


Effect of sleeve gastrectomy on histopathological changes in the gastric mucosa

 Mehmet Sait Berhuni,  Hasan Elkan

Department of General Surgery, Harran University, Faculty of Medicine, Şanlıurfa, Türkiye

ABSTRACT

Introduction: This study aimed to evaluate the impact of weight loss on the histopathological findings of gastric mucosa in patients who underwent laparoscopic sleeve gastrectomy (LSG).

Materials and Methods: Patients who underwent LSG for morbid obesity in our clinic between January 2019 and December 2023 were included in the study. The LSG specimen data were recorded as the surgical group (SG), and the postoperative 6-month endoscopic gastric biopsy data from the same patients were recorded as the biopsy group (BG). The two groups were compared in terms of body mass index (BMI) and histopathological observations of *Helicobacter pylori* (HP), chronic active gastritis (CAG), chronic inactive gastritis (CIG), and intestinal metaplasia (IM).

Results: A total of 86 patients were included in the study. The median BMI was 44.00 (6.05) in the SG and 34.80 (6.00) in the BG, indicating a statistically significant difference between the groups in terms of BMI ($p < 0.001$). Histopathological examination revealed no significant differences between the groups in terms of CAG, CIG, and IM ($p > 0.05$). However, a significant difference was observed between the groups regarding HP ($p < 0.001$).

Conclusion: It was observed that weight loss did not lead to significant changes in histopathological findings such as CAG, CIG, and IM in the gastric mucosa, but it did result in significant differences in terms of HP.

Keywords: Endoscopic gastric biopsy, histopathological findings, laparoscopic sleeve gastrectomy

Introduction

Laparoscopic sleeve gastrectomy (LSG) is the most commonly performed surgical procedure worldwide for obesity.^[1] In the literature, studies on LSG outcomes predominantly focus on the weight loss process, prevention of obesity-related comorbidities, and postoperative complications.^[1,2] Due to the limited number of studies examining gastric specimens obtained after LSG, data on this topic are scarce.^[3] While some studies suggest that

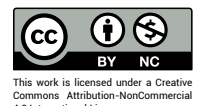
histopathological findings do not provide significant data and consider this examination unnecessary,^[4] other studies emphasize the necessity of such examination due to unexpected histopathological results that may require follow-up.^[5,6]

Although the prevalence of *Helicobacter pylori* (HP) is lower in developed countries, approximately half of the world's population is infected with HP.^[7,8] It is well known



Received: 14.10.2024 Revision: 20.12.2024 Accepted: 23.12.2024

Correspondence: Mehmet Sait Berhuni, M.D., Department of General Surgery, Harran University, Faculty of Medicine, Şanlıurfa, Türkiye
e-mail: drmsaitberhuni@hotmail.com



that HP is associated with gastrointestinal diseases such as chronic gastritis, intestinal metaplasia (IM), gastric cancer, and mucosa-associated lymphoid tissue lymphoma.^[9-11] According to recent studies, HP infection is also closely linked to various diseases outside the digestive system, such as diabetes and nonalcoholic fatty liver disease.^[12] Recent studies on the relationship between HP infection and obesity have reported conflicting results. While some studies have indicated a positive correlation,^[13,14] others have reported no relationship or even a negative correlation.^[15,16]

This study aimed to evaluate the impact of obesity on histopathological findings in the gastric mucosa by comparing the histopathological findings of surgical specimens from patients who underwent LSG with those from gastric biopsy materials obtained 6 months after the surgery.

Materials and Methods

Study Design and Patient Population

This retrospective study included patients who underwent LSG in our clinic between January 2019 and December 2023 and had biopsies taken at their 6-month follow-up. Histopathological data obtained from these patients during LSG were compared with data obtained from the same patients in the 6th postoperative month. The parameters compared between these two different time points were body mass index (BMI) as well as the rates of HP, IM, chronic active gastritis (CAG), and chronic inactive gastritis (CIG) observed in the surgical specimens and postoperative 6-month biopsies. Ethical approval for the study was obtained from the institutional committee (Date: 22.07.2024, decision number: 10).

Exclusion Criteria

Patients who had undergone LSG in our clinic but had a history of previous abdominal surgery, did not wish to participate in the study, developed complications secondary to the surgery, underwent additional surgical interventions alongside LSG, were active alcohol and tobacco users, had a history of chronic medication use, patients with incomplete data, patients with malignancies detected in the histopathological examination, and patients who had received treatment for HP eradication prior to surgery were excluded from the study.

Statistical Analysis

Statistical analyses were conducted using SPSS for Windows, version 25.0 (IBM SPSS Inc., Chicago, IL, USA). The Shapiro-Wilk test assessed the normality of data distribution. Numerical variables were presented as medians with interquartile ranges (IQR), while categorical variables were reported as counts (n) and percentages (%). The Wilcoxon signed-rank test was used to compare dependent variables before and six months after surgery, and the Chi-square test was employed for categorical variables. A 95% confidence interval was applied, and a two-tailed p-value of <0.05 was considered statistically significant.

Results

A total of 86 patients were included in the study. Of these patients, 74 (86.05%) were female and 12 (13.95%) were male. The mean age of the patients was 35.25±9.94 years. The median preoperative BMI was 44.00 (Interquartile range: 6.05) kg/m², while the median BMI at the time of biopsy performed 6 months after surgery was 34.80 (Interquartile range: 6.00) kg/m². A statistically significant difference was observed between the preoperative and pre-biopsy BMI values (p<0.001).

HP was detected in 32 (37.20%) LSG specimens, while HP positivity was observed in 43 (50%) biopsy samples. This difference was found to be statistically significant (p<0.001) (Fig. 1). IM was seen in 6 (6.97%) patients in LSG specimens. In biopsy materials, IM was present in a total of 5 (5.81%) patients, and no statistically significant difference was observed between the groups (p=0.528).

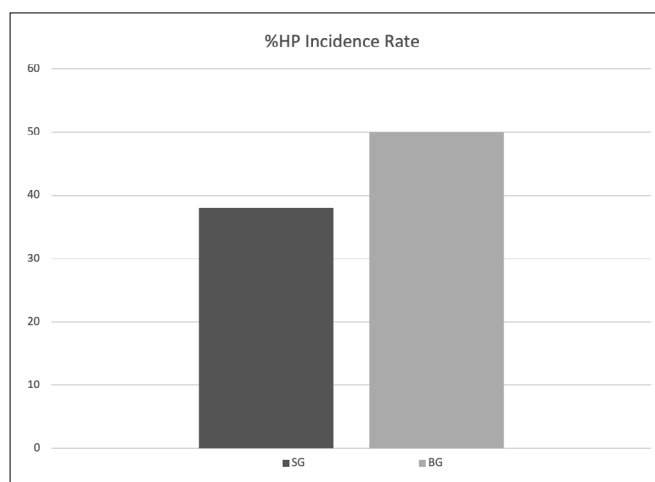


Figure 1. Percentage of *Helicobacter pylori* positivity between groups.

HP: *Helicobacter pylori*; SG: Surgical group; BG: Biopsy group.

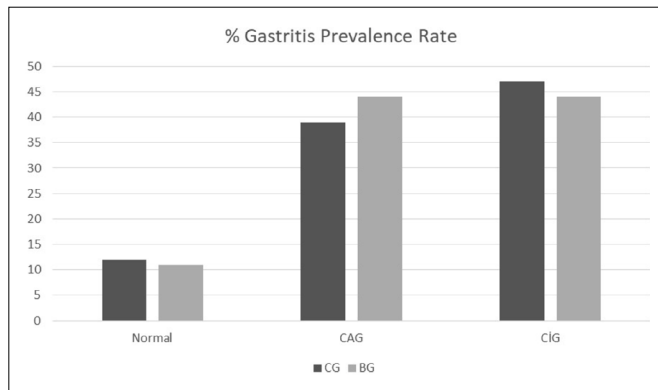


Figure 2. Percentages of gastritis incidence between groups.

CAG: Chronic active gastritis; CIG: Chronic Inactive gastritis; SG: Surgical group; BG: Biopsy group.

In the LSG specimens, normal mucosa was reported in 11 (12.79%) patients, while CAG was reported in 34 (39.53%) cases and CIG in 41 (47.67%) cases. In the biopsy samples, 10 (11.62%) patients had normal mucosa, while CAG and CIG were reported in 38 (44.18%) cases each (Fig. 2). There was no statistically significant difference in the rates of gastritis between the two groups ($p=0.350$) (Table 1).

Discussion

In recent years, there has been an increase in studies focusing on the histopathological findings of specimens obtained after LSG.^[3,17,18] However, studies evaluating the long-term postoperative follow-up of these histopathological findings remain limited.

In their study, Safaan et al.^[19] identified advanced age, female gender, and HP infection as significant risk factors for abnormal histopathological findings (CAG, CIG, follicular gastritis, and lymphoid aggregates) following LSG. In a study conducted in Romania, Mocian et al.^[5] reported an HP prevalence of 27.2% in LSG specimens. Similarly, Sabbah et al.^[20] indicated an HP prevalence of 35.3% in LSG specimens in their study from Lebanon. In a study by Akbulut et al.,^[21] HP positivity was found to be 61.1% in preoperative endoscopic biopsies. In the same study, patients did not receive treatment for HP eradication postoperatively, and routine endoscopies performed due to dyspeptic complaints revealed an HP positivity rate of 30.2%. In this study, the mean time to postoperative endoscopy was 17.1 ± 8.51 months, and a statistically significant difference was reported between preoperative and postoperative HP detection rates. In contrast to the study of Akbulut et al.,^[21] our findings showed HP positivity in 37.2% of cases in the surgical group (SG), which increased

Table 1. Comparison of BMI and histopathological findings

	SG	BG	p
BMI*	44.00 (6.05)	34.80 (6.00)	* <0.001
Intestinal metaplasia			
Yes	6	5	¥ 0.528
No	80	81	
Helicobacter pylori			
Yes	32	43	¥ <0.001
No	54	43	
Gastric mucosa			
Normal	11	10	¥ 0.350
CAG	34	38	
CIG	41	38	

SG: Surgical group; BG: Biopsy group; BMI: Body mass index; LSG: Laparoscopic sleeve gastrectomy; * Wilcoxon Signed Ranks Test—Median value (interquartile range); ¥ Chi Square test, bold p value indicates significance.

to 50% in the biopsy group (BG). This difference may be related to the relatively earlier timing of postoperative endoscopy in the present study.

In the present study, normal mucosa was observed in 12.79% of the SG patients, CAG in 39.53%, and CIG in 47.67%. In the BG patients, normal mucosa was observed in 11.62% of the patients, CAG in 44.18%, and CIG in 44.18%, with no significant difference between the two groups. In a study by Demirpolat et al.^[17] in Türkiye, histopathological examination of LSG specimens revealed that 20.2% of gastric mucosa samples were normal, 37.1% had CIG, and 41.2% had CAG. In a study by Mocian et al.,^[5] 33.7% of the mucosa samples were reported as normal, 39% as CAG, and 27.2% as CIG. In a study by Onzi et al.,^[22] which compared preoperative and 6-month postoperative endoscopic biopsy results in patients who underwent LSG, no significant difference was observed in terms of IM and gastritis, consistent with our findings.

In the present study, the IM detection rate was 6.97% in SG patients and 5.81% in BG patients, which is consistent with the literature. Regarding the detection rate of IM in LSG specimens, Sabbah et al.^[20] reported a rate of 1.66%, Algerian et al.^[23] reported 1%, Tomasiccio et al.^[18] reported 3.15%, and Mocian et al.^[5] reported 11.6%.

The present study has certain limitations. These include the relatively small sample size, the short dura-

tion between surgery and postoperative endoscopy, the single-center design, and the retrospective nature of the study. These limitations hinder the generalizability of our findings.

Conclusion

In conclusion, despite these limitations, the present study comparing the histopathological findings of LSG specimens with biopsy materials obtained at the 6-month postoperative follow-up did not reveal any significant histopathological differences between the groups. We believe that future studies with larger sample sizes and extended biopsy timing could be conducted to verify the accuracy of our current findings.

Disclosures

Ethics Committee Approval: Ethical approval for the study was obtained from the Harran University Ethical Committee (Date: 22.07.2024, decision number: 10).

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Conception – M.S.B.; Design – M.S.B., H.E.; Supervision – H.E.; Data Collection and/or Processing – M.S.B., H.E.; Analysis and/or Interpretation – M.S.B., H.E.; Literature Review – H.E.; Writer – M.S.B., H.E.; Critical Review – M.S.B., H.E.

References

1. Surve A, Cottam D, Pryor A, Cottam S, Michaelson R, Umbach T, et al. A prospective multicenter standard of care study of outpatient laparoscopic sleeve gastrectomy. *Obes Surg* 2024;34(4):1122–30.
2. Kowalewski PK, Olszewski R, Walędziak MS, Janik MR, Kwiatkowski A, Gałązka-Świderek N, et al. Long-term outcomes of laparoscopic sleeve gastrectomy—a single-center, retrospective study. *Obes Surg* 2018;28(1):130–4.
3. Nowak K, DiPalma A, Serra S, Quereshy F, Jackson T, Okrainec A, et al. Review of pathological findings in laparoscopic sleeve gastrectomy specimens performed for morbid obesity. *J Clin Pathol* 2020;73(10):618–23.
4. Komaei I, Currò G, Mento F, Cassaro G, Lazzara C, Barbera A, et al. Gastric histopathologic findings in South Italian morbidly obese patients undergoing laparoscopic sleeve gastrectomy: Is histopathologic examination of all resected gastric specimens necessary? *Obes Surg* 2020;30(4):1339–46.
5. Mocian F, Sorlea S, Coroş M. Histopathological findings on resected gastric specimens from obese patients undergoing laparoscopic sleeve gastrectomy. *Med Pharm Rep* 2023;96(2):186–91.
6. Taha-Mehlitz S, Mongelli F, Sykora M, Scheiwiller A, Diebold J, Metzger J, et al. Routine histopathologic examination of the resected specimen after laparoscopic sleeve gastrectomy – what can be expected? *Acta Chir Belg* 2021;121(6):380–5.
7. Dantas ACB, Jayme VR, Filardi KFXC, Pajeci D, Santo MA. Impact of helicobacter pylori on early postoperative complications after sleeve gastrectomy: a systematic review and meta-analysis. *Arq Bras Cir Dig* 2024;36:e1788.
8. Gravina AG, Zagari RM, De Musis C, Romano L, Loguercio C, Romano M. Helicobacter pylori and extragastric diseases: A review. *World J Gastroenterol* 2018;24(29):3204–21.
9. Mülküt F, Ofluoğlu CB, Tuncer ZS, Saydam M, Aydın I. Assessment of helicobacter pylori colonization in patients with duodenogastric reflux: A retrospective study. *Laparosc Endosc Surg Sci* 2024;31(1):14–7.
10. Zhao W, Han Y, Xiao Y, Liu Y, Zhang Z, Liao L, et al. Relationship between Helicobacter pylori infection and digestive tract diseases and analysis of risk factors: a cross-sectional study based on 3867 Chinese patients. *Aging (Albany NY)* 2024;16(16):11917–25.
11. Kermansaravi M, Rezvani M, Elmi Sadr F, Valizadeh R, Kabir A, Pazouki A. Association of hypercholesterolemia with gastric intestinal metaplasia, findings after sleeve gastrectomy pathology review. *Surg Laparosc Endosc Percutan Tech* 2022;32(5):549–53.
12. Santos MLC, de Brito BB, da Silva FAF, Sampaio MM, Marques HS, Oliveira E Silva N, et al. Helicobacter pylori infection: Beyond gastric manifestations. *World J Gastroenterol* 2020;26(28):4076–93.
13. Nasif WA, Hasan Mukhtar M, El-Moursy Ali AS, Nour Eldein MM, Almaini RA, Ashgar SS. Body mass index is associated with Helicobacter pylori infection and increased oxidative DNA damage in an obese population. *J Int Med Res* 2022;50(2):3000605221076975.
14. Baradaran A, Dehghanbanadaki H, Naderpour S, Pirkashani LM, Rajabi A, Rashti R, et al. The association between Helicobacter pylori and obesity: a systematic review and meta-analysis of case-control studies. *Clin Diabetes Endocrinol* 2021;7(1):15.
15. Xu MY, Liu L, Yuan BS, Yin J, Lu QB. Association of obesity with Helicobacter pylori infection: A retrospective study. *World J Gastroenterol* 2017;23(15):2750–6.
16. den Hollander WJ, Broer L, Schurmann C, Meyre D, den Hoed CM, Mayerle J, et al. Helicobacter pylori colonization and obesity – a Mendelian randomization study. *Sci Rep* 2017;7(1):14467.
17. Demirpolat MT, İslam MM, Ceylan EM, Aykıt F, Satır M, Güvendir Bakkaloglu I, et al. Effect of histopathological findings of gastric specimens resected during laparoscopic sleeve gastrectomy on weight loss success: A retrospective analysis of 599 patients. *Cureus* 2024;16(5):e60881.
18. Tomasicchio G, Picciariello A, Dibra R, Lantone G, Trigiante G, De Fazio M, et al. Histopathologic findings on removed stomach after sleeve gastrectomy. Do they influence the outcome? *Open Med (Wars)* 2022;17(1):485–91.

19. Safaan T, Bashah M, El Ansari W, Karam M. Histopathological changes in laparoscopic sleeve gastrectomy specimens: prevalence, risk factors, and value of routine histopathologic examination. *Obes Surg* 2017;27(7):1741–9.
20. Sabbah NA, Saoud CZ, Deeb M, Nasser SM. Helicobacter pylori Prevalence in Laparoscopic Sleeve Gastrectomy Specimen. *Gastroenterol Res Pract* 2020;2020:8843696.
21. Akbulut S, Seyit H, Peker KD, Karabulut M, Alis H. Is Helicobacter pylori eradication required after laparoscopic sleeve gastrectomy? *Wideochir Inne Tech Maloinwazyjne* 2022;17(4):705–9.
22. Onzi TR, d'Acampora AJ, de Araújo FM, Baratieri R, Kremer G, Lyra HF Jr, et al. Gastric histopathology in laparoscopic sleeve gastrectomy: pre- and post-operative comparison. *Obes Surg* 2014;24(3):371–6.
23. Aljerian K. histopathological findings in laparoscopic sleeve gastrectomy specimens from patients with obesity in Saudi Arabia. *Gastroenterol Res Pract* 2018;2018:1702705.