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Endoscopic stent for the treatment of gastric fistula after bariatric surgery

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ABSTRACT

OBJECTIVE

To analyze the use of endoscopic prostheses for the treatment of gastric fistulas in the postoperative period of bariatric surgeries, evaluating the presence of complications, as well as the type of surgical approach and stents used.

METHOD

An integrative systematic review was conducted, following the PRISMA protocol. The search for scientific articles was carried out in online databases such as PubMed, the Virtual Health Library (BVS) of the Ministry of Health, and the Cochrane Library, considering a 10-year period (2013-2023). Studies available in full text in Portuguese and/or English were included, covering clinical trials, literature reviews, case reports, and other relevant formats related to the investigated topic.

RESULTS

The analyzed studies indicated that different surgical approaches are employed in obesity treatment, with Sleeve and Roux-en-Y Gastric Bypass being the most prominent. Among the strategies used for managing postoperative complications, the use of endoscopic stents proved to be a relevant alternative, especially in cases of leaks and fistulas. Therefore, proper follow-up of these patients is essential to minimize complications such as migration, perforation, and intolerance to prostheses. Additionally, the findings highlight the role of bariatric surgery in promoting sustained weight loss and reducing associated comorbidities, reinforcing its status as a first-line treatment for severe obesity.

CONCLUSION

The endoscopic approach has been shown to be an effective option for treating complications, avoiding surgical interventions, and achieving high effectiveness, with Self-Expanding Metal Stent (SEMS) being the most widely used. No correlation was found between the type of procedure and the need for a stent.

KEYWORDS

Bariatric Surgery; Gastric Fistula; Treatment.

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INTRODUCTION

Obesity is defined as the excessive or abnormal accumulation of body fat and is diagnosed when the Body Mass Index (BMI) is greater than or equal to 30 kg/m². According to the World Health Organization (WHO), overweight and obesity are the fifth leading risk factor for global mortality, being associated with cardiovascular diseases, diabetes, musculoskeletal disorders, sleep apnea, and some types of cancer.[1] In recent decades, obesity has become a global public health problem and is considered an epidemic in countries such as the United States.[2,3] In Brazil, the Vigitel Survey (2019) revealed a 72% increase in the incidence of obesity between 2006 and 2019, rising from 11.8% to 20.3%.[4]

Treatments for obesity range from lifestyle changes to the use of medications and surgical intervention.[5] Although behavioral and pharmacological treatments have shown limited progress, bariatric surgery has demonstrated increasing efficacy, promoting weight loss, remission of comorbidities, reduced mortality, and improved quality of life.[6] Technological advances, such as videolaparoscopy, have made bariatric surgery safer and more effective.[7] Nevertheless, there are specific indications for surgical intervention.[8] Surgical indications include a BMI greater than 40 kg/m² or a BMI between 35 and 40 kg/m² with comorbidities, as well as age between 18 and 65 years, and a stable BMI for two years with failure of previous dietary treatments.[9]

The main current bariatric techniques are sleeve gastrectomy (SG) and Roux-en-Y gastric bypass (RYGB).[10,11] Gastric bypass, considered the gold standard, addresses excess body fat and associated comorbidities such as type II diabetes.[12] The technique involves the creation of a small gastric pouch separated from the rest of the stomach, with resection reaching the proximal jejunum to form the Roux-en-Y configuration. Sleeve gastrectomy involves the removal of most of the greater curvature of the stomach and is also effective in treating obesity and its comorbidities.[13]

Despite the effectiveness of bariatric surgery, it is not free from complications. According to Morais et al. (2022), postoperative complications include anastomotic stenosis, gastro-gastric fistula, internal hernias, gastroesophageal reflux disease (GERD), and dumping syndrome. Gastric fistula is the most common complication, with an incidence of 0.5% to 3%, while pulmonary embolism is the main cause of death, with an incidence of 0.4% to 3.1%.[14]

Gastric fistula arises due to atypical maintenance of contact between the gastric pouch and the stomach and may occur due to iatrogenesis, anastomotic dehiscence, the type of procedure performed, marginal or deep ulcers, foreign body erosion, or the natural predisposition of the stomach portion to shift and connect to the remaining part. It may manifest through inadequate weight loss or gain, the appearance of ulcerations, abdominal pain, formation of stenoses, and recurrent bleeding.[15]

Initial treatment of the fistula involves proton pump inhibitors and sucralfate, resolving 37% of cases. However, when signs and symptoms persist, surgical or endoscopic intervention for closure or excision is recommended. In such cases, possible techniques include laparoscopy, resection of the gastric remnant, and endoscopic measures.[15]

In cases of endoscopic treatment, the self-expanding stent is one of the main techniques. Initially developed for malignant fistulas and esophageal perforations, this technique has also been used for postoperative fistulas, creating a mechanical barrier that allows for oral high-protein nutritional support while the fistulous tract heals.[16]

With the increase in obesity, bariatric surgeries have become more frequent. However, gastric fistula remains a relevant and under-researched complication, with no consensus on its treatment. This study aims to analyze the use of endoscopic stents for the treatment of gastric fistula following bariatric surgery, evaluating the occurrence of complications, as well as the type of surgical approach and stents used.

METHODS

This is a systematic review conducted in accordance with PRISMA criteria. The PICO question, which guided the active search based on population, intervention, comparison, and outcome, was: "In patients with gastric fistula after bariatric surgery (P), how does the use of endoscopic stents (I) compare to alternative treatments (C) in terms of fistula closure rate and complications (O)?"

The search for scientific articles was performed in the MEDLINE database via PubMed, LILACS and MEDLINE via BVS, and the Cochrane Library, considering publications from 2013 to 2023. Clinical trials, pictorial essays, literature reviews, case reports, and other studies addressing the topic according to the objective of the research were included, available online in full text free of charge, in English and/or Portuguese.

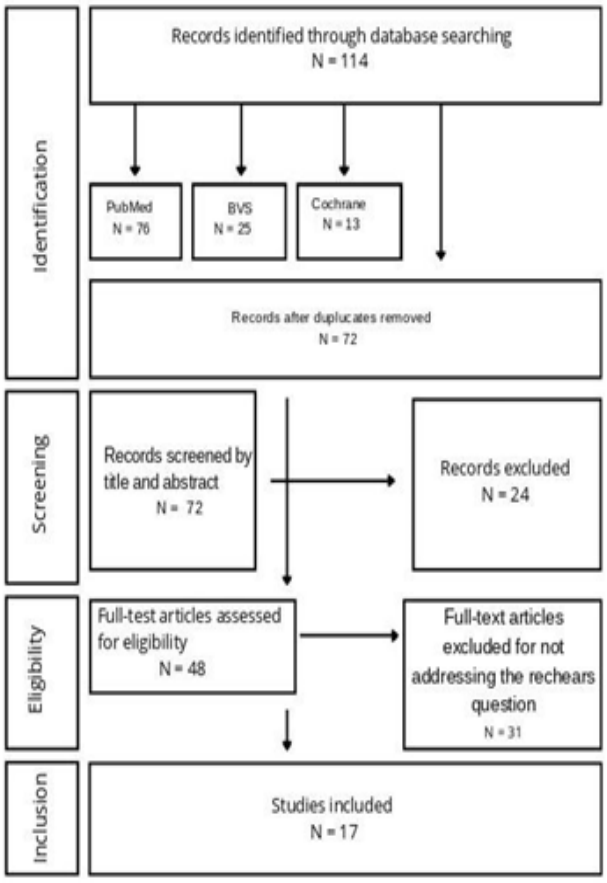
For all mentioned databases, the descriptors used to identify articles were: “Fístula Gástrica,” “Cirurgia Bariátrica,” and “Treatment,” using the boolean operators “AND” and “OR” in both English and Portuguese, organized as follows: “(Fístula Gástrica OR Gastric Fistula) AND (Cirurgia Bariátrica OR Bariatric Surgery) AND (Tratamento OR Treatment).”

The articles retrieved from the three databases were tabulated in an Excel document, grouped into spreadsheets according to the research platform, and exported in CSV format. Subsequently, they were organized alphabetically by title to facilitate the manual removal of duplicates. Among the remaining articles, those whose titles or abstracts mentioned complications related to bariatric surgery were selected. Then, through detailed reading of the abstracts and methods sections, studies were included if they involved a population of patients who developed complications after bariatric surgery and were treated with stents.

RESULTS

Figure 1 presents the PRISMA flow diagram illustrating the article selection process:

Figure 1 - PRISMA flow diagram of study selection and inclusion process [17]



Source: (Authors, 2025)

Table 1 presents an analysis of various studies on the use of self-expanding metal stents in patients. It is divided into three main columns: author, number of patients, and complications (n). The data analysis focused on the number of

patients, with studies varying widely in participant numbers, ranging from 12 to 493 patients. This indicates that some research was conducted with smaller samples, while others analyzed a more significant number of cases. Regarding reported complications, the table highlights various issues associated with the use of the device, including: stent migration (the most frequent), perforation, bleeding (mild and severe), dysphagia (difficulty swallowing), reflux, esophageal stenosis (narrowing of the esophagus), and severe intolerance to the device.

Table 1 - Relationship between number of patients and complications reported by study

Authors	Number of patients	Complications (n)
Freedman et al. (2013)	35	Migration (8)
El Mourad et al. (2013)	46	Migration (7), perforation (1)
Alazmi et al. (2014)	17	Minor bleeding (2), dysphagia (3), migration (1)
Murino et al. (2015)	91	Esophageal stenosis (13), migration (7), perforation (7)
Fishman et al. (2015)	26	Migration (7), severe bleeding (1), severe intolerance (4)
Périssé et al (2015)	29	Migration (7), adhesion (2), intolerance (1), hemorrhage (1)
Southwell et al. (2016)	21	Migration (10), severe intolerance (5), esophageal stenosis (2)
Van et al (2016)	12	Migration (8)
Shehab et al (2016)	22	Migration (4), retrosternal pain and vomiting (20)
Joo et al (2017)	21	Migration, perforation, minor bleeding, dysphagia, severe bleeding, severe intolerance, esophageal stenosis
Shoar et al (2017)	195	Migration, stenosis
Krishnan et al (2019)	37	Migration, reflux
Baptista et al (2019)	43	Not reported
Ferraz et al (2019)	21	Not reported
Vedantam et al (2020)	35	Migration
Rogalsk et al (2021)	503	Migration (113)
Jaruvongvanich et al (2021)	25	Not reported

Source: (Authors, 2025)

Table 2 presents a summary of studies on the use of stents in patients who underwent bariatric surgery. It includes the following key information: author and year, listing the included studies; number of patients, indicating the sample size in each study; type of stent used, specifying whether it was a Self-Expanding Metal Stent (SEMS), Partially Covered Self-Expanding Metal Stent (PSEMS), Self-Expanding Plastic Stent (SEPS), Customized Sleeve Self-Expanding Metal Stent (S-SEMS), or if the type was not reported; type of bariatric surgery, identifying the surgical procedures performed such as RYGB, SG, LAGB (laparoscopic adjustable gastric banding), among others; stent duration, reporting the average dwell time in days, although in some cases this information was not provided; and finally, the clinical success rate, indicating the treatment success percentage in each study, expressed as both percentage and fraction (number of patients with successful outcomes/total number of patients).

Table 2 summarizes the effectiveness of stents in various post-bariatric surgery scenarios, highlighting differences in surgical techniques and clinical success rates.

A total of 17 studies were analyzed, encompassing 1,170 patients. However, one study involving 21 patients did not specify the type of surgery performed, resulting in a detailed analysis of 1,158 patients. In this analysis, the distribution of bariatric procedures was as follows: 312 patients (26.94%) underwent RYGB; 819 patients (70.72%) underwent SG; 2 patients (0.17%) underwent BPD (biliopancreatic diversion); 11 patients (0.95%) underwent LAGB; 3 patients (0.26%) underwent LMGB (laparoscopic mini gastric bypass); 3 patients (0.26%) underwent DS (duodenal switch); 2 patients (0.17%) underwent BPD-DS (biliopancreatic diversion with duodenal switch); 4 patients (0.35%) underwent MFP (miscellaneous foregut procedures); 1 patient (0.08%) underwent VBG (vertical banded gastroplasty); and 1 patient (0.08%) underwent GJ (gastrojejunostomy).

Table 2 - Relationship between number of patients, type and duration of stent used, and clinical success rate by study analyzed

Authors	Number of patients	Type of stent	Type of bariatric surgery	Stent duration (days)	Clinical success rate % (n/n)
Freedman et al. (2013)	35	Not reported	RYGB (35)	≤14 days em 80%	86% (30/35)
El Mourad et al. (2013)	46	PSEMS	SG (24), RYGB (12), LAGB (4), LMGB (3), BPD (2), DS (1)	45	87% (41/47)
Alazmi et al. (2014)	17	SEMS/SEPS	SG (17)	42	76% (13/17)
Murino et al. (2015)	91	PSEMS	SG (55), RYGB (36)	69	81% (74/91)
Fishman et al. (2015)	26	S-SEMS	SG (26)	28	65% (17/26)
Périssé et al (2015)	29	Not reported	SG (23), RYGB (6)	63 days	86,21% (25/29)
Southwell et al. (2016)	21	PSEMS	SG (21)	≤14 days in 67%	95% (20/21)
Van et al (2016)	12	SEMS	SG (7), RYGB (5)	Not reported	75% (9/12)
Shehab et al (2016)	22	SEMS	SG (13), RYGB (9)	42-56 days	100% (22/22)
Joo et al (2017)	21	SEMS, PSEMS, SEPS, S-SEMS	SG, RYGB, LAGB ,LMGB, BPD, DS.	21-70 days	Not reported
Shoar et al (2017)	195	Not reported	SG (195)	Not reported	Not reported
Krishnan et al (2019)	37	Not reported	SG (16), RYGB (15), DS (2), MFP (4)	44 days	94,59% (35/37)
Baptista et al (2019)	43	SEMS (35)	SG (31), RYGB (12)	Approximately 35 days	90,7% (39/43)
Ferraz et al (2019)	21	Not reported	SG (19) , LAGB (2)	Maximum of 28 days	95% (20/21)
Vedantam et al (2020)	35	Not reported	SG (15), RYGB (13), LAGB (5), VBG (1) , GJ (1)	Not reported	Not reported
Rogalsk et al (2021)	503	SEMS	SG (344), RYGB (159)	42-56 days	92% (454/493)
Jaruvongvanich et al (2021)	25	Not reported	SG (13), RYGB (10) BPD-DS (2)	Not reported	80% (20/25)

Source: (Authors, 2025)

DISCUSSION

Endoscopic stents are valuable for treating bariatric complications, avoiding the need for additional surgery and reducing the risk of reintervention. Studies indicate a high success rate in the use of stents for leaks, strictures, and perforations, with a low risk of complications.[35]

Twenty-two patients were treated for leaks after bariatric surgery with 30 stents, achieving successful insertion and removal. Closure was achieved in 13 patients after one procedure and in 18 patients after multiple procedures, with an average of 1.4 stents and 2.8 procedures per patient. Four patients experienced stent migration, which was successfully resolved. Complications included pain, vomiting, bleeding, perforation, and esophageal stenosis. Two deaths occurred, one of which was related to the stent due to bleeding. Mega stents proved effective in the treatment of leaks, especially when combined with OTSC (over-the-scope clips), reducing the need for multiple procedures. OTSC clips are endoscopic devices used to close lesions in the gastrointestinal tract, such as fistulas, perforations, and post-surgical leaks. They are deployed through an endoscope and provide a stronger and longer-lasting closure compared to conventional clips.[18,19]

These clips are particularly useful in the treatment of complications after bariatric surgeries, helping to reduce the need for multiple procedures and promoting more effective healing. They act like a high-strength clamp, compressing the tissues and promoting closure of the defect.[20,21]

Stent fixation can be divided into proximal and distal, with the use of clips minimizing device migration. However, future studies may explore the use of sutures as a potentially more effective alternative for stent fixation. There was no correlation between the type of complication and stent migration, nor was an increased risk of migration observed among the different types of bariatric surgeries analyzed.[35]

Randomized clinical trials are needed to establish the best protocol for the treatment of post-bariatric gastric fistulas. Additionally, endoscopy plays an essential role in the management of post-bariatric complications, and close collaboration between endoscopists and bariatric surgeons can significantly contribute to increasing the success rates of endoscopic procedures.[35]

The use of endoscopic stents has proven to be an effective approach in the management of post-bariatric surgery complications, especially in the treatment of gastric fistulas. However, the choice of stent type is a determining factor for the success of the procedure, directly influencing the fistula closure rate and the occurrence of complications.[18-20,22,35]

Among the articles reviewed, different types of stents used in the post-bariatric context were mentioned, as listed below.[18,20,22, 25-29,32,33]

SEMS, widely employed in the treatment of gastrointestinal obstructions, are composed of a flexible metallic mesh that expands once positioned. In the studies analyzed, SEMS were the most commonly used and were considered the preferred option in most cases.

PSEMS feature a partial covering, usually made of polymer or another material, designed to reduce migration and improve adherence to the gastrointestinal tract walls.

SEPS, unlike metal stents, are composed of flexible plastic materials and may be indicated in situations where metal stents are not the best option.

S-SEMS are customized for specific cases and have a sleeve-shaped covering made of different materials, such as polymers, improving fixation and minimizing migration.

Although the use of stents is an effective strategy, the placement of these prostheses can be associated with complications, including displacement/migration, gastrointestinal tract obstruction, infection, adverse reactions, failure in fistula closure, perforation, adherence, bleeding (mild or severe), dysphagia, esophageal stenosis, and reflux. The incidence of these complications may vary depending on factors such as the type of surgery, the complexity of the fistula, and the experience of the professional responsible for the procedure.[37,38]

CONCLUSION

This study analyzed the use of endoscopic prostheses in the treatment of gastric fistulas resulting from bariatric surgeries. The results demonstrated that endoscopic stents are an effective approach for managing this complication, showing high rates of clinical success and a reduction in the need for additional surgical interventions. However, complications such as stent migration, perforations, and intolerance were observed, highlighting the importance of careful follow-up.

The findings reinforce endoscopy as an efficient and minimally invasive alternative for the treatment of gastric fistulas. To optimize outcomes and minimize complications, it is essential that future studies explore improvements in techniques and management strategies, with a focus on standardizing protocols to ensure greater safety and clinical efficacy.

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