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Original article

Predictive factors of biliary complications after bariatric surgery

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Abstract

Background: Obesity and rapid weight loss are risk factors for gallstone development. Bariatric surgery and significant postoperative weight loss are associated with postoperative biliary complications.

Objective: We aim to identify predictive factors of biliary complications after bariatric surgery.

Setting: University hospital.

Methods: After Institutional Review Board approval, charts at a single institution were reviewed to identify patients with biliary complications after bariatric surgery from 2005 to 2012. Data collected included baseline patients demographic characteristics, perioperative parameters, and postoperative biliary complications. Parameters were analyzed using paired and unpaired Student *t* test for continuous variables and χ^2 test for categorical variables. Univariate and multivariate analyses were used to assess risk factors for complications after bariatric surgery. All tests were 2 tailed; results with $P < .05$ were considered statistically significant.

Results: One hundred thirty-eight (3.6%) of 3765 patients who underwent bariatric surgery developed postoperative biliary complications. Mean time from surgery to biliary complication was 1.8 ± 1.4 years. Complications included acute cholecystitis (18.1%), chronic cholecystitis (70.2%), acute pancreatitis (9.4%), choledocholithiasis (5.7%), and jaundice (2.8%). Interventions were laparoscopic (n = 134, 97.0%) and open (n = 1, .7%) cholecystectomy. Forty patients (28.9%) had known cholelithiasis before surgery. There were no mortalities. Univariate analysis identified female gender, age > 50, cholelithiasis at time of bariatric procedure, and Roux-en-Y gastric bypass independent of excess weight loss as predictive factors of biliary complications. Multivariate analysis confirmed advanced age as an independent predictive factor.

Conclusion: The results of our study suggest that patients of advanced age are at higher risk of biliary complications. However, the indications for prophylactic cholecystectomy at time of bariatric surgery remain unclear. (Surg Obes Relat Dis 2016;▮:00–00.)

Keywords: Postoperative complications; Bariatric surgery; Cholelithiasis

Obesity, defined as body mass index ≥ 30 kg/m^2, has more than doubled in the past 25 years, with close to half the U.S. population now defined as obese [1]. The treatment of obesity includes medical therapies such as behavioral therapy, pharmacotherapies, and dietary modification. However, numerous studies have found that bariatric surgery results in greater weight loss with higher remission rates of co-morbid conditions compared with nonsurgical management [2], and bariatric surgery has proved to be the most

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effective and durable treatment of obesity and related co-morbidities [3,4]. The most common surgical interventions are Roux-en-Y gastric bypass, sleeve gastrectomy, and adjustable gastric banding. Laparoscopic Roux-en-Y gastric bypass (LRYGB) remains the gold standard in bariatric surgery, and the number of LRYGB has almost tripled from 2003 to 2008 [5].

Obesity is a well-established risk factor for the development of gallstones [6]. However, the rapid weight loss associated with bariatric surgery also predisposes patients to cholelithiasis. This likely is due to mobilization of endogenous cholesterol during weight loss; decreased biliary motility secondary to reduced caloric intakes; and decreased secretion of cholecystokinin, especially in the setting of duodenal exclusion in gastric bypass or duodenal switch. The development of cholelithiasis after bariatric surgery has been reported to be as high as 71% [7] but is more commonly reported to be around 32%–42% [8]. Because of this, prophylactic cholecystectomy during gastric bypass was historically recommended in the era of open surgery [9]. The current management of gallbladder pathology remains a point of contention, ranging from prophylactic cholecystectomy, to cholecystectomy in the setting of biliary symptoms or presence of stones and sludge on preoperative or intraoperative ultrasound, to expectant management with or without ursodeoxycholic acid (Ursodiol). Because of the wide range of clinical practices and unclear implications of leaving a gallbladder in situ during bariatric surgery, we aimed to identify those patients who are most at risk of developing postoperative biliary complications in an effort to potentially guide preventative therapy.

Methods

After Institutional Review Board approval and following Health Insurance Portability and Accountability Act regulations, a historical cohort study was conducted using our prospectively maintained bariatric surgery registry. Those who underwent LRYGB, laparoscopic sleeve gastrectomy (LSG), laparoscopic adjustable gastric banding (LAGB), laparoscopic gastric plication (LGP), and revisional bariatric surgery without concomitant cholecystectomy from March 2005 to April 2012 at a single academic institution were included in this study. The electronic medical records of these patients were reviewed to identify those with postoperative biliary complications including acute pancreatitis (AP), choledocholithiasis, jaundice, acute cholecystitis, and chronic cholecystitis. Those patients who had previously undergone cholecystectomy (n = 169, 4.5%) were excluded from the study. Demographic data regarding presentation, symptomology, length of stay, complications, diagnostic workup, and therapeutic interventions were collected. This cohort of patients was matched and compared with a 1:1 cohort who underwent bariatric surgery without postoperative biliary complications. Matching was based on age, gender, body mass index (BMI) at time of surgery, type of procedure, and duration of follow-up. Parameters were analyzed using paired and unpaired Student t tests for continuous variables and χ^2 test for categorical variables. Univariate and multivariate analyses were used to assess the risk factors for complications after bariatric surgery. All tests were 2 tailed and results with a $P < .05$ were considered statistically significant.

Patients undergoing bariatric surgery at our institution undergo evaluation by a multidisciplinary team including evaluations by medical internists, psychiatrists, and nutritionists. Patients are counseled on preoperative cessation of tobacco and alcohol use. We routinely perform preoperative right upper quadrant (RUQ) ultrasound to evaluate for cholelithiasis and fatty liver disease. Patients with gallstones and biliary symptoms undergo simultaneous cholecystectomy at the time of bariatric surgery. Asymptomatic patients with stones do not typically undergo simultaneous cholecystectomy.

Postoperatively patients are evaluated at 1 week, 1 month, 3 months, 6 months, 9 months, 12 month, and 18 months after surgery, after which they are followed annually. Postoperative laboratory examinations are performed every 6 months and include complete blood cell count, complete metabolic profile, serum folate, serum iron and total iron binding capacity, vitamin D, vitamin B_{12}, vitamin B_1, and glycosylated hemoglobin (HbA1C). All patients are required to take postoperative multivitamins and antisecretory agents (most commonly famotidine); depending on surgeon preference, the majority is also prescribed Ursodiol for the first 6 months after surgery. Only patients with signs or symptoms concerning for biliary disease undergo postoperative RUQ ultrasonography.

Results

A total of 3765 patients underwent bariatric surgery at the Cleveland Clinic during the study period. These patients were followed for a mean of 20.28 ± 20.13 months. One hundred thirty-eight patients (3.8%) developed biliary complications after bariatric surgery. The mean age at time of bariatric surgery was 53.0 ± 12.0 years and the population had a male/female ratio of 1:3.6. The average number of co-morbidities, including diabetes, hypertension, hyperlipidemia, and obstructive sleep apnea, among patients before bariatric surgery was 3.4. The mean weight before bariatric surgery was 133.5 kg with mean initial excess weight of 64.7 ± 25.1 kg and mean BMI of 47.9 ± 8.4 kg/m^2. Mean initial excess weight loss was 64.7 ± 25.1 kg with percent excess weight loss (%EWL) of 72.2 ± 28.76%. The majority of patients underwent a Roux-en-Y gastric bypass (82.6%); the remainder had sleeve gastrectomy (8.5%), gastric banding (6.5%), revisional bariatric procedures (1.4%), and one gastric plication (0.7%). Of the patients