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Original Article

Laparosc Endosc Surg Sci 2023;30(4):196-200
DOI: 10.14744/less.2023.82584

Evaluation of the incidence and risk factors of early symptomatic cholelithiasis following obesity surgery in Turkish patients

Mehmet Volkan Yiğit,[1] Zeynep Şener Bahçe[2]

[1]Department of General Surgery, Memorial Hospital, Diyarbakır, Türkiye
[2]Department of General Surgery, Gazi Yaşargil Training and Research Hospital, Diyarbakır, Türkiye

ABSTRACT

Introduction: Obesity is a serious public health issue. According to 2016 data from the Turkish Statistical Institute, 15.2% of males and 23.9% of females aged 15 years or older were detected to be obese in Türkiye. The reason obesity alone is a health problem is that it is accompanied by comorbidities such as diabetes, hypertension, and chronic obstructive pulmonary disease.

Materials and Methods: Data of 294 patients admitted to our hospital with a body mass index (BMI)>40 kg/m^2 who underwent laparoscopic sleeve gastrectomy between January 2015 and December 2020 were retrospectively examined. Demographic data, chronic disease histories, biochemical work-up data, hospitalization period, post-operative complications, and histopathological examination results were recorded.

Results: 235 (80%) of our patients were female and 59 (20%) were male. The mean pre-operative BMI value of the females was found to be 42.3±3.58 kg/m^2 [41-56 kg/m^2]. The mean pre-operative BMI value of the males was found to be 47.6±7.74 kg/m^2 [41-62 kg/m^2]. After bariatric surgery, within the first 6 post-operative months, cholelithiasis was accompanied in a total of 35 patients (11.9%). Following bariatric surgery, 19 patients were operated on for gallstones. Thirteen of these patients were asymptomatic.

Conclusion: We detected that the incidence of post-bariatric surgery cholelithiasis is low. Factors such as sex, age, and comorbidities were not associated with cholelithiasis development in our patients. Therefore, we believe that prophylactic cholecystectomy should be avoided.

Keywords: Bariatric surgery, Cholelithiasis, Obesity

Introduction

Obesity is a serious public health issue, rapidly increasing all over the world. The World Health Organization (WHO) reported that in 2016 globally, 13% of adults aged 18 years or older, meaning more than 650 million adults, are obese.[1] According to 2016 data from the Turkish Statistical Institute (TÜİK), 15.2% of males and 23.9% of females aged 15 years or older were detected to be obese in Türkiye.[2] The reason obesity alone is a health problem is that it is accompanied by comorbidities such as diabetes, hypertension, and chronic obstructive pulmonary disease.[3, 4] While bariatric surgery is the most effective method for

Received: 09.11.2023 **Revision:** 21.11.2023 **Accepted:** 21.11.2023
Correspondence: Zeynep Şener Bahçe, M.D., Gazi Yaşargil Eğitim ve Araştırma Hastanesi, Genel Cerrahi Kliniği, Diyarbakır, Türkiye
e-mail: drzeynepsenerbahce@gmail.com

the treatment of these comorbidities, medical therapy is also used for the treatment of morbid obesity. Surgical treatment options include multiple procedures such as Roux-en-Y gastric bypass (RYGB), laparoscopic sleeve gastrectomy (LSG), and single anastomotic gastric bypass (OAGB). LSG has become today the most frequently performed method in the world and in our country.[4] While bariatric surgery has many benefits, post-operative problems may occur. The most important one is the risk of formation of gallstones.[5] Rapid weight loss in a short period of time after obesity surgery and losing more than 25% of body weight lead to the development of post-operative gallstones.[6] The incidence of gallstone formation after laparoscopic sleeve gastrectomy is 0.9 to 7.5%.[7-9] The present study aimed to retrospectively determine the rate of cholelithiasis development within the sixth post-operative month in patients who underwent LSG. We also made efforts to determine the risk factors of symptomatic cholelithiasis after bariatric surgery.

Materials and Methods

Data of 294 patients admitted to the General Surgery Clinic of our hospital with a body mass index (BMI)>40 kg/m^2 who underwent laparoscopic sleeve gastrectomy between January 2015 and December 2020 were retrospectively examined. Demographic data, chronic disease histories, and data on biochemical work-up, hospitalization period, operation duration, post-operative complications, type of operation, operation report, pre- and post-operative ultrasonography reports, and histopathological examination results were recorded. Pre- and post-operative body mass indices of the patients were calculated. It was questioned whether the patients had undergone a second surgery or another interventional procedure and whether they followed the recommended diet. The rate of post-operative gallstone development and the treatments administered to the patients who developed gallstones were evaluated. Data obtained from the study were analyzed using SPSS (25.0, IBM Corp, Armonk, NY) software. As descriptive statistics, the number (n) and percentage (%) were given for categorical data, and mean±standard deviation for numerical data. The distribution normality of the data was tested using the Kolmogorov-Smirnov test. BMI values of the patients before and after the LSG operation were compared using the t-test (paired-samples t-test). Whether there is a significant difference between gallstone development, and pre- and post-operative BMI values was also tested using this test.

Results

235 (80%) of our patients were female and 59 (20%) were male. The patients' ages ranged from 13 to 71 years old, with the mean age of the female patients being 32.4±10.72 years and the mean age of the male patients 35.9±10.76 years. Patients who underwent post-operative Laparoscopic cholecystectomy (LC) were young, with a mean age of 38.2 years. The mean pre-operative BMI value of the females was found to be 42.3±3.58 kg/m^2 [41-56 kg/m^2]. The mean pre-operative BMI value of the males was found to be 47.6±7.74 kg/m^2 [41-62 kg/m^2] (Table 1). The mean post-operative BMI value was found to be 27.18±2.80 kg/m^2 for females and 27.92±3.79 kg/m^2 for males. The patients were called for ultrasonography (USG) control 6 months after the operation. After bariatric surgery, within the first 6 post-operative months, cholelithiasis occurred in a total of 35 patients (11.9%). None of these patients had a history of gallstones before LSG. Three patients (15.78%) had a history of hypertension (HT), 8 patients (42.1%) a history of diabetes mellitus (DM), and 8 patients (42.1%) a history of dyslipidemia. After bariatric surgery, 19 patients were operated on for gallstones. Thirteen of these patients were asymptomatic. However, patients were operated on because the gallstones were either larger than 1.5 cm or smaller than 0.5 cm and were numerous. The other six patients had complications such as biliary colic and cholangitis due to gallstones. LC was performed on all these patients. (Table 2) Patients who underwent LC were those who lost an average of 6 to 11 kg per month ($p<0.05$) and their mean pre-operative BMI was >48 ($p<0.05$). In

Table 1. Demographic characteristic

	Male	Female
Number of patients	59 (19%)	294 (81%)
Age	35.9 +10.76	32.4 +10.72
Preop BMI	47.6 +7.74	42.3 +3.58
Postop BMI	27.92 +3.79	27.18 +2.8

Table 2. Timing of cholelithiasis development

	N	Cholecystectomy
Preop cholelithiasis	11	11
Periop cholelithiasis	12	12
Postop cholelithiasis	35	19
Total	58	42

our study, only 40 patients routinely received ursodeoxycholic acid preparation for 6 months after the operation; other patients did not receive ursodeoxycholic acid. We did not observe findings that using ursodeoxycholic acid preparation would decrease gallstone formation ($p>0.05$). When USG was performed on patients who had no complaints, biliary sludge was detected in the gallbladder of seven patients, and millimetric stones were detected in the gallbladder of nine patients. The mean period in our trial was 6 months (4-8). Mortality was not observed in any of the patients.

Discussion

Cholelithiasis is seen in 5.9% to 21.6% of the general population,[10] with approximately 20% of the patients being symptomatic.[11] It is well known that the female population has a two- to three-fold higher rate of gallstones than the male population.[12] Particularly, female sex, age, and BMI were associated with an increased prevalence of gallstones.[13] Furthermore, gallstones are observed seven-fold more in female morbidly obese patients (BMI>45 kg/m^2). The possibility of female patients undergoing a cholecystectomy procedure after bariatric surgery is higher than that of male patients, both in obese and normal populations.[14] The risk of gallstone formation is 3- to 5-fold higher in the obese population compared to the normal population.[10, 15] In the literature, it was reported that gallstone or gallbladder polyp was detected in 23.8% of the morbidly obese patients before the LSG operation.[16] In our study, this rate was 7.8%; the rate of post-operative gallstone formation was 11.9%. Our results demonstrated that 6.4% of the morbidly obese patients require LC. It was reported that gallstones are formed due to increased cholesterol levels in the gallbladder and saturation of the gallbladder mucin concentration.[17] Asymptomatic gallstones may become symptomatic 6-12 months after the operation. Symptoms occur in 30% to 52% of the patients with gallstones after obesity surgery, and it was reported that the rate of serious complications like cholangitis, abdominal pain, severe vomiting is 2% to 3%.[18] These patients were detected to lose 3-6 kg per month during the first six months.[19] There are studies associating rapid weight loss with increased gallstone formation.[16] In a Saudi Arabian trial, the incidence of post-bariatric surgery cholelithiasis was found to be 6.53%.[20] Previous studies reported that the incidence of cholelithiasis is increased in patients with rapid weight loss, especially within the first post-operative year.[20, 21] In the literature, the incidence of cholelithiasis in the case of rapid weight loss was also statistically higher.[20] The rates in our study were higher than the literature, with 11.9% of our patients having post-bariatric cholelithiasis in the first 6 months of follow-up, because our patients lost a significant amount of weight (6-11kg) quickly. We think that the reason for rapid weight loss is the patients' desire to lose weight early and malnutrition. There are also studies reporting that there is no correlation between rapid weight loss after the LSG operation and early and late gallbladder or bile duct stones.[22] Recently, Chen et al.[23] reported that the risk of post-bariatric surgery gallstone disease is not increased later. One of the risk factors for gallstone formation is gender.[24] In our study, 14 of the 19 patients who underwent post-operative LC were females (73.7%). No statistical difference was detected between female and male patients in terms of gallstone formation. Since the number of female patients in the study was high, most of the patients who were operated on for gallbladder were women. In their study, Alsaif et al.[25] showed that the development of post-bariatric surgery cholelithiasis is not associated with gender. However, in their study, Haal et al.[26] demonstrated that sex is statistically important for the development of cholelithiasis and stated that it was more common in women.

Another risk factor affecting the development of post-bariatric surgery gallstone formation is age. In the literature, the mean age of patients developing cholelithiasis was observed to be higher.[27] However, data on the correlation between age and cholelithiasis development are lacking. In the present study, we observed that age was not a determinant for cholelithiasis development. Another risk factor is BMI. The risk of developing cholelithiasis was observed to be substantially increased in patients with a BMI ≥40 kg/m^2.[28] The reason for this was shown to be high cholesterol levels.[29] In our study, the mean pre-operative BMI value in patients who underwent post-operative LC was observed to be 48.6 ($p<0.05$). Consistent with the literature, the rate of cholelithiasis development was found to be higher in patients with a high BMI. The type of obesity surgery also affects the incidence of cholelithiasis. In the literature, this rate was reported to be 14.5% for Roux-en-Y gastric bypass, and substantially lower (4.1%) for LSG.[30] Laparoscopic cholecystectomy within the first 6 post-operative months was performed in 5.2% of the patients who underwent LSG and 7.4% of the patients who underwent bypass. Unfortunately, as our study mostly

included patients who underwent LSG, we could not statistically determine its rate compared to other bariatric procedures. As for the correlation between post-bariatric surgery cholelithiasis and comorbidities, hypertension was found to be a protective factor.[20] In our study, 15.8% of the patients had a history of hypertension (HT). However, there was no correlation between cholelithiasis and comorbidities in our study. Ursodeoxycholic acid administration was recommended as an alternative medical therapy to prevent gallstone formation. Routine use of ursodeoxycholic acid preparation after LSG has been reported to decrease the formation of gallbladder and bile duct stones. We recommended ursodeoxycholic acid to our patients as it was recommended in the literature.[31] In our study, ursodeoxycholic acid preparation was routinely applied to only 40 patients for 6 months after the operation. However, we did not observe any evidence that the use of ursodeoxycholic acid preparation would reduce the formation of gallstones ($p>0.05$). Therefore, we did not recommend it to our other patients.

LSG is an effective surgical technique. The highest rate of cholecystectomy within the first six months after bariatric surgery was detected to be 3.7%.[32] In our study, this rate was detected to be 6.5%. Cholecystectomy indication after bariatric surgery is generally associated with acute biliary complications like vomiting, cholangitis, and fever. Therefore, we recommend an ultrasonography follow-up every 6 months after the LSG operation. The drawbacks of our study include the retrospective design and the limited number of patients.

Conclusion

While LSG is an effective and safe method, the patients are at risk for post-bariatric surgery complications including stone formation and acute cholecystitis. We detected that the incidence of post-bariatric surgery cholelithiasis is low. Factors such as sex, age, and comorbidities were not associated with cholelithiasis development in our patients. Therefore, we believe that prophylactic cholecystectomy should be avoided.

Disclosures

Ethichs Committee Approval: The study was approved by the Local Ethics Committee.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – M.V.Y., Z.Ş.B.; Design – M.V.Y., Z.Ş.B.; Supervision – M.V.Y., Z.Ş.B.; Materials – M.V.Y., Z.Ş.B.; Data collection and/or processing – M.V.Y., Z.Ş.B.; Analysis and/ or interpretation – M.V.Y., Z.Ş.B.; Literature search – M.V.Y., Z.Ş.B.; Writing – M.V.Y., Z.Ş.B.; Critical review – M.V.Y., Z.Ş.B.

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