

## Original Research Article

# Assessment of gallstones formation after bariatric surgery

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### ABSTRACT

**Background:** Gallstone formation is a common complication after bariatric surgery. Pure restrictive procedures such as sleeve gastrectomy and gastric banding theoretically should result in less gallstone formation because the food continues to follow the normal gastrointestinal tract.

**Methods:** This study is prospective and retrospective study will be done on fifty (50) patients with morbid obesity in General Surgery Department Menoufiya University Hospitals and will be followed up after bariatric surgery.

**Results:** There were 50 patients, 43 were females (86%) and 7 were males (14%), 39 were done sleeve gastrectomy (78%) and 11 were done mini gastric bypass (22%) and 31 with BMI less than 40 (62%) and 19 with BMI more than 40 (38%). Present study revealed that role of bariatric surgery in gallstones formation postoperatively is statically significant according to parameters as weight loss of more than 25% of original weight was one of the predictive postoperative factors.

**Conclusions:** With assessment of values of risk factors for gallbladder diseases after bariatric surgery there were significance of degree of weight loss more than 25% of original body weight, the 1st 6 months after surgery, BMI more than 40 kg/m<sup>2</sup> and type of surgery as gastric bypass is more gallstone formation than pure restrictive surgery as sleeve gastrectomy.

**Keywords:** Bariatric surgery, Gallstones

### INTRODUCTION

Obesity is a major public health concern in both developed and developing countries.<sup>1</sup> It has been implicated as a significant risk factor for several conditions including diabetes, cardiovascular disease, hypertension, stroke and osteoarthritis.<sup>2</sup>

Management of obesity can include lifestyle changes, medication or surgery, the most effective treatment for obesity is bariatric surgery.<sup>3,4</sup> Bariatric surgery (BS) has become the mainstay of treatment for morbid obesity with many thousands of procedures performed annually.<sup>5</sup> It has been shown to significantly help patients lose weight, improve obesity-related co-morbidities and quality of life and survival.<sup>5,6</sup> Obese subjects have

significantly higher prevalence of cholelithiasis, cholecystitis, pancreatitis and cholecystectomies as compared with the non-obese population.<sup>7</sup> Obese persons are at risk for gallstones because of high saturation of cholesterol in their bile, about 75% of gallstones are of cholesterol type, the risk increases during rapid weight loss using low-calorie diets and after bariatric surgery.<sup>8</sup>

The aim of this study is to evaluate the incidence of gallstones formation after bariatric surgery as a common complication to rapid weight loss after bariatric surgery.

### METHODS

This study is prospective and retrospective study will be done on fifty (50) patients with morbid obesity in General Surgery Department Menoufiya University Hospitals and

will be followed up after bariatric surgery for assessment of development of gallstones in those patients.

**Inclusion criteria**

- Morbidly obese patients with no history of performing cholecystectomy.
- Morbidly obese patients without evidence of GB stones.

**Exclusion criteria**

- Morbidly obese patients with history of performing cholecystectomy.
- Morbidly obese patients with evidence of GB stones.

Patients will be informed about the technique and the possible complications with a written consent. All patients will be subjected to bariatric surgery after complete history taking as the following

**Personal history**

- Name
- Age
- Sex
- Address
- Body mass index (BMI) is 40 or higher (extreme obesity) and 35 to 39.9 (obesity) and have a serious weight-related health problem, such as type 2 diabetes, high blood pressure or severe sleep apnea.
- Complaint

**Investigations**

- Laboratory as CBC, lipid profile, liver and kidney functions.

Imaging as pelviabdominal US.

**RESULTS**

In this study, 50 patients had been followed up after undergoing bariatric surgery for assessment of gallstone formation and results found according to sex, age, DM, hyperlipidemia, type of surgery, relation to BMI, degree of weight loss, rate of gallstone formation in first 6 months and using unsafely prophylaxis in the following:

**Table 1: Incidence of gallstone formation after bariatric surgery in relation to sex.**

Sex	Males (n-7)	Females (n-43)	Chi	p-value
+ve gallstone formation (Yes)	1 (14%)	9 (20.9%)	0.166	0.684 (NS)
-ve gallstone formation (No)	6	34		

The P-value of this study was 0.684 which is insignificant and indicates that sex has no role in increasing risk of gallstone formation after bariatric surgery.

**Table 2: Incidence of gallstone formation after bariatric surgery in relation to age.**

Age	Less than 40y (n-30)	More than 40y (n-20)	Chi	p-value
+ve gallstone formation (Yes)	5 (16.6%)	5 (25 %)	0.521	0.470 (NS)
-ve gallstone formation (No)	25	15		

The P-value of this study was 0.470 which is insignificant and indicates that age has no role in increasing risk of gallstone formation after bariatric surgery.

**Table 3: Incidence of gallstone formation after bariatric surgery in relation to DM.**

DM	Diabetic (n-22)	Non-diabetic (n-28)	Chi	p-value
+ve gallstone formation (Yes)	3 (13.6%)	7 (25 %)	0.994	0.319 (NS)
-ve gallstone formation (No)	19	21		

The P-value of this study was 0.319 which is insignificant and indicates that DM has no role in increasing risk of gallstone formation after bariatric surgery.

**Table 4: Incidence of gallstone formation after bariatric surgery in relation to hyperlipidemia.**

Hyperlipidemia	+ve (n-24)	-ve (n-26)	Chi	p-value
+ve gallstone formation (Yes)	4 (16.7%)	6 (23%)	0.321	0.571 (NS)
-ve gallstone formation (No)	20	20		

The P-value of this study was 0.571 which is insignificant and indicates that hyperlipidemia has no role in increasing risk of gallstone formation after bariatric surgery.

The P-value of this study was 0.001 which is significant and indicates that type of surgery has a role in increasing risk of gallstone formation after bariatric surgery as regarding mini gastric bypass result.

**Table 5: Incidence of gallstone formation after bariatric surgery in relation to type of bariatric surgery.**

Type of surgery	Sleeve (n-39)	Mini gastric bypass (n-11)	chi	p-value
+ve gallstone formation(Yes)	4 (10.26%)	6 (54.6%)	10.52	0.001 (S)
-ve gallstone formation (No)	35	5		

**Table 6: Incidence of gallstone formation after bariatric surgery in relation to BMI.**

BMI	Less than 40 (n-31)	More than 40 (n-19)	Chi	p-value
+ve gallstone formation (Yes)	2(6.45%)	8 (42.1 %)	9.359	0.002 (S)
-ve gallstone formation (No)	29	11		

The P-value of this study was 0.002 which is significant and indicates that BMI more than 40 kg/m<sup>2</sup> has a role in increasing risk of gallstone formation after bariatric surgery.

**Table 7: Incidence of gallstone formation after bariatric surgery in relation to using ursafalk prophylaxis.**

Using ursafalk prophylaxis	With using ursafalk (n-25)	Without using ursafalk (n-25)	Chi	p-value
+ve gallstone formation (Yes)	4(16%)	6(24%)	0.500	0.48 (NS)
-ve gallstone formation (No)	21	19		

The P-value of this study was 0.48 which is insignificant and indicates that ursafalk prophylaxis has no role in increasing risk of gallstone formation after bariatric surgery.

The P-value of this study was 0.041 which is significant and indicates that weight loss more than 25% of original weight after bariatric surgery increases risk of gallstone formation after bariatric surgery.

The P-value of this study was 0.045 which is significant and indicates that gallstone formation in first 6 months is more than next 6 months after bariatric surgery.

**Table 8: Incidence of gallstone formation after bariatric surgery in relation to degree of weight loss.**

Degree of weight loss	More than 25% (n=31)	Less than 25% (n=19)	Chi	P value
+ve gallstone formation (Yes)	9 (29%)	1 (5.2%)	4.16	0.041 (S)
-ve gallstone formation (No)	22	18		

**Table 9: Incidence of gallstone formation after bariatric surgery in relation to timing of weight loss.**

Timing of weight loss	In 1st 6 months (n-21)	In next 6 months (n-29)	Chi	p-value
+ve gallstone formation (Yes)	7(33.3%)	3(10.3%)	4.023	0.045 (S)
-ve gallstone formation (No)	14	26		

**DISCUSSION**

Gallstone diseases is one of the most common complications of obesity and after bariatric surgery with multiple risk factors.

The role of prophylactic cholecystectomy at the time of bariatric surgery remains controversial. The fact that pathologic evidence of gallbladder diseases has been found in more than 75% of routinely resected specimens supports those who advocate prophylactic cholecystectomy.<sup>9</sup>

Theoretically, cholelithiasis should be more common after gastric bypass than after a purely restrictive procedure such as sleeve gastrectomy.<sup>10</sup>

Pure restrictive surgery such as laparoscopic sleeve gastrectomy should result in less gallstone formation because the food continues to follow the normal gastrointestinal transit maintaining the enteric-endocrine reflex.<sup>11</sup>

Some authors mentioned that gallstone formation was more frequent after gastric bypass. Wudel et al., also reported this rate as high as 71%. Because of these high rates, concomitant cholecystectomy was suggested in patients who performed LGB.<sup>12,13</sup>

Another study by Villegas et al., who used only intraoperative ultrasound and concomitant

cholecystectomy, found symptomatic gallstones in 7% of their laparoscopic gastric bypass patients.<sup>14</sup>

The rate of symptomatic gallstone formation for our patients with sleeve gastrectomy and mini gastric bypass was 10.26 and 54.6 % respectively which indicates that gallstone formation after mini gastric bypass operations has more significance and important in prospective screening.

The postoperative factor of weight loss of more than 25% of original weight was found to be associated with symptomatic gallstone formation.<sup>15</sup>

Whereas more than a 24% loss of original body weight was found to be a significant risk factor for gallstone formation.<sup>16</sup>

In our group of patients, the postoperative factor of weight loss of more than 25% of original weight was found to be associated with symptomatic gallstone formation, those patients with weight loss of more than this are likely to become symptomatic even if they are not symptomatic at the time of gallstone detection. These patients should do cholecystectomy once gallstones are identified despite being asymptomatic.

Kielani et al. proposed that the incidence of gallstone formation is highest during the first 6 months after surgery showing 33.8% in the first 6 months versus 21.6% in the next 6 months postoperatively, which supports the hypothesis that gallstone formation is highest during the first 6 months following surgeries due to rapid weight loss during that period.<sup>17</sup>

In present study the incidence of gallstone formation is highest during the first 6 months after surgery showing 33.3% in the first 6 months and 10.3% in next 6 months which indicates that follow up period has significant effect for screening within this period after bariatric surgery.

The risk of gallstone formation increases 8-fold in patients with BMI more than 40 kg/m<sup>2</sup>, it also increases 5-fold in patients who underwent bariatric surgery compared with normal population.<sup>18,19</sup>

In our results patients with BMI more than 40 kg/m<sup>2</sup> is considered a risk factor for gallstones formation after bariatric surgery showing 42.1% while patients with BMI less than 40 kg/m<sup>2</sup> showing 6.45% which is near results of Grover BT et al, that said gallstones formation increases 8-fold in patients with BMI more than 40 kg/m<sup>2</sup>. Risk factors for gallstone formation after bariatric surgery such as female gender and increasing age are well known to surgeons.<sup>20</sup>

Several studies also further attempted to identify risk factors associated with gallstone formation after bariatric procedures and consistently demonstrated that, unlike

general population, conventional risk factors for gallstone development such as age, gender, and diabetes were not associated with gallstone formation during rapid weight loss after bariatric surgery, in fact, it is believed that more rapid and higher amount of weight loss contribute to higher incidence of gallstones.<sup>5</sup>

While according to our results female gender and increasing age have no significant role in colilithiasis after bariatric surgery as the number of patents under research are not equal in number between males and females, above or below 40 years, diabetic patients and hyperlipidemia so other studies with wide scale and large equal numbers of patients under research are recommended for more accurate results.

The prevalence of cholesterol gallstones is high among obese persons. Weight loss further increases the risk of gallstones: the prevalence of new gallstones reaches more than 30% within 12-18 months after gastric by-pass surgery.

The increased occurrence of stones is commonly because of supersaturation of bile with cholesterol, due to an increased synthesis by the liver and secretion into bile.<sup>16</sup>

Identification of predictive factors for gallstone formation after weight reduction surgery may be important in selecting patients for certain prophylactic interventions as regular ultrasound surveillance for gallstones.<sup>14</sup>

These findings are important in developing prospective management protocols to prevent symptomatic gallstones formation after surgery.

## CONCLUSION

With assessment of values of risk factors for gallbladder diseases after bariatric surgery there were significance of degree of weight loss more than 25% of original body weight, the first 6 months after surgery, BMI more than 40kg/m<sup>2</sup> and type of surgery as gastric bypass is more gallstone formation than pure restrictive surgery as sleeve gastrectomy.

It should be another study with large number and wide scale for more accurate results.

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