Original Article

Correlation between pre-operative endoscopic findings with reflux symptom score for gastro-oesophageal reflux disease in bariatric patients

Amit Bhambri, Vitish Singla, Sandeep Aggarwal, Aashir Kaul, Mehul Gupta, Rachna Chaudhary

Department of Surgical Disciplines, All India Institute of Medical Sciences, New Delhi, India

Abstract

Introduction: There is a strong association between gastro-oesophageal reflux disease and morbid obesity.

Methods: Two hundred and eleven morbidly obese patients operated between September 2007 and June 2017 were retrospectively reviewed. All patients underwent pre-operative upper gastrointestinal endoscopy and assessment by reflux symptomatic score questionnaire.

Results: Of the total 211 patients, 156 (73.94%) were females; mean body mass index of the cohort was 46.23 ± 3.1 kg/m^2. There was no evidence of Barrett's oesophagus or malignancy on pre-operative endoscopy. 63.04% of the patients (n = 133) in the study cohort had normal endoscopy. Pre-operative evaluation by reflux symptom score (RSS) questionnaire revealed no evidence of gastro-oesophageal reflux disease in 61.13% of patients (n = 129). The total number of patients with symptoms was 82 (38.86%). They were further divided into two categories based on severity of symptoms, namely, mild + moderate 60 (73.17%) and severe + very severe 22 (26.83%). From the cohort of symptomatic patients, the sub-cohort of 60 mild + moderate symptomatic patients had equal number of patients with normal 30 (50%) and abnormal endoscopy 30 (50%). In the sub-cohort of patients with severe + very severe symptoms (n = 22; 26.83%), endoscopy was abnormal in 6 (27.7%) patients. Whereas, out of 129 (61.13%) asymptomatic patients, one-third (n = 42) had abnormal endoscopy. The weighted kappa score was used between pre-operative endoscopic findings and RSS was statistically not significant (k - 0.0986).

Conclusion: Pre-operative endoscopy is a must in all bariatric patients as significant percentage of asymptomatic patients can have abnormal endoscopy and vice versa.

Keywords: Gastro-oesophageal reflux disease, endoscopy, Los Angeles grading, reflux symptom score, morbid obesity

Address for correspondence: Dr. Sandeep Aggarwal, Room No. 5034, Department of Surgical Disciplines, All India Institute of Medical Sciences, New Delhi, India.
E-mail: sandeep_aiims@yahoo.co.in

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INTRODUCTION

There is a strong association between gastro-oesophageal reflux disease (GERD) and morbid obesity.[1] GERD is present in 30%–60% of patients planned for bariatric surgery.[2,3] History of typical symptoms (heartburn and regurgitation) and atypical symptoms (cough, dysphagia,

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pain and hoarseness) help in making a diagnosis of GERD. Many GERD-related questionnaires have been developed in order to objectify symptoms without the need of undertaking invasive oesophagogastroduodenoscopy (EGD) as the first line of investigation in symptomatic patients.[4] It is considered as a multi-factorial, multi-symptomatic and heterogeneous disease, and it is appropriate to say that there is no single gold standard test for diagnosing GERD. Usually, a combination of several diagnostic tools is required (questionnaires, endoscopy, 24 h monitoring) to make the diagnosis.[5] Chronic GERD can lead to serious complications such as erosive oesophagitis (EE), Barrett's oesophagus (BE) and rarely even oesophageal carcinoma.

EDG is the standard diagnostic tool for the evaluation and grading of oesophagitis and excluding other oesophageal diseases.[6] The sensitivity of endoscopy for GERD is poor, but it has an excellent specificity of 90%–95%.[7,8] Reflux oesophagitis is seen endoscopically by the presence of oesophageal mucosal breaks; this is the most reliable endoscopic indicator for reflux oesophagitis.[8,9] The grading of reflux oesophagitis on EDG is done by the Los Angeles (LA) classification. It is reliable and has a good intra- and inter-observer agreement among both expert and inexperienced endoscopists.[10,11] Consensus on the routine use of EGD before bariatric surgery is lacking. Various studies have highlighted the importance of routine EGD before bariatric surgery.[12,13] It can identify a variety of conditions including hiatal hernia, oesophagitis, ulcers, BE and oesophageal or gastric carcinoma and can also alter the medical or surgical management before surgery.[14] On the other hand, many studies consider EDG as optional. EDG results in a change in surgical management in 0.4%–7.8% of patients only, depending on the interpretation and application of the surgeon.[15] Hence, it appears reasonable enough to forego routine pre-operative EGD in the absence of a clear clinical indication, as the incidence of significant findings is low. Still, there are concerns regarding Roux-en Y Gastric Bypass (RYGB) due to future inaccessibility of the excluded stomach and missing any malignancy if present there.[15]

There are many questionnaires that have been developed to diagnose GERD – to name a few, reflux symptom score (RSS), reflux disease questionnaire, gastro-oesophageal reflux disease questionnaire (Gerd-Q). At our centre, we studied a correlation between EGD performed pre-operatively in a retrospective cohort of all the bariatric procedures with the RSS questionnaire. This questionnaire was devised and validated for GERD at our institute by the department of gastroenterology. All bariatric cases performed between September 2015 and June 2017 were included in the study. We analysed the data and tried to find out if there was any correlation between significant findings present on pre-operative EGD and severity grades of RSS.

METHODS

A consecutive series of 211 morbidly obese (body mass index [BMI] >40 kg/m^2 or >35 kg/m^2 with significant comorbidity) patients operated between September 2015 and June 2017 were included in the study. All patients were evaluated and cleared by our multidisciplinary team for bariatric surgery. The pre-operative evaluation included cardiac, pulmonary, endocrine, psychological and nutritional evaluations, as well as psychological and nutritional counselling. All patients underwent pre-operative EGD. The grades of severity of oesophagitis recorded pre-operatively based on EGD were noted and recorded.

All patients underwent assessment and grading of reflux symptoms using RSS pre-operatively. Grading of symptoms of heartburn and regurgitation was done based on the severity and frequency of symptoms. A score of ≥4 was considered positive for GERD. Data were noted and analysed from medical records of all patients.

All patients with/without GERD were cross-matched with endoscopic severity grades. Grades of EE were assessed, according to the LA classification by the endoscopist. The endoscopist was blinded from the severity grades of GERD calculated by RSS. EDG was performed to evaluate the oesophagus, stomach and duodenum in each patient after the RSS was calculated. RSS was calculated by multiplying the score for severity and frequency of heartburn and regurgitation as given in the Table 1.

The final score for each symptom was obtained by multiplying the scores for severity and frequency. The total score is obtained by adding the final scores of individual symptoms and noted as symptom score (SS). The grades of symptoms were divided into two groups for the ease of analysis, namely, mild + moderate and severe + very severe symptoms.

The demographic data collected included age, BMI and obesity-related comorbidities, including type 2 diabetes, hypertension, dyslipidaemia, sleep apnoea, arthrosis and psychiatric disorders along with the presence of a hiatal hernia. Follow-up evaluation for all patients was done at least 3 months after surgery.

Statistical analysis

The statistical test was performed using the SPSS 12 (SPSS, Chicago, Illinois, USA). The weighted kappa score was

Table 1: Reflux symptom score based on severity and frequency of symptoms

Severity of symptoms of heartburn and regurgitation	Frequency of symptoms of heartburn and regurgitation (in days/week)
Grade 0 No symptoms	Grade 0 absent
Grade 1 Mild symptoms with spontaneous remission. No interference with normal activity and sleep	Grade 1 occasional (<2)
Grade 2 Moderate symptoms with spontaneous but slow remission. Mild interference with normal activity and sleep	Grade 2 frequent (2–4)
Grade 3 Severe symptoms without spontaneous remission. Moderate interference with normal activity and sleep	Grade 3 very frequent (>4)
Grade 4 Very severe symptoms. Marked interference with normal activity and sleep	

used between pre-operative endoscopic findings and RSS. It was found out to be 0.0986 (not statistically significant), implying no relationship between the severity of GERD symptoms in a patient pre-operatively with the severity of grades of oesophagitis on EGD. This discordance in results can be explained by an entity known as non-erosive reflux disease (NERD).

RESULTS

The total number of patients included in the study was 211. Females were 156 (73.94%); the mean BMI of the cohort was 46.23 ± 3.1 kg/m^2. The most common procedure performed in the cohort was sleeve gastrectomy (SG) 151 (71.56%), followed by RYGB 35 (16.58%), and the remaining were one anastomosis/mini gastric bypass (OAGB/MGB) 25 (11.8%). Pre-operatively, RSS was calculated for each patient and majority (n = 129) of patients had no symptoms of GERD. The detailed distribution of patients according to RSS severity grades is shown in Figure 1.

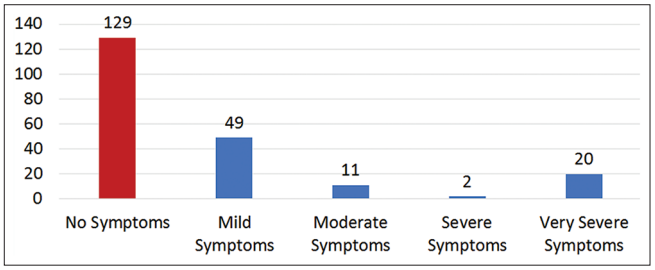

Figure 1: Distribution of patients according to Reflux symptom score

The presence and degree of oesophageal mucosal injury were graded according to the LA classification, which describes four grades of endoscopic severity of oesophagitis, based on the extent of mucosal breaks and circumference of oesophageal wall involved. Majority of the patients (133) in the study cohort had normal endoscopy. The detailed distribution of patients in each of the severity grades of LA classification is shown in Figure 2.

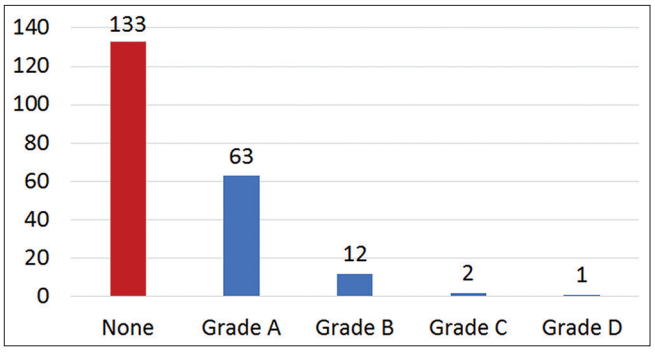

Figure 2: Pre-operative Los Angeles endoscopic grading

Endoscopic severity grades based on LA classification were cross-matched with RSS as shown in Table 2.

Figure 3 shows patients in the cohort with exact matching of LA grading with RSS (n = 111), with higher RSS than LA grades (n = 54) and with higher LA grade than RSS (n = 46).

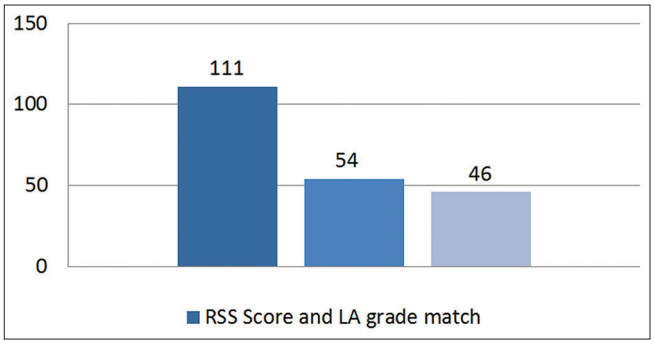

Figure 3: Reflux symptom score and Los Angeles grade matching

Out of the 211 pre-operative EGD performed, 133 (63.04%) EGDs were completely normal. Abnormal findings were present in 78 (39.96%) patients. The hiatal hernia was present in 24.76% of patients. There was no evidence of BE or malignancy in any of the pre-operative EGD.

Based on RSS questionnaire, the total asymptomatic patients in the cohort was 129 (61.13%), whereas the total number of patients with symptoms was 82 (38.86%). They were further divided into two categories based on severity,

Table 2: Endoscopic severity grades cross matched with reflux symptom score

LA grading	RSS				
	No symptoms	Mild symptoms	Moderate symptoms	Severe symptoms	Very severe symptoms
Normal	87	26	4	0	16
Grade A	37	19	4	1	2
Grade B	4	4	3	0	1
Grade C	1	0	0	1	0
Grade D	0	0	0	0	1

LA: Los angles grading, RSS: Reflux symptom score

namely, mild + moderate 60 (73.17%) and severe + very severe 22 (26.83%) for ease of analysing the data.

From the symptomatic cohort for GERD consisting of 82 (38.86%) patients, 60 (73.17%) had either mild or moderate symptoms. From this group of 60 patients, an equal number of patients had normal endoscopy 30 (50%) and abnormal endoscopy 30 (50%).

From the same symptomatic cohort of 82 (38.86%) patients, 22 (26.83%) patients were having either severe or very severe symptoms. From this group, normal endoscopy was seen in 16 (72.72%) patients and 6 (27.27%) patients had an abnormal endoscopy. Almost 72.72% of patients having either severe or very severe symptoms had normal endoscopy [Figure 4].

Whereas, out of the total 129 (61.13%) asymptomatic patients, one-third of patients (42) had abnormal endoscopy.

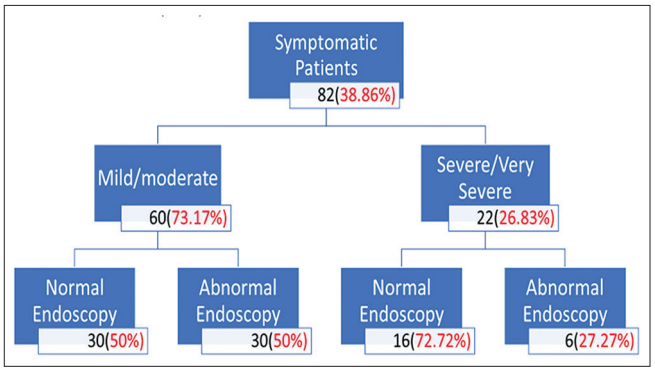

Figure 4: Results of endoscopy in symptomatic patients

DISCUSSION

GERD has been strongly related to morbid obesity. Probable mechanisms that could explain this association are increased transient relaxations of lower oesophageal sphincter (LES), decreased LES pressure, presence of hiatal hernia and raised intra-abdominal pressure.[16] Here the question arises – does GERD is always because of gastro-oesophageal reflux? The answer is obviously no since there are many patients with proven reflux have no symptoms or oesophagitis. In addition, dyspepsia is a diagnosis often misinterpreted as GERD. Furthermore, the degree of underlying oesophageal damage does not correlate with the severity of GERD symptoms, supporting current recommendations to initiate empiric antisecretory therapy in patients with typical GERD symptoms even in the absence of alarming features.[5,17] The presence of typical findings on EGD such as erythema, mucosal breaks, ulcers and BE is diagnostic of GERD with specificity as high as 95%.[7,18] There is a complex relationship between reflux symptoms, endoscopic or histologic findings and degree of exposure of the oesophagus to the acid.[19]

In our study, EE was endoscopically documented in 78 patients (36.96%). Out of them, 75 (96.15%) had LA Grade A or B and only 3 (3.84%) had LA Grade C or D. Majority of patients with mild to moderate symptoms had EE of either LA Grade A or B. This finding was similar to Genco *et al*., who reported that GERD symptoms were more frequent and severe in patients with mild EE (LA Grade A or B) than in those with severe EE (LA Grade C or D).[20] Moreover, the lowest mean visual analogue scale (VAS) score was registered in patients with BE. They also reported that incidence and the degree of GERD symptoms did not correlate to the severity of the oesophageal lesions, to the presence of BE and to the extent of 'Z' line migration on EDG.

Verset *et al*. studied a group of 159 morbidly obese patients before and after vertical banded gastroplasty. Pre-operatively, EE was seen on EDG in 31% of patients.[21] Interestingly, the majority of the obese patients in this group were asymptomatic. They postulated that elevated values of opioids (b-endorphin) and modified values of plasma and membrane lipids in obese patients may modify their pain perception.[22]

Frigg *et al*. performed 104 gastroscopies before placing a laparoscopic adjustable band.[23] Findings of reflux and gastritis were found on EDG in 35 and 53 patients respectively. Total of 29% and 22% of patients in each of the reflux and gastritis group were free of GERD symptoms. Of the gastritis patients, 23 showed a

Helicobacter pylori infection. These results suggest that, not only in symptomatic but also in asymptomatic patients, a gastroscopy should be performed.

The pathogenesis of symptoms manifestation in patients with GERD remains unclear. There is dilatation of intercellular spaces by exposure of oesophageal mucosa to gastroduodenal reflux. It results in increased paracellular permeability which allows the noxious components of the refluxate to stimulate sensory nerve endings which are located within the oesophageal mucosa.[24] But, as not all patients with GERD are symptomatic, it has been hypothesised that the oesophageal perception of reflux could be modulated by other peripheral or central factors.[25]

There is a lack of correlation between symptoms of GERD and EE on EDG, which is seen even post-operatively. Tai *et al*. looked for the incidence of the EE and GERD 1 year after sleeve gastrectomy.[26] Total, 40.1% of patients had no symptoms of GERD but had post-operative EE on EDG. They, therefore, proposed that post-operative follow-up by EDG is necessary to identify the true prevalence of post-operative GERD even in asymptomatic patients.

Soricelli *et al*. showed a lack of correlation between GERD and EE after SG.[27] A total of 144 patients were followed up for 66 months after surgery. They reported that GERD symptoms (70.2%) and VAS score (2.9) were not significantly associated with the development of EE (59.8%) and BE (13.1%) and the severity of the oesophageal lesions. They concluded that only a history of symptoms was not a reliable tool to diagnose GERD after SG. They also advocated that the use of EGD should be considered in the post-operative follow-up of SG patients to confirm GERD diagnosis even in asymptomatic patients. They also reported that the pre-operative diagnosis of GERD did not affect the association between reflux symptoms and findings on EGD after SG.

Unlike our questionnaire, Wang *et al*. reported that Gerd-Q score has good value to distinguish reflux oesophagitis (RE) patients from non-RE patients. Gerd-Q score was positively correlated with the severity of RE. The higher of the score, the more severe of the EE. However, a definitive diagnosis of RE still depends on EDG.[28]

One explanation for the lack of association between GERD and RSS can be entity known as NERD. NERD is defined as patients having symptoms of GERD, but have neither definite endoscopic oesophageal breaks nor BE and patients with burning retrosternal discomfort for at least 3 months with normal oesophageal mucosa on EGD.[29] Zuberi *et al*. tried to determine the correlation between the clinical, endoscopic and histological findings in patients of GERD. Out of 196 GERD patients, the most common symptom was reported as epigastric pain (42.9%), followed by retrosternal burning (41.8%) and reflux (36.7%). There was no significant correlation between the severity of GERD symptoms with endoscopic findings; however, a correlation was observed with the severity of endoscopic findings with histopathological findings. In this study, over 50% of patients had a NERD.[30] According to a study by Azumi *et al*., it is estimated that NERD accounts for up to 70% of patients with GERD.[31]

In GERD, a reflux episode usually occurs because of one of the following motor events: (1) permanently low pressure of the LES, (2) increased intra-abdominal pressure that overcomes the resistance of the LES (stress reflux) or (3) during profound long-lasting transient relaxations of the LES (TLESRs) not elicited by swallowing. It has been clearly established that most reflux episodes in reflux oesophagitis and physiologic conditions occur during TLESRs. In fact, permanently low LES pressure is more likely in patients with severe oesophagitis, whereas TLESRs actually represent the main underlying mechanism of reflux episodes occurring in endoscopy-negative patients or in those with mild oesophagitis.[32]

Despite the frequent association between GERD and morbid obesity and numerous studies reporting the effects of various bariatric procedures on GERD, controversy persists as to which operation is best suited for morbidly obese patients with GERD. In an international sleeve gastrectomy expert panel consensus statement on >12,000 cases, 57% of attendants considered GERD as a relative contraindication to SG, although 48% thought that a hiatus hernia should be aggressively identified and repaired. On the other hand, 81% considered BE, the ultimate stage of GERD, as an absolute contraindication to SG.[33] Most surgeons, therefore, have some concern regarding the appropriateness of SG in GERD patients. There are substantial data showing the positive effects of RYGB on GERD.[34,35] However, the results regarding the effects of other bariatric procedures are controversial. Hence, the importance of this study is to highlight the need to meticulously evaluate GERD in patients planned for bariatric surgery. It is advisable to evaluate all patients pre-operatively both with RSS and EGD as a significant percentage of symptomatic patients can have normal EGD and vice versa and hence both EGD as well as RSS are required to confirm the diagnosis of GERD. Because no single test is diagnostic of GERD, Tolone *et al*. proposed to perform reflux testing with impedance-pH

monitoring to all obese candidates for bariatric surgery with symptoms or endoscopic evidence of GERD.[36] However, currently, this indication for further testing is still debatable and there is no consensus on this pre-operative workup.

Our study has several advantages. Our study population comprised of all patients who had undergone a primary bariatric procedure at a single centre during a nearly 2-year period. All patients in the study group underwent pre-operative EGD.

Our study has some limitation, due to heterogenicity in reporting the EGD findings because pre-operative EGD was performed at several endoscopy units. Furthermore, the main limitations of this study are the absence of pH measurement along with EGD and hence we could not determine the amount of acid exposure in the cohort having NERD (heartburn + normal endoscopy) due to lack of 24 h ambulatory pH monitoring in this study. Furthermore, lack of follow-up with fresh post-operative RSS grades and endoscopic resolution or deterioration of follow-up EDG.

RSS represents a non-invasive screening tool. It can be used as a baseline and/or complementary test if there are no alarm signs. Furthermore, it can be used for monitoring the therapeutic effect of GERD treatments. In those patients with mild symptoms and having a response to proton pump inhibitors, no other test might be required; however, in case of lack of response, it would be the most appropriate to confirm GERD diagnosis, by means of endoscopy and/or pH-monitoring as appropriate. Furthermore, RSS can also be useful for gastro-oesophageal reflux disease diagnosis in the primary care setting as reported by Rey *et al*., that reflux disease questionnaire could be useful in primary care settings for diagnosis of GERD according to Montreal definition.[37]

CONCLUSION

RSS score can be used to help diagnose GERD but is not positively related to LA classification severity grades of GERD on endoscopy. Either positive endoscopy with no symptoms or mild to severe symptoms with normal endoscopy can coexist. Hence both, reflux symptoms as well as endoscopy findings should be taken into consideration while counseling a patient about the type of bariatric procedure.

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Conflicts of interest
There are no conflicts of interest.

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