Original Article

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Does *Helicobacter pylori* Infection Affect Postoperative Outcomes after Bariatric Surgery?

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Abstract

Objective: The impact of *Helicobacter pylori* (HP) infection on postoperative outcomes remains controversial. This study aimed to investigate the relationship between HP infection and postoperative outcomes, including the percentage of postoperative excessive weight loss (%EWL) at 3, 6, and 12 months and post-surgical complications.

Material and Methods: This study involved a retrospective cohort study of 173 patients who underwent weight loss surgery at Thammasat University Hospital, Thailand, between 2015 and 2023. Participants met the indications for bariatric surgery and were preoperatively screened for HP infection.

Results: The majority of the participants were female (77.3%). The mean age and preoperative BMI were 35.3±8.1 years old and 44.2±9.4 kg/m^2 respectively. Seventy-five patients (43.3%) tested positive for HP infection. Baseline characteristics were similar between the HP-positive and non-HP groups. The %EWL of the HP-positive group at 3, 6 and 12 months was 42.72, 62 and 74, respectively. For the non-HP group, the %EWL at 3, 6 and 12 months was 36, 57 and 70.5, respectively. No statistically significant difference of %EWL was observed between the 2 groups. Postoperative adverse effects were reported with no statistically significant difference between the groups. In the HP-positive group, complications were observed in 5 patients (6.7%), whereas in the non-HP group 7 patients (7.14%) had complications.

Conclusion: HP infection did not influence postoperative weight loss outcomes or complications after bariatric surgery.

Keywords: bariatric surgery, *Helicobacter pylori, H. pylori,* morbid obesity, Thailand

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Introduction

Obesity is a significant issue that leads to various health burdens. Obesity-related diseases, including diabetes, hypertension, dyslipidemia, obstructive sleep apnea, and cancer, can increase healthcare costs. The prevalence of obesity has been trending upward in recent years. Bariatric surgery is one of the most effective treatment options for morbid obesity, achieved by reducing the size of the stomach and decreasing the absorption of nutrients. Even though bariatric surgery is highly effective for weight loss, the outcomes and complications can vary due to individual differences, which are influenced by multiple factors.

Helicobacter pylori or *H. pylori* (HP) colonizes the human stomach and causes various gastric pathologies. While most of the infected individuals are asymptomatic, some may develop conditions such as gastritis, gastric ulcers, or gastric malignant lesions[1-2]. The prevalence of HP infection varies among countries, ranging from 9.1% to 88.6%. The overall global prevalence of HP infection is approximately 43.9%[3]. In Thailand, the infection rate ranges from 34.6% to 45.9%[3,4]. The prevalence rate at Thammasat University Hospital is 43.8%[5].

The relationship between HP infection and obesity is not fully understood. HP affects the ghrelin hormone by reducing the production and secretion of ghrelin, leading to hunger suppression[6]. Some studies have reported lower plasma ghrelin levels in HP-infected patients and plasma ghrelin levels increased after HP eradication[7-10]. Conversely, the results differ in obese patients. Morbidly obese patients had a higher density of ghrelin-producing cells in gastric mucosa[11]. Furthermore, the prevalence of HP infection appears to be higher in obese patients compared to the general population[12,13]. Currently, there is limited research on the relationship between HP infection and weight loss outcomes following bariatric surgery.

The association between HP infection and postoperative complications also remains unclear. There have been many studies on this topic. The results indicate that H. pylori infection may either increase postoperative complications[14-18], or may not increase them[19-24].

Therefore, this study aimed to investigate the relationship between HP infection and postoperative outcomes after bariatric surgery, including the percentage of excessive weight loss (%EWL) at 3, 6, and 12 months post-surgery, as well as postoperative complications.

Material and Methods

Study protocol

The study was approved by the Human Research Ethics Committee of Thammasat University (Medicine). This retrospective study was conducted from 1st November 2015 to 31st December 2023 in the Thammasat University Hospital, Thailand. Patients aged 18-60 years who met the indications for bariatric surgery according to the Thai Society for Metabolic and Bariatric Surgery Consensus Guideline, body mass index (BMI) ≥37.5 kg/m^2 or BMI ≥32.5 kg/m^2 with obesity-related complications, were enrolled in the study. Patients with a history of previous bariatric surgery or missing data of HP testing before surgery were excluded.

Clinical data were obtained from the electronic medical records, comprising age, gender, weight, height, BMI, type of operation and obesity-related complications, including diabetes, hypertension, dyslipidemia, obstructive sleep apnea (OSA), and metabolic dysfunction-associated steatotic liver disease (MASLD). The procedures for bariatric surgery were laparoscopic sleeve gastrectomy (LSG), Roux-en-Y gastric bypass (RYGB), and laparoscopic sleeve plus bypass procedures (LSG+), including laparoscopic sleeve gastrectomy with proximal jejunal bypass (LSG – PJB) and laparoscopic sleeve gastrectomy with duodenojejunal bypass (LSG-DJB). Participants were assigned to each type of operation based on the clinical criteria and bariatric team consensus.

All participants underwent esophagogastroduodenoscopy (EGD) before bariatric surgery and the findings were recorded. The EGD reports were classified as normal or abnormal, with the abnormalities including gastritis, gastric ulcer, and other conditions such as atypia, dysplasia, and metaplasia.

The results of HP infection were obtained through either the rapid urease test or histological examination of a random gastric biopsy taken from the greater curvature of the stomach. We prioritized the rapid urease test; however, if the result was negative, the biopsy was subsequently examined histologically. Participants who tested positive received eradication treatment with standard triple therapy for 2 weeks. The patients did not undergo a repeat rapid urease test to confirm HP eradication preoperatively. Nonetheless, the stomach tissue was sent for histological examination and HP assessment after bariatric surgery.

The primary objective was to investigate the relationship between HP infection and %EWL at 3, 6, and 12 months following bariatric surgery. The secondary objective was to examine the correlation between HP infection and post-surgical complications.

Sample size calculation

The sample size for a study investigating the primary outcome of %EWL between patients with and without HP infection was determined based on data from a pilot study conducted by Dr. Pakkavuth (unpublished data). In this pilot study, 8 out of 67 participants (12%) were identified as HP-positive. The mean %EWL was 80.8±27.8 for HP-positive patients and 69.5±14.1 for non-HP patients.

To compare %EWL between the 2 groups, a Student's t-test with Satterthwaite's correction for unequal variances was selected, given the observed differences in standard deviations. Based on this statistical method and the pilot study data, the estimated minimum sample size required to detect a statistically significant difference in %EWL between HP-positive and non-HP patients was determined to be 128.

Statistical analysis

For descriptive statistics, categorical variables were expressed as frequencies and percentages, or analyzed using Fisher's exact test where appropriate. Continuous variables were reported as means with standard deviations (S.D.) or medians with interquartile ranges (IQR), depending on the context. Comparisons between the groups were conducted using Pearson's chi-squared test for categorical variables and either the Student's t-test or the Wilcoxon rank-sum test for continuous variables, as appropriate. Statistical analyses were performed using SPSS version 22 (SPSS Inc., Chicago, IL, USA), and a p-value of less than 0.05 was considered statistically significant.

Results

A total of 214 patients underwent bariatric surgery. Of these, 41 patients were excluded due to prior bariatric surgery or missing data on HP testing. Thus, 173 patients were included in this study. The majority were female (78%, n=135) and 22% (n=38) were male. The mean age and preoperative BMI were 35.3±8.1 years old and 44.2±9.4 kg/m^2 respectively. Most of the patients underwent LSG (44.5%), followed by LSG+ (35.2%) and LRYGB (20.2%). Baseline characteristics, summarized in Table 1, were similar between HP-positive and non-HP groups.

Seventy-five patients (43.3%) tested positive for HP infection. Among them, 63 patients had a positive rapid urease test while 12 patients were found to have HP organisms in the histology of their gastric biopsy.

EGD findings, shown in Table 2, indicate that the HP-positive group had a lower percentage of normal EGD results (9.33%) compared to the non-HP group (13.27%).

Moreover, gastritis was more prevalent in the HP-positive group (84%) than in the non-HP group (73.47%), while gastric ulcer was higher in the non-HP group (13.27%) than the HP-positive group (6.67%). However, the difference did not reach statistical significance. There were no reports of atypia, dysplasia, or metaplasia in either group.

The follow-up rate at 3, 6, and 12 months was approximately 80.9%, 71%, and 54.3%, respectively. The details are presented in Table 3. The %EWL for the HP-positive group and the non-HP group at 3 months were 42.72 and 36, respectively (95% CI=-7.47, 4; p-value=0.551). At 6 months, the %EWL for the HP-positive group was 62, while the non-HP group was 57 (95% CI=-13, 4; p-value=0.298). At 12 months, the %EWL for the HP-positive group was 74, compared to 70.5 for the non-HP group (95% CI=-17, 7; p-value=0.363). No statistically significant difference of %EWL was observed between the 2 groups, as presented in Table 4. The %EWL for each type of operation, shown in Table 5, was also examined and there was no statistically significant difference among the groups.

In the HP-positive group, pathology samples from 63 patients were sent for histological examination. Most of the patients, 58 patients (92%), achieved complete eradication of HP, while only 5 patients (8%) had persistent HP infection. The %EWL of both groups are displayed in Table 6. The %EWL at 3, 6, and 12 months of the complete eradication group was 42.33±15.87, 62.73±24 and 75.97±29.82, respectively. The %EWL at 3, 6 and 12 months of the persistent infection group was 56.69±17.19, 97.33±35.35 and 89.5±2.12, respectively.

The 30-day postoperative adverse effects, shown in Table 7, were reported with no statistically significant difference between the groups. In the HP-positive group, complications were observed in 5 patients (6.7%), including anastomosis stricture (2 patients), wound infection (2 patients), and persistent vomiting (1 patient). In the non-HP group, 7 patients (7.14%) experienced complications, including anastomosis stricture (3 patients), wound infection (4 patients), persistent vomiting (2 patients). Additionally, 2 patients had both anastomosis stricture and wound infection.

Table 1 Baseline characteristics

	HP-positive (n=75)	Non-HP (n=98)	p-value
Female, n (%)	58 (77.33)	77 (78.57)	0.845
Age, years, mean±S.D.	34.71±7.80	35.74±8.17	0.400*
BMI, kg/m^2, median (IQR)	43 (37-49)	42 (37-49)	0.798**
Comorbidity			
Hypertension, n (%)	37 (49.33)	43 (43.88)	0.476
T2DM, n (%)	22 (29.33)	25 (25.51)	0.575
Dyslipidemia, n (%)	38 (50.67)	47 (47.96)	0.724
OSA, n (%)	70 (93.33)	83 (84.69)	0.078
MASLD, n (%)	69 (92.00)	86 (87.76)	0.365
Type of operation			
LRYGB, n (%)	14 (18.67)	21 (21.43)	0.198
LSG, n (%)	32 (42.67)	29 (29.59)	
LSG+, n (%)	29 (38.67)	48 (48.98)	

*Student's t-test, **Wilcoxon rank-sum test, HP=Helicobacter pylori, n=number, S.D.=standard deviation, IQR=interquartile range, BMI=body mass index, T2DM=diabetes mellitus type 2, OSA=obstructive sleep apnea, MASLD=metabolic dysfunction-associated steatotic liver disease, LRYGB=Roux-en-Y gastric bypass, LSG=laparoscopic sleeve gastrectomy, LSG+=laparoscopic sleeve gastrectomy plus bypass

Table 2 Esophagogastroduodenoscopy (EGD) findings

	HP-positive (n=75)	Non-HP (n=98)	p-value
Normal, n (%)	7 (9.33)	13 (13.27)	0.229*
Abnormal, n (%)			
Gastritis	63 (84.00)	72 (73.47)	
Gastric ulcer	5 (6.67)	13 (13.27)	
Others (dysplasia, atyptia, metaplasia)	0	0	

*Pearson's chi-squared test, HP=Helicobacter pylori

Table 3 Follow-up rate during the study period

	HP-positive	Non-HP	Total follow-up rate
Pre-operation	75	98	173
3 months	61 (81.3%)	79 (80.6%)	140 (80.9%)
6 months	50 (66.7%)	73 (74.4%)	123 (71%)
12 months	40 (53.3%)	54 (55%)	94 (54.3%)

HP=Helicobacter pylori

Table 4 Postoperative excessive weight loss between HP-positive and non-HP group

	HP-positive	Non-HP	Difference, % (95% CI)	p-value
%EWL at 3 months, median (IQR)	42.72 (30.91-52.21)	36 (29.67-52)	-7.47 ,4	0.551**
%EWL at 6 months, median (IQR)	62 (50-74)	57 (43-77)	-13 ,4	0.298**
%EWL at 12 months, median (IQR)	74 (57.5-98)	70.5 (50-87)	-17 ,7	0.363**

**Wilcoxon rank-sum test, HP=Helicobacter pylori

Table 5 Postoperative excessive weight loss by type of operation

	LSG			LSG+			LRYGB		
	HP	Non-HP	p-value	HP	Non-HP	p-value	HP	Non-HP	p-value
%EWL at 3 mo, median (IQR)	38.47 (25.84–52)	34.67 (29–52.30)	0.713	44.08 (57–73)	37.70 (29.78–56)	0.252	32.15 (28.44–47.5)	36.78 (27.43–49.73)	0.659*
%EWL at 6 mo, median (IQR)	62 (48–81)	61 (40–80)	0.897	63 (57–73)	56 (46–85.5)	0.419	59 (45–75)	48 (39–63)	0.297*
%EWL at 12 mo, mean±S.D.	73.81±36.46	73.43±29.51	0.970	79±5.10	78.2±22.94	0.919	88.14±46.75	61.89±21.04	0.153**

*Student's t-test, **Wilcoxon rank-sum test, HP=Helicobacter pylori

Table 6 Postoperative excessive weight loss between complete HP eradication and persistent infection

	Complete HP eradication (n=58)	Persistent infection (n=5)	Difference, % (95% CI)	p-value
%EWL at 3 months, mean±S.D.	42.33±15.87	56.69±17.19	-31.06, 2.34	0.090*
%EWL at 6 months, mean±S.D.	62.73±24.00	97.33±35.35	-64.36, -4.84	0.024*
%EWL at 12 months, mean±S.D.	75.97±29.82	89.5±2.12	-56.98, 29.92	0.531*

*Student's t-test, HP=Helicobacter pylori

Table 7 Postoperative complications

Postoperative complications	HP-positive (n=75)	Non-HP (n=98)	p-value
Anastomosis stricture	3 (4.00)	3 (3.06)	1.000*
Persistent vomiting	1 (1.33)	2 (2.04)	1.000*
Wound infection	2 (2.67)	3 (3.06)	1.000*
Total	5	7**	

*Fisher's exact test, **2 patients had both anastomosis stricture and wound infection, HP=Helicobacter pylori

Discussion

In the present study, the prevalence of HP infection in obese patients undergoing bariatric surgery was 43.3%, which is considered high and close to the general population (43.8%) in Thammasat University Hospital[5].

To the best of our knowledge, our trial is the first study to assess the impact of HP infection on %EWL and postoperative complications following bariatric surgery in Thailand. Our findings demonstrated that there were no statistically significant differences in %EWL between the HP-positive and non-HP groups at any follow-up time. Although the %EWL was higher in the HP-positive group compared to the non-HP group, the difference was not statistically significant.

Previous studies had similar results to ours, showing no association between HP infection and %EWL at 6 and 12 months[22-25]. Conversely, some studies reported contrasting results. Farazmand et al. showed that %EWL at 12 months after RYGB was higher in the HP-positive group; there was, however, no difference at other times (24 to 60 months)[26]. Another study by Wang et al. showed negative results in weight loss outcomes on laparoscopic vertical banded gastroplasty (LVBG). HP infection had a negative impact on %BMI change at 12-36 months after laparoscopic vertical banded gastroplasty. Moreover, a higher HP density was associated with a lower %EWL at 24-48 months' follow-up[27]. In comparison, our study had a shorter follow-up period, which might not have been long enough to observe that effect.

The mechanism by which HP infection affects obesity is not fully understood. Some potential pathways include hormonal changes and alterations in gut microbiota. HP reduces the production and secretion of ghrelin hormone, leading to hunger suppression[6]. Additionally, HP infection is associated with a reduction in gut microbiome diversity, which is observed in obese patients[28]. The gut microbiota

in the HP-positive group is characterized by a lower abundance of Actinobacteria, Bacteroidetes, and Firmicutes, alongside a higher abundance of Proteobacteria[29]. Park et al. studied the effect of HP infection on LSG and gut microbiota in obese patients. They found that HP infection was associated with a reduction in the diversity of gut microbiota. Firmicutes and Actinobacteriota decreased while Campylobacterota increased in the HP-positive group. However, there was no significant effect on weight loss outcomes[25].

The eradication of HP influences changes in weight. Many studies have reported that HP eradication can lead to an increase in body weight and BMI[30-32], while others have not[33,34]. Goday et al. studied the impact of HP eradication on weight changes following bariatric surgery. They discovered a more significant reduction in BMI at 3 months after LSG, but this difference was not statistically significant at other times or in the case of LRYGB[35].

While many studies demonstrated no association of HP infection and complications after bariatric surgery[19-24], a few reported opposing findings. HP infection could increase the risk of postoperative outcomes, including marginal ulcers, staple line leak, bleeding, or infection[14-19]. For that result, preoperative screening for HP infection may help minimize these risks.

Furthermore, HP is well-established as a major risk factor for gastric cancer[36]. Eradicating HP could reduce the incidence of gastric malignancies, particularly in asymptomatic infected populations[37,38]. A systematic review has indicated a growing trend in gastric cancer cases following bariatric bypass surgery over the past decade[39]. Therefore, screening for and eradicating HP before bariatric surgery may be beneficial.

However, the current recommendations regarding screening for HP before undergoing bariatric surgery remain debatable. Some guidelines, such as those from the American Society for Metabolic & Bariatric Surgery (ASMBS), the Canadian guidelines, and Thai guidelines, suggest preoperative screening for HP in specific populations, such as those living in high-prevalence areas or undergoing gastric bypass procedures[40-42]. Nevertheless, the European Association for Endoscopic Surgery (EAES) does not recommend it for routine HP eradication because there is insufficient evidence showing that HP infection affects postoperative complications[43].

The limitations of this study include its study design and short follow-up period. Our study utilized a retrospective design, which can report only associations rather than causations.

Conclusion

HP infection did not influence postoperative weight loss outcomes or complications after bariatric surgery. Further large-scale investigations are needed.

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Conflict of interest

The authors declare no conflicts of interest.

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