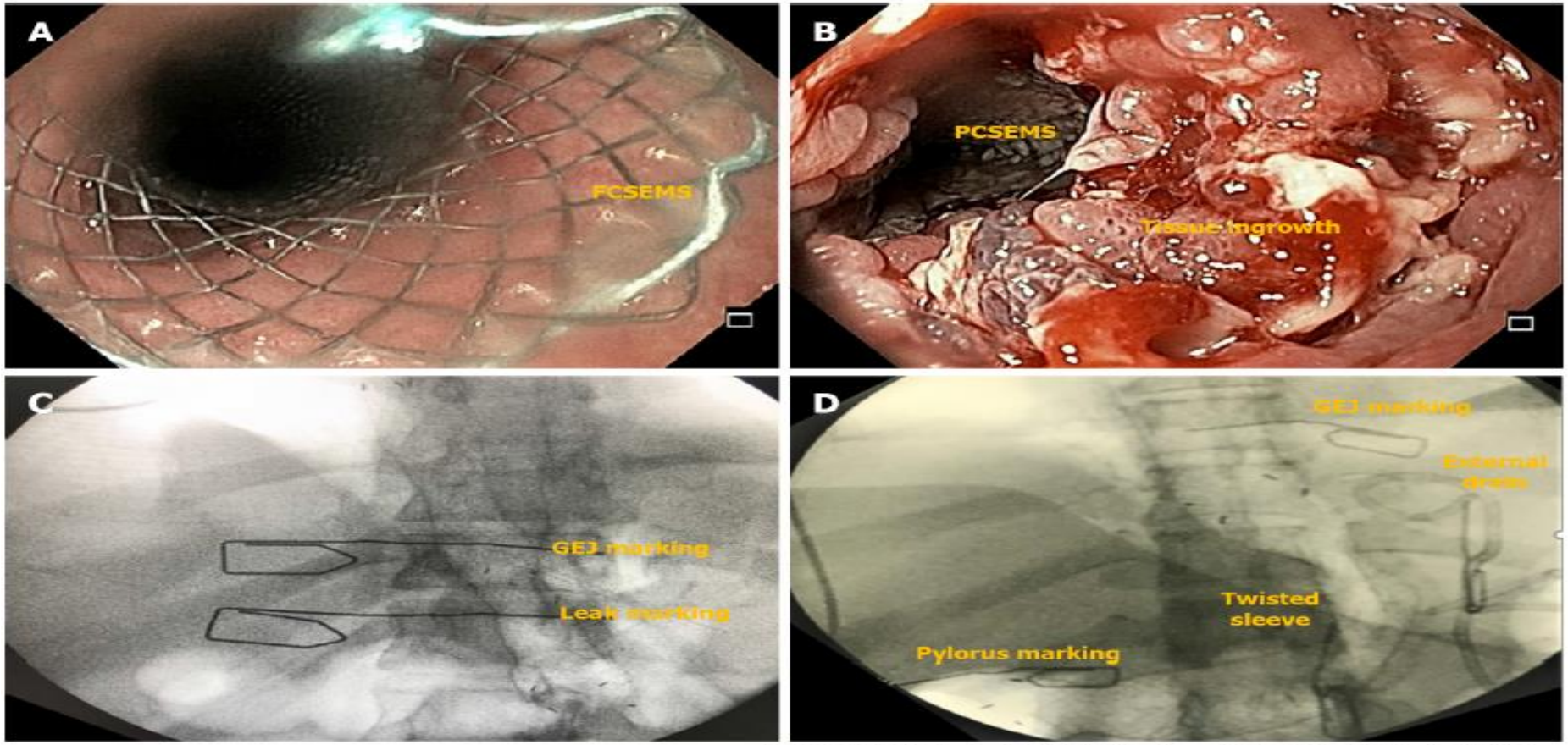
- In a meta-analysis comparing conventional esophageal SEMS and the customized bariatric stents, there were no statistical difference in terms of efficacy (93% *vs* 82%) and migration (15% *vs* 32%) rates.

- Therefore, this novel customized bariatric stent should be used with caution, preferably in specialized centers with close follow up.

- The SEMS are best applied in acute and early leaks with complete dehiscence and/or with associated downstream stenosis, always in conjunction with external drainage.

- It prefer the esophageal PCSEMS with dwell time of no more than 3 wk, over customized bariatric stents.

Self-expandable metal stents



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Figure 7 Stents for the treatment of post bariatric and metabolic surgery leaks. A: Esophageal fully covered self-expandable metal stent; B: Tissue in-growth in an esophageal partially covered self-expandable metal stent; C: Esophageal stent for the treatment of an acute leak after Roux-en-Y gastric bypass; D: Customized bariatric stent for the management of an acute leak in the angle of His after laparoscopic sleeve gastrectomy showing a stenosis at the level of the incisura angularis. FCSEMS: Fully covered self-expandable metal stents; GEJ: Gastroesophageal junction; PCSEMS: Partially covered self-expandable metal stents.

Cardiac septal defect occluder



- The non-surgical closure of a cardiac septal defect was first described in 1976 and was considered a revolution in the treatment of cardiac defects.
- Although developed for the closure of cardiac defects, the off-label use of the CSDO has been reported for the management of bronchopleural and GI fistulas.
- The CSDO is a self-expanding, double-disc closure device composed of nitinol and polyester, with shape-memory and impressive expansion force.
- The thick waist portion serves to selfcenter the device during deployment to close the defect.
- The disc diameter varies from 9 mm to 54 mm, and the waist size varies from 4 mm to 38 mm.

Cardiac septal defect occluder

- The appropriate device size (“waist diameter”) should be 50% larger than the defect orifice.

- Regarding placement, first, the distal flange is released either into the GI lumen (percutaneous placement) or the fistula tract (endoscopic placement), then, after adequate position is confirmed, the proximal flange is deployed.

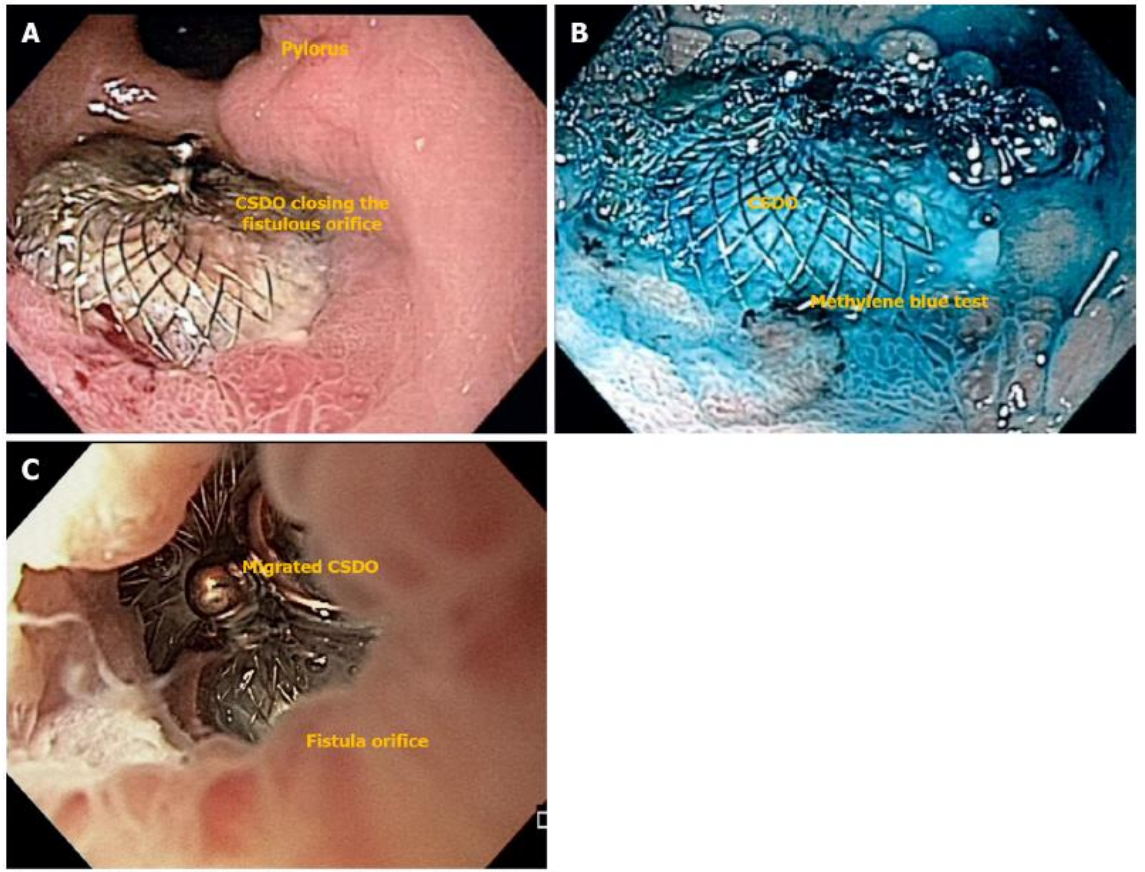
- In a multicenter study, clinical success rate for late and chronic defects after BMS was 97.1% *vs* 62.5%.

Cardiac septal defect occluder

- Due to its expansion force, immediate contrast study or methylene blue test after the procedure usually confirms complete occlusion of the fistulous tract allowing hospital discharge after anesthesia recovery.
- If immediate, complete closure fails, adjunctive therapies such as glues/tissue sealants can be performed. Therefore, CSDO is recommended for late and chronic defects as an epithelialized tract is needed for device accommodation.
- The device should not be used in acute and early leaks or fistulas as it can increases the size of the defect due to its significant expansion force.

Cardiac septal defect occluder

- The CSDO is the best approach for epithelialized fistulas tracts but as an off-label high-cost device, it only use it after conventional technique failure.
- Regarding long-term follow-up, some devices stay in place and other migrate after complete healing of the defect.



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Figure 8 Cardiac septal defect occluder for the treatment of chronic fistulas after bariatric and metabolic surgery. A: Endoscopic imaging of a successful closure of a gastrocutaneous fistula after cardiac septal defect occluder (CSDO) placement in a distal staple line leak after laparoscopic sleeve gastrectomy; B: Methylene blue test showing no leakage to the skin; C: CSDO migration after placement in an early leak after Roux-en-Y gastric bypass surgery. CSDO: Cardiac septal defect occluder.

Endoscopic vacuum therapy

- The traditional technique involves the use of a polyurethane sponge connected to a nasogastric tube placed into the extraluminal compartment (intracavitary position) or into the GI lumen (intraluminal position).
- The nasogastric tube is then connected to a vacuum machine with continuous negative pressure (between -125 and -175 mmHg).
- It is important to understand that, when an associated collection is identified, the EVT system must be placed inside the collection (intracavitary).
- Despite the high efficacy, the traditional system is associated with challenging placement and removal (through the mouth) leading to a prolonged procedure, and the need for frequent exchanges due to tissue ingrowth.

Endoscopic vacuum therapy

- Recently, a cost-effective modified-EVT manufactured from widely available materials and utilizing wall suction was described with promising results.
- Furthermore, the use of intraluminal EVT *via* a triple-lumen tube was reported that allowed both drainage (gastric fenestrations) and nutrition (enteral portion) using a single tube through the nares.

Endoscopic vacuum therapy

- Previous studies had already demonstrated very positive outcomes for EVT in the management of general upper GI leaks and fistulas, including with higher success rates and lower AEs rates when compared to SEMS.

- A recent meta-analysis evaluated the use of the EVT in the management of leaks and fistulas after BMS demonstrating a pooled clinical success rate of 87.2% with 6% AE rate.
- In this study, the mean number of EVT system exchanges was 6.47 with a mean interval of 4.39 d.

Endoscopic vacuum therapy

- Despite the satisfactory results, there is a concern regarding patients' complaints due to the nasogastric tube and a possible prolonged hospital stay.

- Additionally, the risk of major bleeding related to the development of a fistula between the wound cavity and major blood vessels, including the aorta or its branches is a reported concern from some experts.

Endoscopic vacuum therapy

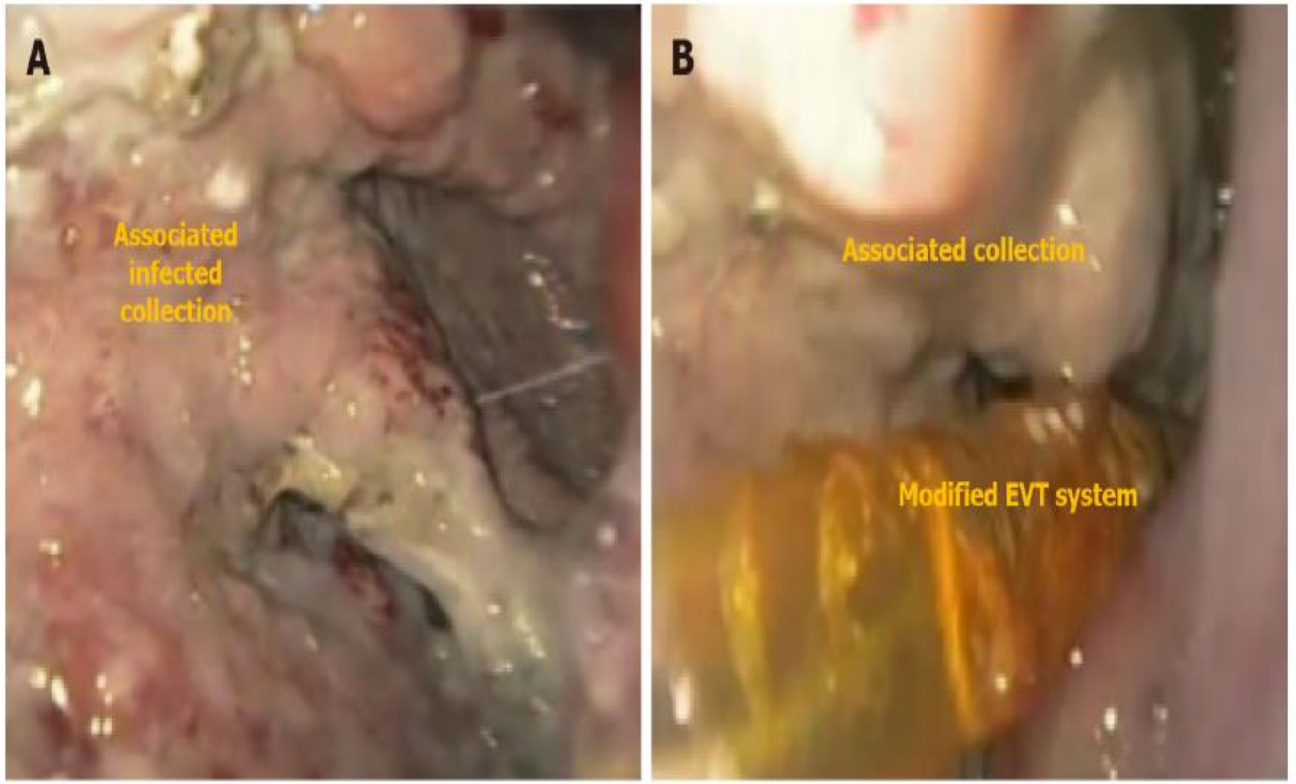
- The cost-effective modified EVT is the preferred approach due to its high efficacy, satisfactory patient acceptance, and safety benefit of avoiding sponge dislodgement and exchange related bleeding.

- The best indication for EVT is acute and early leaks with associated infected collections.

Endoscopic vacuum therapy

A: Leak associated collection after laparoscopic sleeve gastrectomy;

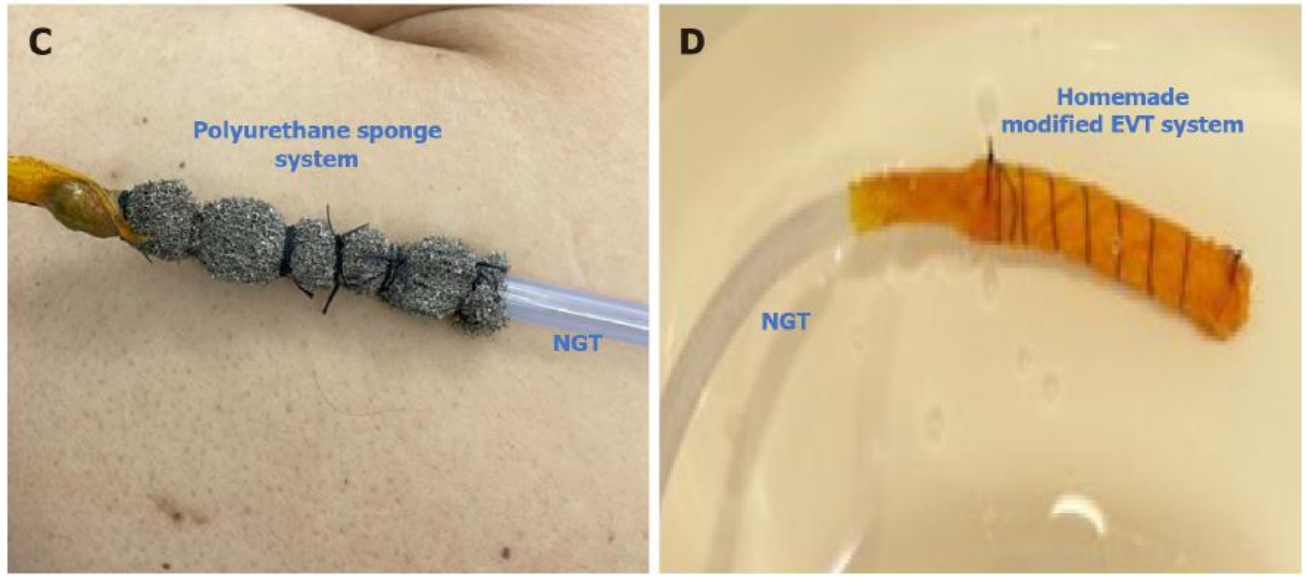
B: Intracavitary modified endoscopic vacuum therapy (EVT) placement;



Endoscopic vacuum therapy

C: Traditional (polyurethane) sponge system;

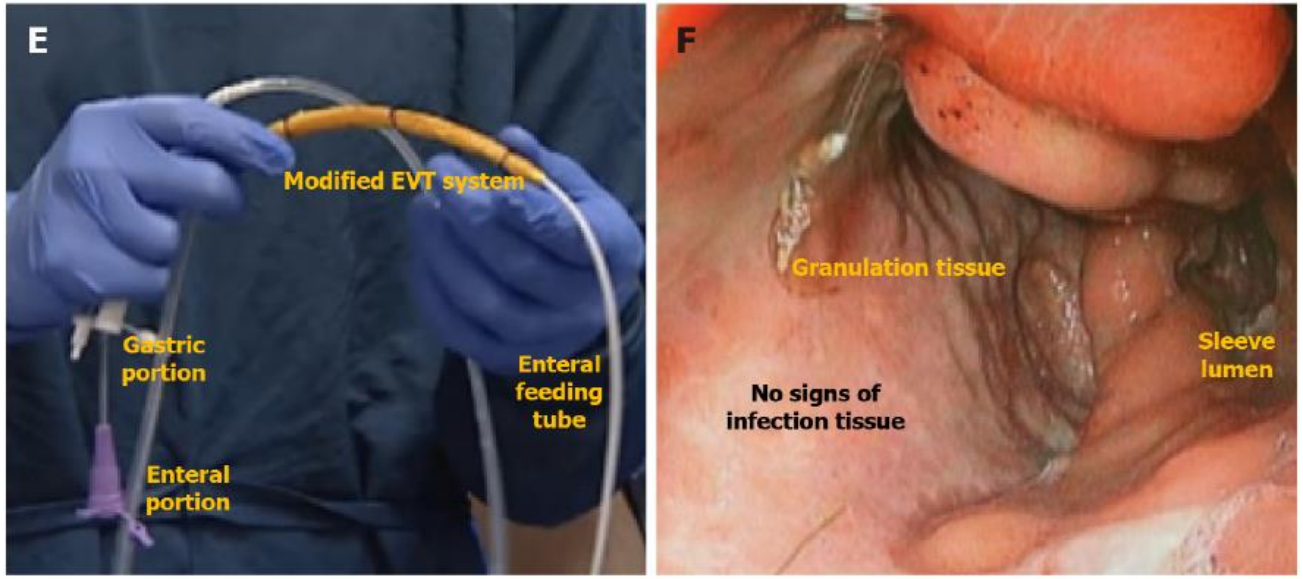
D:Homemade modified EVT;



Endoscopic vacuum therapy

E: Triple lumen tube used for intraluminal EVT allowing for drainage and nutrition with one tube through the nares;

F: Complete tissue healing showing granulation tissue and no signs of infection after EVT treatment.



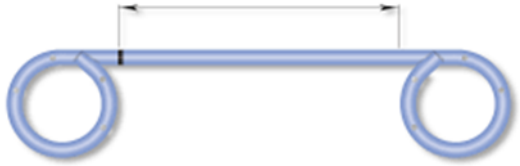
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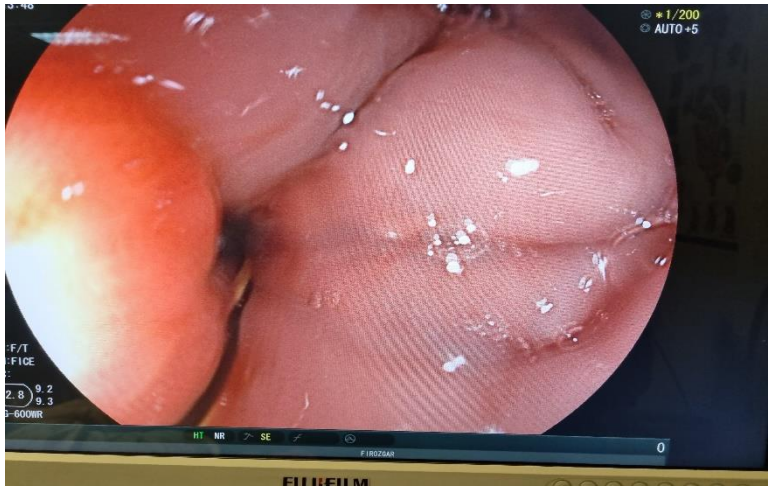
Endoscopic internal drainage with double pigtail stent

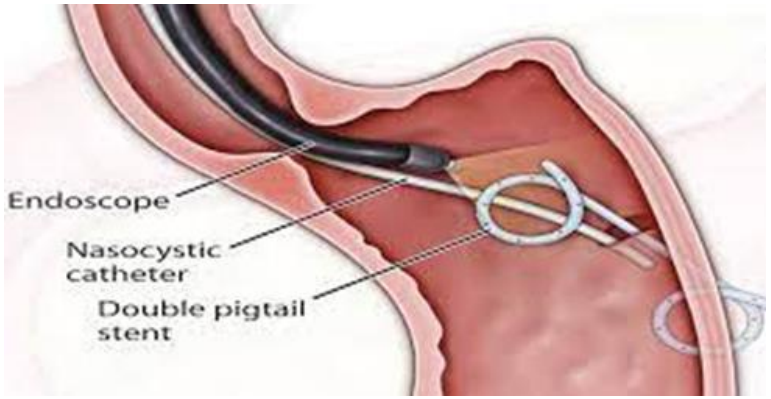
- EID with DPS is indicated for leaks and fistulas with associated fluid collections after BMS.
- The principle for internal drainage is based on the concept that when the pressure within the gastric lumen is lower than that of the perigastric collection, flow will be directed into the GI tract.

- Additionally, oral contents will preferentially flow through the gastric lumen.

Endoscopic internal drainage with double pigtail stent









Endoscopic internal drainage with double pigtail stent

- For EID with DPS to be effective as a sole strategy, the following conditions should be absent:
- (1) Uncontained perigastric collections; (2) High intragastric pressure secondary to downstream stenosis; and (3) Existence of a gastropleural fistula.

- With drainage, the perigastric cavity, will typically contract until it is obliterated, resolving the leak.

Endoscopic internal drainage with double pigtail stent

- EID has been widely adopted, especially in Europe, with high clinical success rates for both acute and chronic leaks and fistulas and a low rate of AEs, allowing a shorter hospital stay.

- The largest study evaluating EID with DPS for the treatment of complications after BMS included 617 patients, with a clinical success rate of 89.5% for leaks and 78.5%, for fistulas.

Endoscopic internal drainage with double pigtail stent

- Defect closure is usually achieved after a long period of treatment. However, as most patients are not hospitalized, present no symptoms, receive oral diet, and return to their daily activities, the long treatment time is not considered an issue when compared to other techniques which are associated with symptoms related to the therapy, such as bariatric stents, or need for hospital stay, such as EVT.

- AEs are reported in about 13.8% of patients, mostly due to stent migration, but also including perforation and bleeding.

Endoscopic internal drainage with double pigtail stent

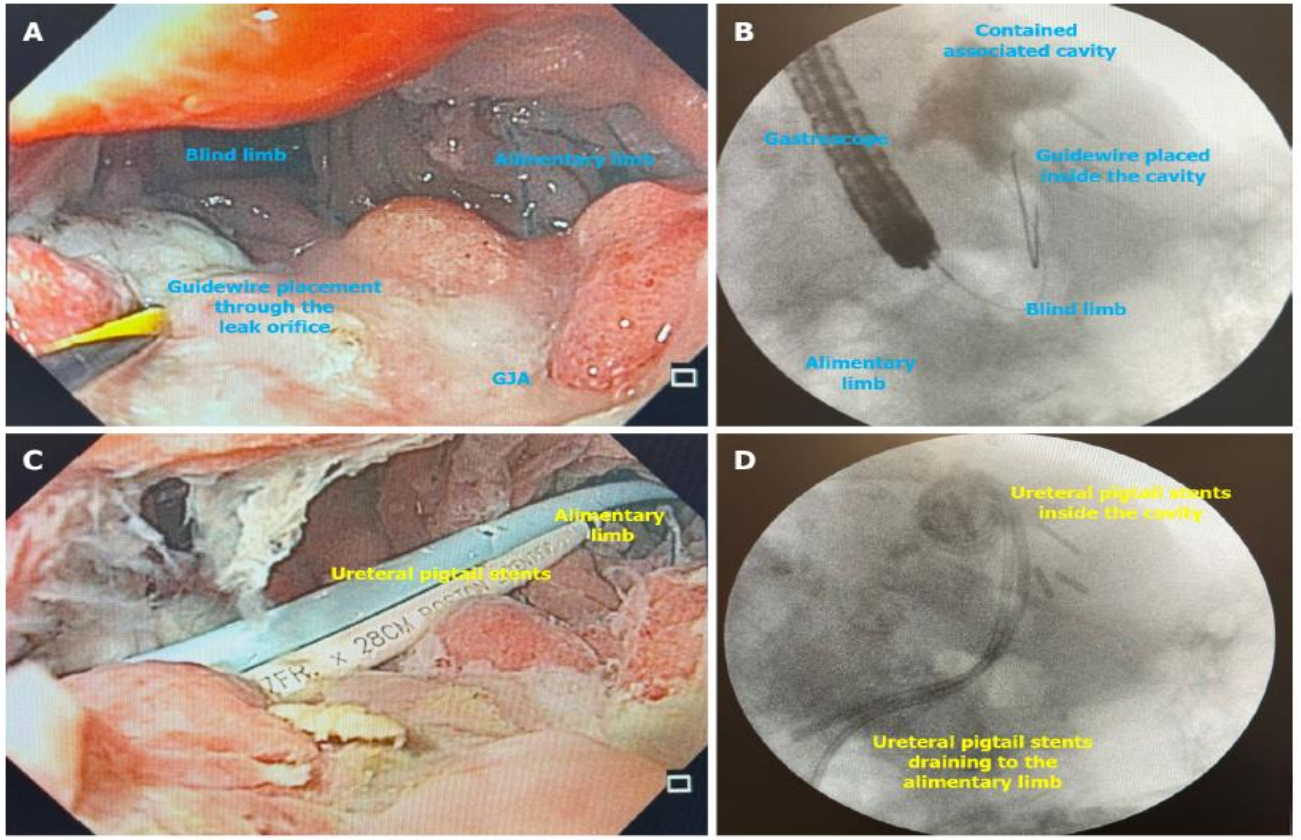


Endoscopic internal drainage with double pigtail stent

- EID with DPS is the best approach for defects with associated collections in patients with no signs of sepsis.
- As most patients are not hospitalized, close follow-up is needed to avoid complications.

- Additionally, to minimize the risk of AEs related to the DPS, we prefer to use ureteral stents as they are more flexible and softer than biliary DPS, avoiding damage to tissue and vessels.

Endoscopic internal drainage with double pigtail stent



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Figure 10 Endoscopic internal drainage with double pigtail stents. A: Leak orifice at the gastrojejunal anastomosis suture line; after Roux-en-Y gastric bypass surgery; B: Fluoroscopy showing a contained associated collection and guidewire placement; C: Endoscopic internal drainage with ureteral pigtail stents; D: Fluoroscopy showing adequate placement and drainage of the leak associated collection. GJA: Gastrojejunal anastomosis.

Septotomy

- Septotomy must be performed when a septum between the defect orifice/associated collection and the GI lumen is identified.

- The principle of this therapy is similar to the Zenker´s diverticulotomy.
- The septum is sectioned to match the pressure of the leak or fistula orifice within the gastric chamber, providing better drainage.

- The septotomy can be performed with endoscopic electrosurgical knives, through the scope scissors or argon plasma coagulation (APC), until the depth of the suture line without exceeding this limit (the cut must not extend beyond the base of the perigastric cavity) to avoid perforation.

Septotomy

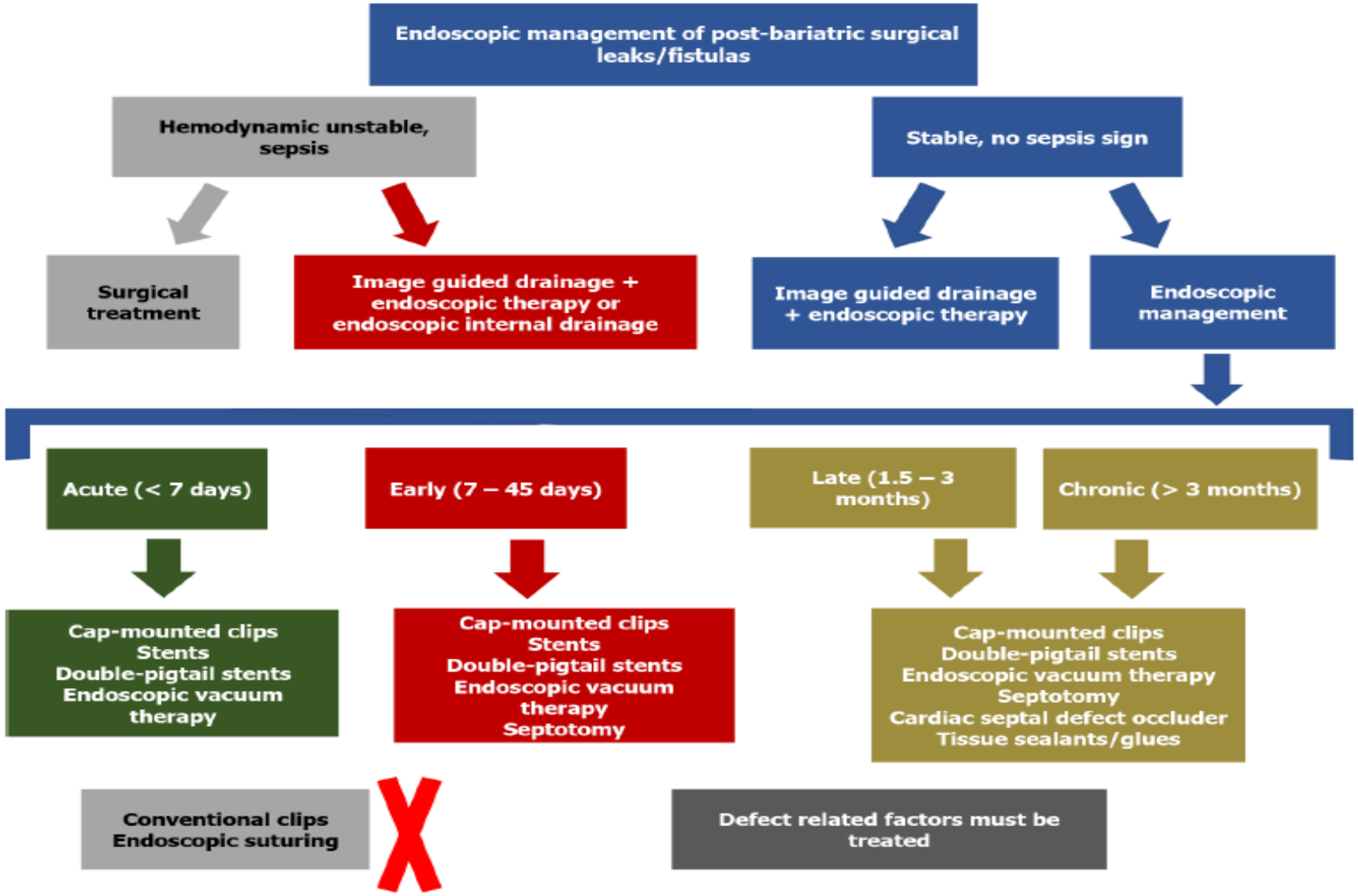
- It is important to state that in most cases, several sessions are needed.
- Septotomy is associated with high clinical success rates and with low AEs in expert hands.

- In a study involving 27 patients with leaks and fistulas after BMS, including RYGB, LSG, and duodenal switch, the clinical success rate after one to six septotomies was 100%.

CHOOSING THE BEST APPROACH

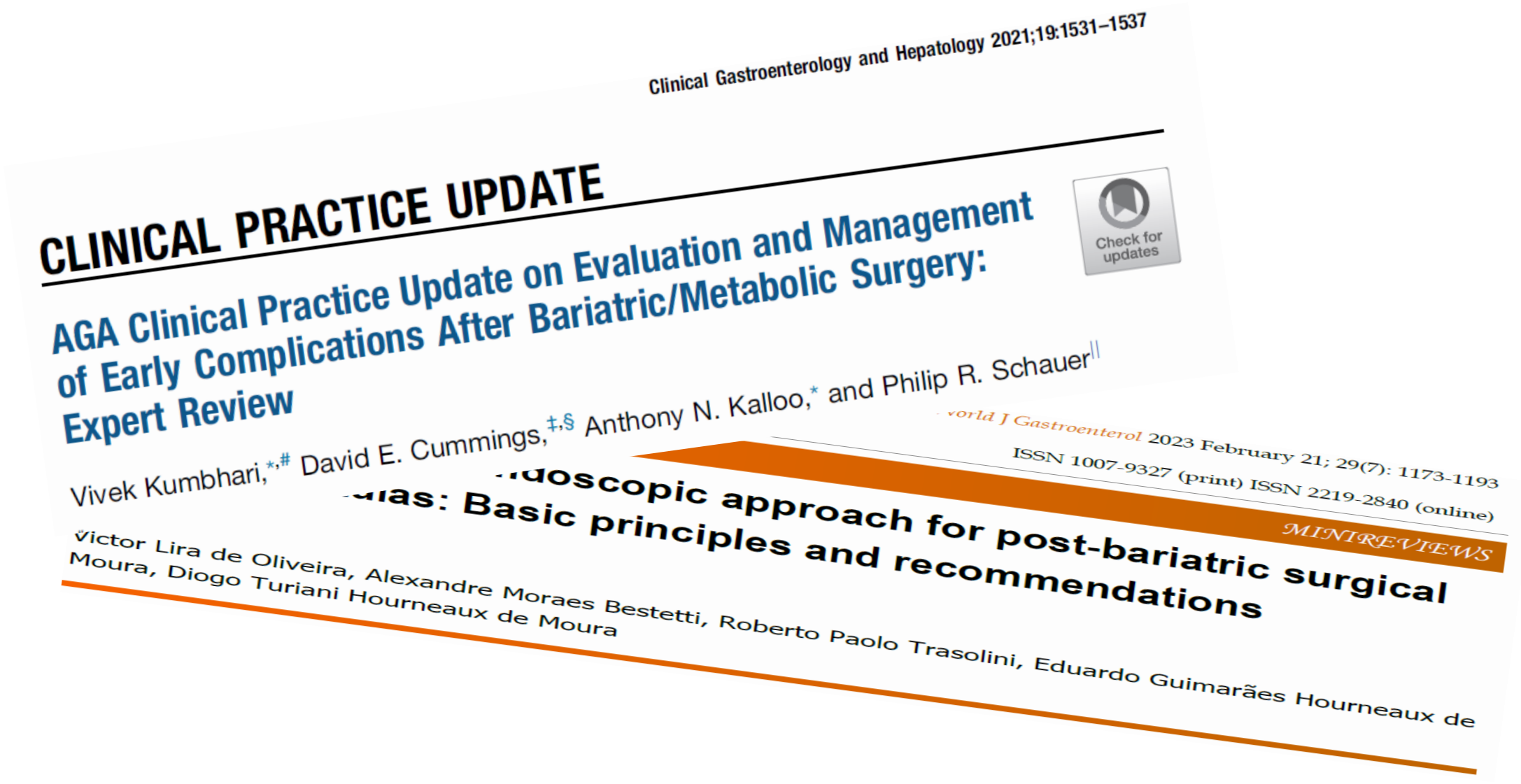
- Based on the pathophysiology of leaks and fistulas after BMS, the appropriate therapy should be individualized, considering the patient´s clinical condition, defect characteristics (size, chronicity, associated collections, and health of the surrounding tissue), device availability, cost, patient preference, mechanism of action of each endoscopic therapy, one’s personal experience and comfort and local availability of experienced physicians.

CHOOSING THE BEST APPROACH



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THANKS FOR YOUR ATTENTION



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CLINICAL PRACTICE UPDATE

AGA Clinical Practice Update on Evaluation and Management of Early Complications After Bariatric/Metabolic Surgery: Expert Review

Vivek Kumbhari,[*,#] David E. Cummings,[‡,§] Anthony N. Kalloo,[*] and Philip R. Schauer[||]

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MINIREVIEWS

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Victor Lira de Oliveira, Alexandre Moraes Bestetti, Roberto Paolo Trasolini, Eduardo Guimarães Hourneaux de Moura, Diogo Turiani Hourneaux de Moura