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Concomitant cholecystectomy during laparoscopic sleeve gastrectomy

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Abstract
Background The prevalence of cholelithiasis in morbidly obese individuals is 19–45 %. Laparoscopic sleeve gastrectomy (LSG) has become one of the most performed procedures worldwide. The management of gallstones at the time of LSG is under debate. We herein report our experience with concomitant LSG and cholecystectomy.
Methods Patients undergoing LSG, between 2006 and 2014 with symptomatic cholelithiasis (SC), underwent concomitant cholecystectomy (SGC), and were compared to those who had LSG alone. Gender, age, and BMI were noted. Preoperative ultrasonography was performed for all patients and gallstone presence was recorded. Operative time, intraoperative mishaps, perioperative complications, length of hospital stay (LOS), and the incidence of subsequent symptomatic gallbladder disease were collected as well.
Results SC was present in 180 patients who underwent SGC. LSG was performed in 2,383, of whom 43 (2 %) had asymptomatic cholelithiasis (AC). SGC patients had a higher percentage of females and were older (79 % and 46 years vs. 62 % and 43 years, respectively). BMI, LOS, and complications were similar. Operative time was prolonged by 35 min in SGC. Two patients with SGC had bile leakage. Of patients with AC, 9.3 % required cholecystectomy during the first post-operative year after LSG due to evolution of symptoms, compared to only 2.7 % of those with normal preoperative gallbladders. Presenting symptoms and severity of the disease were worse in the first group.
Conclusions For SC, LSC is safe and warranted. Prophylactic cholecystectomy when gallstones are absent is unnecessary. Management of AC at the time of LSG is still debatable.

Keywords Bariatric · Sleeve gastrectomy · Cholecystectomy · Obesity

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Bariatric surgery (BS) has become the mainstay of treatment for morbid obesity with many thousands of procedures performed annually [1, 2]. It has been shown to significantly help patients lose weight and improve obesity-related comorbidities, and quality of life and survival [3, 4]. Sleeve gastrectomy (SG) is an accepted bariatric procedure that has gained popularity over the last decade both with bariatric surgeons and patients. Its appeal lays in its relative operative simplicity and lower risk profile, along with promising short and mid-term weight loss outcomes.

Morbid obesity is associated with a high prevalence of cholelithiasis [5, 6]. Obese subjects have significantly higher prevalence of cholelithiasis, cholecystitis, pancreatitis, and cholecystectomies as compared with the

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non-obese population [7]. The prevalence of cholelithiasis-associated disease seems to increase with the body mass index (BMI) [5]. Moreover, there is an increased risk of gallstone formation during rapid weight loss [8]. A Swedish study showed a fivefold increase in the possibility of symptomatic gallstone disease after BS, compared with that in the general population [9].

In the past, when open BS was the norm, combined, prophylactic cholecystectomy was advocated and was delayed only when the primary Roux-en-Y gastric bypass (RYGBP) was complicated [10]. The adoption of laparoscopic BS raised the debate on advantages and disadvantages of the concomitant surgery once more. There is yet no consensus regarding the management of cholelithiasis at the time of BS. Some advocate expectant management in these patients [11–13], while others perform routine prophylactic cholecystectomy [14, 15]. In the era of RYGBP, a strong argument favoring concomitant cholecystectomy and BS is the concern for post-operative biliary system access. In cases of choledocholithiasis, obstructive jaundice or severe biliary pancreatitis, endoscopic access to the biliary system is complicated, requiring operative trans-gastric approaches or acrobatic endoscopic techniques [16–19].

As SG entails no anatomical alteration hindering endoscopic biliary access, should it be required, and with the shift of bariatric practice toward performance of SG in a growing proportion of candidates [20, 21]—this question reemerges.

We herein report our experience with concomitant SG and cholecystectomy (SGC).

Materials and methods

Patients undergoing laparoscopic SG in a multidisciplinary center between January 2006 and July 2014 were included in the study. Patients with a previous cholecystectomy were excluded. Concomitant cholecystectomy was performed in patients with preoperative SC (i.e., history of biliary colic, cholecystitis, biliary pancreatitis, gallstone-attributed obstructive jaundice, or ascending cholangitis). Patients who underwent SGC comprised the study cohort whereas patients who had SG only became the control group. In our practice, patients do not receive ursodeoxycholic acid after surgery.

Operative technique for sleeve construction was identical in both groups and as previously described [22]. Cholecystectomy was carried out in a routine, anterograde or retrograde approach as deemed safest, after completion of the SG, utilizing the same ports. An additional 5-mm port was occasionally added for retraction.

Demographic data (gender, age, and BMI) and preoperative cholelithiasis status were compared. Perioperative data including operative time, intraoperative mishaps, perioperative complications, and length of hospital stay were collected as well as the incidence of subsequent gallbladder disease.

Results

In the study period, a total of 2,708 patients underwent SG. 145 (5.4 %) had a previous cholecystectomy and were excluded. Of the remaining 2,563, 180 (7 %) had symptomatic gallbladder disease, underwent SGC and were the study group. The remaining 2,383 patients had SG and were the control group. Asymptomatic cholelithiasis was present in 43 (2 %) of the control group.

The study group had a higher female proportion and was older than the control group in a statistically significant manner (79 % and 46 years vs. 62 % and 43 years, respectively. $p < 0.01$). BMI was evenly distributed between the groups (Table 1).

Complications rates in both groups were similar (5 % in the study group and 4.4 % in the control group, ($p = 0.87$, RR = 1.12, 95 % CI = 0.59–2.13), (Table 2). There were 2 cases (1 %) of bile leakage in the study group. One was due to inadvertent common hepatic duct injury during sharp dissection in a liver-encased triangle of Calot. The surgery was converted to an open procedure with direct suturing of the duct by a hepato-biliary specialist. Residual bile leak was controlled by a drain and gradually ceased with no further intervention. The second was discovered owing to bilious drainage apparent after surgery. This was attributed to minor leakage from the gallbladder bed and also subsided spontaneously without need for papillotomy. A detailed list of complications is presented in Table 2. Surgery duration was prolonged by 35 min and had no effect on hospitalization time.

Table 1 Patient characteristics

			p value
All patients undergoing SG	2,708		
Previous cholecystectomy	145 (5.35 %)		
Cholelithiasis	Asymptomatic	Symptomatic	
	43	180	
Procedure	SG	SGC	
Number of patients	2,383	180	
Mean age (range)	43 (14–76)	46 (22–70)	<0.01
% Female	62 %	79 %	<0.0001
Mean BMI (kg/m^2)	42.9	43.1	NS

SG sleeve gastrectomy, *SGC* concomitant sleeve gastrectomy & cholecystectomy, *NS* not statistically significant

Table 2 Early and late complications

Complication type Early complications	Bariatric surgery $N = 2{,}383$ (%) $N = 106$ (4.44 %)	Concomitant surgery $N = 180$ (%) $N = 9$ (5 %)
Hemorrhage	54 (2.27 %)	4 (2.22 %)
Leakage	23 (0.96 %)	2 (1.11 %)
Abdominal wall hematoma	6 (0.25 %)	
Intra-abdominal hematoma	6 (0.25 %)	
Pneumonia	3 (0.13 %)	
Portal vein thrombosis	4 (0.17 %)	
Deep vein thrombosis	1 (0.04)	
Pulmonary embolism	1 (0.04)	
Gastric blockage	3 (0.13 %)	
Rupture of spleen	2 (0.08 %)	
Pseudomembranous colitis	3 (0.13 %)	1 (0.55 %)
Bile leakage		2 (1.11 %)
Late complications	$N = 73$ (3.06 %)	$N = 2$ (1.11 %)
Intra-abdominal abscess	2 (0.08 %)	
Abdominal wall hernia	7 (0.29 %)	2 (1.11 %)
Symptomatic cholelithiasis	64 (2.69 %)	

Complication type Late complications	Bariatric surgery $N = 2{,}383$ (%) $N = 73$ (3.06 %)	Concomitant surgery $N = 180$ (%) $N = 2$ (1.11 %)
Intra-abdominal abscess	2 (0.08 %)	
Abdominal wall hernia	7 (0.29 %)	2 (1.11 %)
Symptomatic cholelithiasis	64 (2.69 %)	

Median follow-up time was 28 months (range 3–100 months).

Of the 43 patients with asymptomatic gallstones, 4 (9.3 %) developed symptoms: empyema of gallbladder 3 weeks after SG, in one; severe acute pancreatitis 1 month after SG in another, and acute cholecystitis, 3 and 4 months after SG in two patients.

Of the 2,383 patients of the control group, without preoperative cholelithiasis, 64 (2.7 %) developed symptomatic cholelithiasis and required surgery. These procedures were all performed laparoscopically without complication. Of these, one required endoscopic retrograde cholangiography (ERC) for choledocholithiasis with obstructive jaundice and three suffered from acute gallstone pancreatitis. Median time between SG and LC in this group was 11 ± 9 months (range 2 weeks–53 months). Of these 64 patients, 42 (66 %) presented within the 1st year, 21 (33 %) between 1–3 years and only 1 (2 %) after 3 years.

Median length of hospital stay was 2 days in both groups. There were no mortalities in either patient group.

Discussion

The reported prevalence of gallstones in morbidly obese patients varies between 19 and 45 % [5, 8, 10, 14, 23], and up to 25 % of patients have undergone cholecystectomy before bariatric surgery [15, 24, 25]. Our patient population shows similar proportions. There have been a myriad of publications discussing the issue of gallbladder management in RYGBP, but only a few regarding SG [24, 26, 27].

Regarding the addition of cholecystectomy to bariatric surgery, Tucker and co-workers reported that concomitant RYGBP and cholecystectomy (RYGBP + C) added a mean operative time of 18 min (range 15–23 min); with one patient requiring laparoscopic trans-gastric endoscopic retrograde cholangiography. Surgical intervention for symptomatic cholelithiasis after RYGBP was required in 6 % of patients without preoperative gallbladder pathology. They conclude that RYGBP + C is indicated for patients with preoperative cholelithiasis [28].

In a recent report, Tsirline and co-workers reported on frequency and timing of cholecystectomies after bariatric surgery. They found a threefold incidence after RYGBP when compared to LSG (10.6 and 3.5 %, respectively), but did not report the incidence of asymptomatic gallstones in their cohort. Their conclusion was that for asymptomatic patients (with unknown gallbladder status), routine prophylactic cholecystectomy at the time of bariatric surgery is unwarranted [29].

Tarantino and colleagues found that prophylactic cholecystectomy during RYGBP resulted in prolonged hospitalization and operative time, but was not associated with higher complication risk. 18.6 % of the patients that had RYGBP only, required a subsequent cholecystectomy [30].

In a meta-analysis, looking at the data of 70,287 patients, of whom 9.1 % had RYGBP + C, Worni and co-workers showed higher unadjusted mortality rates, more frequent post-operative complications and longer hospital stay among that subgroup, when compared to patients that underwent only RYGBP. The authors concluded that concomitant cholecystectomy should only be performed for symptomatic gallbladder disease [31].

Another meta-analysis, analyzing the rate and morbidity of subsequent cholecystectomy in patients who underwent RYGBP without concomitant cholecystectomy, found that only 6.8 % of them develop symptomatic disease requiring a cholecystectomy. When RYGBP + C was performed, the overall perioperative complication rate was increased by 1.1 %. Again, the conclusion favored concomitant RYGBP and cholecystectomy only in symptomatic cholelithiasis [32].

Swartz and colleagues followed patients treated prophylactically with ursodeoxycholic acid after undergoing bariatric surgery for 6 months. Neither preoperative ultrasound

nor concomitant cholecystectomy was performed. In this study, 14.7 % of patients required subsequent cholecystectomy and it was concluded that asymptomatic gallstones in bariatric patients may be safely managed identically to those in the non-obese population [13]. This is further supported by the fact that complexity, and therefore complication rates, is enhanced with rising BMI [33].

SG is rapidly gaining momentum, both as a stand-alone and as a putative first stage procedure in bariatric surgery. Since its introduction into the bariatric armamentarium, SG has become the most popular procedure in Israel. This follows similar worldwide trends reported elsewhere [20, 21, 34]. Of its advantages are its relative operative simplicity, lack of anastomoses, and retention of normal food pathway through the digestive tract with an absence of a malabsorptive component. As opposed the bypass procedures, this unaltered gastrointestinal pathway permits unhindered access to the biliary system, allowing simple ERCP, when indicated, as indeed was performed in one patient from the control group.

Our data seem to suggest that for symptomatic gallstones, SGC is safe and indicated. However, bile leaks occurred in 2 of 180 patients, a worrisome rate of 1 %, albeit deviation from the original surgery (e.g., conversion to open bile duct repair) was needed only in one.

In our patient population, 9 % of patients with asymptomatic sludge or stones required cholecystectomy after the SG due to evolution of symptoms during the first postoperative year, as opposed to only 2.7 % of those with normal preoperative gallbladders. Moreover, presenting symptoms and severity of the disease was worse in the patients who had asymptomatic cholelithiasis at the time of the SG. Thus, the best management strategy for this patient group is still debatable. All subsequent cholecystectomies were completed with no adverse events, probably due to the relative ease after weight loss in this subgroup.

Finally, patients with intact gallbladders, probably warrant a more conservative approach, as only a small minority (2.7 % in our group) will require a later cholecystectomy.

Limitations of our study include a retrospective observational design with its inherent flaws. It is arguable that as in time, more patients will require cholecystectomies. However, this is offset by several reports showing the timing of cholelithiasis symptoms occurring mostly in the 1st to 2nd years after BS [9, 13, 24]. In our cohort, 66 % of patients who underwent subsequent LC, presented, and were operated within the 1st year after SG. Within 3 years, they amounted to 98 %. Furthermore, though our follow-up rate is high for the 1st year (>90 %), it drops as time progresses (70 % at 3 years), perhaps causing underestimation of subsequent gallbladder disease in our patients. It is our belief, that should our patients require surgical intervention, they would return to our care. This, of course, is not guaranteed.

A sufficiently powered, prospective, and randomized trial looking into this question is needed to settle this debate.

Disclosures Drs. A. Raziel, N. Sakran, A. Szold and D. Goitein have no conflict of interest to declare.

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