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Concomitant versus Delayed Cholecystectomy in Morbidly Obese Patients with Asymptomatic Gall Stones Undergoing Laparoscopic Sleeve Gastrectomy

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ABSTRACT

Background: Performing cholecystectomy concomitant to laparoscopic sleeve gastrectomy (LSG) in morbidly obese patients with asymptomatic cholelithiasis is poorly discussed.

Objectives: We conducted the current investigation to compare concomitant to late cholecystectomy in asymptomatic gall stone patients undergoing LSG.

Patients and methods: One hundred morbid obese patients scheduled for LSG were included in this retrospective analysis. They were divided into two groups: Group 1 included patients who underwent concomitant cholecystectomy, and group 2 that included patients who omitted such a procedure. Delayed cholecystectomy was scheduled if the patient developed symptoms related to gall bladder disease. The incidence of post-operative complications and percentage of developing symptomatic cholelithiasis in group 2 were our outcomes. **Results:** All preoperative data were statistically comparable between the two groups. However, operative time and intraoperative blood loss were significantly increased in group 1. The incidence of total early post-operative complications also increased in the same group (14% vs 0% in the other group). In Group 1, we encountered two patients with intraperitoneal bleeding (4%) who required laparoscopic management, in addition to the other two cases with biliary leakage (4%). In group 2, 18% of patients expressed symptomatic gall stone disease before the scheduled operation, while two cases (4%) developed acute complications that required early cholecystectomy. **Conclusion:** Cholecystectomy is associated with an increased incidence of early post-operative complications when performed in association with LSG. However, about 25% of asymptomatic cases who omitted the concomitant procedure will develop symptoms before the scheduled cholecystectomy.

Keywords: Cholecystectomy timing; Asymptomatic cholelithiasis; Sleeve gastrectomy.

INTRODUCTION

Bariatric surgery has proved to be an effective plan in achieving durable and sufficient weight loss compared to other obesity management plans [1, 2]. Laparoscopic sleeve gastrectomy, which is a restrictive bariatric procedure, has become popular over the past two decades in managing such a condition for both patients and bariatric surgeons. It nearly represents about 50% of bariatric procedures performed around the globe [3]. It can achieve satisfactory weight loss along with improvement or resolution of associated comorbidities [4, 5]. Morbid obesity is a documented risk factor for cholelithiasis [6]. Although the incidence of gall stone disease ranges between 10% and 20% in the general population [7]. This risk increases by about three to five times in association with obesity when compared to non-obese individuals [8, 9]. Although bariatric surgery is a successful way of improving obesity-related comorbidities [1], the risk of gall stone disease significantly increases following rapid weight loss (28 – 71%) [10, 11]. In addition, about 3% to 28% of bariatric surgery patients require cholecystectomy for symptomatic gall stones following the bariatric procedure [12-14]. In the era of open roux en Y gastric bypass (RYGB), routine cholecystectomy was performed regardless of the presence of gall bladder pathology. This was based on the concept of increased risk of developing cholelithiasis after the procedure, with difficult endoscopic access to the biliary tree. Also, the large midline incision used allowed easy access to the gall bladder [11, 12, 15]. However, this approach became less popular with the introduction of laparoscopy, as access to cholecystectomy during the primary bariatric procedure was difficult and associated with an increased risk of biliary complications [11, 12].

It is agreed that asymptomatic gall stone disease is an indication for cholecystectomy, either in the setting of bariatric surgery or not [16]. Nevertheless, there is a great debate regarding performing cholecystectomy in bariatric surgery patients with asymptomatic gall stones [17]. Most literature studies handle the previous debate in patients undergoing laparoscopic RYGB [16, 18], and there is a clear paucity of trials handling the issue of asymptomatic gall stone disease in patients undergoing LSG. That is why we conducted the current investigation to compare concomitant to late cholecystectomy in asymptomatic gall stone patients undergoing LSG.

PATIENTS AND METHODS

The study was designed for adult morbid obese patients scheduled for LSG and having asymptomatic

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cholelithiasis (on preoperative ultrasonographic examination). We collected the data of consecutive 100 patients with the previously mentioned criteria conducted at our general surgery department during the period between January 2018 and December 2021. We excluded patients who were scheduled for bariatric operations rather than LSG, who had symptomatic cholelithiasis, and who were lost at follow up.

The decision to perform concomitant or not was completely dependent on the operator decision, and all patients were informed about the possibility of gall bladder removal during the same procedure or later, according to the intraoperative findings and expected difficulties. The benefits and possible complications of each management plan were explained to all of the included subjects.

After adequate preoperative preparation, which included history taking, physical examination, laboratory investigations, pelviabdominal ultrasound, and anaesthetic consultation, the patients were admitted to our department the day before the operation. Operations were performed on the morning of the subsequent day via laparoscopy when the patient was lying in the French position and the main operator between the patients' legs. After abdominal insufflation via the Veress needle, the five ports of LSG were inserted as follows; the camera port was inserted above the umbilicus, two working ports at the right and left midclavicular lines, in addition to two assistant ports, one at the epigastrium and the other one at the left anterior axillary line. The LSG was performed after dividing the greater omentum and short gastric vessels from the greater gastric curve. This dissection was started 4 cm from the pyloric opening till reaching the left diaphragmatic crus. The sleeve tube was created over a 38-Fr bougie using surgical endostaplers. After performing an intraoperative leak test to ensure staple line competency, a drain was inserted along the staple line through the inferior assistant port.

After finishing the LSG, if a concomitant cholecystectomy was decided, the removed 5-mm port (to insert the drain) was moved to the right anterior axillary line for fundus retraction. The cholecystectomy procedure was performed in the same LSG position when the operator was between the patient legs. After achieving the critical view of safety, clipping of the cystic artery and duct was done, followed by dissection of the gall bladder from its bed. After finishing the procedure, a drain was left at the Morrison pouch. The bladder was extracted through the right working port (the same port of gastric extraction). According to the state of cholecystectomy during the primary LSG procedure, the 100 patients were divided into two groups; group 1 included 50 patients who had a concomitant cholecystectomy, and group 2 included the remaining 50 patients who did not undergo the same procedure.

After the operation, patients were informed about the state of the gall bladder, whether removed or not, and the cause of not removing it during the initial operation (large left lobe, improper visualization of Calot triangle, difficult fundus retraction due to heavy left lobe, or anaesthetic advice to shorten the procedure). Both groups received the standard post-operative care (IV fluids, frequent monitoring), and oral fluids were allowed on the 1st post-operative day unless complications were anticipated. Surgical pain was assessed via the visual analogue scale (VAS) [19].

Over a follow-up period of 1.5 years for patients who did not remove the gall bladder, a delayed cholecystectomy was scheduled if the patient developed symptoms. The cholecystectomy procedure was performed when the patient was in an anti-Trendelenburg position via the classic four-port technique (periumbilical camera port, epigastric and midclavicular working ports, and right anterior axillary port for assistance). The same principles were followed, as mentioned in the concomitant procedure. However, the bladder was extracted through the epigastric port.

For both groups, data collection included age, sex, body mass index, smoking, comorbidities, gall stone number, operative time, blood loss, post-operative complications, and duration of hospitalization. In the delayed group (group 2), the incidence of developing symptomatic gall stone disease along with the second operative data was collected as well. Our outcomes included the incidence of post-operative complications in both groups and the percentage of developing symptomatic cholelithiasis in group 2.

Ethical approval:

The study was approved by the Ethics Board of Al-Azhar University and an informed written consent was taken from each participant in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

With SPSS version 26 for Windows, the acquired data were coded, processed, and analysed. Numbers (frequency) and percentages were used to represent qualitative data. The comparison between groups was done using the Chi-Square test (or Fischer's exact test). Non-parametric data were expressed as median and range, whereas parametric data were expressed as mean and standard deviation (SD). The student's t-test was applied to compare two groups of normally distributed quantitative data, while Mann-Whitney U-test was used if the data were abnormally distributed. For all tests, P values ≤ 0.05 are considered significant.

RESULTS

Age and gender distribution were statistically comparable between the two study groups (p = 0.662 and 0.603 respectively). BMI had mean values of 47.19 and 45.52 kg/m^2 in groups 1 and 2 respectively (p = 0.093). The prevalence of smoking and obesity-related comorbidities showed no significant differences between our two groups (p > 0.05). Previous abdominal surgeries showed the same previous insignificant findings. Furthermore, the number of gall stones was also comparable between the same groups, as a single stone was present in 56% and 50% of patients in groups 1 and 2, respectively, while the remaining cases had multiple stones (Table 1).

Table (1): Preoperative data.

Variable	Group 1 (n = 50)	Group 2 (n = 50)	P value
Age (years)	39.64 ± 6.50	40.22 ± 6.74	0.662
Sex			
-Female	42 (84%)	40 (80%)	0.603
-Male	8 (16%)	10 (20%)	
BMI (kg/m2)	47.19 ± 4.62	45.52 ± 4.23	0.093
Smoking	5 (10%)	5 (10%)	1
Obesity-related comorbidities	5 (10%)	6 (12%)	0.749
-Diabetes	2 (4%)	1 (2%)	0.558
-Hypertension	1 (2%)	1 (2%)	1
-OSA			
Previous abdominal surgery	7 (14%)	9 (18%)	0.585
No of gall stones			
-Single	28 (56%)	25 (50%)	0.548
-Multiple	22 (44%)	25 (50%)	

Group 1 showed a significantly prolonged operative time compared to group 2 (114.68 vs 11.34 minutes respectively, p = 0.007).

Likewise, intraoperative blood loss was significantly increased in the same group (65.6 vs 41.36 in group 2, p < 0.001) as shown in table (2). Concomitant cholecystectomy was omitted in group 2 due to the following causes; large right lobe (22 cases, 44%), large left lobe (12 cases, 24%), adhesions at the Calot triangle (14 cases, 28%), and anesthetic considerations (two cases, 4%) (Not shown in the tables).

Table (2): Operative data

Variable	Group 1 (n = 50)	Group 2 (n = 50)	P value
Operative time (min)	100.62 ± 11.86	62.36 ± 7.23	< 0.001*
Intraoperative blood loss (ml)	65.60 ± 7.54	41.36 ± 6.60	< 0.001*

*: Significant p value

As shown in table (3), the duration of hospitalization had a median value of two days in both groups. However, the hospitalization duration had a higher range in group 1. Pain scores showed a significant increase in the same group. The total incidence of early complications was significantly increased in group 1 (14% vs 0% in group 2, p = 0.006). Port site infection was encountered in three patients in group 1 compared to no cases in group 2, with no significant difference between the two groups. Intraperitoneal bleeding was encountered in two patients in group 1 (4%); one was from the cystic artery while the other was from the staple line. Both bleeding sources were controlled by clipping. Bile leakage was detected in two patients in the same group (4%). One was managed by ERCP and stent, whereas the other one was conservatively managed.

Table (3): Post-operative data

Variable	Group 1 (n = 50)	Group 2 (n = 50)	P value
Hospital stay (day)	2 (1 – 5)	2 (1 – 3)	0.259
VAS	4 (2 – 5)	3 (2 – 4)	0.025*
Port site infection	3 (6%)	0 (0%)	0.079
Intraperitoneal bleeding	2 (4%)	0 (0%)	0.153
Staple line leakage	0 (0%)	0 (0%)	1
Biliary leakage	2 (4%)	-	-
Total early complications	7 (14%)	0 (0%)	0.006*

*: Significant p value.

When it comes to the follow-up data of group 2, nine patients (18%) developed symptoms related to gall stones, while another two cases (4%) had acute complications. One patient had acute cholecystitis, while the other one had obstructive jaundice due to a small stone that passed spontaneously. The duration of cholecystectomy in group 2 ranged between 30 and 60 minutes (median = 44 minutes), and the encountered adhesions were mild or moderate in most cases. Their hospital stay ranged between one and two days. No post-operative complications related to cholecystectomy was encountered in this group (Table 4).

Table (4): Follow up data in group 2 (delayed cholecystectomy group), including the second admission for cholecystectomy

Variable	Frequency (percent)
No of the cases developed complications requiring early intervention	2 (4%)
No of the cases reporting symptoms	9 (18%)
Operative time (min)	44 (30 – 60)
Hospital stay (day)	2 (1 – 2)
Post-operative complications	0 (0%)

DISCUSSION

Most surgeons can show some disagreement about the proper timing of cholecystectomy in obese patients scheduled for LSG and having asymptomatic gall stones. Some surgeons are in favour of concomitant removal as it is cost-effective, requires no additional trocar insertion, avoids the risk of future biliary interventions and ultrasonographic follow up, and is associated with better life quality. Contrarily, some disagree with the previous facts as there is an increased risk of complications, prolonged operative time, and suboptimal trocar sites. Additionally, only a small percent of these cases become symptomatic after bariatric surgery [(20)]. We conducted the current retrospective analysis aiming to compare concomitant to late cholecystectomy in asymptomatic gall stone patients undergoing LSG. Although our study was retrospective and non-randomized in nature, most of the preoperative data were statistically comparable between the two groups. This should negate any bias that might have skewed the results in favour of one group rather than the other one.

In the current investigation, we noted a significant increase in operative time in group 1 (the concomitant group), and this is reasonable as the additional cholecystectomy procedure is expected to increase the operative time, especially with the difficulties expected in a bariatric patient. Similarly, **Dakour-Aridi and his associates [(11)]** reported a significant prolongation of operative time in the concomitant cholecystectomy group, which had a mean value of 128.2 minutes compared to 95.3 minutes in the sleeve only group ($p < 0.001$). **Tarantino and his coworkers [(21)]** noted the same finding when cholecystectomy was done with RYGB. Despite the previous reports, one should consider the operative time of the second operation, which, if added to the primary procedure time, is expected to wipe this significant difference.

We also noted a significant increase in intra-operative blood loss in group 1 ($p < 0.001$). Besides, conducting two procedures instead of one, if the bleeding was encountered from Calot triangle dissection or gall bladder bed, we think that one may take more time to control compared to the original cholecystectomy ports and access. Difficult fundus retraction, heavy right lobe, enlarged left lobe, and the fatty nature of the liver itself could explain this finding.

In our study, the duration of hospitalization expressed no significant differences between the two groups. However, group 1 had a higher duration range compared to group 2. This is due to the complicated cases with bleeding and bile leakage, which required more days of hospitalization. In a similar study, other researchers negated any significant difference between the concomitant and delayed groups regarding the duration of hospitalization ($p = 0.57$), which had mean values of 2.3 and 2.1 days in the same previous groups, respectively [(11)].

We noted increased post-operative pain scores in the concomitant group compared to the other one, and that could be due to more tissue dissection needed in another abdominal compartment compared to the other group.

Our findings showed that the incidence of total early post-operative complications was significantly increased in group 1 (in association with concomitant cholecystectomy) (14% vs 0% in group 2, $p = 0.006$). **Dakour-Aridi *et al.* [(11)]** also noted a slightly increased risk of adverse events in the concomitant cholecystectomy group (5.7% vs 4% in the delayed group), and that risk was more evident regarding the incidence of bleeding and pneumonia [(11)]. This coincides with our findings.

We encountered two cases of bleeding in the concomitant group in the current study (4%). One of them was from the stable line, while the other one was from the gastric staple line. No cases with haemorrhage were encountered in the other group. In the study conducted by **Raziel *et al.* [(4)],** the incidence of post-operative haemorrhage was comparable between the two groups, as it was detected in 2.27% and 2.22% in the bariatric and concomitant groups, respectively.

In our study, the incidence of biliary leakage in group 1 was 4% (two cases). One was managed by ERCP and stent, while the other one was conservatively managed. In another study, the incidence of bile leakage with concomitant cholecystectomy was 1.11% (two cases). One case was due to common bile duct injury, while the other one was due to leakage from the gall bladder bed. The former was managed by open conversion and duct repair, while the latter spontaneously resolved without papillotomy [(4)]. Although the incidence of complications related to cholecystectomy in association with bariatric surgery is low, its management in the obese population could be problematic, as it may require conversion and it could increase mortality risk [(16)].

In the current study, nine patients (18%) developed gall stone symptoms, and two cases (4%) had early stone related complications. In fact, the incidence of getting symptomatic after LSG mostly resembles the normal population who have asymptomatic cholelithiasis.

It was reported that about 6% to 25% of these individuals could develop gall stone related symptoms [22]. Like our findings, **Yardimci and his colleagues** [16] evaluated 24 patients with asymptomatic cholelithiasis who had LSG without concomitant cholecystectomy. The authors reported that five patients reported biliary colic (20.83%). However, other acute complications, including acute cholecystitis, obstructive jaundice, and pancreatitis, were not reported through the scheduled follow up period. **Raziel *et al.*** [4] reported that only four out of the 43 patients who underwent LSG and had asymptomatic gall stones manifested symptoms after the operation and required cholecystectomy. In the study conducted by **Sioka and his coworkers** [23], 13% of LSG patients who had positive ultrasonographic findings before the bariatric procedure developed cholelithiasis-related symptoms following LSG. On the other hand, **Morais *et al.*** [24] did not report any patient developing symptomatic gall stones after different bariatric operations, including LSG.

It is expected to find some differences regarding the percentage of asymptomatic patients who turned symptomatic. This would differ according to patient criteria, degree of weight loss, post-operative dietary habits, and the duration of follow up. Therefore, it is important to conduct further studies to elucidate the risk factors of having asymptomatic disease after bariatric operations, and such patients should undergo the concomitant cholecystectomy procedure.

The current study has some limitations; being retrospective in nature, the inclusion of patients from a single surgical institution are the main disadvantages. Thus, more studies including more patients from different centres should be conducted soon.

CONCLUSION

Based on our findings, cholecystectomy is associated with an increased incidence of early post-operative complications when performed in association with LSG. However, about 25% of asymptomatic cases who omitted the concomitant procedure will develop symptoms before the scheduled cholecystectomy. Till reaching a global surgical consensus regarding that matter, the operating surgeon should assess the additional risk of simultaneous cholecystectomy against the morbidity of delayed gallstone problems or deferred cholecystectomy.

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