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Safety of the concomitant cholecystectomy during laparoscopic sleeve gastrectomy in patients with symptomatic gallstone: A single-center experience

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ABSTRACT

Introduction: There are still controversies in the management of gallstones in patients who are candidate for bariatric surgery. The aim of this study was to evaluate the effect of the concomitant cholecystectomy (CC) during laparoscopic sleeve gastrectomy (LSG) on post-operative short-term complications in patients with symptomatic gallstone.

Materials and Methods: After exclusion and inclusion criteria, a total of 251 patients were included in the study. Patients were divided into two study groups as Group A (only LSG, n=214) and Group B (LSG + CC, n=37).

Results: Female-to-male ratio was 2/1 in Group A and 8/1 in Group B (p=0.01). The mean age, comorbid disease distributions, length of stay, and initial body mass index were similar in both groups. The differences in the rates of postoperative 30-day minor and major complications in Group A (7.5% and 2.8%, respectively) and Group B (18.9% and 2.7%, respectively) were not significant (p=0.64). CC prolonged the operation time at an average of 15 min (p<0.001).

Conclusion: CC during LSG is a safe procedure in patients with symptomatic gallstone, which has an acceptable increase in operation time and does not cause an increase in minor or major complications and prolongation on length of stay.

Keywords: Post-operative complications; sleeve gastrectomy; simultaneous cholecystectomy; symptomatic gallstone.

Introduction

The incidence of gallstones is higher in the weight loss process after bariatric surgeries compared to the general population. During weight loss period, high serum cholesterol excreted in the bile and resulting in an increased bile-cholesterol saturation index which is the major metabolic precedent of cholesterol gallstones.[1] Recent studies indicate that the symptomatic and complicated diseases related to de novo gallstone formation are also higher during the weight loss period following bariatric surgeries.[2-5] As a result, cholecystectomy has been described as the most frequent surgical operation performed after bariatric surgeries.[6] Therefore, prophylactic concomitant cholecystectomy (CC) was routinely performed in all patients during open bariatric surgeries in the past, irrespec-

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tive of gallstone status. Because of the aim of minimizing the morbidity associated gallstone-related diseases and subsequent surgery requirement which could complicate a future cholecystectomy due to abdominal scarring after primer bariatric surgery.

Today, after the advances and widespread applicability in laparoscopic techniques in bariatric procedures, there have been some changes in the perspective of CC. However, there are still some controversies in the management of gallstones in obese patients who are candidates for bariatric surgery. Recent studies reported that CC during laparoscopic bariatric surgeries has significant potential complications that can lengthen the duration of operation, increase morbidity, and length of stay.[7] On the other hand, it has been shown that ursodeoxycholic acid (UDCA) may suppress the gallstone formation during weight loss period after surgery.[3,8,9] Hence, routine prophylactic CC is not recommended today in bariatric surgeries.[4] As an exception, only be performed during biliopancreatic diversion because of the high incidence of postoperative gallbladder disease.[10]

Another confusing issue is asymptomatic gallstones which proven by pre-operative imaging. About this, recent studies reported that the rate of complicated gallbladder disease was low after sleeve gastrectomy even without post-operative UDCA medication, so routine prophylactic CC is not indicated for asymptomatic gallstones.[11,12] In symptomatic patients, CC during laparoscopic sleeve gastrectomy (LSG) has been found to be safe, as well as acceptable increasing duration of operation without an increase in length of stay and major complications or mortality risk.[13,14]

Consequently, the issue of treatment approaches in cholelithiasis in patients with bariatric surgery candidate is still not clear. Although it has been declared that CC is acceptable and safe in symptomatic patients, it was shown that it has an adverse effect on duration of operation and early post-operative complications in recent studies. Based on this condition, in this study, it was aimed to evaluate the effect of CC during LSG on short-term complications.

Materials and Methods

The data of 2004 consecutive morbidly obese patients undergoing LSG between January 2014 and January 2018 were prospectively recorded and retrospectively analyzed. Patients who underwent previous cholecystectomy or weight reduction surgery before primary LSG were excluded from the study. Patients with a missing data were also excluded from the study. The remaining patients met the validated international criteria for bariatric surgery. Surgery was indicated for patients with a body mass index (BMI) of ≥40 kg/m^2 or ≥35 kg/m^2 in the presence of obesity-related medical comorbidities such as hypertension, type 2 diabetes, obstructive sleep apnea syndrome, and hyperlipidemia. After inclusion and exclusion criteria, a total of 251 patients included in the study. The patients were divided into two groups according to whether a CC was performed. In Group A, a total of 214 patients who were performed only LSG, in Group B, a total of 37 patients who were performed CC during LSG due to symptomatic gallstones were included in the study. The flowchart of patient enrollment is shown in Figure 1.

Routine pre-operative screening and post-operative surveillance ultrasound were not performed in asymptomatic patients. Abdominal imaging was only performed to the patients before surgery with gallstone-related symptoms or gallstone-related disease history such as biliary colic, cholecystitis, biliary pancreatitis, and obstructive jaundice. In our clinic, prophylactic cholecystectomy or cholecystectomy for asymptomatic gallstone was not

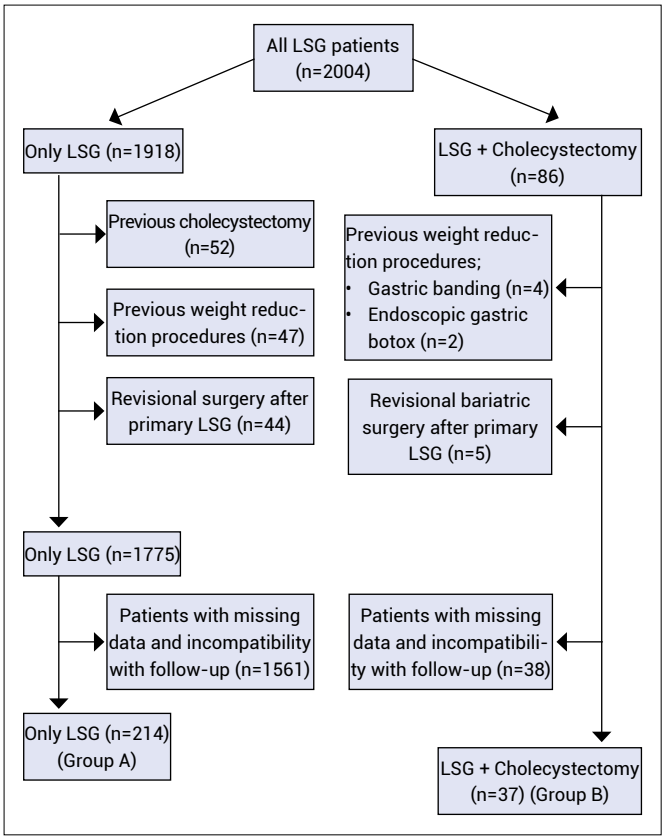

Figure 1. Flow chart illustrating patient enrollment.

performed in any of the patients during LSG. CC was only performed to the patients with symptomatic gallstone proven by the pre-operative abdominal imaging. LSG + CC was performed to all symptomatic patients during the remission period of their disorders related to gallstone formation. CC was performed after completion of the LSG with the conventional laparoscopic antegrade approach, utilizing the same ports.

Patients' age, gender, initial weight and BMI, comorbid diseases, duration of operation, and follow-up time were recorded and excessive weight loss (EWL) rates were measured at 6-month intervals during the post-operative period in both Groups A and B. EWL was calculated with pre-operative weight and assuming a normal BMI of 25 kg/m^2. The duration of operation was defined in minutes between the time of the first skin incision and the last skin suturing. All post-operative complications were graded according to the modified Clavien–Dindo classification (CDC) system. Minor complications were defined as CDC Grades I and II, and major complications were defined as CDC Grades III–V.

All analyses were performed using SPSS software (SPSS Statistics v22.0, IBM Corp., Armonk, New York). Categorical variables were expressed as numbers and percentages, whereas continuous variables were summarized as mean and standard deviation and median where appropriate. The Chi-square test was used to compare categorical variables between the groups. The Kolmogorov–Smirnov test was used to test whether the continuous measurements showed homogeneous distribution. For a comparison of continuous variables between the two groups, the Mann–Whitney U-test was used. Statistical significance was taken as p=0.05.

The study was approved by the Institutional Review Board, and the data were collected following the principles of the Declaration of Helsinki. The patients were informed about the possible complications and technical details of the surgery, and written informed consent was obtained from each patient.

Results

Thirty-one of the patients who were included in Group B had biliary colic symptoms such as upper right abdominal pain with an increased incidence of nausea, vomiting, and feelings of fullness during or after feeding. The remaining six patients had complicated disease before bariatric surgery procedure (four had acute cholecystitis, one had acute pancreatitis, and one had obstructive jaundice). All symptomatic patients were treated by conservative treatment approaches.

The demographics of the both group and cross analysis of perioperative findings and weight loss follow-up are shown in Table 1. Female-to-male ratio was 2:1 in Group A and 8:1 in Group B, and this difference was significant (p=0.01). The mean age and initial BMI of both Groups A and B were similar (36.4±8.7 years vs. 38.6±9.3 years p=0.20 and 45.8±5.7 kg/m^2 vs. 45.5±5.9 kg/m^2, p=0.71, respectively). Pre-operative comorbid disease incidence was similar in both groups (44.9% vs. 56.8%, respectively, p=0.18). The mean duration of operation for patients with and without cholecystectomy was 82.7±19.6 and 68.0±8.0 min, respectively (p<0.001). The length of stay for both groups was similar (5.29±2.53 days in Group A and 5.35±1.6 day for Group B, p=0.14).

Post-operative complication rate was 10.3% in Group A and 21.6% in Group B, and this difference was not significant (p=0.06). There was any biliary leakage in both groups. Surgical site infection (SSI) rates were higher in Group B, but this not significant (2.8% in Group A and 8.1% in Group B, p=0.13). When the severity of complications was compared between the groups according to the CDC, the differences of the minor and major complication rates were not significant (p=0.64).

Discussion

Gallstone disease is the most common disorder of the biliary system which occurs for 10–15% prevalence in the population.[15] Some risk factors have been defined as being associated with gallstone formation such as advanced age, female sex, reduced physical activity, family history, drugs, metabolic syndrome/diabetes mellitus, obesity, and rapid weight loss.[16] In the past decades, the frequency of cholelithiasis and related complicated disorders is gradually increasing with the increase in obesity frequency and the rising preference of the weight reduction surgeries which resulting excess weight loss in a short time. Studies indicated that crystallization promoting compounds (mucin) are of great importance in the development of cholesterol crystals and gallstones in obese subjects during weight reduction, probably because of defective gallbladder emptying. The gallbladder motility reduces as a result of the decrease in cholecystokinin release reflex, especially in the duodenal by-passed surgeries.[17] Therefore, surgeons had performed prophylactic cholecystectomy more frequently during bariatric surgeries, irrespective of gallstone status, because of the aim

Table 1. Demographic parameters and perioperative findings of the study groups

	LSG (n=214)		LSG + CC (n=37)		P
	n	%	n	%	
Follow-up period (month)	16.7±7.9		17.5±8.1		0.22
Age	36.4±8.7		38.6±9.3		0.20
Gender					
Male	69	94.5	4	5.5	0.01
Female	145	81.5	33	18.5	
Comorbid diseases					
T2D	34	15.9	10	27.0	0.10
HT	37	17.3	7	18.9	0.81
HF/CAD	8	3.7	2	5.4	0.65
Asthma/COPD /OSAS	50	23.4	4	10.8	0.13
Hyperlipidemia	25	11.7	6	16.2	0.43
Abnormal TFT	12	5.6	4	10.8	0.27
Total	96	44.9	21	56.8	0.18
Post-operative 30-day complications					
Transfusion	3	1.4	1	2.7	0.47
Pneumonia	2	0.9	1	2.7	0.38
Splenic infarct	6	2.8	1	2.7	1.00
SSI	6	2.8	3	8.1	0.13
Biliary leakage	0		0		-
Reoperation	1	0.5	0		-
Hemorrhage	4	1.9	1	2.7	0.55
Leakage	0		0		-
Luminal obstruction	2	0.9	0		-
Portal venous embolism	2	0.9	2	5.4	0.11
Total	22	10.3	8	21.6	0.06
Clavien–Dindo classification					
Minor (Grades 1–2)	16	7.5	7	18.9	0.64
Major (Grades 3–4)	6	2.8	1	2.7	
Duration of operation (min)	68.0±18.0		82.7±19.6		<0.01
Length of stay (day)	5.29±2.53		5.35±1.6		0.14
Initial weight (kg)	130.3±21.8		122.0±17.6		0.01
Initial BMI (kg/m^2)	45.8±5.7		45.5±5.9		0.71
Excess weight loss (%)					
6th month	72.9±24.2		74.9±17.5		0.49
12th month	89.6±21.2		92.7±21.0		0.88

BMI: Body mass index; CC: Concomitant cholecystectomy; HF/CAD: Hearth failure/coronary artery disease; HT: Hypertension; LSG: Laparoscopic sleeve gastrectomy; TFT: Thyroid function tests; T2D: Type 2 diabetes mellitus; SSI: Surgical site infection.

of the minimizing the morbidity associated gallstone-related diseases and subsequent treatment requirement.[18]

In sleeve gastrectomy procedure, the normal anatomical structure of biliopancreatic drainage is maintained due to the nature of the surgical technique. This permits the access to the biliary system by endoscopic interventions and it provides a normal food pathway through the digestive tract with an absence of a malabsorptive intestine. Hence,

gallstone formation is expected to be low in these patients and recent studies support this. The incidence of both symptomatic and asymptomatic cholelithiasis is lower than those reported for RYGB even without a protocol of intraoperative ultrasound followed by CC, post-operative UDCA usage, and routine ultrasound surveillance.[4,12,19,20] Given these results, routine pre-operative ultrasound and prophylactic cholecystectomy are not recommended for patients with asymptomatic gallstone who are candidate for LSG.[4,21] However, in contrary of these findings, some studies emphasized that symptomatic gallstones after LSG are not low at all.[22] Altieri et al. reported in large series study that subsequent cholecystectomy requirement was significantly lower in RYGB (6.5%) compared to LSG (10.1%).[23] In addition, the other studies reported that the occurrences of symptomatic gallstones are in RYGB and LSG was similar.[24] As a result of these findings, the challenging problems associated with gallstone-related disorders after LSG may occur not less than RYGB.

Most of surgeons have been concerned about the increasing staple line leaks, prolonged operation time, and the other potential complications related to CC during LSG.[13,14,21,25,26] They may also think that a delayed cholecystectomy may be technically easier and comfortable with a decrease in intra-abdominal fatty tissue during weight loss. However, contrary to popular belief, in a large series study, it was reported that CC added 27 min of operative time without affecting the rates of major complications, death, or length of stay. It was emphasized that the only adverse outcome associated CC was a slightly increased risk of SSI (1.0%).[13] Furthermore, Raziel et al. reported that 9% of LSG patients with asymptomatic gallstones or sludge need to subsequent cholecystectomy compared to 2.7% of patients without gallstone and they underlined that presenting symptoms and severity of the disease were worse in patients with asymptomatic gallstones.[27] In addition, Tustumi et al.[21] showed that the risk for complications and reoperation is higher when cholecystectomy performed post-bariatric procedure compared to concomitantly. In the recent study, the length of stay and post-operative minor and major complication rates were similar, only except for approximately 15 min prolongation in duration of operation. Furthermore, there was a slight increase in the rate of SSI in CC patients, but it was not significant. As a result of these findings and the literature data, CC during LSG seems to be more advantageous and safer.

Recent studies showed that the post-surgical routine use of UDCA is very effective on reduction in de nova gallstone formation after surgery and complications in patients with asymptomatic gallstone. In Şen et al.,[8] it was found that an almost 4-fold decrease in the rate of new gallstone formation with daily UDCA treatment after LSG. In addition, Penna et al.[28] reported that 96.8% of patients with asymptomatic gallstone remained asymptomatic under UDCA medication after RYGB. Considering the effects of UDCA, it seems more appropriate that CC should be indicated for symptomatic cases only. Although there is no consensus regarding to this topic, a recent systematic review supports this condition. It was not recommended routine prophylactic cholecystectomy at the time of bariatric surgery and it was emphasized that CC is acceptable and safe in symptomatic patients as we suggest.[4]

This study has some limitations because of its retrospective design and limited number of patients. Female gender domination in CC patients causes heterogeneity in the groups.

Conclusion

It should not be postponed to a subsequent cholecystectomy after LSG in patients with symptomatic gallstone. CC during LSG is a safe procedure which has an acceptable increase in operation time and does not cause an increase in minor or major complications and prolongation on length of stay after surgery.

Disclosures

Ethichs Committee Approval: The study was approved by Fırat University Medical Faculty Hospital Ethics Committee (15.06.2020/396254).

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – A.L.; Design – A.L.; Supervision – E.A., C.K; Materials – A.L., O.D.; Data collection and/or processing – A.L., O.D., M.Y.; Analysis and/or interpretation – A.L., O.D., M.Y.; Literature search – A.L., O.D., M.Y.; Writing – A.L., E.A., C.K.; Critical review – A.L., E.A., C.K.

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