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Research Article

Prevalence of symptomatic and asymptomatic gallstones in laparoscopic sleeve gastrostomy

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Abstract

***Background*:** Nowadays obesity is one of the major health problems worldwide, leading many obese patients to undergo surgical intervention. Laparoscopic sleeve gastrectomy (LSG) is a common approach for surgical management of morbid obesity. Gallbladder stones are a common side effect of sudden weight loss after bariatric surgery. The aim of this study was to investigate the relationship between weight loss and gallstones and the need for prophylactic cholecystectomy.

***Methods*:** This cross-sectional study was conducted on all patients who had undergone gastric sleeve surgery in Babol University of Medical Sciences hospitals during 2013-2017. Demographic data such as gender, age, weight, and BMI were collected with informed consent via a questionnaire. Patients were followed up over an 18-month period by ultrasound and by a visit from the surgeon. The incidence of gallstones and gallbladder sludge and the need for cholecystectomy were studied.

***Results*:** In this study, 114 patients including 94 females and 20 males with a mean age of 37.4±8.29 years and mean weight of 142.23±10.29 kg underwent LSG. The incidence of asymptomatic and symptomatic gallstones was 23% (26/114) and 7% (8/114), respectively. An apparent relationship was observed between weight loss and the incidence of gallstones during the follow-up periods, except for the first month. Moreover, ursodeoxycholic acid administration reduced significantly the incidence of gallbladder sludge and stones ($p<0.001$).

***Conclusion*:** The results suggest that the formation of gallstones during the period of weight loss is related to the amount or rate of weight loss in the postoperative period.

Keywords: Sleeve gastrectomy, Obesity, Gallstone, Gallbladder sludge

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Introduction

Severe obesity may be associated with critical complications such as type 2 diabetes, dyslipidemia, hypertension, sleep apnea, osteoarthritis, and urinary incontinence (1). Bariatric surgery is the best therapeutic approach for morbid obesity and results in greater long-term weight loss than the best available nonsurgical treatments (2, 3).

Gallstone formation is a common complication in patients who have undergone gastrectomy. Possible mechanisms associated with this increased incidence include vagotomy, extent of gastrectomy, method of gastrointestinal reconstruction, and lymph node dissection (4). The incidence of gallstone formation varies among different types of bariatric surgery. Laparoscopic sleeve gastrectomy (LSG) is one of the most commonly used procedures in bariatric surgery (5, 6). LSG has been described as an efficient and technically safe procedure with minimal adverse effects (7). Few studies have investigated the incidence of gallstones after LSG. The present retrospective study analyzed the incidence of gallstones in patients who had undergone LSG.

Methods

The present study was a semi-experimental study. In This prospective study was conducted to investigate gallbladder stones in patients who underwent sleeve gastrectomy from 2013 to 2017. Written informed consent was obtained from all patients, and demographic data such as gender, age, weight, and BMI were collected from medical records. All patients underwent gallbladder ultrasonography at 1, 2, 6, 12, and 18 postoperative months. Patients were divided into 5 groups according to gallbladder ultrasound reports: Patients without gallbladder stones in whom cholecystectomy was performed concurrently with sleeve gastrectomy or at later follow-up, patients without gallbladder sludge or gallstones, patients with gallbladder sludge, patients with asymptomatic gallstones and patients with symptomatic gallstones. In the presence of asymptomatic gallbladder sludge or gallstones, patients were treated with ursodeoxycholic acid (UDCA) capsules (300 mg twice daily). In the presence of symptomatic gallstones, the necessary measures were taken to perform cholecystectomy. Inclusion criteria included patients aged 18-65 years, BMI≥40 without comorbidity, BMI≥35 with at least one obesity-related condition, and BMI=30-34/9 with diabetes or metabolic syndrome. Exclusion criteria included a history of cholecystectomy and bariatric surgery, use of hemolytic medications, and pregnancy.

Statistical analysis

Data were presented as means ± SD for continuous data and percentages for categorical data. For comparing continuous and categorical variables between groups, analysis of variance and chi-square tests were used, respectively and p-value< 0.05 was considered significant. The analysis was performed by SPSS version 27.

Results

A total of 114 patients (94 females and 20 males) with a mean age of 37.3±8.29 years (range, 25-56) who underwent LSG were included in our study. The mean preoperative weight was 142.23±10.99 kg (110-168 kg) and the mean preoperative BMI was 48.05±4.79 kg/m2 (41-60kg/m2).

The formation of gallstones within 18 months after LSG was observed in 26 of 114 patients (23%). Among the 26 patients, 8 of them (30%) had symptomatic gallstones. In addition, gallbladder sludge developed in 14 (12.3%) of the patients during the 18-month follow-up.

The incidence of cholecystectomy, gallbladder sludge, asymptomatic gallstones, and symptomatic gallstones in the intervals after LSG is shown in Table 1.

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Table 1. Incidence of asymptomatic and symptomatic gallstones in the intervals after LSG

Time (month)	Cholecystectomy	Without Gallstone	Gallbladder sludge	Asymptomatic gallstone	Symptomatic gallstone
1	2 (1.8%)	109 (95.6%)	0	0	3 (2.6%)
2	5 (4.4%)	94 (82.5%)	0	15 (13.2%)	0
6	5 (4.4%)	77 (67.5%)	17 (14.9%)	13 (11.4%)	2 (1.8%)
12	7 (6.1%)	90 (78.9%)	12 (10.5%)	3 (2.6%)	2 (1.8%)
18	9 (7.9%)	89 (78.1%)	13 (11.4%)	2 (1.8%)	1 (0.9%)

Data are the number of patients (percentage).

According to the results, the UDCA significantly decreased the incidence of gallbladder sludge from 14.9% to 10.5% ($p<0.001$) and gallstones from 11.4% to 2.6% ($p<0.001$).

Additionally, patients with gallstones had lost more weight than others 2 and 6 months after LSG surgery ($p<0.001$). At 12–18 months after surgery, weight loss was highest in patients with gallstones and gallbladder sludge ($p<0.001$) (Table 2).

Table 2. Comparison of weight loss with gallbladder-related diseases in the intervals after LSG

Time (month)	Cholecystectomy	Without Gallstone	Gallbladder sludge	gallstone	p-value
1	18.5±4.95	17.74±3.61	-	21.67±3.74	0.196
2	31.2±11.16	27.32±4.19	-	37.87±4.85	<0.001
6	46.22±18.88	40.19±5.19	43.07±5.04	51.06±7.17	<0.001
12	60.29±18.6	50.53±9.15	61±9.67	64.17±10.87	<0.001
18	58.67±13.71	52.76±7.82	65.67±11.01	62.46±10.21	<0.001

Results are presented as mean±SD; P<0.05 was considered statistically significant

In the first month after surgery, no correlation was found between the amount of weight loss and gallstone formation. However, 2 and 6 months after surgery, there was a statistically significant relationship between higher weight loss and gallstone formation (p=<0.001). Moreover, at 12 and 18 months after LSG, patients who lost more weight had a greater tendency to form gallstones and gallbladder that was statistically significant (p=0.001) (Table 3).

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Table 3: Incidence of gallbladder diseases at different levels of weight loss

Time (month)	Rate of weight loss	Without gallbladder	Without gallstone	Sludge	Gallstone	Total	p-value
1	<20 kg	1 (50%)	87 (79.8%)	0	2 (66.7%)	90 (78.9%)	0.514
	20-40 kg	1 (50%)	22 (20.2%)	0	1 (33.3%)	24 (21.1%)	
	40> kg	0	0	0	0	0	
2	<20 kg	1 (20%)	2 (2.1%)	0	0	3 (2.6%)	<0.001
	20-40 kg	3 (60%)	92 (97.9%)	0	12 (80%)	107 (93.9%)	
	40> kg	1 (20%)	0	0	3 (20%)	4 (3.5%)	
6	<40 kg	3 (60%)	48 (62.3%)	2 (11.8%)	5 (33.3%)	58 (50.9%)	<0.001
	40-60 kg	1 (20%)	29 (37.7%)	14 (92.4%)	10 (66.7%)	54 (47.4%)	
	60> kg	1 (20%)	0	1 (5.9%)	0	2 (1.8%)	
12	<40 kg	2 (28.6%)	10 (11.1%)	0	0	12 (10.5%)	0.001
	40-60 kg	1 (14.3%)	66 (73.3%)	5 (41.7%)	2 (40%)	74 (64.9%)	
	60> kg	4 (57.1%)	14 (15.6%)	7 (58.3%)	3 (60%)	28 (24.6%)	
18	<40 kg	2 (22.3%)	4 (4.5%)	0	0	6 (5.3%)	0.001
	40-60 kg	3 (33.7%)	70 (78.7%)	5 (38.5%)	1 (33.3%)	79 (69.3%)	
	60> kg	4 (44%)	16 (16.9%)	8 (61.5%)	2 (66.7%)	29 (25.4%)	

Data are the number of patients (percentage); P<0.05 was considered statistically significant.

Discussion

The results of the current study suggested that gallstone formation was a common complication after LSG and was directly related to the extent of weight loss. In the present study, the incidence of gallstones within 18 months after LSG was observed in 23% (26 of 114) of patients, which is consistent with the majority of published data (8, 9). Furthermore, of the 26 cases in which gallstones developed, 8 (30%) were symptomatic. Thus, the rate of symptomatic gallstones after surgery was 7% of all patients overall. Most previous studies reported the incidence rate of symptomatic gallstones in patients after LSG to be between 3% and 10% (10-12). Manatsathit et al. reported a higher rate (22.9%) for symptomatic gallstone formation after LSG (13).

In the present study, the therapeutic option in cases with asymptomatic and symptomatic gallstones was UDCA and cholecystectomy, respectively.

UDCA reduces the risk of gallstones by inhibiting cholesterol secretion in bile and is recommended as a preventive measure after Roux-en-Y gastric bypass (RYGB) (14). It was observed that UDCA 300 mg twice daily significantly reduced the formation of asymptomatic gallstones and gallbladder sludge in patients undergoing LSG. In agreement with the ongoing study, UDCA 500 mg once daily or 300 mg twice daily was previously reported to significantly prevent cholelithiasis in LSG patients (15, 16). In the current study, because of rapid weight loss as a confounding factor and the lack of a control group, it cannot be said with certainty that UDCA is effective in reducing the incidence of gallstone formation.

The present study suggests that LSG patients who lost more weight were more prone to gallstone formation. The rate of weight loss played a remarkable role in the development of gallbladder disease after LSG. In contrast, weight loss had no significant effect on the development of gallstones in some patients who developed gallstones (13, 17). The effect of weight loss on cholelithiasis depends on the rate of weight loss. The faster the weight loss, the greater the likelihood of stone formation, which can have various causes, such as dehydration and malabsorption. Therefore, the need for prophylactic treatment has greater clinical significance in these patients.

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In conclusion, the risk of gallstone formation increased after weight loss by LSG. However, symptomatic gallstones occurred in a small percentage of patients. Therefore, prophylactic cholecystectomy with potential complications is unnecessary for the vast majority of patients undergoing LSG. As reported by Ozan Sen et al., the conversion rate from asymptomatic to symptomatic gallstones after LSG is very low (18). So, cholecystectomy should be performed only in symptomatic patients. However, prophylactic cholecystectomy could be performed in cases with special conditions, such as patients of advanced age, lack of access to health centers, and presence of contraindications that spare patients from undergoing multiple operations. For subsequent studies, we recommend studies with a larger sample size, consideration of the effects of concomitant diseases such as diabetes and elevated liver enzymes on weight loss, and hepatobiliary iminodiacetic acid screening before bariatric surgery and at follow-up.

Conclusion

Based on the present findings, educational intervention improved the practice of mothers in the test group. If educational interventions to educate mothers and fathers are designed and implemented with educational patterns and models, they will be more effective and through changes in its structures, it will improve the nutritional practice of mothers and improve the growth of their children.

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Author's contribution: Abolhasan Alijanpoor designed the study; Nasrin Tamaskani performed the experiments and wrote the manuscript; Soraya Khafri analyzed the data; and Ali Zahedian helped to design the experiments. All authors revised and approved the final version of manuscript.

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