

Endoscopic Findings in the Upper Gastrointestinal Tract of Morbidly Obese Patients with Indication for Bariatric Surgery

Di Palma G*, Bolino C, Sanchez C, Caro L and Cerisoli C

Gedyt (Gastroenterologia Diagnostica y Terapeutica), Ciudad Autonoma de Buenos Aires, Argentina

***Corresponding Author:** Di Palma G, Gedyt (Gastroenterologia Diagnostica y Terapeutica), Ciudad Autonoma de Buenos Aires, Argentina.

Received: January 30, 2020; **Published:** March 30, 2021

Abstract

Background: Obesity, a metabolic disease associated with frequent comorbidities, may predispose to the development of digestive diseases. Bariatric surgery is the most effective treatment to date. The European Association of Endoscopic Surgery requires performing an upper endoscopy to all Roux-en-Y gastrojejunal bypass (RYGB) candidates with or without gastrointestinal (GI) symptom.

Objectives: 1. Describe the endoscopic findings of the GI tract of morbidly obese patients in bariatric surgery plan. 2. Establish whether there were differences in endoscopic findings according to the presence or absence of digestive symptom.

Methods: Population: Adults with a BMI > 35 kg/m² with comorbidities or > 40 kg/m² with bariatric surgery indication. Incomplete endoscopies and acute gastro-esophageal pathology prior to the preoperative endoscopy were exclusion criteria. The study took place in a gastroenterology and endoscopy centre, between December 2014 and June 2015. Design: Observational, comparative and cross sectional study. Procedures: Endoscopies were performed under propofol with Olympus equipment GIF N180 and endoscopic findings were registered. Patients completed a questionnaire to collect clinical data before the endoscopies, as usually, and were classified into symptomatic and asymptomatic. Age, BMI, *H. pylori* status, NSAIDs; sex and alcohol consumption were variables to control. Ethics: Patients signed informed consent before the procedures and the study was approved by the local IRB. Statistical analysis: SPSS v19; 95% CI, X², TT.

Results: 146 patients were included; 72% female; average age: 43.45 ± 10.28 years; average BMI: 41.10 ± 5.47 m/kg². Most patients (67%) had at least one endoscopic finding, being erosive esophagitis, Hiatal Hernia (HH) and erosive gastropathy the most common (table). Symptom were registered in 30%: esophageal reflux disease 11% (n:5); dyspepsia 53% (n:24) and both 36% (n:16). An association between symptom and HH was observed (p < 0.01), being HH more frequent in symptomatic patients; No other association was registered. BMI was higher in symptomatic patients with HH (M (DE) = 44.58 5.42) than in those with no HH (M (DE) = 39.80 (4.43); p = .002; no association was observed between alcohol consumption, NSAIDs, age, sex, Hp status and the presence of symptom and HH. The prevalence of *H. pylori* was 22% (31/138), with no differences between symptomatic and asymptomatic patients; p = 0.58. PPI consumption was registered in 5% (n:7) and it was more frequent within symptomatic patients (11 vs 2, 2%; p = 0.02).

Conclusion: Endoscopic findings were observed in two thirds of the sample being the most frequent erosive esophagitis and HH. HH was more frequent in symptomatic patients, and BMI was higher in symptomatic HH patients.

Keywords: Obesity; Upper Endoscopy; Bariatric Surgery; Digestive Diseases

Background

Obesity is a metabolic, epidemic, chronic, heterogeneous and stigmatized disease, of multifactorial origin, characterized by the increase of body mass, whose magnitude and distribution restrain the individual's health. Obesity is associated to frequent comorbidity such as diabetes, arterial hypertension, coronary disease, osteoarthritis of the knee and cancer, among others; it is also determined by genetic and environmental interaction [1].

Obesity is a health problem increasing in almost all occidental countries [2-9]. The World Health Organization (WHO) estimated that approximately 1.600 million people worldwide are overweight and at least 400 million of them are obese; it's expected to have 700 million obese people in the year of 2017 becoming a real epidemic disease [10].

Data from the Pan American Health Organization reinforce the recognition of this problematic issue in America Region with 139 million overweight and/or obese people (25% of all America population). Due to the current epidemic increase, 289 million people will be affected in 2015 (39% of the Region). In Argentina, the first survey was carried out in 2005 by the Encuesta Nacional de Factores de Riesgo (ENFR) (National Survey of Risk Factors). This study suggested that 34.5% of population is overweight and 14,6% is obese [11]. It means that 49.1% of Argentina population were overweight. In the second survey conducted by ENFR in 2009 the prevalence increased to 35.5% for overweight and 18% for obesity [12]. Thus, more than half of the Argentina population (53.4%) is overweight in some level.

When we define obesity we do it based on the Body Mass Index (BMI). The measurement is defined by the individual weight in Kg divided for his height in square meters. According to WHO, a BMI of 25 and 30 is considered overweight, a BMI of 30 and 35 is considered obesity level I, a BMI of 35 and 40 as level II and above 40, level III. Morbid obesity is defined by a BMI > 35 in presence of comorbidities; or > 40 with or without comorbidity [13].

Weight reduction improves quality of life and reduces mortality of patients [14]. Currently, the conservative treatment based on diet, changes of lifestyle and pharmacological agents show successful results but the long-term efficacy is limited [15]. Bariatric surgery is the best treatment so far. Besides, it shows effectivity in sustaining weight reduction in a long-term period, patients show improvement of blood pressure numbers, improvement or remission of hyperglycemia and reduction of global and cardiovascular mortality in approximately 80% [16-18].

Under the term Bariatric Surgery, we refer to the Adjustable Gastric Band, the Gastric Sleeve or Vertical Banded Gastroplasty and to the Roux-en-Y Gastric By-Pass as these are the most widely used in our area and all over the world. It is considered as therapeutic option for people with a BMI between 35 and 39.9 kg/m² and with one of the following comorbidities: DMT2, HTA, sleep apnea or arthrosis with high functional disability; or people with BMI > = 40 kg/m² with no response to conventional treatment [19].

Obesity may predispose patients to develop digestive disorders, which can occur with a frequency of 2 to 3 times more often than in a general non obese population. Among these disorders are: gastroesophageal reflux, hiatal hernia, Barrett's esophagus, esophageal adenocarcinoma, colorectal polyps, non-alcoholic fatty liver, cirrhosis and hepatocarcinoma [20]. Many of these disorders can be found in patients' candidates for bariatric surgery and can cause symptoms and postsurgical complications, or even determine the type of surgery or contraindicate it.

This is the reason why the guides of the European Association of Endoscopic Surgery establish that the Upper Endoscopy should be performed on all patients candidates to the Roux-en-Y Gastric By-Pass with or without digestive symptom (as the anatomy changes, the excluded organs cannot be immediately visualized after surgical procedure) [21]. The American Association of Gastrointestinal Endoscopy adds the recommendation of performing this procedure on all symptomatic patients, since these patients have greater possibility of presenting organic pathology. Also recommends for all candidates to gastric band to exclude the possibility of hiatal hernia which may

alter the surgical approach [22,23]. Asymptomatic candidates are controversial. [24] as some authors, on the one hand, have described severe lesions in asymptomatic patients or patients with few symptoms, justifying performing prebariatric endoscopic studies [25-29] other authors recommend a non endoscopic approach due to costs and the risks associated to sedation [30].

Objectives of the Study

The aim of our work is to demonstrate the role of Upper Digestive Video Endoscopy (UDVE) in the evaluation of morbidly obese patients' candidates for surgery describing the preoperative endoscopic findings.

We carried out a literature search as follows: Obesity, Endoscopy, Bariatric surgery, upper gastrointestinal pathology.

- Describe the endoscopic findings of esophagus gastroduodenal tract (Upper GI Tract) of obese patients in bariatric surgery plan.
- Establish whether there are differences in the endoscopic findings according to the presence or absence of digestive symptoms prior to the study.

Materials and Methods

Study population

- **Criteria inclusion:** Adults with BMI > 35 kg/m² presenting comorbidities (Diabetes Mellitus Type 2, Arterial Hypertension, Sleep Apnea, arthrosis with high functional disability) or > 40 kg/m² with bariatric surgery indication, asymptomatic or with digestive symptom, who have successfully completed the preoperative valuation of the multidisciplinary group specialist in bariatric surgery.
- **Exclusion Criteria:** those who could not properly complete the endoscopic study (either by decision of the endoscopist or anesthesiologist doctors); presence of acute upper GI pathology during the month prior to the pre-surgical endoscopy.

Temporo-spatial coordinates: The study was carried out between December 2014 to June 2015 in an outpatient center of diagnostic and therapeutic endoscopy (Gedyt: Azcuénaga and VOYF based) in Buenos Aires DF city.

Sampling

Considering Frigg, *et al.* [32] background as a study involving simultaneous analysis of symptomatic and asymptomatic patients, the calculation of the minimal sampling n has been proceeded. The following data were taken as references: the previous study indicated that 58.1% of the symptomatic patients had pathology and 52.4% of the asymptomatic had pathology. Considering a significance level of .05 and a power of .80, a n 1194 minimum per group would be required to detect a difference in the pathology findings among the groups of 5.7%.

Design work: Comparative, observational, transversal.

Procedures

Our working group, specialized in patients' candidates for bariatric surgery consists of psychologists, specialists in internal medicine, gastroenterologists, surgeons and nutritionists. The individual is evaluated by the different specialties and once the surgical treatment is approved, an Upper Digestive Videoendoscopy (UDVE) procedure is routinely indicated to be carried out by qualified and properly trained professionals.

The equipment used in this study are Olympus GIFN180 (Olympus Medical System Corp., Shinjuku, Tokyo, Japan). The UDVE was performed with patient in left lateral decubitus, with fasting for 8 hours, with continuous monitoring and sedation with propofol and support of O₂ by nasal cannula. All participants had to sign the usual consent of the institution prior to the study.

The study enrolled clinical data of patients who met the inclusion criteria, selected through a symptom questionnaire completed prior to the study, as usual in the institution, by registering the presence or absence of digestive symptom which were previously defined (See table 1). Patients were stratified into two groups: A (symptomatic patients) and B (asymptomatic patients).

<p>Symptom of Gastroesophageal Reflux Disease (GERD) (According to the Montreal consensus [39]): twice or more time a week and do not impact on quality of life or once a week and do impact the quality of life)</p> <p>Symptom of typical reflux:</p> <ul style="list-style-type: none"> • Heartburn: burning sensation in the restrosternal area • Regurgitation: perception of reflowed gastric content in the mouth <p>Symptom of atypical reflux:</p> <ul style="list-style-type: none"> • Noncarcinogenic thoracic pain: retroesternal pain similar to angina pectoris, recurrent, noncarcinogenic origin. • Coughing • Asthma • Laryngitis • Dental Erosions <p>Symptom of Low Dysphagia (Perception of impairment of normal flow of swallowed material, both of solids, semi'solids and liquids- esophageal cause).</p> <p>Symptom of Dyspepsia (According to Roma III Committee [42]): pain or persistent/recurrent discomfort centered in the upper abdomen: a- postprandial fullness, b- early satiety, c- epigastric pain, d-epigastric burning. Symptom must be present in the 3 last months and have started a minimum of 6 months before diagnosis.</p>
--

Table 1: Symptom definition.

Endoscopic findings of Upper GI Tract were also described (See table 2) and grouped according to Sharaf., *et al.* [25] (See table 3).

In all cases 2 biopsies were performed to investigate *Helicobacter pylori*: 2 antrum and 1 gastric angle. When an ulcer was localized, 6 samples were taken to exclude malignant origin. Same conduct applied to raised lesion cases. In case of suspicious mucosa in Barrett’s esophagus, biopsies of the four quadrants every 2 cm were taken to confirm the diagnosis (Seattle protocol). Under an endoscopic suspicion of celiac disease 2 bulb samples and 4 of second portion were taken. The samples were sent in 10% formalin for histopathological analysis.

1)	Normal study: no pathology findings.
2)	Esophagus: presence of: <ul style="list-style-type: none"> • Erosions, according to Los Angeles classification [40-41]. • Hiatal Hernia: presence of saccular structure with gastric folds inside thorax in the lower esophagus. It measures in cm. • Peptic ulcer: fibrin exudate with defined edges in the squamocolumnar junction. • Barrett’s ultra-short segment: squamocolumnar epithelium in distal esophagus measuring less than 1 cm long. • Barrett’s short segment: squamocolumnar epithelium in distal esophagus measuring less than 3 cm long. • Barrett’s long segment: squamocolumnar epithelium in distal esophagus measuring more than 3 cm long. • Zenker’s diverticulum. • Peptic stenosis. • Esophageal diverticulum.
3)	Stomach: presence of: <ul style="list-style-type: none"> • Erosions, according to Sidney [42] classification of gastritis • Active ulcer: fibrin exudate with delimited edges and convergence of folds • Ulcer scar: presence of white lineal scar • Polyps: raised lesions, according to Paris [43] classification
4)	Duodenum: presence of: <ul style="list-style-type: none"> • Erosions: diffuse or isolated. • Active ulcer: fibrin exudate with delimited edges and convergence of folds. • Ulcer scar: presence of white lineal scar. • Polyps. • Endoscopic signs of celiac disease.
5)	Cancer of the esophagus, stomach or duodenum.
6)	Esophageal and/or gastric varicose veins.
7)	Bezoar.

Table 2: Definition of endoscopic findings.

<p>Group 0: No pathological endoscopic findings.</p> <p>Group I: Pathological endoscopic findings which do not change the surgical conduct or postpone surgery (mild to moderate esophagitis, gastritis and/or mild duodenitis).</p> <p>Group II: Pathological endoscopic findings which change the surgical conduct or postpone surgery (raised lesions, mucosa and submucosa, ulcers in any location, severe esophagitis and/or moderate to severe duodenitis, Barrett’s esophagus, bezoar, hiatal hernia of any size, peptic stenosis, Zenker’s diverticulum, esophageal diverticulum, arteriovenous malformations).</p> <p>Group III: Absolute contraindications for surgery (cancer of esophagus, stomach or duodenum, esophageal and/or gastric varicose veins).</p>
--

Table 3: Classification of endoscopic findings.

Variables studied

Endoscopic findings of GI tract in patients with or without digestive symptom

- Variables control.
- Age: Two groups: patients under and over 60 years old.
- BMI: Defined by the individual weight in Kg divided for his height in square meters.
- Presence of *Helicobacter pylori*: presence or absence of *H. pylori*.
- Consumption of NSAIDs: Defined as consumption by 6 months or more daily, the minimum dose of aspirin or any other drug group.
- Gender: Male and Female.
- Smoking: Absence or amount of cigarettes per day.
- Alcoholism: Absence or amount of of grams per day.

Ethical Issues

All patients were required to sign a prior informed consent, as usual in the institution, before starting the procedure. The study was approved by the Teaching and Research (GEDyT) and Bioethics Committees.

Statistic analysis

To meet the objectives set for the analysis, statistical descriptions were estimated by using frequencies, percentages, measures of central trends, variabilities and confidence intervals. Tests for independent samples were used for groups comparison in case of continuous variables and test association (chi-square) for the categorical. The program Statistical Analysis: SPSSv19 has been used.

Results

Sample characterization

146 Patients were included; 72% (n:105) of them was female, with an average age of 43.45 ± 10.28 years, and an average BMI of 41.10 ± 5.47 m/kg².

30% (n:45) of the patients reported symptom prior the endoscopic exploration: 53% (n:24) had dyspepsia, 11% (n:5) gastroesophageal reflux and 36% (n:16) presented both.

161 pathological endoscopic findings were observed. The prevalence of these in our population was 67% (n: 98) (See table 4). The remaining patients, 33% (n:48), had normal findings.

Endoscopic diagnosis	n	% (IC95)
No pathological findings	48	23 (17 - 29)
Hiatal Hernia	41	19,8 (14 - 26)
Erosive gastropathy	39	18,8 (13 - 25)
Esophagitis Los Angeles A	34	16,4 (11 - 22)
Esophagitis Los Angeles B	16	7,6 (4,6 - 12)
Non erosive gastropathy	7	3,4 (1,4 - 6,8)
Barrett´s esophagus	7	3,4 (1,4 - 6,8)
Esophagitis Los Angeles C	4	1,8 (0,5 - 4,9)
Erosive Duodenopathy	4	1,8 (0,5 - 4,9)
Bezoars	3	1,4 (0,3 - 4,2)
Active gastric ulcer	2	1 (0 - 2,7)
Gastric polyps	1	0,4 (0 - 2,7)
Esophageal Varicose veins	1	0,4 (0 - 2,7)
Subepithelial gastric lesion	1	0,4 (0 - 2,7)
Esophageal Polyp	1	0,4 (0 - 2,7)
Total	209	100

Table 4: Total endoscopic findings.

74.2% of pathological findings on endoscopy not delayed or changed the surgical procedure (See table 5).

Group	n	% (IC95)
0	48	23 (17,6 - 29,4)
I	107	51,2 (44 - 58)
II	53	25,4 (19 - 32)
III	1	0,4 (0 - 2,6)

Table 5: Classification of endoscopic findings according to their impact on the surgery.

When we evaluated the association of symptom prior to the study, we observed a statistically significant association between the presence of symptom and the presence of sliding hiatal hernia; $p = < 0.01$. This finding also was the most frequent.

No statistically significant association between other endoscopic findings and the presence or absence of symptom was observed.

When analyzing sliding hiatal hernia with respect to control variables a statistical relation with age, BMI and chronic NSAID consumption was evident.

When age variable was analyzed it was found that patients over 60 were the most asymptomatic.

Regarding BMI, this was higher in patients with symptomatic sliding hiatal hernia (44.58 ± 5.42 vs 39.80 ± 4.43); $p = 0.002$.

Finally, although a significant statistical relation was not observed between the presence of sliding hiatal hernia and chronic consumption of NSAIDs, a trend to show more symptomatology in this patient group was clearly evidenced.

No association between sliding hiatal hernia and the other control variables (Presence of *H. pylori*, Sex, Smoking and Alcoholism) was observed.

The prevalence of *H. pylori* was 22% (n: 31/138) with no difference in patients with or without symptom; $p = 0.58$. Consumption of proton pump inhibitor was registered by 5% (n: 7), which was more frequent in symptomatic patients (n: 11 vs 2, 2%; $p = 0.02$).

Discussion

We considered the work developed by Sharaf, *et al.* [25] as starting point for our study.

In the endoscopies performed in our population we detected pathological findings in 67% of patients, 30% of them were symptomatic. These findings were less frequent than in Sharaf's population which found that almost 90% of participants had one or more lesions with a similar proportion of symptomatic patients. Other works described smaller percentages like Carabotti, *et al.* [33] which reports pathological endoscopic findings in 47% of cases with no significant differences between symptomatic and asymptomatic patients concluding that the presence or absence of symptom should not be a condition to perform the endoscopy. Azagury, *et al.* [31] reported 47% of pathological findings in 468 asymptomatic patients concluding that due to the low impact of the endoscopic findings on the surgical procedure, a less invasive strategy should be proposed considering the potential complications that patients are exposed and the high costs this strategy entails. Diez-Rodríguez, *et al.* [34] described pathological findings in 49% of cases without discerning symptomatic or asymptomatic patients. Küper, *et al.* showed a prevalence of lesions of 80%, mostly in the stomach, with only 20% of symptomatic patients [28].

Regarding the endoscopic findings in our population we noted that the most frequent was sliding hiatal hernia (75% of those measuring less than 3 cm), followed by the erosive gastropathy and reflux esophagitis. These resemble those described in most published literature. It is important to remark that hiatal hernia was frequently observed, with statistically significant differences, when increasing BMI and age in symptomatic patients. It has also been observed increased consumption of NSAIDs in symptomatic patients with hernia.

Most of pathologies found in endoscopies belonged to the groups I and II (51% and 25% respectively). These results differ from those of Sharaf (28% and 61% respectively). Even so, there were more normal endoscopies in our patients (23% vs 10%).

The presence of *Helicobacter pylori* infection was 22% in our population. The works found in the available literature describe a prevalence of 23 - 70% [36-38]. Two retrospective studies showed higher incidence of marginal ulcer (32% vs 12%, $p = .02$) and ulcer perforation (5% vs 0%, $p = .09$) in the groups without eradication of *H. pylori* in patients with Roux-Y bypass [36,37]. Studies with a large amount of patients showed, therefore, no association between the presence of *H. pylori* infection and postoperative adverse events in patients submitted to the same surgery [38]. Clearly, the results of the literature are controversial regarding searching and eradicating the germ before surgery, so further studies are needed to establish guidelines.

This study is a prospective work that presents as main limitation the low number of included patients and the need to complete the questionnaires by the patients themselves.

Conclusion

Currently, the indication of Upper Digestive Video Endoscopy (UDVE) in morbidly obese patients' candidates for bariatric surgery is controversial. Although there is a consensus to perform the surgery in symptomatic patients, the procedure in asymptomatic patients is still under discussion.

In this work we found a significant number of endoscopic findings that changed the surgical approach; findings that were both in symptomatic and asymptomatic patients. For this reason, we believe appropriate to perform UDVE for all obese patients with surgical indication regardless the presence or absence of digestive symptom.

We found a lower percentage of *H. pylori* infection than in the general population of our country. The role of mass detection and eradication of the germ is yet to be defined since the work published so far are not conclusive.

Bibliography

1. Braguinsky J., et al. "Obesidad: saberes y conflictos. Un tratado de obesidad". 1st edition. Buenos Aires: Asociación Civil de Investigación y desarrollo en Salud. Ministerio de Salud de la Nación (2007).
2. Laurier D., et al. "Prevalence of obesity: a comparative survey in France, the United Kingdom and the United States". *International Journal of Obesity and Related Metabolic Disorders* 16.8 (1992): 565-572.
3. Epstein F and Higgins M. "Human obesity: general aspects". In: Bjorntorp P, Brodoff BN, editors. *Epidemiology of Obesity*. Philadelphia: JB Lippincott 3 (1992): 330-342.
4. Méndez MA., et al. "Overweight exceeds underweight among women in most developing countries". *The American Journal of Clinical Nutrition* 81.3 (2005): 714-721.
5. Malik VS., et al. "Global obesity: trends, risk factors and policy implications". *Nature Reviews Endocrinology* 9.1 (2013): 13-27.
6. Wang Y and Lobstein T. "Worldwide trends in childhood overweight and obesity". *The International Journal of Pediatric Obesity* 1.1 (2006): 11-25.
7. Sturm R. "Stemming the global obesity epidemic: what can we learn from data about social and economic trends?" *Public Health* 122.8 (2008): 739-746.
8. James WP. "The fundamental drivers of the obesity epidemic". *Obesity Reviews* 1 (2008): 6-13.
9. Kopelman PG. "Obesity as a medical problem". *Nature* 404.6778 (2000): 635-643.
10. Ministerio de Salud de la Nación, Academia Nacional de Medicina. Guía para la adaptación de Guías de Práctica Clínica: RM 850/08 [Internet].
11. Ministerio de Salud. República Argentina. 1° Encuesta nacional de factores de riesgo 2005 para enfermedades no transmisibles (2005).
12. Ministerio de Salud. República Argentina. 2° Encuesta nacional de factores de riesgo 2009 para enfermedades no transmisibles. (2009).

13. Obesidad y sobrepeso, Nota descriptiva N°311. Mayo de (2014).
14. Astrup A. "Healthy lifestyles in Europe: prevention of obesity and type II diabetes by diet and physical activity". *Public Health Nutrition* 4 (2001): 499-515.
15. Padwal R., et al. "Long-term pharmacotherapy for obesity and overweight". *Cochrane Database of Systematic Reviews* 4 (2003): CD004094.
16. "Gastrointestinal surgery for severe obesity: National Institutes of Health Consensus Development Conference Statement". *The American Journal of Clinical Nutrition* 55.2 (1992): 615S-619S.
17. Avidor Y, et al. "Bariatric surgery: a systematic review and meta-analysis". *The Journal of the American Medical Association* 292.14 (2004): 1724-1737.
18. Buchwald H., et al. "Weight and type 2 diabetes after bariatric surgery: systematic review and meta-analysis". *The American Journal of Medicine* 122.3 (2009): 248-256e5.
19. Guía de Práctica Clínica Nacional sobre Diagnóstico y Tratamiento de la Obesidad en adultos para todos los niveles de atención, Ministerio de Salud de la Nación.
20. Gerson LB. "Impact of obesity on endoscopy". *Gastrointestinal Endoscopy* 70.4 (2009): 758-762.
21. Sauerland S., et al. "Obesity surgery: evidence-based guidelines of the European Association for Endoscopic Surgery (EAES)". *Surgical Endoscopy* 19.2 (2005): 200-221.
22. Anderson MA., et al. "Role of endoscopy in the bariatric surgery patient". *Gastrointestinal Endoscopy* 68 (2008): 1-10.
23. Schreiner M and Fennerty M. "Endoscopy in the Obese Patient". *Gastroenterology Clinics of North America* 39.1 (2010): 87-97.
24. Martin M. "Routine preoperative endoscopy: necessity or excess?" *Surgery for Obesity and Related Diseases* 4.6 (2008): 713-714.
25. Sharaf RN., et al. "Endoscopy plays an important preoperative role in bariatric surgery". *Obesity Surgery* 14.10 (2004): 1367-1372.
26. Muñoz R., et al. "Importance of routine preoperative upper GI endoscopy: why all patients should be evaluated?" *Obesity Surgery* 19.4 (2009): 427-431.
27. Csendes A., et al. "Endoscopic and histologic findings of the foregut in 426 patients with morbid obesity". *Obesity Surgery* 17.1 (2007): 28-34.
28. Küper MA., et al. "Effort, safety, and findings of routine preoperative endoscopic evaluation of morbidly obese patients undergoing bariatric surgery". *Surgical Endoscopy* 24.8 (2010): 1996-2001.
29. De Moura Almeida A., et al. "Preoperative upper gastrointestinal endoscopy in obese patients undergoing bariatric surgery: is it necessary?" *Surgery for Obesity and Related Diseases* 4.2 (2008): 144-151.
30. Arrowsmith JB., et al. "Results from the American Society for Gastrointestinal Endoscopy/U.S. Food and Drug Administration collaborative study on complication rates and drug use during gastrointestinal endoscopy". *Gastrointestinal Endoscopy* 37.4 (1991): 421-427.
31. Verset D., et al. "The Place of Upper Gastrointestinal Tract Endoscopy Before and After Vertical Banded Gastroplasty for Morbid Obesity". *Digestive Diseases and Sciences* 42.11 (1997): 2333-2337.

32. Frigg A., *et al.* "Radiologic and Endoscopic Evaluation for Laparoscopic Adjustable Gastric Banding: Preoperative and Follow-Up". *Obesity Surgery* 11 (2001): 594-599.
33. Schirmer B., *et al.* "Flexible Endoscopy in the Management of Patients Undergoing Roux-en-Y Gastric Bypass". *Obesity Surgery* 12.5 (2002): 634-638.
34. Madan A., *et al.* "Routine preoperative upper endoscopy for laparoscopic gastric bypass: is it necessary?" *The American Journal of Surgery* 70.8 (2004): 684-686.
35. Zeni T., *et al.* "Value of Preoperative Upper Endoscopy in Patients Undergoing Laparoscopic Gastric Bypass". *Obesity Surgery* 16.2 (2006): 142-146.
36. Loewen M., *et al.* "Screening endoscopy before bariatric surgery: a series of 448 patients". *Surgery for Obesity and Related Diseases* 4.6 (2008): 709-714.
37. Bravo Torreblanca C., *et al.* "Correlación de los hallazgos endoscópicos pre y postoperatorios en pacientes sometidos a cirugía bariátrica". *Cir Gen* 35.1 (2013): 20-24.
38. Vakil N., *et al.* "The Montreal definition and classification of gastroesophageal reflux disease: a global evidence- based consensus". *The American Journal of Gastroenterology* 101.8 (2006):1-21.
39. Tack J., *et al.* "Functional gastroduodenal disorders: a working team report for the Rome III consensus on functional gastrointestinal disorders". *Gastroenterology* 130.5 (2006): 1466-1479.
40. Armstrong D., *et al.* "The endoscopic assessment of esophagitis: a progress report on observer consistency". *Gastroenterology* 111.1 (1996): 85-92.
41. Lundell LR., *et al.* "Endoscopic assessment of oesophagitis: clinical and functional correlates and further validation of the Los Angeles classification". *Gut* 45.2 (1999): 172-180.
42. Dixon MF, *et al.* "Classification and grading of gastritis. The Updated Sydney System". *The American Journal of Surgical Pathology* 20.10 (1996): 1161-1181.
43. Participants in the Paris workshop. "The Paris endoscopic classification of superficial neoplasia lesions: esophagus, stomach and colon". *Gastrointestinal Endoscopy* 58.6 (2003): S3-43.
44. Allison M., *et al.* "Gastrointestinal damage associated with the use of nonsteroidal antiinflammatory drugs". *The New England Journal of Medicine* 327.11 (1992): 749-754.

Volume 8 Issue 4 April 2020

© All rights reserved by Di Palma G., *et al.*