



## Prevalence and Management of Gall Stones in Sleeve Gastrectomy

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### Authors' contributions

This work was carried out in collaboration between both authors. Author SMA put the design of the study, proposed the protocol, made the analytical and statistical work. Author AMM reviewed the literatures, wrote the first the manuscript and compared our results with others in the literatures. Both authors read and approved the final manuscript.

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### ABSTRACT

**Introduction:** Obesity is a public health problem with increased prevalence, recent exciting studies linked cholelithiasis to obesity and reduction of weight. Abdominal Ultrasound is essential preoperative work up to reveal cholelithiasis-related obesity. The objective of this study is to determine the incidence of cholelithiasis in morbidly obese patients, pre-and post Laparoscopic Sleeve Gastrectomy (LSG) and to evaluate the outcome of concomitant cholecystectomy when laparoscopic sleeve gastrectomy is combined with cholecystectomy in the same setting.

**Materials and Methods:** This retrospective study was applied on 221 cases of laparoscopic sleeve gastrectomies, performed for morbid obesity in King Abdulaziz University Hospital, Jeddah, Saudi Arabia, from January 2013 to December 2015.

Preoperative preparation including trans-abdominal ultrasound to rule out Cholelithiasis was fulfilled. Patients with symptomatic Cholelithiasis were informed about the possibility of performing combined (concomitant) cholecystectomy with the sleeve gastrectomy.

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**Results:** 33 out of 221 (15%) of the morbidly obese patients, who were admitted for LSG had cholelithiasis, 28/221 (12.7%) were diagnosed preoperatively, while 5/221 (2.3%) developed it postoperatively.

The age of the cholelithiasis group ranges between 19-51 years, with a mean of 37.4 year old. 28 females, 5 males were involved in the study which represent 85%, 15% for females and males respectively.

**Conclusion:** This study illustrated the high incidence of gall stones before sleeve gastrectomy indicates abdominal ultrasound as an essential preoperative work up, while advised to be done selectively for the symptomatic cases during follow-up period based on the low incidence of postoperative cholelithiasis. Our study also highlighted the successful management of concomitant cholecystectomy when laparoscopic sleeve gastrectomy is combined with cholecystectomy in the same setting.

*Keywords: Obesity; cholelithiasis; sleeve gastrectomy; concomitant cholecystectomy.*

## 1. INTRODUCTION

Obesity, a condition that has impact on public health, due to increasing frequency of extreme obesity, the demand for bariatric surgery is emphasized [1]. Recent exciting studies linked cholelithiasis to obesity and reduction of weight. Morbid obesity has a high incidence of gallstone formation, and it should be routinely ruled out preoperatively with ultrasonography. Rapid weight loss after surgery for the treatment of morbid obesity is also associated with a high incidence of gallstone formation [2].

The objective of this study is to determine the incidence of cholelithiasis in morbidly obese patients, pre-and post Laparoscopic Sleeve Gastrectomy (LSG), and to evaluate outcome of concomitant cholecystectomy when laparoscopic sleeve gastrectomy is combined with cholecystectomy in the same setting.

## 2. MATERIALS AND METHODS

This retrospective study was applied on 221 cases of laparoscopic sleeve gastrectomies, performed for morbid obesity in King Abdulaziz University Hospital, Jeddah. Saudi Arabia, from January 2013 to December 2015.

Preoperative preparation including full blood works, trans-abdominal ultrasound to rule out cholelithiasis and upper Gastro-intestinal endoscopy were fulfilled. Eligibility for surgery was defined according to the 1991 NIH consensus criteria for bariatric surgery. Patients with symptomatic Cholelithiasis were informed about the possibility of performing combined (concomitant) cholecystectomy with the bariatric procedure.

Vertical Sleeve Gastrectomy was performed by a skilled, well trained laparoscopic surgery team. The mean operative time was estimated for all cases, in addition to the mean hospital stay period. In-patient medications were only Intravenous fluids, low molecular weight Heparin and Proton-pump inhibitor, the latter was prescribed as a home medication after discharge from the hospital for 2 weeks, no Ursodeoxycholic acid was prescribed according to our protocol. Patients were instructed to come to the outpatient clinic for follow-up at intervals of a week, month, 3, 6 months and also at a year time. The demographic data for each patient, as age, gender and Body Mass Index (BMI) were collected in a data sheet. Incidence of gall bladder diseases and time between sleeve operation and starting the biliary symptoms were documented. Approval from the hospital ethical committee was obtained; data was entered and analyzed by SPSS–IBM version 22.

## 3. RESULTS

This study included 221 morbidly obese patients, who were admitted in KAUH through the outpatient clinic from January 2013 to December 2015. The age ranges between 18-68 years, with a mean of 34 years old. 144 females, 77 males were involved in the study which represent 65 %, 35% for females and males respectively, the mean BMI was 40.9 KG/m<sup>2</sup>.

33 out of 221 patients showed cholelithiasis (14.9%) of all sleeve gastrectomies, the age of those cases with cholelithiasis has ranged between 19-51 years, with a mean of 37.4. As regarding gender, 28/ 33 females and 5/33 males were involved in the study, that represents 85%, 15% for female and males respectively.

**Table 1. Gender distribution of laparoscopic sleeve gastrectomy and cholelithiasis cases**

Total	Males	Females	
221 (100%)	77 (35%)	144 (65%)	Sleeve gastrectomy cases
33 (100%)	5 (15%)	28 (85%)	Cholelithiasis cases

**Table 2. Gender distribution of cholelithiasis cases pre–and post LSG**

Total	Females	Males	
28/33 (84.8%)	23	5	Preoperative cholelithiasis
5/33 (15.2%)	5	0	Post-operative cholelithiasis
33 (100%)	28 (85%)	5 (15%)	Total number of patients

28 out of 33 patients of symptomatic cholelithiasis were discovered during the preoperative preparation, 17 of them had undergone concomitant cholecystectomy and sleeve gastrectomy simultaneously, while 6 cases were deferred to be done later, due to technical difficulties, therefore 5 cases had laparoscopic cholecystectomy before coming to do sleeve gastrectomy, on the other hand another 5 cases developed gall stones postoperatively during follow-up at different intervals.

The mean BMI of cholelithiasis cases was 45.29 kg/m. while the mean BMI for the whole group who had sleeve gastrectomy was 45.9 KG/m<sup>2</sup>, p. value 0.55.

The operative time for all cases of sleeve gastrectomy ranged between 106 to 316 minutes, the mean was 143 minutes, while it was prolonged in the concomitant cholecystectomy and sleeve gastrectomy with a range between 115 to 398 minutes (Mean:204 minutes). The hospital stay was 2-3 days for all cases. The period of time between sleeve gastrectomy and cholecystectomy for the patients who developed gall stones has ranged between 5-41 months, mean of 21.7 month, all were done laparoscopically, with no conversion to open or need of ERCP preoperatively.

#### 4. DISCUSSION

Obesity has a major concern among physician, due to its large influence on metabolic and hepatic diseases. Cholelithiasis is the primary expression of obesity in the hepatobiliary system [2], and it is a well-recognized complication of rapid weight reduction [3]. Obesity and rapid weight loss are major risk factors for the development of cholelithiasis [4], that could be explained by the higher cholesterol saturation of gallbladder bile [5].

Cholelithiasis has a higher significant incidence in the white race, and in women, with no significant differences in age [6]. It is considered as an epidemic disorder in Arabian Gulf States, in bariatric surgery the incidence of symptomatic gallstones, and timing of cholecystectomy are still not well established yet [7]. The general population has 5% documented incidence of cholelithiasis, while it is significantly high in obese population reaching 45% [8,9]. After bariatric surgery, weight reduction is considered to be the only predictive factor to postoperative gallstone formation [10]. 35–38% of patients with morbid obesity develop gallstones as they lose weight after bariatric surgery [11,12].

The significant observation in the literature review, regarding prevalence of gallstones is that, the preoperative cholelithiasis is anticipated in higher incidence than during the postoperative period, due to that finding it should be routinely ruled out preoperatively with trans-abdominal ultrasonography.

Preoperative (LSG) gall stones were found at different incidences in literatures, Li et al. [13] showed 32.2%, 31.2% in Sioka et al., but it was low as 1.8% according to Arias et al. [14], our study showed that (12.7%) had symptomatic gall stones preoperatively.

Post Laparoscopic Sleeve Gastrectomy, gall stones had ranged between 3.8% and 5.8% [15]. Therefore, our study illustrated only 5 out of 221 cases (2.3%) developed cholelithiasis postoperatively, that low incidence can explained by the failure of long post-operative follow-up which depends mainly on the patient's compliance, the limitation period of our study.

Despite the near results of incidence of post LSG cholelithiasis, thus there is a large debate about the peak incidence of symptomatic gallstones and the timing of cholecystectomy

which still with controversy , according to Deitel and Petrov, the incidence of postoperative symptomatic cholelithiasis had peaked at 16 months after bariatric surgery, which is similar to the peak frequency reported earlier by Amaral et al after gastric bypass at 16 months as well, Miller et al study showed nearly the same figure at 15 months post gastric restrictive procedures, other studies reported that no patient underwent cholecystectomy earlier than 9 months or later than 23 months after LSG. Our results were different as the range was from 5-41 months, mean: 21.75 months.

**Table 3. Difference between incidences of cholelithiasis pre- and post- LSG**

	<b>Preoperative cholelithiasis</b>	<b>Post-operative cholelithiasis</b>
Li et al. 2009	32.8%	3.8%
Sioka et al. 2014	31.2%	5.8%
Arias et al. 2009	1.8%	3.8%
Uglioni et al. 2009	N/A	3.8%
Our study	12.7%	2.3%

Preventive therapy for gallstone formation in bariatric surgery as medical therapy, or relatively high-fat diet should be practiced, Festi et al. reported a relatively high-fat intake could prevent gallstone formation, probably by maintaining an effective gallbladder emptying, which could counterbalance lithogenic mechanisms acting during weight reduction [16]. Erlinger, Gebhard et al. studies had supported that trial [17,18]. Therefore that higher-fat regimen could lead to failure of the surgical procedure with inadequate weight loss by following the relatively high-fat regimen [19,20].

Ursodeoxycholic acid has been advocated as a preventive measure for the gallstone formation, it seems to inhibit the development of biliary cholesterol crystals. The optimum dose for gallstone prophylaxis appears to be 600 mg/d, or 4 to 5 mg/kg for 6 months [21,22], suspension form which is more preferable than the previously large capsule form of UDCA, which is effective and has few adverse drug reactions , but its use has not been very popular yet due to its cost [23]. Mc et al. in a meta-analysis, referred to the reduction rate of cholelithiasis formation by the protective use of Ursodiol therapy [24].

The setting of cholecystectomy in relation to LSG as routine, concomitant, or delayed cholecystectomy, remains an ongoing

therapeutic dilemma, the published data about them is not illuminating, and relied only on local institution practice. A routine synchronous cholecystectomy during bariatric surgery is still recommended by some centers [25,26], to avoid the presumed technical difficulties during subsequent cholecystectomy. In contrast to the opinions favoring routine cholecystectomy, other surgeons only recommend the removal of the gallbladder in the presence of gallstones, [26] justified by the fact of the relatively low incidence of postoperative symptomatic gallstones.

Nowadays, the conservative approach of reserving cholecystectomy only for symptomatic disease offers as a safe modality of treatment [27,28]. Laparoscopic cholecystectomy (LC) in bariatric patients may be technically challenging and not straightforward procedure due to suboptimal port placement, difficult body habitus and using different approach, in addition to the potential risks of lengthening the operative time, increased morbidity, and prolonged hospital stay.

Our experience proved the above mentioned technical difficulties of the concomitant cholecystectomy due to the set-up of the operation, patient habitus that results in prolongation of the operative time, but actually the hospital stay was not affected, with no postoperative complications, among 23 cases of symptomatic cholelithiasis, 17 patients had successful concomitant cholecystectomy with the LSG, while 6 patients were deferred due to technical difficulties and huge hepatomegaly.

On the other hand, the setting of delayed cholecystectomy after LSG has the advantage that the different body habitus and the reduced weight facilitated the subsequent cholecystectomy.

Asymptomatic gallstones (silent gallstones) represent a dilemmatic regimen, as the natural history of asymptomatic gallstones may remain asymptomatic [29,30]. Furthermore, recent trend advices that, concomitant cholecystectomy should be considered only in symptomatic gall stones [31].

## **5. SUMMARY FOR TREATMENT OF CHOLELITHIASIS-ASSOCIATED SLEEVE GASTRECTOMY**

### **1- Preventive (No cholelithiasis):**

- Medical: Ursodeoxycholic acid
- Fat-rich diet (needs more studies)

Surgical: Routine cholecystectomy (debatable)

## 2- Definitive (cholelithiasis):

Concomitant / Delayed cholecystectomy

## 6. CONCLUSION

Cholelithiasis showed increased prevalence in obesity, it is generally accepted that gallstone formation is correlated with obesity as well as weight loss, our study showed that 15% of LSG patients had cholelithiasis, 12.7% were found preoperatively, while 2.3% developed gall stones postoperatively. That higher incidence of gall stones before sleeve gastrectomy indicates abdominal ultrasound as an essential preoperative work up, while it is advised to be done selectively for the symptomatic cases during follow-up. Our study also highlighted the successful management of concomitant cholecystectomy when laparoscopic sleeve gastrectomy is combined with cholecystectomy in the same setting. The preventive measures against gall stone formation, needs more studies. The current policy regarding management of cholelithiasis in LSG of the bariatric patient is not validated needs further evaluation as well. Concomitant cholecystectomy if feasible is an excellent choice, otherwise delayed cholecystectomy is the option.

## CONSENT

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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