Original Article

Preventive Measures of the Cholelithiasis Post-Bariatric Surgery

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Abstract

The only effective treatment for severe obesity is bariatric surgery. While bariatric surgery is helpful in managing obesity and its aftereffects, it does not lessen the incidence of cholelithiasis. Numerous research, however, have indicated that bariatric surgery could raise the risk of cholelithiasis. A reduction in hospital admissions for colic pain and problems related to gallstone formation might be achieved by monitoring the development of cholelithiasis after fast weight loss, which is a result of most bariatric surgeries. To evaluate the value of prophylactic measures by investigating the existing research about the occurrence of cholelithiasis after bariatric surgery. The PubMed database was utilized to choose papers, and the following keywords were entered into the mesh: ((“cholelithiasis"[Mesh]) AND (“bariatric surgery” [Mesh]) OR (“prevention"[Mesh])). Rapid excess weight loss has been identified as the primary cause of gallstone development following bariatric surgery. Only just a minority of patients suffer symptoms in the first year after bariatric surgery, and cholecystectomy is rarely needed. As a result, it is not advised to be done as prophylactic. However, in the first 6 months, prophylactic pharmaceutical treatment (such as Ursodeoxycholic acid) might be utilized instead. Ursodeoxycholic acid used as a preventative measure greatly decreased gallstone development following weight loss surgery. It might be advantageous in high-risk patients.

Keywords: Cholelithiasis, Bariatric surgery, Prevention, Ursodexycholic

Introduction

Obesity is a major health issue worldwide today, accounting for a large number of expenditures on healthcare in many Western nations [1]. Bariatric surgery is advised for obesity that is unmanageable with diet and medicine, particularly in those with type 2 diabetes [2]. According to recent guidelines, those with BMIs above 40 kg/m2 or over 35 kg/m2 and major obesity comorbidities were encouraged to have bariatric surgery [3]. The Roux-en-Y Gastric Bypass process is the most commonly used and gold standard process; sleeve gastrectomy has received prominence in the past ten years; an adjustable gastric band has been demonstrated in various research to be connected to much greater complication rates than other types of surgeries and therefore has grown less frequently adopted; and biliopancreatoduodenectomy. Obesity and its effects, which include insulin resistance and dyslipidemia, were identified as independent risk elements for cholelithiasis [4]. Bariatric surgery is helpful in treating obesity and its aftereffects, but it has little effect on cholelithiasis prevalence. However, a number of studies have shown that bariatric surgery may raise the risk of cholelithiasis [5]. Following bariatric surgery, cholelithiasis is a serious complication that requires close monitoring. Severe cholelithiasis requires cholecystectomy in 10% of patients undergoing sleeve gastrectomy or Roux-en-Y gastric bypass [6]. The purpose of this paper is to evaluate the effectiveness of preventive interventions by reviewing the current research on the incidence of cholelithiasis following bariatric procedures and the associated risk factors.

Materials and Methods

The following keys were utilized in the mesh ((“cholelithiasis"[Mesh]) AND (“bariatric surgery” [Mesh])

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OR (“prevention"[Mesh])) when choosing articles from the PubMed database.

With respect to the inclusion criteria, the papers were chosen on the basis of one of the following subjects: post-bariatric surgery cholelithiasis prophylaxis.

All other articles that did not have one of these topics as their major destination were excluded.

Out of 71 papers indexed in recent decades, 35 were chosen as the most clinically relevant, and their entire texts were reviewed. Using the reference lists from the recognized and connected papers, further research and publications were discovered. Expert consensus suggestions and commentary were given where appropriate to assist practicing clinicians in assessing cholelithiasis after bariatric surgery most simply and practically feasible.

Results and Discussion

A high hepatic cholesterol release caused by genetic causes; systolic malfunction of the gallbladder wall; bowel malfunction with overly cholesterol absorption or cholesterol supersaturation caused by issues in hepatic bile circulation; and accelerated growth of cholesterol crystals and solid cholesterol crystals are the primary causes of cholelithiasis. The basic process is as follows: cholesterol is secreted into bile by the liver, and any excess is conveyed via lecithin cholesterol vesicles, where cholesterol is abundant, has affinity, and rapidly clumps. When these vesicles combine, they form the nuclei that initiate the most significant stone assembly. Granulocytes are activated upon the generation of cholesterol crystals, which eject DNA from the cell and encapsulate cholesterol crystals, after which individual crystals combine to create bigger stones [7, 8].

As a result, supersaturation of cholesterol is a required condition for gallstone formation.

There are two probable causes for the increased prevalence of cholelithiasis after bariatric surgery. The first is that rapid weight reduction promotes fat mobilization, which raises blood cholesterol and triglyceride levels. On the other hand, gallbladder contractile dysfunction might be caused by intestinal dysfunction caused by bariatric surgery with lower cholecystokinin levels [8]. The use of Ursodeoxycholic acid as a gallstone preventive approach has been supported [9]. Gallstone formation was shown to be lowered when patients took ursodeoxycholic acid orally every day for six months following gastric bypass surgery, or even until gallstone development, according to research by Sugerman *et al*. [10]. These results are in line with another experiment in vertical banded gastroplasty with gastric banding, which discovered that the Ursodeoxycholic acid group saw a lower rate of cholecystectomy than the placebo group [11]. The development of gallstones was found to be lowered by Mc *et al*. [12] in a meta-analysis involving the protective use of ursodeoxycholic acid treatment. On the other hand, a recent cost-effective analysis found that although using ursodeoxycholic acid decreased the costs associated with a concurrent cholecystectomy and hospital stay, prescribing the medication is an expensive extra expense, and using it following bariatric surgery is not advised [13]. Ursodeoxycholic acid is a naturally occurring bile acid that is administered orally. Skin rashes, nausea, and diarrhea are the most common side effects. among those who have PBC, or primary biliary cirrhosis. Nonetheless, there have been documented advantages to ursodeoxycholic acid treatment, including a reduction in total cholesterol and liver enzymes [14, 15]. As a result, Ursodeoxycholic acid therapy may have beneficial metabolic benefits in persons after bariatric surgery in addition to lowering symptomatic gallstone disease. On the other hand, little information is available on how these drugs affect metabolism in this group [16].

Furthermore, the precise activities and processes of numerous bile acids are yet unknown, although their effects on lipids, glucose metabolism, and non-alcoholic fatty liver disease (NAFLD) have already been documented. The gut microbiota, in turn, has a significant impact on bile acid metabolism, particularly following bariatric surgery [17]. Indeed, changed bile acid profiles have been linked to several of the early benefits of bariatric surgery, such as an almost immediate improvement in glucose control. Increases in Ursodeoxycholic acid and its glycine and taurine conjugates after 1 month following bariatric surgery increased total bile acid concentration, according to Albaugh *et al*. Increases in bile acid levels were primarily due to increasing levels of primary unconjugated bile acids 24 months after surgery [18, 19].

Ursodeoxycholic acid has also been found in clinical studies to have hepatoprotective properties, change bile acid and lipid metabolism, and boost hepatic insulin sensitivity and immunomodulatory activities [15, 20]. Gumen *et al*. investigated the effects of Ursodeoxycholic acid on liver enzymes, lipid profile, glucose level, and inflammatory markers in patients six months following bariatric surgery [14]. They observed that Ursodeoxycholic acid patients had a higher rise in mean ALP level than placebo patients. There were no other significant changes in blood levels noted. Ursodeoxycholic acid treatment has been shown to have limited or no effect on liver enzymes, metabolism, and inflammation, with minor clinical side effects.

Based on these data, it is known that Ursodeoxycholic acid therapy is safe in patients undergoing bariatric surgery; nevertheless, its participation in post-surgical metabolic changes appears to be limited [14, 15]. Ursodeoxycholic acid does not appear to have a clinically relevant effect on liver function, lipid, glucose, or inflammatory metabolism after bariatric surgery. ALP was only slightly affected, which could not be explained by changes in calcium metabolism. The processes that cause gallstone development are yet

unknown. Future research in patients undergoing bariatric surgery should focus on the underlying mechanisms of action in humans, as well as the effects of other bile acids, such as chenodeoxycholic acid, which may be more advantageous to human metabolism [14].

Ursodeoxycholic acid is a hydrophilic bile acid that can help dissolve gallstones or biliary sludge. Ursodeoxycholic acid acts by decreasing bile cholesterol saturation and increasing cholesterol solubility, which can assist in preventing the production of new gallstones and dissolve existing gallstones. Prophylactic usage of Ursodeoxycholic acid throughout the weight loss phase, independent of the technique of weight loss either with a low-calorie diet or bariatric surgery, has been shown in a few clinical trials to minimize gallstone development, with reduction rates of up to 58% [21, 22]. Most trials employed 500-600 mg of Ursodeoxycholic acid daily for 6-12 months postoperatively; as a result, the Ursodeoxycholic acid group had a decreased incidence of gallstone development. A recent meta-analysis of these randomized controlled studies found that Ursodeoxycholic acid reduces bile lithogenicity, implying that Ursodeoxycholic acid might effectively prevent gallstones and lower the risk of cholecystectomy following bariatric surgery [23]. As a result, the American Clinical Practice Guidelines for the Perioperative Nutritional, Metabolic, and Nonsurgical Support of Bariatric Surgery were developed based on the findings of multiple clinical trials. The patient recommends taking 500-1,000 mg of Ursodeoxycholic acid daily for the first 3-6 months after surgery [24].

The gold standard treatment for symptomatic gallstones is cholecystectomy; however, the relevance of preventive cholecystectomy during bariatric surgeries is controversial. In the period of open surgery, preventive cholecystectomy was traditionally suggested; however, several studies have found that preventive cholecystectomy is related not only to a longer operative time, but also to a greater risk of complications, longer hospital admissions, and even increased mortality [25, 26].

Even though routine concomitant cholecystectomy has steadily declined in recent decades, combined laparoscopic cholecystectomy with sleeve gastrectomy or Roux-en-Y Gastric Bypass did not affect mortality or the risk of major complications, and it was only associated with a 0.6% increased risk of surgical site infection [25-27]. Furthermore, the popularity of sleeve gastrectomy has lowered the drive for gallstone prophylaxis. This is because, unlike RYGB, sleeve gastrectomy provides endoscopic access for endoscopic retrograde cholangiography and stone extraction for common duct stones. As a result, current clinical practice recommendations do not support ultrasound screening for asymptomatic gallstones, but only for symptomatic patients having bariatric surgery [27, 28].

Several studies reported a significant frequency of symptomatic gallbladder stones following sleeve gastrectomy and advocated conducting laparoscopic cholecystectomy in conjunction with sleeve gastrectomy [29]. Sioka *et al*. confirmed that 13.0% of individuals with preoperative obvious cholelithiasis developed complex cholelithiasis [9]. Because of the high proportion of patients who developed complications, particularly those with potentially significant morbidities, the actual technical difficulties during subsequent cholecystectomy, and the short time to develop complications [9, 29], they concluded that routine concomitant laparoscopic cholecystectomy could be considered. Others observed a decreased frequency of symptomatic Gallstones but did not advocate for routine laparoscopic cholecystectomy. Raziel *et al*. found that four (9.3%) of 43 patients with asymptomatic gallstones developed symptoms, including two cases of acute cholecystitis, one case of pancreatitis, and one case of gallbladder empyema [30]. Tsirline *et al*. [31] observed that 7.8% of asymptomatic persons had cholecystectomy after bariatric surgery. Habeeb *et al*. study discovered a greater prevalence of symptomatic Gallstones following sleeve gastrectomy than previous studies, with 61 patients (55%) requiring another laparoscopic cholecystectomy treatment and the majority of cases (85% of them) performed within a year of sleeve gastrectomy [29]. The increased incidence can be attributed to the larger sample size, considerable weight reduction within one year, and consistent follow-up with close observation and ultrasonography, which finds many cases with symptomatic gallstones. The most prevalent reason for laparoscopic cholecystectomy following sleeve gastrectomy was acute cholecystitis that did not improve with conservative care and necessitated surgery within 72 hours, followed by persistent biliary colic. Other authors agree with us that urgent laparoscopic cholecystectomy is the best treatment for biliary colic since delayed laparoscopic cholecystectomy causes more readmissions, operational time, hospital stay, and conversions than urgent laparoscopic cholecystectomy [32]. It has been documented in the literature that concomitant cholecystectomy with bariatric surgery increased the operative time by 18-49 minutes [33].

According to certain findings, simultaneous cholecystectomy in individuals undergoing bariatric surgery increases hospital stay and morbidity [34]. In patients with morbid obesity undergoing sleeve gastrectomy due to fatty liver, simultaneous cholecystectomy proved more difficult to conduct than conventional cholecystectomy because standard cholecystectomy trocar entry sites were not employed. As a result of this challenge, the duration of the operation was extended, and it was projected that morbidity would increase owing to the duration of the prolonged anesthesia. Cholecystectomy in an obese patient may be challenging due to comorbidities such as pulmonary and vascular issues, in addition to obesity. It may be simpler to accomplish it after significant weight reduction [35].

Conclusion

Rapid excess weight loss has been identified as the primary cause of gallstone development following bariatric surgery. During the first year following bariatric surgery, just a small percentage of patients may develop symptoms, and cholecystectomy is rarely required. As a result, it is not advised to be done as prophylactic. However, in the first 6 months, prophylactic pharmaceutical treatment (such as Ursodeoxycholic acid) might be utilized instead. Ursodeoxycholic acid used as a preventative measure greatly decreased gallstone development following weight loss surgery. It might be advantageous in high-risk patients.

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