

Prophylactic Cholecystectomy During Laparoscopic Sleeve Gastrectomy in Morbidly Obese Patients: Presentation of Our Series and Review of The Literature

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ABSTRACT

The management of gallstones at the time of laparoscopic sleeve gastrectomy is under debate. We report our experience in the treatment of patients with morbid obesity and cholelithiasis with or without symptoms. Laparoscopic sleeve gastrectomy was performed in 306 patients between 2009 and 2019. Patients with cholelithiasis underwent concomitant cholecystectomy. We collected information on age, gender, BMI and operative time. In addition, we noted any complications, the length of hospital stay and the incidence of symptomatic disease in patients after sleeve gastrectomy. Cholelithiasis was detected preoperatively in 41 patients. Only 18 of these patients had symptomatic cholelithiasis. Laparoscopic cholecystectomy was combined in 36 patients. Four patients developed cholelithiasis after the weight loss and underwent laparoscopic cholecystectomy at that time. Laparoscopic cholecystectomy during laparoscopic sleeve gastrectomy is safe and prevents possible postoperative events of cholecystitis.

Keywords

Sleeve gastrectomy, Prophylactic cholecystectomy, Morbid obesity, Concomitant cholecystectomy.

Introduction

The worldwide increasing prevalence of morbid obesity and associated severe comorbidities, has resulted in a substantial rise in the number of bariatric procedures performed every year [1]. Quality Level I data have indicated that bariatric surgery is the most effective treatment modality in maintaining long-term weight reduction and improving obesity related illnesses such as type 2 diabetes mellitus [2,3]. Candidates for bariatric surgery include adults with a BMI of 35 to 39.9 kg/m² with at least one comorbidity, who have not met weight loss goals with diet, exercise and drug therapy [4]. Sleeve gastrectomy (SG) emerged as the first part of a staged duodenal switch procedure and subsequently became a stand-alone restrictive bariatric operation [5].

SG is associated with fewer major complications than Roux-en-Y

gastric bypass (RYGB) and has been proven to result in greater weight loss than adjustable gastric band [6]. Therefore, SG has emerged as the most frequently implemented bariatric procedure [6,7]. One of the issues complicating bariatric surgery is the management of concurrent biliary disease. Furthermore, bariatric surgery itself has been associated with de novo gallstone formation [8]. Gallstone formation has several known risk factors. In the general population gallstone formation risk increases with age over 40 years, female gender, obesity and rapid weight loss [9]. The risk increases 8-fold in patients with BMI >40 Kg/m² and 5-fold in patients who underwent bariatric surgery compared to the general population [7,10].

It has been reported that a weight loss of 1.5kg or 1-1.5% of total body weight per week dramatically increases the risk for gallstone formation (18-fold) [11,12]. In this retrospective study we document the incidence of symptomatic gallbladder disease post SG and summarize a single institution's experience in the management of biliary disease in patients undergoing SG.

Materials and Methods

Study design

This study was a retrospective study conducted at the Third Department of Surgery at Athens General Hospital “Georgios Gennimatas”. Ethical approval for this study was granted upon evaluation by the Scientific Committee of Athens General Hospital. Written consent was obtained from all patients.

Patients

Data were collected from the files of morbidly obese patients who underwent SG in our department from January 2009 to September 2019. Eligibility for surgery was defined according to the NIH consensus criteria for bariatric surgery. Patients preoperatively underwent upper gastrointestinal (GI) tract evaluation with gastroscopy to exclude severe gastroesophageal reflux disease (GERD) and peptic ulcer disease among other conditions. Transabdominal ultrasound (US) was performed to rule out gallbladder disease.

Patients with positive findings on US were counseled for concurrent cholecystectomy. Exclusion criteria for bariatric surgery were patients with psychiatric disorders, patients with high operative risk, patients with severe symptoms and endoscopic findings of GERD, addiction to drugs or alcohol and weight over 200kg. Routine follow up visits at the outpatient clinic were scheduled at 15 days, 6, 12 and 24 months after the operation. Patients were evaluated for weight loss, improvement of pre existing co-morbidities and development of symptomatic cholelithiasis. Patients with symptoms suggestive of gallbladder disease were offered a transabdominal US.

Procedure

All procedures were carried out by one surgeon (I.M). A brief outline of the procedure is as follows: The patient is placed in a reverse Trendelenburg position of 30° and to the right at angle of 150°. The surgeon is placed between the legs. The sleeve procedure is performed using 5 ports in strategic anatomical points (two 11mm, two 5mm, one 12mm). In patients receiving a concurrent cholecystectomy an additional 5 mm port is placed in the right lateral abdominal wall and the patient is repositioned accordingly. A tissue sealer is used to facilitate with tissue dissection and hemostasis. Dissection of the gastric greater curvature occurs 2-3cm above the pylorus, towards the His angle by separating the gastrocolic ligament using a tissue sealer. Cholecystectomy, when necessary, has always been performed after SG, and required an additional 15-29 minutes while the mean time of sleeve gastrectomy was 50 minutes (35-110 minutes).

Results

Out of 306 patients who underwent SG, 298 had primary SG and 8 had conversion to SG from gastric banding. The median age was 36.5 years (range 18-59) and the median BMI was 47.2 Kg/m² (range 35.1-64.5). Patients in this study were predominantly female (71.1%). Mean excess weight loss (EWL) was 54% at 12 months. Thirty-eight patients were lost on follow up after the first 12 months.

Of the 306 patients, 33 (11%) had a previous cholecystectomy and 36 (11.7%) had a concomitant cholecystectomy. Pathology reports indicated gallstones in 32 patients and biliary sludge in 4 patients. Five patients with preoperative diagnosis of cholelithiasis did not undergo prophylactic cholecystectomy because they did not consent to a concomitant cholecystectomy. One of them developed acute cholecystitis 13 months after sleeve gastrectomy and was operated laparoscopically at that time. Four patients with normal preoperative abdominal US, developed symptomatic cholelithiasis during follow up, and underwent subsequent laparoscopic cholecystectomy. All patients with biliary symptoms appeared during the second postoperative year (12-20 months). One female patient with gastric leak was reoperated and after a long hospital stay developed cholecystitis. She was successfully treated with percutaneous cholecystostomy. Concomitant cholecystectomy in our series was not associated with an increased conversion rate to open surgery, duration of hospital stay or postoperative morbidity.

Discussion

Obesity and rapid weight loss are risk factors for developing biliary stones [13]. Patients after bariatric procedures are in a unique situation where both risk factors are putatively at play. Obese patients have significantly higher prevalence of cholelithiasis, cholecystitis, pancreatitis and cholecystectomies as compared with the general population [14,15]. The prevalence of cholelithiasis-associated disease seems to increase with the body mass index (BMI) [14]. In the bariatric surgery population the reported incidence of pre-operative gallstones is approximately 20-25% [16]. This fact is in accordance with our results where 22.5% of our patients either had previous cholecystectomy or had cholelithiasis in pre-operative screening.

However the true incidence of cholelithiasis is difficult to determine, since transabdominal US can yield a high rate of false negative results due to technical difficulties and special considerations need to be taken in obese patients [17]. For this reason some authors propose the use of intraoperative ultrasound, which is more accurate in the detection of gallbladder disease [18]. No patient in our series underwent cholecystectomy earlier than 12 months or later than 20 months after SG. That indicates the postoperative effect of SG regarding gallstones and it seems similar to the effect of RYGB, since gallstones tend to occur in the first 6-12 months and rarely after 2 years [19,20].

The risk of gallstone formation is also related to the speed and degree of weight loss [14,21]. The incidence of cholelithiasis after Roux-en-Y gastric bypass is reported to be as high as 71%. [22] High incidence of cholelithiasis also occurs after sleeve gastrectomy [19]. A loss of more than 25% of excess weight is considered to be a significant risk factor for gallstone formation [23]. The mechanism for gallstone formation during rapid weight loss is not completely understood. It seems that cholesterol is mobilized from tissue stores and excreted into the bile, resulting in an increased bile cholesterol saturation index [24,25]. Moreover the increased gallbladder secretion of mucin, calcium, prostaglandins and arachidonic acid contribute to gallstones formation [19].

Due to the high incidence of gallstones formation after gastric bypass, many authors supported that duodenal exclusion in this procedure results in decreased gallbladder motility secondary to reduced reflex secretion of cholecystokinin [26]. They also claim that damage to hepatic branches of the left vagus nerve during the division of the stomach also disturb the mobility of the gallbladder [27,28]. Subsequent studies revealed that there is no significant change in cholecystokinin levels before or after meals and division of the stomach below the level of the second branch of the left gastric artery reduces the risk of damaging the hepatic branch of the vagus nerve [29]. This theory is compatible with the results of other studies that show similar rates of asymptomatic (30-52.8%) or symptomatic (7-16%) cholelithiasis after sleeve gastrectomy and gastric bypass [30-33]. These results strengthen the role of rapid weight loss as the main factor of gallstones formation after bariatric surgery. The rates of symptomatic and asymptomatic cholelithiasis after gastric banding are lower (6.8% and 26% respectively) due to the relatively slow and less amount of weight loss [34,35]. Although the first 9 to 24 months after bariatric surgery seem to be the most important for the development of gallbladder lithiasis, symptomatic gallstones seem to occur up to 20 years after the first diagnosis of uncomplicated disease [36].

The main question is whether to remove the gallbladder at the time of bariatric surgery to avoid future morbidity related to gallbladder disease, regardless of symptoms or not. Traditionally, prophylactic cholecystectomy during open bariatric surgery was a common practice [37,38]. With the development of laparoscopic surgery the rate of concomitant cholecystectomy has progressively decreased and most surgeons avoid cholecystectomy at the time of bariatric procedure [39,40]. A recent study documented a decline of concomitant cholecystectomy during bariatric surgery from 26.3% in 2001 to 3.7% in 2008 [41]. Some attribute this trend to the fact that laparoscopic bariatric procedures leave minimal abdominal adhesions, rendering subsequent cholecystectomy much less difficult than that after open bariatric surgical procedures [42].

Our results indicate that concurrent cholecystectomy in the presence of cholelithiasis does not result in increased morbidity. Conversely, the small number of patients that did develop symptomatic biliary disease post SG was treated successfully by laparoscopic cholecystectomy. An important limitation of our investigation is the relatively small number of patients who underwent cholecystectomy after SG. This small number does not allow for an accurate comparison between these patients and those that underwent concurrent cholecystectomy during SG.

Currently there is no consensus in the treatment of gallbladder disease in patients presenting for weight loss surgery. It seems that current strategy relies on local institution practice. Some centers propose concomitant cholecystectomy in patients with documented cholelithiasis, others avoid prophylactic cholecystectomy in asymptomatic patients [43,44]. Most centers follow prophylactic cholecystectomy at the time of laparoscopic Roux-en-Y gastric bypass [45-47]. Some authors suggest the approach where no concomitant cholecystectomy is performed and patients receive

prophylactic medication against biliary disease [23,48,49].

Different approaches are accepted in the management of cholelithiasis in sleeve gastrectomy. One approach is to offer laparoscopic cholecystectomy when gallstones are identified in the routine preoperative assessment, even if they are asymptomatic (approach of Hamad) [44]. The second is the simultaneous service of cholecystectomy without preoperative evaluation (approach of Fobi) [31]. The third is the non-interventionist policy that includes treatment only of the symptomatic patients without preoperative screening [50]. In our practice preoperative ultrasound was obtained for all patients and prophylactic cholecystectomy was advised in all patients with preoperative evidence of cholelithiasis, even if they were asymptomatic.

Reasons to support routine concomitant cholecystectomy include the overall low morbidity rate associated with the additional procedure and the rather high rate of pathologic findings on the specimens [42,44,51,52]. In theory prophylactic cholecystectomy abolishes the risk of gallbladder disease and its related complications, as well as the risks associated with a second procedure. Also it eliminates the diagnostic dilemma of atypical symptoms often present in post-operative period. In addition it avoids the danger presented by common bile duct stones, which can be particularly challenging to treat after gastric bypass. It is accepted that small gallstones may easily migrate into the common bile duct (choledocholithiasis), where they may cause biliary obstruction and potentially biliary pancreatitis [22]. After some bariatric operations, performing an endoscopic retrograde cholangiopancreatography (ERCP) to evaluate the bile duct and remove stones is difficult or even impossible due to the profound anatomical changes established by the surgery [47,53-55].

Newer techniques like double -balloon enteroscopy and combined laparoscopic and endoscopic approaches have been described but they are technically demanding and performed in few centers only [22,56]. Performing concomitant cholecystectomy with bariatric surgery, as it is proven by many studies, does not significantly increase the conversion rate to open surgery, the postoperative morbidity or the hospital stay [45,57]. A recent systematic review and meta-analysis showed that the risk for postoperative complications was lower when performing cholecystectomy concomitantly with bariatric surgery compared to post- or pre-bariatric surgery [58,59].

Arguments against the performance of routine cholecystectomy during bariatric surgery are the following. Concomitant cholecystectomy in morbidly obese patients is commonly considered technically difficult because of suboptimal port placement, visceral obesity and large size of liver that renders the manipulation of the gallbladder challenging [35,44]. It adds time and increases the risk of intraoperative complications [41]. The majority of patients rarely develop complications without first having at least one previous episode of biliary colic [60,61]. Choledocholithiasis and biliary pancreatitis are very rare complications occurring in only 0.2% of the patients after LRYGB

[42]. Postoperative adhesions are expected to be minimal after laparoscopic surgery so that subsequent cholecystectomy isn't so difficult. Delayed cholecystectomy is also easier as a result of the reduced intra-abdominal fat and liver size after the bariatric surgery [48,62].

Moreover, there is a way to reduce the risk of gallstones formation. Ursodeoxycholic acid (UDCA) is a bile acid and normally it is produced by the body that is stored in the gallbladder. It decreases the production of cholesterol and increases dissolving cholesterol in bile. The use of ursodeoxycholic acid has been proposed as a preventive measure for the gallstone formation [63]. The dose is 300mg twice per day for 3 months for patients with BMI<40 kg/m², for 4 months for BMI 40-50kg/m² and for 6 months for BMI>50kg/m² [62,64]. Another medicine with similar action but less commonly used is Ezetimibe. Studies support that it can induce a complete resistance to cholesterol gallstone formation [65,66].

Despite the strong evidence regarding the benefit of prophylactic UDCA, its utilization in clinical practice has not been universally adopted because of its high cost and gastrointestinal side effects such as nausea, vomiting, diarrhea and abdominal pain [67,68].

Conclusion

Because of the aforementioned reasons, the question of whether to perform prophylactic cholecystectomy during obesity surgery remains unclear. A weakness of our study was that was retrospective in nature. A prospective study with longer follow up is needed for more reliable results. We propose though to perform cholecystectomy in presence of gallstones in patients undergoing sleeve gastrectomy as it may bring clear benefits. We also propose postoperative surveillance with ultrasound for the early detection of gallstones.

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