Zagazig University Medical Journal
www.zumj.journals.ekb.eg
https://doi.org/10.21608/zumj.2024.276751.3248 Volume 30, Issue 9.1, December. 2024, Supplement Issue
Manuscript IDZUMJ-2403-3248
DOI: 10.21608/ZUMJ.2024.276751.3248
Original Article

Assessment of gallbladder stones formation after different operations for reduction of weight in adults

Mohamed El-Saeed*[1], Doaa Omar Refaat[1], Amr Ibrahim[1], Walid A.Mawla[1]
[1]: General surgery Department,faculty of medicine, Zagazig University, Egypt

Corresponding author*:
Mohamed El-Saeed

Email:
Tabkyeltyor8@gmail.com

Submit Date 13-03-2024
Revise Date 21-03-2024
Accept Date 25-03-2024

Abstract

The aim of this study is to study the relation between gallbladder stones disease and different operations for weight reduction. **Methods:** This retrospective study included 100 participants above 18 years old after surgery for morbid obesity. Data was collected from the patient records, including the preoperative data (preoperative weight and type of surgery) and postoperative data (amount of weight loss and its rate, gallbladder stones formation or its complications). **Results:** From the total studied 100 participants; 29 patients had symptoms of cholecystitis, 11 of them had gall bladder stones and 18 cases were asymptomatic. There were 71 patients asymptomatic; however 8 patients among them had gall bladder stones detected by US. There was no significant difference between different types of operations as regards symptoms of cholecystitis. **Conclusion:** When evaluating the occurrence of gallbladder stones following bariatric surgery, the degree of weight loss exceeding 25% of initial body weight within the first half-year following surgery was considered a significant risk. More gallstones are forming from gastric bypass surgery than from pure restrictive surgery, such as sleeve gastrectomy, in patients with BMIs more than 40 kg/m2.

Keywords: Gallbladder stones, Bariatric surgery, Weight reduction.

INTRODUCTION

A medical disease known as obesity occurs when there is an excessive build-up of body fat that could be harmful to one's health. When a person's body mass index (BMI) is more than 30 kg/m2, they are typically classified as obese; within that range, they are termed overweight. Obesity raises the risk of a number of illnesses, including depression, osteoarthritis, obstructive sleep apnea, type2diabetes, cardiovascular diseases, and several types of cancer. The main causes of obesity are a genetic predisposition, an excessive food intake, and inactivity **[1].**

With higher rates among women than males, the WHO estimates that at least 500 million persons (more than 10%) are obese. In 1997, the WHO formally recognized obesity as a global epidemic **[2].** At 2015–2016, there were around 39.6% of adults in the US who were obese (37.9% of men and 41.1% of women) **[3].** Due to the increased risk of acute pancreatitis and acute cholecystitis, gallstone disorders and obesity are closely related topics. Acute pancreatitis is a potentially deadly condition **[4].**

Bariatric surgery is the most effective treatment for obesity **[5].** Vertical-sleeve gastrectomy, Roux-en-Y gastric bypass, laparoscopic adjustable gastric banding, and biliopancreatic diversion are among the operation types **[6].**

Long-term weight loss, improvements in obesity-related illnesses, and a reduction in overall mortality are linked to surgery for severe obesity **[7].**

Following bariatric surgery, cholelithiasis is a frequent consequence. Since pure restrictive surgeries like gastric banding and sleeve gastrectomy preserve the enteric–endocrine response and allow food to pass through the gastrointestinal tract normally, there should be a reduction in the production of gallstones **[8].**

Thus, the relationship between various bariatric surgical procedures and the development of gallstones is covered in this study.

METHODS

This retrospective study included 100 participants and was carried out at the general surgery department at Zagazig university hospital. The Zagazig University Faculty of Medicine's Ethical Committee gave the study their blessing.

Inclusion criteria: All patients above 18 years old after surgery for morbid obesity who were operated from (Jan.2018 to Jan. 2020) in the general surgery department.

Exclusion criteria: included patients with: History of cholecystectomy before surgery, gallbladder polyps or stones visible on preoperative ultrasonography and if patient information or data was not available.

Data was collected from the patient records, including the preoperative data (preoperative weight and type of surgery) and postoperative data (amount of weight loss and its rate, gallbladder stones formation or its complications).

All patients were subjected to pelvi-abdominal ultrasound pre and postoperative and follow up after operation by sonar every 3 months for a period of one year.

Data of all the patients with surgery for obesity in the last two years were collected including clinical examination and imaging and the results were documented. The results were analyzed by statistical methods to define the relation between different types of surgery for obesity and gall stone formation.

Statistical analysis

Using SPSS version 24 software (Spss Inc, Chicago, ILL Company), the gathered data were tallied and examined. The numbers and percentages were used to display the categorical data. Categorical variables were analyzed using the Fisher's exact test (FET) or the Chi square test (X2). With the assumption of normality at P>0.05, the Kolmogorov Smirnov test was used to assess the quantitative data for normalcy. The expressions for quantitative data were mean ± standard deviation, median, and range. For normally distributed variables across two independent groups, the student "t" test was employed; for nonparametric variables, the Man-Whitney U test was utilized to evaluate the correlation between nonparametric variables, Spearman's correlation coefficient (rho) was employed. In this investigation, P <0.05 was deemed significant, and 0.05 was declared as the recognized threshold of significance. P > 0.05 indicates non-significance (N-S). It is significant (S) if P<0.05. Highly significant (HS) is P≤0.001.

RESULTS

In our study participants' age was ranged from 28 to 52years with mean of 39.8, the majority of them (73%) were females and (27%) were males. We found most of the participant underwent Sleeve operation (80%).

There was significant difference between pre-operative weight between studied males and females (P=0.002), also at 3 months and 6 months females had a higher weights in comparison to males, but at 12 months follow up there was no significant difference between females and males as regards body weight (Table 1). We found insignificant change of weight between study groups according to operation over follow up period (Table 2). There was no significant difference in the incidence of gall bladder stones detected by US between different types of operations (Table 3). Regarding body weight, there was a substantial difference between patients with gall bladder stones and those who did not. At 6 months and 12 months follow up, patients with gall bladder stones had lower weight in comparison to those without gall bladder stones (P=0.004, P=0.06 respectively) (Table 4).

From the total studied 100 participants; 29 patients had symptoms of cholecystitis, 11 of them had gall bladder stones and 18 cases were asymptomatic (acalculous cholecystitis). There were 71 patients asymptomatic; however 8 patients among them had gall bladder stones detected by US. In sleeve group; 24 cases showed symptoms of cholecystitis, 9 of them had gall bladder stones and 15 cases without gall bladder stones. While in SASI group 5 (50%) of cases showed symptoms of cholecystitis, 2 of them had gall bladder stones and 3 cases without. While in R-Y operation group no cases had symptoms cholecystitis. Regarding asymptomatic patients, 4 cases among sleeve group had gall bladder stone detected by US, 2 cases among R-Y group and 2 cases among SASI group. There was no significant difference between different types of

operations as regards symptoms of cholecystitis (Table 5).

There was no complication related to gall bladder stones either peritonitis, abscess, perforation or gangrenous cholecystitis were reported among studied participants. We found 5 cases in sleeve group underwent cholecystectomy after bariatric surgery without any significant difference between other groups.

Table 1: Weight loss over follow up period among studied participants according to sex distribution

	Total (n=100)	**Female (n=73)**	**Male (n=27)**	**P value**
Weight pre operation	130.03±20	140.2±26	118.5.8±14	**0.002**
Weight at 3ms (Kg)	124.9±15	129.8±15	109.8±16	**0.04**
Weight at 6ms (Kg)	110.2±12	114.2±11	95.5±9.5	**0.03**
Weight at 12ms (Kg)	86.8±11.2	85.6±10.2	84.7±8.7	0.52

Table 2: Weight loss over follow up period among studied participants according to type of operation

	Sleeve	**R-Y**	**SASI**	**P value**
Weight pre operation	129.2±26.7	114.4±22.2	143.5±33.4	0.357
Weight at 3ms (Kg)	122±18	106±16	130±17	0.386
Weight at 6ms (Kg)	108±13	97±11	113±10	0.713
Weight at 12ms (Kg)	85.56±15.9	84±11.7	87.8±11.8	0.951

Table 3: U/S Findings among studied patients in relation to type of operation

PAUS Finding	**sleeve**	**Bypass**		**P value**
		R-Y	**SASI**	
GS 3m	3(3.75%)	0	0	0.392
GS 6ms	8(10%)	1(10%)	2(20%)	0.406
GS 12ms	4 (5%)	0	1(10%)	0.392
Total GS	15 (18.75%)	1 (10%)	3(30%)	0.392

Table 4: Gall bladder stone in relation to weight among studied participants

	With GBS (n=19)	**Without GBS (n=81)**	**P value**
Pre weight	130.2±21.1	131.1±20.1	0.91
Weight 3m	119.4±18.1	122.6±15.1	0.08
Weight 6m	105.1±10.2	113.8±7.5	**0.004**
Weight 12m	80.5±9.8	89.7±10.2	**0.06**

Table 5: Symptoms of Cholecystitis in relation to type of operation

	sleeve	R-Y	SASI	P value
Symptomatic: with GBS Without GBS	24 (30%) 9 (11.25%) 15 (18.75%)	0	5 (50%) 2 (20%) 3 (30%)	0.678
Asymptomatic: with GBS Without GBS	56 (70%) 4 (5%) 52 (65%)	10 (100%) 2 (20%) 8 (80%)	5(50%) 2 (20%) 3 (30%)	

DISCUSSION

After BS, the incidence of GS varies but is generally about 30%. According to reports, there is a substantial chance of having GS within two years following weight loss surgery, particularly during the first ten months. Maximum weight loss after bariatric surgery occurs during the first postoperative year and decreases over time. Two years following surgery is when GS disease symptoms peak **[9].**

Our study revealed that 19% of the studied patients had GS which is similar to **EL shafey et al., [10]** who reported incidence of post bariatric GS 22.7%. **Guzmán et al. [11]** discovered that up to 33% of patients followed up for a full year following bariatric surgery (BS) had GS. A rate of 23.2% was observed by **Sioka et al. [12]** for the development of GS following BS.

According to our study, 29% of patients experienced cholecystitis symptoms following a sleeve operation, and the incidence of GS was 18.75%.

These data is similar to **El-Shafey et al., [10]** who stated that 18.8% of patients had GS following a laparoscopic sleeve procedure, and 30.8% of those patients experienced symptoms.

Conley et al. [13] found that 31.0% of patients who did not have cholelithiasis at baseline experienced symptomatic GS in their study of 47 patients following LSG and a 9–12 month follow-up period.

Hasan et al. [14] after reviewing 102 cases of morbid obesity following LSG without the use of GS lowering prophylactic, they discovered that 27.5% of patients who had not previously received GS experienced the development of new stones at 12 months following surgery.

We reported that patients with gall bladder stones had lower weight in comparison to those without gall bladder stones. **Conley et al. [13]** also revealed that patients who acquired GS following LSG 70 + 22% vs. 58 + 24% had greater excess weight loss.

Raziel et al. [15] shown that 9% of LSG patients with asymptomatic stones prior to surgery needed a cholecystectomy in the first year following the procedure, and 2.7% of patients with normal preoperative gallbladders had GS after three years of follow-up. These data were nearly similar to our results, as we reported that 5% of patients after Sleeve operation required cholecystectomy operation.

Cholelithiasis develops in 35 percent of patients following gastric bypass due to changes in enterohepatic circulation and normal gallbladder physiology. The incidence of symptomatic cholelithiasis requiring cholecystectomy following RY gastric bypass may vary, ranging from 3 to 28% of patients **[15].**

In the current study, incidence of GS was higher in (SASI: 30%) comparing to (LSG: 18.75% and R-Y bypass: 10%). However, P >0.05 indicates that these differences were not statistically significant. The prevalence of GS symptoms was (sleeve: 24%, SASI: 50%, R-Y gastric bypass: 0%).

El-shafey et al., [10] revealed that the incidence of GS was higher in the R-Y bypass (50%) than in the SASI (33%) and LSG (18%). Instances of GS with symptoms were (30.8% for LSG, 50% for SASI, 50% for MGB, and 0% for LRYGB) (p = 0.745).

In a different study comparing symptomatic GS following various types of bariatric surgery, the authors found that while patients with RYGB lost

more weight and were heavier than those with sleeve operations, there were no appreciable differences in the rates of symptomatic and complicated cholelithiasis (1.8 vs. 1.9%) between the two patient groups **[15].**

According to Moon et al., there was no statistically significant difference in the frequency of GS symptoms following LRYGB and LSG (6.1 vs. 5.7% **[16].**

Sneineh et al. [17] found that 14.5% of patients who underwent R-Y gastric bypass had symptomatic GS development. This was much more than 4.4% after a sleeve and 7.5% after a mini gastric bypass procedure (p = 0.04).

According to a different study, 3.8% of patients following LSG and 8.7% of patients after RY gastric bypass experienced symptomatic GS. **[15].** In contrast to LSG, Tsirline and colleagues found a threefold incidence following RY gastric bypass (10.6 and 3.5%, respectively). The frequency peaked at 3.7% in the first half-year and gradually decreased to 1% annually in the third **[18].**

In study of **Elshaer et al., [19]** Patients who underwent sleeve gastrectomy and mini gastric bypass had symptomatic gallstone development rates of 10.26 and 54.6%, respectively. This suggests that gallstone formation following micro gastric bypass surgeries is more significant and relevant in prospective screening.

Patients who lose more weight than this will likely develop symptoms even if they are not symptomatic at the time of gallstone diagnosis. The postoperative factor of weight loss of more than 25% of initial weight has been demonstrated to be connected with symptomatic gallstone formation. Despite not having any symptoms, these people should have a cholecystectomy as soon as gallstones are found. **[19].**

In our study, patients with gall bladder stones had significant lower weights in comparison to those without gall bladder stones.

In the current study, the highest incidence of GB stones was detected at 6 months follow up, in agreement with **Kielani et al.** who postulated that the first six months following surgery have the highest incidence of gallstone formation, with 33.8% of cases occurring during this time compared to 21.6% in the following six months, It lends credence to the theory that gallstone production peaks in the first six months after surgery because of the rapid weight loss that occurs during that time **[18].**

Gallstone formation is most common in the first six months following surgery, with a rate of 33.3% in the first half and 10.3% in the second half. This suggests that the follow-up period has a major impact on screening during this time following bariatric surgery **[19].**

When choosing patients for preventive measures like routine ultrasound surveillance for gallstones, it may be crucial to identify predictive variables for gallstone formation following weight reduction surgery **[20].** These findings are important in developing prospective management protocols to prevent symptomatic gallstones formation after surgery.

In light of those findings as well as our own, Coupaye et al. recommend that ultrasonography measures be carried out during the period of marked and rapid weight loss discovered that a risk factor for GS development was weight loss of more than 30 kg at 6 months after bariatric surgery **[21].**

The study's primary limitation is the smaller number of patients who had bariatric procedures. Given the contemporaneous restriction of ultrasound in the examination of obese patients, it is possible that not all patients had the condition discovered during the very brief follow-up period.

CONCLUSION

When evaluating the occurrence of gallbladder stones following bariatric surgery, the degree of weight loss exceeding 25% of initial body weight within the first half-year following surgery was considered a significant risk. More gallstones are forming from gastric bypass surgery than from pure restrictive surgery, such as sleeve gastrectomy, in patients with BMIs more than 40 kg/m2. To get more precise results, there should be another study with a larger sample size and scope.

Declaration of interest
The authors report no conflicts of interest. The authors along are responsible for the content and writing of the paper.
Funding information
None declared

REFERENCES

1. Luppino FS, de Wit LM, Bouvy PF, Stijnen T, Cuijpers P, Penninx BW, et al. Overweight, obesity, and depression: a systematic review and meta-analysis of longitudinal studies. Arch. Gen. Psychiatry, 2010; 67(3), 220-229.

2. Caballero B. The Global Epidemic of Obesity: An Overview. Epidemiol. Rev., 2007; 29(1), 1–5. https://doi.org/10.1093/EPIREV/MXM012

3. Hales C, Carroll M, Fryar C, Ogden C. Prevalence of Obesity Among Adults and Youth: United States, 2015–2016. NCHS data brief, no 288. Hyattsville, MD: NCHS Data Brief, 2017; 288, 1–8. https://www.cdc.gov/nchs/data/databriefs/db288.pdf

4. Kumaravel A, Zelisko A, Schauer P, Lopez R, Kroh M, Stevens T. Acute pancreatitis in patients after bariatric surgery: incidence, outcomes, and risk factors. Obes. Surg., 2014; 24, 2025-2030. https://doi.org/10.1007/S11695-014-1337-4

5. Colquitt J, Pickett K, Loveman E, Frampton G. Surgery for weight loss in adults. Cochrane Database Syst Rev, 2014; (8). https://doi.org/10.1002/14651858.CD003641.PUB4

6. Heymsfield S, Wadden T. Mechanisms, Pathophysiology, and Management of Obesity. 2017; 376(3), 254–266. https://www.nejm.org/doi/10.1056/NEJMra1514009

7. Chang S, Stoll C, Song J, Varela J, Eagon C, Colditz G. Bariatric surgery: an updated systematic review and meta-analysis, 2003– 2012. JAMA Surg., 2014; 149(3), 275. https://doi.org/10.1001/JAMASURG.2013.3654

8. Li V, Pulido N, Fajnwaks P, Szomstein S, Rosenthal R. Predictors of gallstone formation after bariatric surgery: a multivariate analysis of risk factors comparing gastric bypass, gastric banding, and sleeve gastrectomy. Surg. Endosc., 2009; 23(7), 1640–1644. https://doi.org/10.1007/S00464-008-0204-6

9. Talha A, Abdelbaki T, Farouk A, Hasouna E, Azzam E, Shehata G. Cholelithiasis after bariatric surgery, incidence, and prophylaxis: randomized controlled trial. Surg. Endosc., 2020; 34(12), 5331–5337. https://doi.org/10.1007/S00464-019-073237/TABLES/4

10. El shafey H, Elgohary H, El Azawy M, Omar W. The incidence of gall stones after bariatric surgery and its association with weight loss. Int. J. Surg. Open, 2021; 33, 100340. https://doi.org/10.1016/j.ijso.2021.100340

11. Guzmán HM, Sepúlveda M, Rosso N, San Martin A, Guzmán F, Guzmán HC. Incidence and risk factors for cholelithiasis after bariatric surgery. Obes. Surg., 2019; 29, 2110-2114. https://doi.org/10.1007/s11695-019-03760-4

12. Sioka E, Zacharoulis D, Zachari E, Papamargaritis D, Pinaka O, Katsogridaki G, et al. Complicated gallstones after laparoscopic sleeve gastrectomy. J. Obes., 2014. https://doi.org/10.1155/2014/468203

13. Conley A, Tarboush M, Manatsathit W, Meguid A, Szpunar S, Hawasli A. Do gallstones found before sleeve gastrectomy behave the same as those formed after surgery due to weight loss? Am. J. Surg., 2016; 212(5), 931–934. https://doi.org/10.1016/J.AMJSURG.2016.01.039

14. Hasan MY, Lomanto D, Loh LL, Shabbir A. Gallstone disease after laparoscopic sleeve gastrectomy in an Asian population—what proportion of gallstones actually becomes symptomatic?. Obes. Surg., 2017; 27, 2419-2423.

15. Raziel A, Sakran N, Szold A, Goitein D. Concomitant cholecystectomy during laparoscopic sleeve gastrectomy. Surg. Endosc., 2015; 29(9), 2789–2793. https://doi.org/10.1007/S00464-014-4010-Z/TABLES/2

16. Moon R, Teixeira A, Ducoin C, Varnadore S, Jawad M. Comparison of cholecystectomy cases after Roux-en-Y gastric bypass, sleeve gastrectomy, and gastric banding. Surg Obes Relat Dis, 2014; 10(1), 64–68. https://doi.org/10.1016/J.SOARD.2013.04.019

17. Sneineh MA, Harel L, Elnasasra A, Razin H, Rotmensh A, Moscovici S, et al. Increased incidence of symptomatic cholelithiasis after bariatric Roux-En-Y gastric bypass and previous bariatric surgery: a single center experience. Obes. Surg., 2020; 30, 846-850. https://link.springer.com/article/10.1007/s11695-019-04366-6

18. Tsirline VB, Keilani ZM, El Djouzi S, Phillips RC, Kuwada TS, Gersin K, et al. How frequently and when do patients undergo cholecystectomy after bariatric surgery?. Surg Obes Relat Dis, 2014;

10(2), 313-321. https://doi.org/10.1016/J.SOARD.2013.10.011

19. Elshaer A, Ammar M, Fawzy A, Hagag M. Assessment of gallstones formation after bariatric surgery. Int. Surg. J., 2019; 6(1), 37. https://doi.org/10.18203/2349-2902.isj20185120

20. Villegas L, Schneider B, Provost D, Chang C, Scott D, Sims T, et al. Is routine cholecystectomy required during laparoscopic gastric bypass? Obes. Surg., 2004; 14(2), 206–211. https://doi.org/10.1381/096089204322857573

21. Coupaye M, Castel B, Sami O, Tuyeras G, Msika S, Ledoux S. Comparison of the incidence of cholelithiasis after sleeve gastrectomy and Roux-en-Y gastric bypass in obese patients: a prospective study. Surg Obes Relat Dis, 2015; 11(4), 779–784.https://doi.org/10.1016/J.SOARD.2014.10.015

Citation

El-Saeed, M., Refaat, D., Ibrahim, A., A.Mawla, W. Assessment of gallbladder stones formation after different operations for reduction of weight in adults. *Zagazig University Medical Journal*, 2024; (4905-4911): -. doi: 10.21608/zumj.2024.276751.3248