ARAŞTIRMA MAKALESİ / *RESEARCH ARTICLE*

Should Cholecystectomy be Performed Simultaneously with Bariatric Surgery in Obesity Patients?

Obezite Hastalarında Kolesistektomi Bariyatrik Cerrahi ile Eşzamanlı Yapılmalı mı?

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ABSTRACT

Introduction: *Asymptomatic cholelithiasis may be detected in the tests performed while obese patients are being prepared for surgery. Determining whether asymptomatic gallstones will cause enough symptoms after bariatric surgery to cause the patient to undergo cholecystectomy surgery will help in the decision to perform concomitant cholecystectomy. This study aimed to determine whether there is a marker to determine whether patients with preoperative cholelithiasis are likely to undergo cholecystectomy after bariatric surgery.*

Material and Methods: *We retrospectively reviewed the files of 771 patients who underwent bariatric surgery for obesity in the Gastroenterology Surgery Clinic of a Tertiary Training and Research Hospital between January 2015 and November 2023. Patients with cholelithiasis before bariatric surgery were included in Group 1 if they had undergone cholecystectomy surgery after bariatric surgery and in Group 2 if they had not.*

Results: *Cholelithiasis was detected in 168 (21.8%) of 771 patients whose charts were reviewed. Group 1 included 73 patients who had undergone cholecystectomy after bariatric surgery, and Group 2 included 90 patients who had not undergone cholecystectomy. There were significant differences between the two groups in terms of age, gender, height-weight ratio, hemoglobin, total cholesterol, low and high-density lipoprotein, triglycerides, gallbladder stone diameter (p=0.395, 0.828, 0.584, 0.660, 0.316, 0.461, 0.988, 0.476, 0.208, respectively).*

Discussions: *Our study found that asymptomatic gallstones required surgery twice as often as in the general population. Age, gender, height-weight ratio, hemoglobin, total cholesterol, low and high-density lipoprotein, triglycerides, and gallbladder stone diameter did not affect asymptomatic gallstones becoming symptomatic to require surgery. Obese patients undergo cholecystectomy surgery after bariatric surgery at a much higher rate than the general population. Therefore, cholecystectomy simultaneously with bariatric surgery should be considered as an option in these patients.*

Key words: *bariatric surgery; cholecystectomy; obesity*

ÖZET

Giriş: *Obezite hastalarında yeterli kilo verimi sağlanamadığında bariyatrik cerrahi yöntemler uygulanmaktadır. Bu hastalar ameliyata hazırlanırken yapılan tetkiklerde asemptomatik kolelithiazis saptanabilmektedir. Asemptomatik kolelithiazisin, bariyatrik cerrahisi sonrasında hastanın kolesistektomi ameliyatı geçirmesine neden olacak kadar semptoma yol açıp açmayacağını belirlemek eşzamanlı kolesistektomi yapılması kararının verilmesine yardımcı olacaktır. Bu çalışmanın amacı kolelithiazis saptanan hastaların bariyatrik cerrahi sonrası kolesistektomi geçirme olasılığını belirleyecek bir belirteç olup olmadığını saptamaktır.*

Gereç ve Yöntem: *Ocak 2015 ile Kasım 2023 arasında Üçüncü Basamak Eğitim Araştırma Hastanesi Gastroenteroloji Cerrahisi Kliniğinde obezite nedeni ile bariyatrik cerrahi uygulanan 771 hastanın dosyaları retrospektif olarak tarandı. Bariyatrik cerrahi öncesinde kolelithiazis tespit edilen hastalar eğer bariyatrik cerrahi sonrasında kolesistektomi ameliyatı geçirmişlerse Grup 1'e, geçirmemişlerse Grup 2'ye dâhil edildiler.*

Bulgular: *Dosyası taranan 771 hastanın 168'inde (%21,8) kolelithiazis tespit edildi. Bariyatrik cerrahi sonrası kolesistektomi ameliyatı geçirmiş olan 73 hasta Grup 1'e, kolesistektomi ameliyatı geçirmemiş olan 90 hasta Grup 2'ye dâhil edildi. İki grup arasında yaş, cinsiyet, boy kilo oranı, hemoglobin, total kolesterol, düşük ve yüksek dansiteli lipoprotein, trigliserit, safra kesesi taş çapı açısından anlamlı farklılık saptanmadı (sırasıyla p=0,395, 0,828, 0,584, 0,660, 0,316, 0,461, 0,988, 0,476, 0,208)*

Tartışma: *Çalışmamızda asemptomatik safra kesesi taşlarının topluma göre iki kat daha yüksek oranda cerrahi gerektirdiğini saptadık. İki grup arasında yaş, cinsiyet, boy kilo oranı, hemoglobin, total kolesterol, düşük ve yüksek dansiteli lipoprotein, trigliserit, safra kesesi taş çapı açısından anlamlı fark olmaması, bu faktörlerin asemptomatik safra kesesi taşlarının ameliyata neden olacak kadar semptomatik hale gelmesinde bir etkileri olmadığını olmadığını göstermekteydi. Kolelithiazis tespit edilen obezite hastalarının bariyatrik cerrahi sonrası safra kesesi ameliyatı olup olmayacaklarını önceden öngörmek mümkün görünmese de bu hastalar bariyatrik cerrahi sonrasında topluma göre çok daha yüksek oranda kolesistektomi ameliyatı geçirmektedirler. Bu nedenle bu hastalarda bariyatrik cerrahi ile eş zamanlı olarak kolesistektomi ameliyatı yapılması bir seçenek olarak göz önünde bulundurulmalıdır.*

Anahtar kelimeler: *bariyatrik cerrahi; kolesistektomi; obezite*

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Introduction

Obesity is an epidemic disease with increasing prevalence all over the world, decreasing the life quality of individuals and causing a large number of morbidities[1]. Effective weight loss can be achieved through lifestyle changes and adjustments in eating habits[2–4]. When weight loss cannot be achieved with these methods, bariatric surgery methods come to the fore[5]. In patients who are candidates for bariatric surgery, tests are performed before surgery to determine whether there is an obstacle to surgery. During these examinations, diseases that have not shown any symptoms before can be detected[6–8]. Gallstones are among these diseases. While 80% of gallstones detected incidentally in the community remain silent and do not require treatment, 20% require treatment[9]. There is no consensus among surgeons on the treatment of symptomatic gallstones[10]. Watchful waiting, administration of ursodeoxycholic acid, extracorporeal shock-wave lithotripsy, or cholecystectomy may be preferred in managing symptomatic gallstones[10,11]. Cholecystectomy is one of the most common operations in general surgery practice[12]. However, some authors suggest that concurrent cholecystectomy with bariatric surgery may cause morbidities ranging from prolonged hospitalization to mortality[13,14]. Another group of authors suggests that cholecystectomy can be safely performed simultaneously after appropriate port placement[15].

Considering these different opinions, determining whether asymptomatic gallstones will cause enough symptoms after bariatric surgery to cause the patient to undergo cholecystectomy surgery will help the surgeon decide whether to perform cholecystectomy concurrently with bariatric surgery. In this study, we aim to determine whether patients with preoperative cholelithiasis have a marker to determine the likelihood of undergoing cholecystectomy after bariatric surgery.

Materials and Methods

The Ethics Committee approved the study (E-71522473–050.01.04–31897_405). Subsequently, this study was conducted. For this retrospective study, the files of 771 patients admitted to the Gastroenterology Surgery Clinic of the Third Level Training and Research Hospital for obesity and who underwent sleeve gastrectomy (SG) between January 2015 and November 2023 were retrospectively reviewed. Age, gender, weight, Body Mass Index (BMI), total cholesterol, hemoglobin, triglyceride, high and low-density lipoprotein values, abdominal ultrasonographic examination findings at the time of admission and stone diameter if there was a stone in the gallbladder were extracted from the files of the patients. Patients with gallstones were included in Group 1 if they had undergone cholecystectomy after SG and in Group 2 if not.

Exclusion Criteria: Patients younger than 18 years, patients without gallbladder stones before sleeve gastrectomy surgery, and patients who underwent cholecystectomy surgery before or concurrent with SG.

Surgical Technique

All operations are performed by one of the three consultant surgeons. Surgical intervention was performed in the French position [16]. We placed thirty-eight French orogastric bougie per-oraly and subsequently freed omentum from the stomach. Surgeons transected the greater curvature using laparoscopic staplers. In cases in which cholecystectomy was performed simultaneously with bariatric surgery, cholecystectomy was performed by entering an additional trocar from the right lower quadrant of the abdomen when necessary.

Statistical Analysis

All analyses were performed using IBM Statistical Package for Social Sciences (SPSS) program software version 23.0 (IBM Corp., Armonk, NY, USA). We used The Kolmogorov-Smirnov test to evaluate whether the distributions of numerical variables were normal. Information on the general characteristics of the study population was provided with descriptive analyses. We used the Student-T test to analyze parametric numeric variables and the Mann Whitney-U test to analyze nonparametric variables. We used the Chi-Square test for categorical data analysis. The non-numerical variables were presented as percentages and counts. While the normally distributed numeric variables were presented as mean and standard deviation, the numeric variables that were not normally distributed were presented as median (minimum-maximum). The $p<0.05$ level was considered statistically significant.

Results

Gallbladder stones were detected in 168 (21.8%) of 771 patients whose files were reviewed. Since 5 of 168 patients underwent cholecystectomy during SG, these patients were excluded from the study. A hundred and

Table 1. *Demographic variables*

		Group 1 (n=73)	Group 2 (n=90)	p Value
Age		33 (20–63)	36 (18–61)	0.395*
Gender	Female	61 (44.2%)	77 (55.8%)	0.828**
	Male	12 (48%)	13 (52%)	
Height		165 (154–175)	166 (154–181)	0.412*
Weight		138 (115–170)	138 (115–184)	0.941*
Body Mass Index		50 (41–68)	49 (40–69)	0.584*

* The Mann-Whitney U Test, ** The Chi-Square Test

Table 2. *Statistical analysis regarding patients variables*

		Group 1 (n=73)	Group 2 (n=90)	p Value
Hemoglobin		13.32±1.52	13.2±1.54	0.660*
Cholesterol		201.19±36.3	207.02±36.731	0.316*
Low-density lipoprotein		135.25±28.06	138.87±32.45	0.461*
High-density lipoprotein		45 (30–71)	45 (28–82)	0.988**
Trigliserite		162 (77–461)	147 (70–548)	0.476**
Diameter of gallstone	Multiple, millimetric gallstones	30 (55.6%)	24 (44.4%)	0.208***
	<1 cm	18 (36.7%)	31 (63.3%)	
	1–2 cm	20 (42.6%)	27 (57.4%)	
	>2 cm	4 (33.3%)	8 (66.7%)	

* The Independent Samples T-test, ** The Mann-Whitney U test, *** The Chi-Square test

sixty three patients were included in the study. Seventy three of 163 patients (45%) had undergone cholecystectomy after SG. The 73 patients who had undergone cholecystectomy after sleeve gastrectomy were included in Group 1, and 90 patients who had not undergone cholecystectomy were included in Group 2.

The interval between sleeve gastrectomy surgery and cholecystectomy surgery was 382 (13–2586) days in patients included in Group 1.

The patients' median age in the study was 35 (18–63) years, while the patients' median ages in group 1 and group 2 were 33 (20–63) and 36 (18–61) years, respectively. We did not find a significant statistical difference between the groups regarding age (p=0.395) (Table 1).

Of the patients included in the study, 25 were male, and 138 were female. Of the female patients, 61 (44.2%) were in group 1 and 77 (55.8%) were in group 2. Of the 25 male patients, 12 (48%) were in group 1 and 13 (52%) were in group 2. We did not find significant statistical differences between the groups regarding gender distribution (p=0.828) (Table 1).

The median height of the patients included in the study was 166 (154–181), the median height of the patients in Group 1 was 165 (154–175), and the median height of the patients in Group 2 was 166 (154–181). There was no statistically significant difference between the groups regarding height (p=0.412) (Table 1).

The median weight of the patients included in the study was 138 (115–184). The median weight of the patients in Group 1 was 138 (115–170), and the median weight in Group 2 was 138 (115–184). We did not find a significant statistical difference between the groups regarding weight (p=0.941) (Table 1).

The median BMI of the patients in the study was 50 (40–69). The median BMI of the patients in Group 1 was 50 (41–68), and the median BMI in Group 2 was 49 (40–69). We did not find a significant statistical difference between the groups in terms of (BMI) (p=0.584) (Table 1).

The mean hemoglobin values of the patients in the study were 13.25±1.52, and the mean hemoglobin values in Group 1 and Group were 13.31±1.52 and 13.21±1.54, respectively. We did not find significant

statistical differences between the groups regarding hemoglobin values (p=0.660) (Table 2).

The mean cholesterol values of the patients included in the study were 204.36±36.55, and those in Group 1 and Group 'were 201.19±36.34 and 207.02±36.73, respectively. We did not find a significant statistical difference between the groups regarding cholesterol values (p=0.316) (Table 2).

The mean Low-density lipoprotein (LDL) values of the patients included in the study were 137.19±30.45, and the mean LDL values of the patients in Group 1 and Group 'were 135.25±28.06 and 138.87±32.45, respectively. We did not find significant statistical differences between the groups regarding LDL value (p=0.461) (Table 2).

The median High-density lipoprotein (HDL) values of the patients included in the study were 45 (28–82). The median HDL values of the patients in Group 1 were 45 (30–71), and the median HDL values of the patients in Group 2 were 45 (28–82). No statistically significant difference was found between the groups regarding HDL values (p=0.988) (Table 2).

The median triglyceride values of the patients included in the study were 151 (70–548), 162 (77–461) for the patients in Group 1, and 147 (70–548) for the patients in Group 2. We did not find a statistically significant difference between the groups regarding triglyceride values (p=0.476) (Table 2).

Discussion

With the extensive use of ultrasonography, gallstones are now detected in 10–15% of the population[17]. Our study group found that the prevalence of cholelithiasis was approximately twice as high as this rate. Although many factors play a role in the etiology of cholelithiasis, obesity is effective in gallbladder stone formation[18]. One of the most important reasons why the frequency of cholelithiasis was twice as high in our study group compared to healthy individuals may be because the study was conducted in obese patients.

In addition to obesity, conditions that facilitate gallbladder stone formation have been described in the literature. A sedentary lifestyle, diabetes mellitus, family history, high-calorie diet, and female gender are among these conditions[19]. In their study conducted in 2001, Kama et al. reported that 75% of the individuals with gallstones were women[20]. Our study found that a much higher proportion (85%) of patients with gallstones were women. Although obesity is more common in the male gender, it is known that women have a higher body fat percentage than men[21]. High body fat is a predisposing factor for many gastrointestinal diseases and gallstones[22]. The fact that our study was conducted in obese patients and women have a higher body fat ratio may explain the much higher incidence of gallstones in women in our study. In addition to the female gender, advanced age is a risk factor for gallstone formation[23]. The patients with gallstones in our study were in the young age group, which is in contrast with the literature, but the fact that our study was conducted in obese patients may explain this contrast. All of our patients were obese or super obese. As discussed above, this factor significantly affects the incidence of gallstones, which is higher than that of the general population. However, the lack of significant difference in height, weight, and BMI between the two groups suggests that height, weight, and BMI do not affect asymptomatic gallstones becoming symptomatic enough to warrant surgery.

Along with obesity, hyperlipidemia is another important factor that plays an important role in gallstone formation. Hypercholesterolemia, low HDL levels, and hypertriglyceridemia have been shown to facilitate the formation of gallstones[24,25]. In a study conducted by Sheng B et al. in 2022, they found that high weight decreased the rate of gallstone detection in patients with hypercholesterolemia. In the same study, effective control of hypercholesterolemia was much more effective than weight control in managing asymptomatic gallstones[26]. Our study found that cholesterol, HDL, LDL and triglyceride levels were ineffective in asymptomatic gallstones becoming symptomatic. However, the fact that the rate of asymptomatic gallstones becoming symptomatic enough to cause surgery was approximately two times higher in our patient group compared to the general population suggests that cholecystectomy should also be performed during bariatric surgery in obese patients with asymptomatic gallstones.

In general, weight loss reduces the formation of gallstones, but a loss of more than 25% of body weight or a weight loss of 1.5 kg/week has the opposite effect[27]. Rapid weight loss has an effect on asymptomatic gallstones becoming symptomatic. The literature has determined that this is caused by increased lipolysis due to rapid weight loss, gallbladder hypomotility due to decreased nutrition, and bile concentration[28–29]. Our

study is compatible with the literature. However, this compatibility is due to blood cholesterol levels.

The limitations of this study are its retrospective nature and the lack of information on weight loss and changes in blood cholesterol levels after bariatric surgery.

Conclusion

Although it is not possible to predict whether obese patients with gallstones will undergo gallbladder surgery after bariatric surgery, these patients undergo cholecystectomy surgery after bariatric surgery at a much higher rate than the general population. Therefore, cholecystectomy simultaneously with bariatric surgery should be considered as an option in these patients.

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