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Prevalence of Cholecystitis in Morbidly Obese Patients After Laparoscopic Sleeve Gastrectomy

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ORIGINAL

Abstract

Background Aims: Rapid weight loss after laparoscopic sleeve gastrectomy is associated with an increased risk of cholelithiasis. With 7-15% of patients requiring cholecystectomy after bariatric surgery, there is ongoing debate regarding the potential benefits of performing cholecystectomy with the primary bariatric surgery.

The goals of this study were to investigate the frequency and timing of cholecystectomies post LSG and determine the associated risk of choledocholithiasis post LSG in Prince Sultan Military Medical City, Riyadh.

Subjects and methods: A retrospective cohort study of 1112 patients undergoing LSG. The inclusion criteria are patients who are age above 18 years old who underwent laparoscopic sleeve gastrectomy (LSG).

Statistical analysis: Analysis was performed using IBM's Statistical Package for the social Sciences (SPSS) version 21.0. Results were expressed in numbers and percentages for categorical variables. Continuous variables were expressed as means and standard deviations. All the comparisons were analyzed using non-parametric methods. The level selected for statistical significance was a probability value <0.05.

Results: Our results shows the main cause of having cholecystitis is the significant loss of weight within the first six months

Conclusion: A 17.9% incidence of symptomatic cholelithiasis was noted among post-LSG patients over a period of seven years. Rapid weight loss was the only risk factor that contributed to the development of post-LSG gallbladder stone disease.

keywords: Bariatric surgery, cholelithiasis, gallstones, laparoscopic sleeve gastrectomy, weight loss

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Introduction

Obesity is a cholecytokinin resistant state, leading to reduced bile flow and an increased risk of cholelithiasis This risk is further increased in a state of morbid obesity Shiffman et al. (1993a). On the other hand, patients undergoing certain weigh loss regimens such as fasting and stringent dietary restrictions were also at an increased risk of cholelithiasis Marzio et al. (1988). Rapid weight loss itself increases the risk of gallstone formation Shiffman et al. (1991); De Oliveira et al. (2003) . This can be attributed to the elevated secretion of cholesterol, calcium, mucin and arachidonic acid derivatives into the bile during rapid weight loss Shiffman et al. (1993b, 1992). This can explain the prevalence of gallstone disease post bariatric surgery, as 7-15% of patients require a cholecystectomy post bariatric surgery Marzio et al. (1988); Shiffman et al. (1991); Tucker

et al. (2008); D'Hondt et al. (2011). Ongoing debate exists regarding concomitant cholecystectomy during the initial bariatric procedure for patients at risk of gallbladder disease. Potential risks of such procedure include prolonged operative time, increased technical challenges and exposure, increased risk for conversion to laparotomy Subhas et al. (2011) . However, few studies have focused on the incidence of cholecystectomy following specific bariatric procedures. The goal of our study was to investigate the frequency and timing of cholecystectomies after bariatric surgery. We also aimed to determine the associated risk factors in patients who underwent laparoscopic gastric bypass or laparoscopic sleeve gastrectomy (LSG) and evaluate the prevalence.

Methods

This was a retrospective study of morbidly obese patients undergoing bariatric surgery between January 2012 and January 2019 at Prince Sultan Military Medical City. Inclusion criteria were: all patients undergoing bariatric surgery, and patients ages 18 and above. Exclusion criteria: patients with a prior cholecystectomy or those planned for prophylactic cholecystectomy.

Presurgical assessment of all patients included a full history and physical examination to assess for the presence of Cholecystitis. Ultrasound Sound Scan (USS) was requested for patients with clinical suspicion of gallbladder disease. Patients diagnosed with gallbladder disease underwent prophylactic cholecystectomy at the time of bariatric surgery and were excluded from this study. After surgery, patients were advised to start with small amounts of water and liquids for the first two weeks. They were requested to avoiding solid and fatty meals, have small healthy meals, and increase mobility. Most patients were prescribed esomeprazole to reduce gastric acid production. Post-operative clinic visits were scheduled as follows: weeks two and six, followed by visits at months three, six, and twelve. Subsequent yearly visits were requested as needed.

During each visit, patients were asked about their diet and symptoms of gallbladder disease. Their Body Mass Index (BMI) was recorded and a physical examination was performed. Patients with clear symptoms and findings of gallbladder disease underwent laparoscopic cholecystectomy (LC) by one of the aforementioned bariatric surgeons. Collected data: age, gender, home medications, comorbidities, pre-operative BMI, gallstone development post bariatric surgery, the timing of LC, type of bariatric procedure, and weight loss achieved at the time of LC.

Statistical Analysis

Statistical analysis was performed using IBM's Statistical Package for the Social Sciences (SPSS) version 21.0. Results were expressed in numbers and percentages for categorical variables. Continuous variables were expressed as means and standard deviations. All comparisons were analyzed using non-parametric methods.

Results

This study monitored 1112 patients, 365 (32.8%) of which were male and 747 (67.2%) were female Table 1. The average BMI of patients at the time of Cholecystitis diagnosis was 30.04, with a minimum of 19.8 and a maximum of 57.4. The average weight was reduced by 30.99% [Table 6]. Of the 1112 patients included, 192 developed cholelithiasis and four developed acute cholecystitis Table 7.

Of our 1112 patients, 219 were found to have positive findings on US. The majority (n=114, 52.05%) of them were found to have positive findings before their surgery. Fifteen patients developed US findings within the first six months of surgery, 58 had positive findings 7-11 months after surgery, and 32 had them after 12 or more months of surgery Table 10.

Table 1. Gender

	Frequency	Percent
Male	365	32.8
Female	747	67.2
Total	1112	100.0

Table 2. comorbidities

	Frequency	Percent	Valid Percent	Cumulative Percent
BA	25	2.2	2.2	2.2
DM	117	10.5	10.5	12.8
HTN	31	2.8	2.8	15.6
dyslipidemia	70	6.3	6.3	21.9
Prediabetes	22	2.0	2.0	23.8
hypothyroidism	38	3.4	3.4	27.2
DM,BA	2	2	2	27.4
DM, dyslipidemia	36	3.2	3.2	30.7
DM, HTN	96	8.6	8.6	39.3
HTN, dyslipidemia	20	1.8	1.8	41.1
Prediabetic ,Hypothyroidism	2	2	2	41.3
DM, HTN, dyslipidemia	46	4.1	4.1	45.4
DM, dyslipidemia, Hypothyroidism	2	2	2	45.6
DM, HTN, Hypothyroidism	13	1.2	1.2	46.8
Others	60	5.4	5.4	52.2
Non	522	46.9	46.9	99.1
DM, Hypothyroidism	10	9	9	100.0
Total	1112	100.0	100.0	

Table 3. Age

	N	Minimum	Maximum	Mean	Std. Deviation
Age	1112	18.00	86.00	40.5486	12.97465

Table 4. BMI Before Surgery

	N	Minimum	Maximum	Mean	Std. Deviation
BMI Before Surgery	1112	27.00	79.00	45.0013	7.47577

Table 5. BMI Before Surgery

	Frequency	%	Valid %	Cumulative%
25-29.9	6	5	5	5
30-34.9	58	5.2	5.2	5.8
35-39.9	268	24.1	24.1	20.9
40-44.9	312	28.1	28.1	57.9
45-49.9	240	21.6	21.6	79.5
50-54.9		11.2	11.2	90.7
55-59.9	61	5.5	5.5	96.2
60-64.9	26	2.3	2.3	98.6
65-69.9	10	9	9	99.5
70-74.9	2	2	2	99.6
75-80	4	4	4	100.0
Total	1112	100.0	100.0	

Table 6. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
BMI Time Diagnosis	130	19.80	57.40	30.0440	6.52958
Percentage Weight	130	4.60	61.40	30.9904	11.99110

Table 7. Presentation

	Frequency	Percent	Valid Percent	Cumulative Percent
Acute Cholecystitis	4	4	4	4
Cholelithiasis	192	17.3	17.3	17.6
Obst.J	2	2	2	17.8
Obst.J +Acute chole	1	1	1	17.9
non	913	82.1	82.1	100.0
Total	1112	100.0	100.0	

Table 8. BMI of Time Diagnosis * Presentation Cross tabulation(Obstructive Jaundice(OJ) + Acute cholecystitis

		Presentation					
		AC	Cholelithiasis	OJ	OJ/AC	Non	Total
BMI Time Diagnosis	15-19.9	0	4	0	0	0	4
	20-24.9	0	26	2	0	0	28
	25-29.9	3	40	0	1	0	44
	30-34.9	0	25	0	0	0	25
	35-39.9	0	21	0	0	0	21
	40-44.9	0	4	0	0	1	5
	45-49.9	0	3	0	0	0	3
	55-60	1	0	0	0	0	1
Total		4	123	2	1	1	131

Table 9. Follow Up

	Frequency	%	Valid%	Cumulative%
1-3 4-7	312 567	28.1 51.0	28.2 51.2	28.2 79.4
8-12	171	15.4	15.4	94.9
13 &more	57	5.1	5.1	100.0
Total	1107	99.6	100.0	
Missing & system	5	4		
Total	1112	100.0		

Table 10. USS findings Before and After Bariatric Surgery

		US Positive Negative		Total
		yes	No	
Time US	before Surgery	114	700	814
	time of surgery to 6 months	15	83	98
	7 to 11 months after surgery	58	42	100
	12 and above after surgery	32	68	100
Total		219	893	1112

Discussion

A study conducted in 2014 by Tsirline et al. assessed the frequency and timing of LC post bariatric surgery Tsirline et al. (2014) . Their results show that patients requiring LC were those with significant drops in BMI. The highest rate of LCs was recorded in the first six months. Age and

gender had no effect on the rate of LC post bariatric surgery. Hasan et al. conducted a study in 2017 investigating gallstone disease post LSG in an Asian population Hasan et al. (2017). Among their sample of 102 patients, 58.8% were female and 41.2% were male. Their mean age and BMI were 43 and 41.6 respectively. Post operatively, 27.5% of patients had developed new, ultrasound evident, gallstones. A similar study by Siola et al. reviewed 165 LSG patients Sioka et al. (2014) . Their median age and BMI were 40 and 46.1 respectively. Prior LC was noted in 12 (8%) patients. Their median follows up period was 26 months. Although the incidence of gallbladder stone formation in the general population is found to be only 5%, while it is significantly increased in obese population reaching 45%. A significant proportion of bariatric patients (58%) compared to the general population became symptomatic and soon developed complications in the absence or not of preoperative gallstones after LSG; thus, recommendation for early cholecystectomy is warranted. Routine concomitant LC could be considered because the proportion of patients who developed complications especially those with potentially significant morbidities are high and the time to develop complications is short and because of the real technical difficulties during subsequent LC . Dittrick et al. (2005); De Oliveira et al. (2003)

After bariatric surgery, weight loss of more than 25% of the original weight is considered to be the only predictive factor to postoperative gallstone formation Li et al. (2009). The debate for the best timing of LC arises from the fact that obese patients are carrying higher morbidity and mortality in comparing to the general population. In a symptomatic obese patient with the evidence of gallstone, concomitant laparoscopic cholecystectomy with the bariatric surgery has certain risks due to the technical challenging from the patient's and trocars position. Heavy visceral fat, difficulty of maintaining the intra-abdominal pressure, prolonged operation time and the surgeon experience all are affecting the overall come. Hamad et al. (2003)

The aforementioned studies demonstrated a similar gender distribution to our results, with gender playing no role in as a risk for gallbladder disease post bariatric surgery. They also agree that the highest rate of cholecystectomies occurred within the first six months of bariatric surgery. Our observations indicate a shortage in sample size numbers, which negatively impact the accuracy of the results in previse studies. There is a lack of articles discussing post LSG gallbladder disease, especially in Saudi Arabia.

Table 11. Percentage Weight * Presentation Cross tabulation (gallstones : GS)

		AC	GS	OJ	OJ/AC	Non	Total
Percentage Weight	1- 9.9	0	2	0	0	0	2
	10- 19.9	1	24	0	0	0	25
	20- 29.9	1	33	0	0	0	34
	30- 39.9	0	6	2	0	0	38
	40- 49.9	2	22	0	1	1	26
	50- 59.9	0	4	0	0	0	4
	60- 70	0	2	0	0	0	2
Total		4	123	2	1	1	131

Table 12. Gender

	Frequency	%	Valid%	Cumulative%
Before surgery	814	73.2	73.2	73.2
time of surgery to 6 months	98	8.8	8.8	82.0
7 to 11 months	100	9.0	9.07	91.0
12 and above	100	9.0	9.0	100.0
Total	1112	100.0	100.0	

Conclusion

We detected a 17.9% incidence rate of symptomatic cholelithiasis among post-LSG patients over a period of seven years. Rapid weight loss was the only risk factor that contributed to post-LSG development of symptomatic cholelithiasis. We did not find a significant correlation between symptomatic cholelithiasis and other risk factors, such as gender, DM, HTN, and DLP.

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