



Trabajo Original

Obesidad y síndrome metabólico

Clinical symptoms are correlated with gastrojejunal anastomosis complications only during the first year after laparoscopic Roux-en-Y gastric bypass

Los síntomas clínicos se relacionan con las complicaciones de la anastomosis gastroyeyunal solamente durante el primer año después del baipás gástrico laparoscópico

María Lapeña Rodríguez¹, Norberto Cassinello Fernández^{1,2}, José Martín Arévalo¹, Vicente Sanchiz Soler³, Raquel Alfonso Ballester^{1,2} and Joaquín Ortega Serrano^{1,2}

¹Endocrine and Bariatric Surgery Unit. Hospital Clínico Universitario. Valencia, Spain. ²Department of Surgery. Universidad de Valencia. Valencia, Spain. ³Department of Gastroenterology. Hospital Clínico Universitario. Universidad de Valencia. Valencia, Spain

Abstract

Introduction: after laparoscopic Roux-en-Y gastric bypass (LRYGBP) many patients complain of epigastric pain or food intolerance, leading to the performance of upper gastrointestinal (UGI) endoscopy.

Objective: this study aims to assess which symptomatology as reported by LRYGBP patients during follow-up suggested correlation with pathological findings of endoscopy, and which factors might play a role, taking the timing of symptom presentation into account.

Materials and methods: a retrospective cohort study was performed identifying LRYGBP patients presenting with food intolerance and/or epigastric pain who had undergone endoscopy. Primary outcomes were endoscopy findings, their association with patient characteristics, and timing of symptom presentation.

Results: of the 514 patients complaining of epigastric pain and/or food intolerance, 81 (15.6 %) underwent endoscopy. A gastrojejunostomy complication was found in 58 % of cases. All patients who complained about food intolerance and epigastric pain presented pathological findings. The only preoperative factor associated with a gastrojejunostomy complication was being a smoker ($p = 0.021$). Time between surgery and endoscopy was also a predictive factor for endoscopic pathological findings ($p = 0.007$); in cases of epigastric pain, symptom onset during the first year (median: 10 months) was related to increased risk of gastrojejunal complications ($p < 0.05$).

Conclusions: endoscopies performed within one year of surgery were significantly more likely to reveal pathological findings than endoscopies performed after the first postoperative year, especially in patients experiencing epigastric pain.

Keywords:

Laparoscopic Roux-en-Y gastric bypass. Gastrojejunal complication. Epigastric pain. Food intolerance. Upper gastrointestinal endoscopy.

Resumen

Introducción: tras un baipás gástrico laparoscópico en "Y de Roux" muchos pacientes refieren dolor epigástrico o intolerancia alimenticia, lo que motiva la realización de una endoscopia digestiva alta.

Objetivos: el objetivo de este estudio es intentar establecer una relación entre la sintomatología referida por los pacientes sometidos a baipás gástrico con los hallazgos endoscópicos patológicos y conocer qué factores pueden estar implicados, considerando el momento de presentación.

Material y métodos: estudio retrospectivo de cohortes, identificando a los pacientes sometidos a baipás gástrico laparoscópico que presentan dolor epigástrico o intolerancia alimenticia durante el seguimiento y a los que se realizó una endoscopia digestiva alta. El objetivo primario es relacionar los hallazgos endoscópicos con la sintomatología y el momento de aparición.

Resultados: de los 514 pacientes que presentaban dolor epigástrico o intolerancia alimenticia, 81 (15,6 %) fueron sometidos a endoscopia digestiva alta. En un 58 % de los casos se encontraron complicaciones relacionadas con la gastroyeyunostomía. En todos los pacientes que presentaban simultáneamente dolor e intolerancia aparecieron hallazgos endoscópicos patológicos. El único factor preoperatorio relacionado con las complicaciones fue el hábito tabáquico ($p = 0,021$). El tiempo entre la cirugía y la realización de la endoscopia también fue un factor significativamente relacionado con los hallazgos endoscópicos ($p = 0,007$). En los casos de dolor epigástrico durante el primer año (media: 10 meses) existía un incremento del riesgo de aparición de complicaciones de la gastroyeyunostomía ($p < 0,05$).

Conclusiones: las endoscopias realizadas durante el primer año postoperatorio tenían más probabilidades de presentar hallazgos patológicos, sobre todo en los pacientes afectados de dolor epigástrico.

Palabras clave:

Baipás gástrico laparoscópico en "Y de Roux". Complicaciones. Gastroyeyunostomía. Dolor epigástrico. Intolerancia alimenticia. Endoscopia digestiva alta.

Received: 08/03/2021 • Accepted: 27/04/2021

Acknowledgements: we thank the INCLIVA translation service for their help in the revision of the English translation.

Funding: this study was not supported by any funds.

Conflicts of interest: the authors declare that they have no conflicts of interest.

Lapeña Rodríguez M, Cassinello Fernández N, Martín Arévalo J, Sanchiz Soler V, Alfonso Ballester R, Ortega Serrano J. Clinical symptoms are correlated with gastrojejunal anastomosis complications only during the first year after laparoscopic Roux-en-Y gastric bypass. *Nutr Hosp* 2021;38(5):978-982

DOI: <http://dx.doi.org/10.20960/nh.03602>

Correspondence:

Norberto Cassinello Fernández. Servicio de Cirugía General. Hospital Clínico Universitario. Av. de Blasco Ibáñez, 17. 46010 Valencia, Spain
e-mail: cassinello73@hotmail.com

INTRODUCTION

Bariatric surgery is the only therapy with demonstrated benefits in terms of excess weight loss and improvement or resolution of weight-related comorbidities in morbid obese patients (1,2). Laparoscopic Roux-en-Y gastric bypass (LRYGBP) is the most frequently performed among all applied bariatric procedures, and has become the second commonest bariatric procedure worldwide (39.6 %) after sleeve gastrectomy (45.9 %) (3).

Perioperative complications have been reduced with the development and widespread use of advanced laparoscopic techniques, accreditation programs, and specialized bariatric surgery units (4). However, medium or long-term complications related to gastrojejunal anastomosis such as stomal stenosis or anastomotic ulcers are well-known complications after LRYGBP that occur in 3-31 % and 1-16 % of patients, respectively, involving different local (mechanical or hand-sewn sutures, *Helicobacter pylori* presence) and systemic factors (smoking habits or type 2 diabetes mellitus [T2DM]) (5).

Patient complaints during follow-up remain challenging for the surgeon due to the sometimes confusing and vague nature of symptomatology. A barium swallow or upper gastrointestinal (UGI) endoscopy are usually performed when patients experience treatment-resistant gastrointestinal symptoms like epigastric pain or food intolerance during follow-up, but any correlation between those symptoms and endoscopic findings is not well established.

The aim of this study was to assess what kind of symptomatology referred by LRYGBP patients during follow-up suggested correlation with pathological findings during endoscopy, and which factors might play a role, taking the time frame into account.

MATERIAL AND METHODS

A retrospective review was conducted of 514 consecutive primary LRYGBPs carried out between January 2008 and December 2018 at our center. All surgeries were performed by three experienced surgeons at the bariatric surgery unit. Exclusion criteria included other techniques (sleeve gastrectomy, one-anastomosis gastric bypass) or revisional procedures. Patients with complications needing reintervention for leakage or other causes were also excluded from the study.

Clinical assessment included gender, age, body mass index (BMI), comorbidities (T2DM) and smoking habit. Liver/gallbladder ultrasound and UGI endoscopy were performed in all patients. Preoperative UGI endoscopic findings were classed as normal, erythematous gastritis or ulcer. *Helicobacter pylori* eradication was not routinely performed.

LRYGBP was performed by creating a 30-mL gastric pouch over a 36-Fr bougie. Gastro-jejunal anastomosis was created in a side-to-side mechanical fashion (linear stapler, 45 mm in length) with running 2/0 monofilament suture closure of the gastrojejunostomy. Alimentary limb length was 150-200 cm in an antecolic, antegastric route. Biliary limb was 60-80 cm long. Jejunum-jejunal anastomosis was also mechanical side-to-side with a linear stapler.

During follow-up, symptoms were recorded as epigastric pain, food intolerance or both, and proton-pump inhibitors, sucralfate or prokinetic treatment were started empirically. Endoscopy was performed in patients who reported treatment-resistant gastrointestinal symptoms. The time between surgery and endoscopy was reviewed.

Normal postoperative endoscopic findings were defined by no findings or by superficial gastritis. Stomal stenosis of the gastro-jejunal anastomosis was defined as a diameter smaller than 10 mm, not allowing passage of the scope, requiring posterior dilatation. Anastomotic ulcer was defined as any ulceration of the mucosa at the level of the gastrojejunostomy.

Data were obtained from clinical records and the endoscopy database, and analyzed anonymously. An informed consent was provided before surgery and endoscopy.

STATISTICAL ANALYSIS

The statistical analysis was performed using the IBM SPSS Statistics 25 software (IBM Corp., Armonk, NY). Quantitative variables are presented as means (standard deviations), and qualitative variables as percentages (range). Group comparisons were made using the Chi-square or Fisher's exact test, as appropriate. Mean comparisons were made using Student's t-test. For non-parametric variables, the Mann-Whitney test was employed. A p-value < 0.05 was considered statistically significant.

RESULTS

During the period between January 2008 and December 2018 a total of 641 patients underwent bariatric surgery in our center, of which 514 were primary LRYGBPs and were included in the review.

During postoperative follow-up 81 patients (15.6 %) who complained of epigastric pain and/or food intolerance underwent endoscopy (66 women and 15 men, mean age: 44.8 ± 8.82 years, with a preoperative BMI of 46.2 ± 6.1 kg/m²). Median time between surgery and endoscopy was 8 months (Table I).

Table I. Demographic data

No. of endoscopies (total LRYGBP)	81 / 514
Age* (years)	44.8 ± 8.82
Sex, M/F	15 / 66
BMI* (kg/m ²)	41.9 ± 8.2
Smoker (yes/no)	32 / 49
Type 2 DM (yes/no)	21 / 60
Time between surgery and endoscopy [†] (months)	8 (0, 129)

*Mean ± SD. †Median (minimum, maximum). BMI: body mass index.

Table II. Symptoms and endoscopic findings

	Normal	Ulcer	Stenosis	Total
Food intolerance	19 (42.2 %)	10 (22.2 %)	16 (35.6 %)	45 (55.5 %)
Epigastric pain	15 (48.4 %)	16 (51.6 %)	-	31 (38.3 %)
Epigastric pain + food intolerance	-	4 (80 %)	1 (20 %)	5 (6.2 %)
Total	34 (42 %)	30 (37 %)	17 (21 %)	81 (100 %)

Table III. Comparison of patients with normal and pathologic endoscopic findings

	Normal endoscopy n = 34	Pathologic endoscopy n = 47	p-value
Sex (F/M)	31 / 3	35 / 12	0.082
Age* (years)	43.3 ± 8.8	45.9 ± 9.7	0.235
BMI* (kg/m ²)	47.5 ± 7.2	44.8 ± 4.9	0.059
Type 2 DM (yes/no)	11 / 23	10 / 37	0.309
Smoker (yes/no)	8 / 26	24 / 23	0.021
Pathological preoperative endoscopy	10	20	0.253
<i>Time between surgery and endoscopy* (months)</i>			
Epigastric pain	15 (2, 129)	7 (0, 111)	0.007
Food intolerance	29 (3, 95)	10 (0, 31)	< 0.05
Epigastric pain + food intolerance	7 (2, 129)	5 (0, 111)	0.139

*Mean ± SD. *Median (minimum, maximum).

In this symptomatic patients group, endoscopy diagnosed 47 (58 %) cases with a gastrojejunostomy complication, while in 34 cases (42 %) no pathological findings were revealed.

When endoscopic findings were analyzed (Table II), the commonest symptoms in patients with a gastrojejunal complication (ulcer or stenosis) were food intolerance (54.5 %), epigastric pain (34.1 %), or both (11.4 %). In the patient group without abnormal findings, self-reported symptomatology included food intolerance in 55.9 % and epigastric pain in 44.1 %.

Table II also shows the analysis of clinical symptoms. A total of 45 patients (55.6 %) presented food intolerance. In 19 cases (42.2 %) no pathological findings were observed, but ulcer was observed in 10 cases and stenosis in 16. Epigastric pain was present in 31 patients (38.3 %), 15 without pathological findings and 16 evidencing ulcer. Only 5 patients (6.2 %) reported food intolerance and pain, but all these patients presented a complication: 4 had ulcer and 1 stenosis.

There were 32 smokers and 49 non-smokers in the cohort of 81 patients. Gastrojejunal complications were observed in 75 % of smokers, while only 46.9 % in the non-smoker group had this condition ($p = 0.021$). No significant differences in complications were found between T2DM patients (47.6 %) and non-diabetics (61.7 %). Furthermore, preoperative endoscopic findings were not significantly correlated with pathological postoperative findings ($p = 0.253$).

When analyzing the time elapsed from LRYGBP to endoscopy, median length was 7 months in patients with gastrojejunal complications, and 15 months in patients without pathological findings ($p = 0.007$). In the group with epigastric pain and the subsequent ulcer patient subset, endoscopy was performed more frequently during the first postoperative year (median 10 months, $p < 0.05$). Non-significant differences were found in the food intolerance subgroup ($p = 0.139$) (Table III).

DISCUSSION

The goal of our study was to assess whether any preoperative factors, clinical symptoms, or time intervals suggested a higher risk for medium- or long-term complications as subsequently confirmed by postoperative endoscopy in patients submitted to LRYGBP. Patient complaints after bariatric surgery are sometimes confusing and unspecific. Nausea, vomiting, and epigastric pain are the most common symptoms after bariatric surgery, frequently associated with dietary non-adherence or food impaction due to surgery-induced anatomical and functional changes.

The pathophysiology underlying gastrojejunal complications (stenosis or ulcer) has not been well established. Ischemia, tobacco use, nonsteroidal anti-inflammatory drugs (NSAIDs), pouch size, and T2DM are among the predisposing factors.

The technique used to create the gastrojejunal anastomosis (circular or linear stapler, absorbable or non-absorbable sutures) might also be an important factor in the development of late anastomotic complications.

UGI endoscopies should be considered in patients with persistent symptoms despite dietary and/or lifestyle changes or nutrition counseling. Our results show that 58 % of cases with symptomatology suggestive of a postoperative complication revealed some sort of pathological findings during endoscopy. Although normal UGI endoscopy results have been reported as the most common postoperative finding in these patients, other studies nonetheless concur with our findings (6,7).

Self-reported symptomatology when these complications appear is typically epigastric pain or food intolerance, also found in our study (8). Our results showed that food intolerance was the most common symptom (56 %): almost 60 % of these cases evidenced a complication, and although stenosis was more frequent (16/45), the presence of ulcers (10/45) was also considerable. In cases of epigastric pain (38 %) ulcer was observed in almost 50 %. Also, a small proportion of cases (6 %) presented epigastric pain and food intolerance, but interestingly, all of them presented one of the two anastomotic complications studied.

Gastrojejunal stenosis and ulcers are well-known complications after LRYGBP, with an estimated incidence between 3 % and 27 %, and 0.6 % and 25 % of cases, respectively (9,10). A series investigating postoperative symptom management, published by Lee et al., reported normal findings in 43 % of cases, anastomotic ulcer in 27 %, and stomal stenosis in 19 % (11). These findings agree with those reported in our series, which detected normal findings (42 %), anastomotic ulcer (37 %), and stomal stenosis (21 %) in symptomatic patients who underwent UGI endoscopy.

The pathogenesis of anastomotic ulcers is unclear. Azagury et al. (12) performed a study in 103 patients with marginal ulcers after a Roux-en-Y gastric bypass, finding that diabetes, smoking, and gastric pouch length were significantly associated with marginal ulcer formation. These results were in line with other subsequent publications that showed smoking as a risk factor (13,14). In our study smoker patients presented a higher risk of complications than nonsmokers (52 % vs. 23.5 %, $p = 0.021$). In T2DM patients no major differences were discovered by our study.

The role of *H. pylori* presence is ill-defined, and the need for *H. pylori* screening and eradication before surgery is still controversial. Some authors like Rawlins et al. find no support for the assumption that *H. pylori* could be involved in the development of complications (15). Moreover, other studies showed that obese patients presented a significantly lower rate of *H. pylori* infection eradication when compared to controls with the triple therapy (16). Given the lack of consistent evidence, we do not routinely eradicate *H. pylori*.

As regards the relationship of timing between surgery and endoscopy, Huang et al. found a trend toward a shorter interval between surgery and endoscopy in patients with abnormal endoscopy as compared with those with normal endoscopy ($p = 0.09$) (17). In our study major differences were identified between pathological and normal endoscopies, with shorter times

in cases with pathological findings ($p = 0.007$). In patients experiencing epigastric pain, the longer the interval from surgery, the greater the likelihood of normal endoscopy. Patients who experienced epigastric pain during the first postoperative year had a higher rate of complications in the gastrojejunal anastomosis ($p < 0.05$).

In summary, the present study confirms that upper gastrointestinal endoscopy is an important diagnostic tool in LRYGBP patients with certain postoperative symptoms such as epigastric pain or food intolerance. In our series, the most common (almost 60 %) endoscopic finding was a pathological cause (stenosis or ulcer). Endoscopies performed within one year after surgery were significantly more likely to have pathological findings than those conducted after this first postoperative year, especially in patients suffering from epigastric pain.

This study has certain limitations. Firstly, it is a retrospective study involving a considerable patient sample but with a long follow-up, which could entail certain loss of patients over the study period. Secondly, intraoperative factors not comparable in this study (as only side-to-side mechanical anastomoses were performed) may be involved. Additionally, patient symptomatology is mostly unspecific and time of presentation can vary substantially. Finally, postoperative endoscopy was not routinely performed in all LRYGBP, which ruled out evaluating complications in asymptomatic patients.

Nowadays, perioperative protocols in bariatric surgery depend on many factors (national guidelines, regional associations, or even surgeon preferences), and there is no consensus on whether complementary tests should be requested during postoperative follow-up. The diagnostic method is usually chosen based on high clinical suspicion. Our data suggests that the timing of symptom presentation could inform decision-making and triaging as regards endoscopy, thus minimizing unnecessary invasive and costly procedures.

In the future, it would be important to carry out prospective studies to better identify groups at risk of developing complications, making it possible to establish endoscopic follow-up protocols and earlier diagnoses for these individuals. On the other hand, since ulcer is the most frequent pathological finding, it would be interesting to evaluate a PPI treatment during the first year after surgery, since it has been seen that one of the most important predisposing factors is acid production by the gastric reservoir.

REFERENCES

1. Puzifferri N, Roshek TB, Mayo HG, Gallagher R, Belle SH, Livingston EH. Long-term follow-up after bariatric surgery: a systematic review. *JAMA* 2014;312(9):934-42. DOI: 10.1001/jama.2014.10706
2. World Health Organization. Obesity and Overweight Fact Sheet [Internet]; 2020. Available from: <https://www.who.int/es/news-room/fact-sheets/detail/obesity-and-overweight>
3. Angrisani L, Santonicola A, Iovino P, Vitiello A, Zundel N, Buchwald H, et al. Bariatric Surgery and Endoluminal Procedures: IFSO Worldwide Survey 2014. *Obes Surg* 2017;27(9):2279-89. DOI: 10.1007/s11695-017-2666-x
4. Sjöström L. Bariatric surgery and reduction in morbidity and mortality: experiences from the SOS study. *Int J Obes (Lond)* 2008;32(Suppl 7):S93-7. DOI: 10.1038/ijo.2008.244

5. Vasquez JC, Wayne Overby D, Farrell TM. Fewer gastrojejunostomy strictures and marginal ulcers with absorbable suture. *Surg Endosc* 2009;23(9):2011-5. DOI: 10.1007/s00464-008-0220-6
6. Yang CS, Lee WJ, Wang HH, Huang SP, Lin JT, Wu MS. Spectrum of endoscopic findings and therapy in patients with upper gastrointestinal symptoms after laparoscopic bariatric surgery. *Obes Surg* 2006;16(9):1232-7. DOI: 10.1381/096089206778392176
7. Quadros LG, Kaiser Jr. RL, Galvão Neto MP, Campos JM, Santana MF, Ferraz AAB. Long-term postoperative endoscopic findings after gastric bypass procedure: a co-occurrence analysis. *Arq Gastroenterol* 2016;53(4):273-7. DOI: 10.1590/S0004-28032016000400012
8. Boerlage TCC, Wolvers PJD, Bruin SC, Huibregtse IL, Voermans RP, Fockens P, et al.. Upper endoscopy after Roux-en-Y gastric bypass: diagnostic yield and factors associated with relevant findings. *Surg Obes Relat Dis* 2020;16(7):868-76. DOI: 10.1016/j.soard.2020.03.001
9. Da Costa M, Mata A, Espinós J, Vila V, Roca JM, Turró J, et al. Endoscopic dilation of gastrojejunal anastomotic strictures after laparoscopic gastric bypass. Predictors of initial failure. *Obes Surg* 2011;21(1):36-41. DOI: 10.1007/s11695-010-0154-7
10. Palermo M, Acquafresca PA, Rogula T, Duza GE, Serra E. Late surgical complications after gastric by-pass: a literature review. *Arq Bras Cir Dig* 2015;28(2):139-43. DOI: 10.1590/S0102-67202015000200014
11. Lee JK, Van Dam J, Morton JM, Curet M, Banerjee S. Endoscopy is accurate, safe, and effective in the assessment and management of complications following gastric bypass surgery. *Am J Gastroenterol* 2009;104(3):575-82. DOI: 10.1038/ajg.2008.102
12. Azagury DE, Abu Dayyeh BK, Greenwalt IT, Thompson CC. Marginal ulceration after Roux-en-Y gastric bypass surgery: characteristics, risk factors, treatment, and outcomes. *Endoscopy* 2011;43(11):950-4. DOI: 10.1055/s-0030-1256951
13. Coblijn UK, Lagarde SM, de Castro SMM, Kuiken SD, van Wagenveld BA. Symptomatic marginal ulcer disease after Roux-en-Y gastric bypass: incidence, risk factors and management. *Obes Surg* 2015;25:805-11. DOI: 10.1007/s11695-014-1482-9
14. Coblijn UK, Goucham AB, Lagarde SM, Kuiken SD, van Wagenveld BA. Development of ulcer disease after Roux-en-Y gastric bypass, incidence, risk factors, and patient presentation: a systematic review. *Obes Surg* 2014;24:299-309. DOI: 10.1007/s11695-013-1118-5
15. Rawlins L, Rawlins MP, Brown CC, Schumacher DL. Effect of *Helicobacter pylori* on marginal ulcer and stomal stenosis after Roux-en-Y gastric bypass. *Surg Obes Relat Dis* 2013;9(5):760-4. DOI: 10.1016/j.soard.2012.06.012
16. Abdullahi M, Annibale B, Capoccia D, Tari R, Lahner E, Osborn J, et al. The eradication of *Helicobacter pylori* is affected by body mass index (BMI). *Obes Surg* 2008;18(11):1450-4. DOI: 10.1007/s11695-008-9477-z
17. Huang CS, Forse RA, Jacobson BC, Farraye FA. Endoscopic findings and their clinical correlations in patients with symptoms after gastric bypass surgery. *Gastrointest Endosc* 2003;58(6):859-66. DOI: 10.1016/s0016-5107(03)02310-1