

Double shot in the gastrojejunal anastomosis to prevent anastomotic stricture. Experience in our center

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DOI: <https://doi.org/10.53435/funj.00837>

Received (first version): 1-October-2021

Accepted: April-2022

Published online: April 2022

Abstract:

Biliopancreatic diversion has beneficial effects on obesity¹ and associated comorbidities². However, this surgery is not free of complications and possible side effects. Gastrojejunal stenosis is a postoperative adverse event that influences the quality of life of patients and may require hospital admissions, endoscopic procedures and even surgical reoperations. To prevent these adverse events, we propose to extend the gastrojejunal anastomosis by consecutive double linear stapling to compare the rates of anastomotic stenosis versus simple linear stapling. For this, we did a consecutive retrospective review of morbid obese patients that underwent laparoscopic biliopancreatic diversion, in which 98 patients were included, 83 belonging to the simple linear stapling group and 15 patients to double linear double stapling. To homogenize the sample, the Propensity Score Matching system was applied, obtaining a final sample of

45 patients, 30 with simple linear stapling and 15 with double. After analyzing the data, it was observed that the gastrojejunal anastomosis with double linear stapling obtained a lower incidence of stenosis and edema and has shown a shorter hospital stay, maintaining a correct weight loss in the postoperative follow-up.

Keywords:

- Obesity
- Biliopancreatic diversion
- Anastomosis
- Endostapler
- Stenosis

Introduction

Obesity has become a global health burden due to the continuous increase in incidence and prevalence¹. For this reason, bariatric surgery is booming, since it has proven to be the best effective treatment to solve it².

With the increasing number of procedures performed and longer-term follow-up, the rate of bariatric revision procedures has also increased from 6% in 2011 to 14,14% in 2017¹. It's mostly indicated when there is a lack of weight loss², or in the long-term complication in the malabsorptive techniques like marginal ulcers and gastrojejunal stenosis³. Gastrojejunal stenosis is a relatively common postoperative adverse event after Roux-en-Y gastric bypass⁴ which is estimated between 3% and 27% of patients⁵, also reported in biliopancreatic diversion (BPD)⁶. Although the underlying etiopathogenic mechanisms are unclear, anastomotic leak, ischemic tissue necrosis related to anastomotic tension

and marginal ulceration have been described as the clinical conditions that are most often related to this problem⁴. In addition, stenosis can be predisposed by smoking, alcohol consumption, non-steroidal anti-inflammatory drug use, persistent acidity in the gastric pouch and *Helicobacter pylori*^{7,8}. Other technical factors such as the ascension of the jejunal loop anteriorly or posteriorly to the transverse colon as well as the technique used to perform the gastro-jejunal anastomosis seem to be involved in its development^{9,10}. To solve this underestimated problem¹¹, we proposed to extend the gastrojejunal anastomosis by means of double consecutive linear stapling with the intention of widening the anastomotic mouth and preventing its possible stenosis (figure 1).

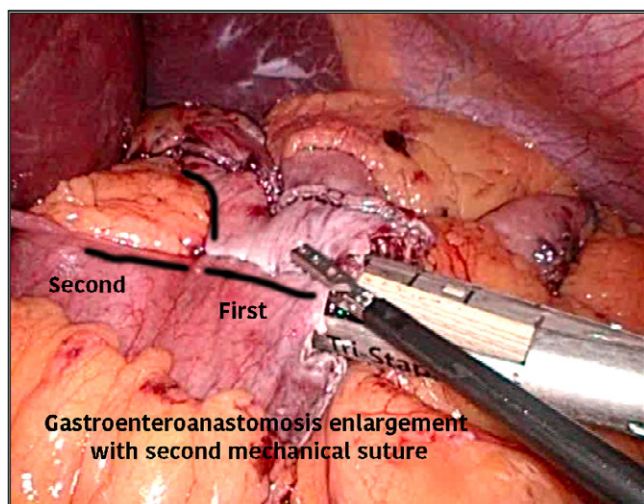


Figura 1. doble grapado lineal mediante endograpadora laparoscópica en la anastomosis gastroyeyunal de derivación biliopancreática laparoscópica

Material and Methods

The study is a consecutive retrospective review of patients who underwent laparoscopic biliopancreatic diversion for morbid obesity in our center, from January 2006 to December 2017. The inclusion criteria required being of legal age, as well as presenting the ability to understand and follow the study procedures and have given a signed consent. Those patients who required conversion to open surgery or loss to follow-up were excluded from the study. The main objective of the study was to evaluate the efficacy and results of this procedure, comparing the stenosis rates of the gastrojejunal anastomosis after simple linear stapling with double linear stapling in patients undergoing laparoscopic biliopancreatic diversion. Secondary endpoints were the presence of other complications, mortality, the need of endoscopic procedures or surgical reinterventions, postoperative stay, readmissions, and weight lost during the follow-up.

In the study, a 2:1 ratio was applied using the Propensity Score Matching system¹² with the aim of eliminating selection bias in non-experimental methods, homogenizing the two groups to be compared and granting greater statistical power. After data analysis, normality tests were used to determine the normal distribution of the variables. For the analysis of the quantitative variables, we used the T Student test or the Wilcoxon test, and for the qualitative variables, the Chi-square test.

Results

Ninety-eight patients were included, 83 belonging to the group with simple linear stapling (84.7%) and 15 patients with double linear stapling (15.3%). After the application of

the Propensity Score Matching¹², the final sample turned out to be of 45 patients: 30 (66.6%) with simple linear stapling and 15 (33.3%) with double. No statistically significant differences were observed in the analysis of the variables sex, age, height, weight and BMI, considering the two study groups homogeneous.

Among the preoperative comorbidities, cardiovascular risk factors such as arterial hypertension, diabetes and dyslipidaemia, sleep apnea and hypopnea syndrome (OSAHS), asthma, osteoarthritis, gastroesophageal reflux, heart disease, nephropathy, hepatic steatosis and thromboembolic disease were analyzed. The only comorbidities in which a significant difference was observed were OSAHS and osteoarthritis. Twelve patients (40%) in the simple linear stapling group had OSAHS compared to 13 patients (87%) in the double linear stapling group with a p of 0.003. Eleven patients (37%) in the simple linear stapling group had osteoarthritis compared to 12 patients (80%) in the double linear stapling group with a p of 0.006.

Regarding postoperative complications, a significant difference was detected both in the presence of edema and in stenosis between simple versus double linear stapling, with a p of 0.02 and p of 0.04 respectively. Focusing on the stenotic complication, in the simple linear stapling, 5 early stenoses were observed, all of them treated by endoscopic dilation and 10 late, 2 of which were recurrent, 6 were treated surgically and 4 endoscopically. In the double stapling, there were 2 late stenoses, both treated surgically.

In contrast, no significant differences were observed in the rest of postoperative complications: anastomotic dehiscence, upper gastrointestinal bleeding, surgical wound infection and postoperative pneumonia. There were no episodes of intestinal occlusion, pulmonary edema, renal failure, thromboembolism or acute myocardial infarction in the postoperative period (Table 1).

	TYPE OF LINEAR STAPLING		P
	SIMPLE (N=30)	DOBLE (N=15)	
DEHISCENCE	4 (13%)	1 (6,7%)	0.5
EDEMA	8 (27%)	0	0.02
STENOSIS	13 (43%)	2 (13%)	0.04
UPPER GASTROINTESTINAL BLEEDING	4 (13%)	1 (6,7%)	0.5
OCCCLUSION	0	0	-
WOUND INFECTION	1 (3%)	0	0.47
PNEUMONIA	0	1 (6,7%)	0.15
PULMONARY EDEMA	0	0	-
RENAL INSUFFICIENCY	0	0	-
THROMBOEMBOLISM	0	0	-
ACUTE MYOCARDIAL INFARCTION	0	0	-

Table 1. Comparación de complicaciones postoperatorias según tipo de grapado de anastomosis gastroeyununal: Ocho pacientes (29 %) en el grapado lineal simple presentaron edema y ningún paciente (0%) en el grapado lineal doble, con una p de 0.02. Trece pacientes (43%) en el grapado lineal simple presentaron estenosis y 2 (13%) pacientes en el grapado lineal doble con una p de 0.04. Por lo que, podemos concluir que se observa diferencia significativa en la presencia de edema y estenosis, siendo menor su incidencia en el grupo de grapado doble. Resto de complicaciones no presentaron diferencias estadísticamente relevantes

There were no differences regarding the number of readmissions, follow-up time or mortality. There is a significant difference in terms of the shorter hospital stay in the double stapling group (Table 2).

	TYPE OF LINEAR STAPLING		P
	SIMPLE (N=30)	DOBLE (N=15)	
HOSPITAL STAY (DAYS)	6,8 ± 3,8	5,13 ± 2,1	0.05
RE-ENTRY	15 (50%)	4 (26%)	0.13
MORTALITY	1 (3%)	0	0.47
POSTOPERATIVE FOLLOW-UP (MONTHS)	72 ± 45	35 ± 18	0.24
WEIGHT LOST (%)	32 ± 13,5	35,5 ± 10,7	0.42

Table 2. Analysis of postoperative variables according to type of gastrojejunal anastomosis stapling: There were no differences regarding the number of readmissions or mortality between the two subgroups, p 0.13 and p 0.47 respectively. There is a statistically significant difference in terms of hospital stay, being shorter in the double stapling group with a p 0.05. No significant differences were identified in terms of the duration of postoperative follow-up (p 0.24), in the double stapling group there are fewer months of follow-up due to the fact that the patients included are more recent compared to those with simple stapling.

Finally, no significant difference was observed in the percentage of weight loss (Kg) in the two subgroups one year after the intervention, obtaining a correct weight loss in both (32 ± 13.5 in simple linear stapling vs 35.5 ± 10.7 in double linear stapling, 0.42).

Discussion

Gastrojejunostomy stenosis remains one of the most common complications after bypass, which has a substantial impact on postoperative morbidity. Although less frequently, the same problem has been described in BPD. The surgical technique with which the gastrojejunostomy is performed can influence the appearance of complications. The need to reduce this possibility has led to the description of technical alternatives.

The objective of our study was to assess the decrease in the stenosis of the gastrojejunal anastomosis in the BPD when an extension of the anastomosis is used by means of consecutive double linear stapling. In the analysis of our results, a statistically significant decrease in both edema and anastomotic stenosis stands out in the group with double linear stapling.

In our series, although the two groups turned out to be homogeneous, a higher incidence of OSAHS and osteoarthritis was observed in the group with double linear stapling. Patients awaiting bariatric surgery are subject to an increase in obesity-related comorbidities. In the literature, it has been described that patients awaiting bariatric surgery may experience an increase of up to 46.2% in cardiovascular events with sequelae and 21.2% in fatal cardiovascular events¹. No adverse cardiovascular events were recorded in our series. The reason we attribute to this difference is that the patients who underwent double stapling were more recently operated on, so they had been on the waiting list for longer, having had more time to develop OSAHS and osteoarthritis. Despite these differences between the two groups, these variables were not shown to influence the stenosis of the anastomosis.

Neither were significant differences observed in mortality, in the number of readmissions or in hospital stay. These aspects could have been altered by the acquisition of greater surgical experience by the team, which could generate a difference between the patients operated on at the beginning of the series compared to those operated more recently. A statistically significant shorter hospital stay has been observed in the double stapling group, justifiable with the improvement in postoperative management and an increase in experience compared to the clinical course after surgery. The objectives of bariatric surgery include weight loss, remission and improvement in metabolic disease and the reduction of comorbidities allowing an improvement in the quality of life. There are many ways of evaluating how a patient responds to bariatric surgery. In our study it was decided to use, among others, postoperative complications,

readmission rate, weight loss, and morbidity and mortality. It is therefore important to emphasize that, in the analysis of the data presented, weight loss remained adequate in both groups, a fact that can lead us to conclude that the introduction of a double linear stapling can be considered useful in the treatment of Morbid obesity by BPD.

As limitations of the study, it is worth highlighting the fact that it is a non-randomized, single-center retrospective study, presenting a small sample size despite the Propensity Score Matching, a lack of external validation, and finally, a lack of previous research studies on the subject.

Conclusion

The gastrojejunal stenosis is a postoperative adverse event in patients undergoing BPD, that affects quality of life and sometimes requires endoscopic or surgical treatment. In our series of cases, the gastrojejunal anastomosis with double linear stapling has obtained a lower incidence of stenosis and edema and has shown a shorter hospital stay, maintaining a good postoperative weight loss. Even so, more studies are recommended to evaluate and validate the efficacy of this technique.

Author contributions

All the authors involved in the report contributed to the concept of the article, the data collection and the writing of the manuscript. All authors reviewed the article before submitting the final manuscript.

Acknowledgments and Statement:

We appreciate the effort made for this publication by all the authors, an effort that is often not recognized and that in spite of this sees us involved in the search for solutions that can improve the quality of life of our patients.

Conflict of interest

- Financing: There were no sources of financing to carry out this work.
- Conflict of interest: The authors declare that they have no conflict of interest.

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