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Revision of Gastric Plication to Gastric Bypass (Indications and Solutions)

Wisam Hamza Al-Sewadi[1], Falih M. Algazgooz[2], Nawal Abdullah[3]*, Jawad Ramadhan Fadhl[1]

[1]Department of Surgery, Al-Zahraa College of Medicine, Basra, Iraq; [2]Department of Surgery, Al-Sadr Teaching Hospital, Basra, Iraq; [3]Department of Human Anatomy, AL-Zahraa College of Medicine, Basra, Iraq

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***Correspondence:** Nawal Abdullah, Department of Human Anatomy, AL-Zahraa College of Medicine, Iraq. E-mail: nawal.abdullah@uobasrah.edu.iq
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Abstract

BACKGROUND: Laparoscopic gastric plication (LGP) has gained increased acceptance as initial weight loss operation, but as with any other procedures, insufficient weight loss, early and late complications such as early and late strictures, gastroesophageal reflux and leak and others have been announced as an indication for revision to gastric bypass surgery as the correct solution.

AIM: The aim of the study was to recognize the common indications for revision of gastric plication (GP) to RYGP and OAGB in our centers and to evaluate the outcome of treating weight regain, complications, and comorbidities.

METHODS: A retrospective study conducted on 54 cases of undesirable results following gastric plication in other centers that were revised to gastric bypass procedures (RYGB and OAGB) from June 2015 to June 2018. Weight regain, gastroesophageal reflux disease not responding to medical treatment, undiagnosed hiatal hernia at surgery, post-operative leak, and strictures are the main categories included as indications for revision to gastric bypass in this study for a period of follow up to 2–5 years regarding weight loss, improvement of GERD and hiatal hernia, improvement of leak, stricture, and axial rotation of stomach.

RESULTS: 54 consecutive patients included in this study previously subjected for LPG few years ago. 13 (24%) male and 41 (76%) female patients with mean age of 39.5 years ranging from (21–58) years and BMI from (41–48) Kg/m^2. The main indication for revision surgery in the form of gastric bypass procedure (RYGB and OAGB) was weight regain in about 69% of cases. In addition to non-responding GERD to medical treatment (13%), hiatus hernia with plicated stomach migration to the mediastinum (3.7%), local collection secondary to leak (1.85%), stricture at site of plication (1.85%), and one case of axial rotation of the stomach (1.85%). Patient postoperatively done well and a follow-up for up to 3 years after revision surgery was uneventful. Most of our patients have good improvement regarding the inclusion criteria in our study (100% cured GERD, 90% cured leak site, about 90% cured symptomatic and radiological hiatal hernia, 100% cured after early, late strictures, and axial rotation while regarding loss of weight and least comorbidities about 88%).

CONCLUSION: Although GP is an established bariatric procedure in treating and solving obesity and its complications, there are certain restrictions and difficulties that makes RYGB superior to GP.

Introduction

Overweight and obesity are a rising worldwide problem with increasing incidence at recent decade. Since 1975 obesity prevalence became tripled [1]. In 2016, about 2 billion adults above 18 years old were overweight with more than 500 million individuals considered obese with body mass index - BMI ≥ 30 kg/m^2, generally 13% of world population being obese [2], [3], [4].

Different complications and linked comorbidities promote the need for bariatric surgery. In 2011, the popular procedures were Roux-en-Y gastric bypass (RYGB; 46.6%), laparoscopic sleeve gastrectomy (LSG; 27.8%), and adjustable gastric banding (AGB; 17.8%) [5].

Laparoscopic gastric plication (LGP) is a comparatively new restrictive technique preferable for many surgeons and patients who are unwilling to experience traditional surgical procedures and command for loss of weight and gastric preservation [6], [7].

Many advantages of LGP such as it is a reversible technique for replication or revision compared with other procedure, also it keeps stomach wall intact, no any gastrointestinal anastomosis, no stapler used which avoided complications such as bleeding and leakage, no foreign body placement beside the procedure has few nutritional deficiencies and available for all [3], [8], [9].

In spite of all its advantages, it has few disadvantages mainly the weight regain, failed plication (because of herniation of stomach through plication suture or presence of an area that secrete ghrelin which is not resected like sleeve gastrectomy), also lack of calibration which are difficult to be managed. The present study was performed for revision to gastric bypass procedure done to those patients who have undesirable complications.

Aim

The main objective was to focus on and evaluate the characteristics, indications, and outcomes of individuals submitted to revision gastric bypass surgery.

Methods

This retrospective study subjected on 54 patients who underwent LGP and developing unordinary complications or irrational outcomes, current study was conducted in Iraq, Basrah city at Al-Sadr teaching hospital and Al-Moosawi private hospital from June 2015 to June 2018. 54 patients enrolled in the study of both gender (41 female with BMI 43 + 3.9 kg\m^2 and 13 male with BMI 45 + 3 kg\m^2), age ranged between (21–58) years. They had been operated previously at other centers for gastric plication. Patients are subjected to revision surgery inform of bypass procedures (RYGB or OAGB according to certain criteria or complications that lead us to choose the type of bypass procedure.

Baseline information and improvement were obtained and analyzed. Surgical data include revision indications, perioperative consequence, type of surgery, complications, and weight loss were evaluated.

All of our patients were thoroughly assessed by bariatric surgeon, endocrinologist, dietitian and psychologists regarding the indication for obesity surgery, types of bypass procedure, any endocrine cause lead to obesity, abnormal diet habit and its effect on types of bypass procedure, comorbidities (DM type II, HT), and any psychological causes for weight regain or failure of weight loss.

Routine laboratory investigations were done in the preoperative period including CBC, blood sugar, HbA1c, cortisone level, thyroid function test, bleeding profile, serum insulin, c peptide level, cardiology assessment, and anesthesiology assessment. The patients were kept on fat, carbohydrate free and high protein diet for at least two weeks to minimize liver size. According to the type of complications surgery considered into:

Group one

Patients with gastroesophageal illness with or without hiatal hernia not responding to medications and diet modification, patients with leak after initial procedure and those with stricture at distal stomach especially the incisura all are converted to RYGB.

Group two

Those patients with failure of weight loss or regain after a period of time especially if associated with metabolic disease such as DM type II or HT are converted to OAGB in operative theatre after doing OGD to evaluate erosive gastritis or Barrett' esophagus.

Usually the first visit in the postoperative period was conducted on the 6th day for general look and any significant complaint, weight reduction, compliance to medications and dietary advices with regular blood sugar assessment for diabetic patients. The second visit usually within twenty days for assessment and dietary advices, then for the 1st year every 3 months and each 6 months for the following years although some of our patients are loosed in a period of follow-up about three patients (5%). The follow-up for 2–4 years (2015–2018) regarding weight loss, treatment of complications like GERD, stricture, leak and improving the comorbidities like DM type II.

Results

Fifty-four patients enrolled in this study with M\F ratio 1:3 and mean age 48.8 ± 8.2 for male and 35.5 ± 12 for female (p = 0.009). The BMI was (43 ± 2.9 kg/m^2) for male and 45 ± 3 kg/m^2) for female with no significant difference (p = 0.30) as in Table 1.

Table 1: Distribution of criteria of patients undergoing bariatric surgery

Patients' criteria	Males	Females	p-value	Range
Number (frequency)	13 (24.1%)	41 (75.9%)	NA	NA
Age (years) (mean ± SD)	48.8 ± 8.2	35.5 ± 12	0.009	21-48
BMI (kg/m^2) (mean ± SD)	43 ± 2.9	45 ± 30	0.039	21-48

The 54 cases had been operated as gastric plication few years ago, and recently they are subjected to gastric bypass procedures according to the following complications or unreasonable outcomes like weight regain which is the most common while GE leak, stricture and axial rotation are the less common problems, the patients were classified according to complications as: Thirty-seven patients had weight regain of BMI as an indication for bariatric surgery according to the guidelines. (68.5%), those subjected to reverted OAGB and RYG, few of them had associated comorbidities like DM type II.

Table 2: Complications or unreasonable outcomes that was considered as an indication for conversion

Complications	Numbers of cases	Frequency
Weight regains	37	68.5%
GERD	7	13%
Weight loss failure	5	9.3%
Hiatal hernia	2	3.7%
GE leak	1	1.9%
Gastric stricture	1	1.9%
Axial rotation	1	1.9%
Total	54	100%

Seven patients had GERD whether undiagnosed preoperatively or *de novo* diagnosed endoscopically or radiologically and some of them by manomatory (13%). Five patients had failure of weight loss. (9.25%), two patients (3.7%) have

moderate to large size hiatus hernia with migration of plicated stomach to the mediastinum are subjected to reversion to reduce stomach to the abdomen with hiatoplasty and RYGB, one patients of axial rotation of the stomach (1.85%) presented after 18 months was reverted to RYGB, one patient (1.85%) with GE leak after gastric plication presented as localized collection was converted to RYGB and drain near leak site and one patient with gastric stricture not resolved by other minimal approaches (1.85%) presented with late stricture at site of insurance (plication). Indication causes as shown in Table 2 and Figure 1.

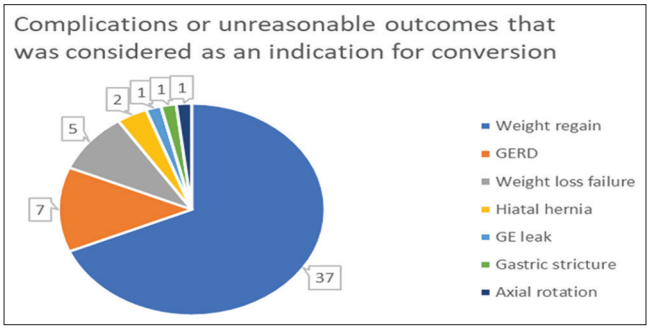

Figure 1: Indications for revision surgery

Majority of our patients had good improvement regarding the inclusion criteria in this study (100% cured GERD, 90% cured leak site, about 90% cured symptomatic and radiological hiatal hernia, 100% cured after early, late strictures, and axial rotation while nearly 88%) regarding loss of weight and improvement of comorbidities as shown in Table 3.

Table 3: Cure percentage (%) regarding complications

Complications	Percentage of cure
GERD	100
Weight loss	88
Hiatus hernia	90
GE leak	90
Gastric stricture	100

Figures 2-7 show steps of revision gastric plication to RYBG procedure.

Discussion

Current extensive use of bariatric surgery has been recognized to certain procedures with weight loss and least complications than others. Throughout the past decade, restrictive surgeries like sleeve gastrectomy became widespread because it is technically simple with encouraging results of high weight loss, but with many complications as long staple line with possibility of bleeding or leakage; moreover, the procedure is irreversible and expensive [10], [11], [12].

Gastric plication was first announced in 1976 by Tretbar *et al.* as a bariatric procedure [13] and was lately reintroduced and achieved laparoscopically by

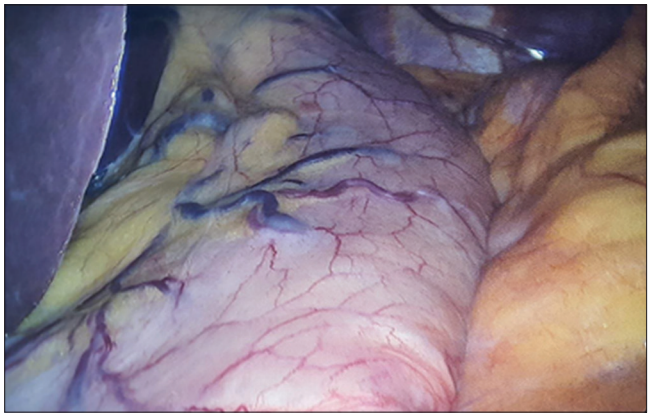

Figure 2: Gastric plication before conversion

Talebpour and Amoli [8], it is recognized as a satisfactory and tolerable treatment for obesity.

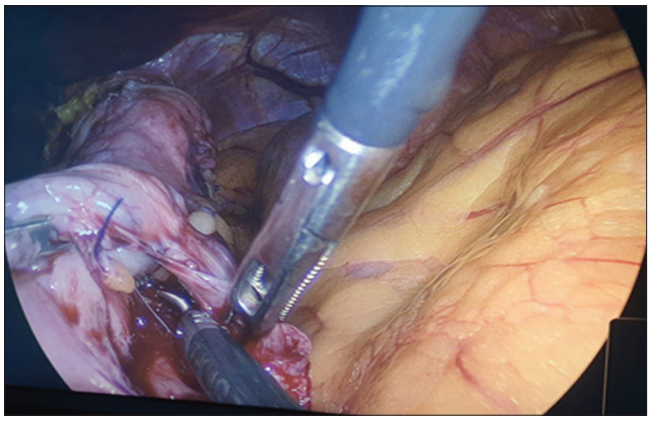

Figure 3: Dissection of previous gastric plication (cutting the plication sutures and freeing the stomach)

This new less invasive procedure which have been proven to encourage a useful therapy with least complications of resecting part of stomach wall to reduce gastric volume which ultimately enhanced weight loss specifically for morbidly obese persons. These current bariatric procedures are the laparoscopic adjustable gastric banding (LAGB), SG and laparoscopic greater curvature plication (LGCP) [14]. LGCP is a new surgical technique which minimizes gastric volume by using sutures invaginating the greater curvature of

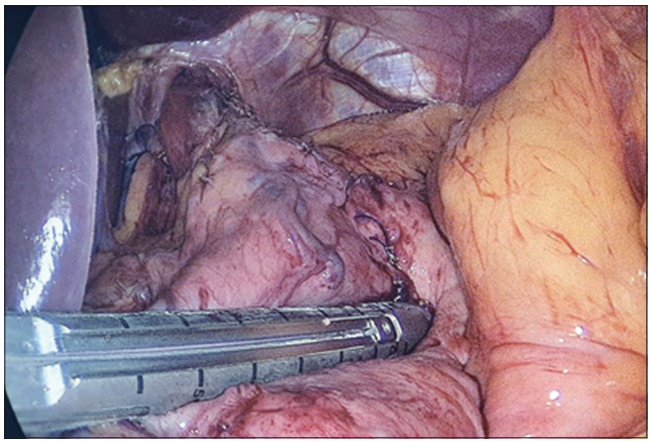

Figure 4: Creating a gastric pouch about 5-6 cm length and 2.5 cm width

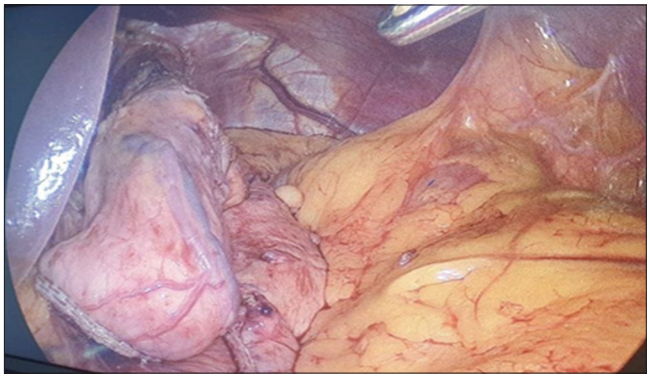

Figure 5: Gastric pouch completed

stomach, without stapling or resection, this procedure had acceptance for surgeons and patients for many advantages, no foreign body implant (like gastric banding) was used, no intestinal bypass or gastric wall resection is needed, by this risk of leakage is minimized. In spite of enhanced weight loss but it still complications may occur like perioperative morbidity and gastric devascularization [15], [16].

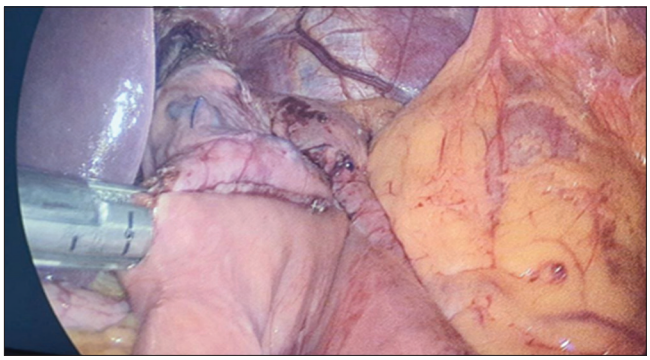

Figure 6: Gastro-intestinal anastomosis creating the Roux loop

According to the literature reports the reoperation rate for main surgical complication was 0–15.4%, and the most common causes were obstruction and gastric perforation. Among the fourteen selected articles analyzed by Yang *et al*., the gastro-gastric hernia was found in at least three patients [17].

It was noted that reduction of the gastric fold due to resected wall atrophy make the suture loose gradually. Thus, the main discomfort about laparoscopic

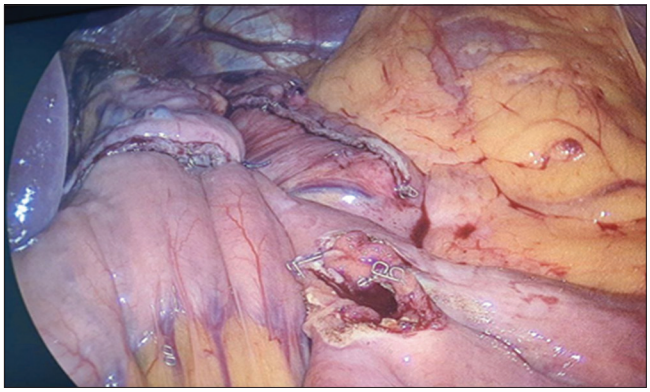

Figure 7: Intestinal-intestinal anastomosis in progress

greater curvature plication and its complications is the deficient standardization of surgical procedures.

Zerrweck *et al.* have announced clearly that LGP has high failure rate with symptomatic patients and that it would be safe to do revisional surgery with the choice of LSG being faster and with less hospitalization, and even better percentage of EML is achieved with LGBP at 18 months [18].

On the other hand, Ibrahim *et al.* in their retrospective study proposed a standard technique of LGP procedure of “sero-muscular bites” using non absorbable thread with four bite suturing and adjusting Bougie will improve the results [19], [20]. Furthermore, Albanese *et al.* stated that the durability of gastric plication was important, revision surgery was needed in 30 patients after a mean time of 18 ± 8 months for GP or prolapsed [21].

In the authors’ experience, the current study mentioned the complications of gastric plication surgery in general and finds the solution by revisional surgery of both ROXGP and OAGP technique, most of our patients had good improvement regarding the inclusion criteria in this study as shown in follow-up results. About 100% cure for GERD, 90% cured leak site, 90% cured symptomatic and radiological hiatal hernia, 100% cured after stricture, and 88% improvement regarding weight loss and comorbidities, beside the patients followed after operation proved to have good chance of recovery from these complications.

Conclusions

LGP yet considered investigational because of high surgical revision and global complication rate with insufficient data available to confirm definitive conclusions. Although early weight loss results are satisfactory, the outcomes remains mandatory point of weakness that must be taken in regard openly with patients.

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