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Research Article

The Effects of Sleeve Gastrectomy on Nonalcoholic Fatty Liver Disease. A Review of the Literature -

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ABSTRACT

Background: Nonalcoholic Fatty Liver Disease (NAFLD) is the most common liver disease in the developed countries. Patients with Nonalcoholic Steatohepatitis (NASH), a subset of NAFLD, are at risk for progressive liver disease and in need of effective treatment options. There is a lack of data assessing sleeve gastrectomy and their effect on NAFLD.

Objective: To assess the effects of Sleeve Gastrectomy (SG) on NAFLD.

Methods: An online search of PubMed, Medline, and Google Scholar was independently carried out by two researchers using key words like Non-Alcoholic Fatty Liver Disease, Non-Alcoholic Steato-Hepatitis, Bariatric Surgery, Obesity Surgery, Sleeve Gastrectomy and Liver Biopsy, percutaneous liver biopsy, to identify all articles. Articles were also identified from references of relevant articles. All sleeve gastrectomies that had intraoperative and postoperative liver biopsies were included.

Results: The review included 10 studies that provided data regarding nonalcoholic fatty liver disease in men and women that had undergone sleeve gastrectomy for morbid obesity. Participants in these studies had undergone liver biopsy at the time of the operation and as a follow up. We decided to not perform a meta-analysis due to the high risk of bias and the high degree of heterogeneity of the included studies.

Conclusions: In addition to a correlation between NAFLD and metabolic syndrome, NAFLD may lead to a worse outcome in steatohepatitis (NASH). Surgery may provide a possible solution to this problem but we need further research to examine the associations, pathophysiology, and the impact of SG on this particular disease.

Keywords: Nonalcoholic Fatty Liver Disease (NAFLD); Nonalcoholic Steatohepatitis (NASH); Sleeve gastrectomy; Metabolic syndrome

INTRODUCTION

NAFLD is a clinico-pathological condition [1] characterized by the histologic finding of 5% or greater macrovesicular steatosis of hepatocytes in an individual without significant alcohol use or other known causes of chronic liver disease [2]. The histologic spectrum of NAFLD are divided to isolated steatosis or nonalcoholic fatty liver to Nonalcoholic Steatohepatitis (NASH)-related cirrhosis and NASH-Hepatocellular Carcinoma (HCC) [3]. Although not entirely a diagnosis of exclusion, the diagnosis of NAFLD does require a careful query of alcohol consumption, because alcoholic liver disease itself can often demonstrate similar histologic features to NAFLD. As such, current guidelines recommend using criteria requiring alcohol exposure of less than 30 g/ day for men and less than 20 g/day for women as a component of NAFLD diagnosis. The diagnosis of NAFLD incorporates the clinical history, laboratory data, radiographic data, as well as histologic information. NAFLD can be diagnosed noninvasively by the finding of hepatic steatosis on abdominal imaging study; liver biopsy is not always needed to confirm the diagnosis. However, a liver biopsy is required to distinguish isolated steatosis from NASH and to stage fibrosis severity, which may subsequently affect risk of disease progression and disease management. Three key histologic features are needed to confirm the diagnosis of NASH and include steatosis, inflammation, and cellular ballooning. [4]. Bariatric surgical procedures are increasingly and successfully applied in the treatment of morbid obesity. Bariatric operations traditionally are divided to restrictive, malabsorptive or combined according to the mechanism they induce weight-loss. Malabsorptive procedures have been reported as having more sustainable long-term results in terms of weight loss and amelioration of related comorbidities compared to restrictive procedures, in exchange for more common post-operative nutritional deficiencies [5]. Restrictive procedures on the other hand are linked with a progressively attenuated weight-loss and metabolic result but have a more favorable long-term nutritional profile [6-8]. The aim of this study is to focus on NAFLD and the ensuing regression after sleeve gastrectomy which is one of the most popular procedure for the morbid obesity.

MATERIAL AND METHODS

A comprehensive search of PubMed Database was conducted and the review covered a period from 2000 to 2017. The keywords which were used individually or in combination were: sleeve gastrectomy, NAFLD, NASH, obesity, steatosis. This study was based on a retrospective review of a database comprising all patients with proven NAFLD undergoing SG.

INCLUSION AND EXCLUSION CRITERIA

Studies with data for sleeve gastrectomy were only included. These studies included technical notes, review articles, original articles, case reports studies and case matched comparison studies. Duplicate publications and those not written in English were excluded. For duplicate publications, the latest and most complete study was included. Number of patients was not an exclusion criterion.

RESULTS

Many studies have shown NAFLD regression after sleeve gastrectomy in bariatric surgery patients. (Table 1) Most studies included few cases. Manco, et al. [9,10] included 20 patients that underwent SG and they reported reversion of steatohepatitis and reduction of hepatic fibrosis in morbidly obese adolescents with NAFLD 1 year after surgery. Another study from Billeter, et al. [11] included thirty-four obese patients with a BMI >35 kg/m^2. The effects on LFT and glycemic control were evaluated over 12 months. An additional prospective study from Aldoheyan, et al. [12] evaluated the histological and biochemical effects of sleeve gastrectomy on nonalcoholic fatty liver disease in 27 patients with 3 months follow-up. Similarly Algooneh, et al. [13] examined 84 patients diagnosed with NAFLD prior to undergoing LSG and Froylich, et al. [14] studied nine patients that underwent SG with liver biopsies prior to surgery and in the follow up. In general follow-up is quite limited spanning from 3 months (10) to 1year [9,11-14].

Most studies agree that following surgery NAFLD is either improved [10,15] or fully regressed. [9, 11-13] Techniques followed to evaluate NAFLD, however varied: some authors used liver biopsy (10, 11, 14, 16) and others used ultrasound sonography [15-17] or MRI [12].

Table 1: Patients characteristics.

Study	Patients	Regression of NAFLD	Comments	Additional benefits after SG
Manco, et al. [9]	93 Obese (BMI ≥ 35 kg/m^2) adolescents	20/20 patients	20 Pts underwent LSG. Follow up: 1 year later	Decreased hypertension and ameliorated dyslipidemia, weight loss
Tariciotti, et al. [18]	1 patient (53years old- BMI 40 kg/m^2)	NA	The patient underwent LT	Advantages in terms of allograft and patient survival, diabetes resolution
Billeter, et al. [13]	34 patients	17/17 patients	17 patients underwent LSG –Follow up: 1 year later	Improved insulin resistance, glycemic control, and reduced the need of insulin
Aldoheyan, et al. [10]	27 patients (35 ± 8 years old-BMI: 44.6 ± 7.8)	12/18 patients	27 patients underwent LSG plus Liver biopsy – Follow up: 3 months later	Weight reduction
Wolter, et al. [16]	302 patients (Age: 43.3 ± 11.9, BMI:43.3 ± 11.9)	80% with NAFLD	150 patients underwent LSG plus Liver biopsy- No follow-up	Decreased postoperative complications
Algooneh, et al.[15]	84 patients (Age: 17–62, BMI : 46.6 ± 7.8)	47/84 patients	84 patients underwent LSG- Follow up : Ultrasound	Weight reduction
Froylich, et al. [14]	9 patients (Age: 46.3 11.7, BMI : 72.7 21.0)	9/9 patients	9 patients underwent LSG plus Liver biopsy –Follow up: ½-1 year later	Weight reduction
Calvo, et al. [12]	19 patients (Age:34-55,BMI:42.1-51.2)	19/19 patients	19 patients underwent LSG –Follow up: 1 year later with MRI	Weight reduction
Praveen Raj, et al. [11]	20 patients(Age: 21–70, BMI: 45.99 +/- 11.71)	10/10 patients (with pre-op NAFLD)	20 patients underwent LSG plus liver biopsy Follow up: ½-1 year later	Weight reduction
Berry, et al. [17]	252 patients(Age: 15-70, BMI: 30-34.3)	213/252 patients (with pre-op NAFLD)	111 patients in the Follow up with Ultrasound	Insulin resistance was remitted dyslipidemia hypertension and GERD. T2DM had 60% of complete remission and 40% improvement.

NA: Not Addressed.

Tariciotti, et al. [18] in their case report from Italy referred to a 53 years old woman with Hepatocellular carcinoma and Hepatitis C virus related cirrhosis. She also presented with severe morbid obesity (BMI 40 kg/m^2) and insulin-dependent diabetes. Once listed for Liver Transplantation (LT), she was assessed by the bariatric surgery team to undergo a combined LT/SG. An experienced bariatric surgeon, following completion of the LT, performed the SG. The patient had an uneventful recovery and is currently alive, 5 months after the combined procedure, with normal allograft function, significant weight loss (BMI = 29 kg/m^2), and diabetes resolution.

DISCUSSION

LSG is a new and effective restrictive surgical procedure used with increasing frequency [19]. This surgical procedure was originally performed as the first step in a staged weight loss procedure for severely obese adults [20]. Sleeve gastrectomy was first performed laparoscopically by Ren, et al. [21]. In this restrictive procedure, the stomach is reduced to approximately 20% of its original size by the surgical removal of a large portion. The open edges are then stapled together to form a sleeve or narrow banana-shaped tube. As a result, the size of the stomach is permanently reduced [22].

Bariatric surgery in obese patients with NAFLD results in sustained and significant weight loss and improves NASH, according to the current literature. SG is considered a safe and effective option for these patients, as long as appropriate long-term follow-up is provided. Existing data are not sufficient to recommend general use of this surgical procedure in patients that exhibit NAFLD. The burden of obesity associated comorbidity such as NAFLD in selected patients may prove risky and future studies and a long-term risk analysis of patients with obesity associated liver disease are much needed to clarify the exact indications for bariatric surgery.

We propose the collection of data of all weight loss procedures until prospective and controlled trials are performed. This study tries to address the problem of a pathologic entity as NAFLD and the resolution after a rather commonly used operation like SG and as such, it can be helpful for the clinician.

CONCLUSIONS

In summary, this study reaffirms that many patients have been reported as having suffered from NAFLD [23] and SG for morbid obesity seems to play a significant role for the resolution of the disease. Physicians should be highly suspicious for the diagnosis of NAFLD in obese patients. Since liver biopsy should routinely be performed intraoperatively in those morbid obese patients undergoing bariatric surgery, the definite diagnosis in all suspicious cases by a hepatologist is imperative and usually results in the regression of the disease.

REFERENCES

1. Italian Association for the Study of the L. AISF position paper on nonalcoholic fatty liver disease (NAFLD): Updates and future directions. Dig Liver Dis. 2017; 49: 471-483. https://goo.gl/TXb3VC

2. Chalasani N, Younossi Z, Lavine JE, Diehl AM, Brunt EM, Cusi K, et al. The diagnosis and management of non-alcoholic fatty liver disease: practice guideline by the American Gastroenterological Association, American Association for the Study of Liver Diseases, and American College of Gastroenterology, and the American Gastroenterological Association. Hepatology. 2012; 55: 2005-2023. https://goo.gl/4gvwd2

3. Rinaldi L, Nascimbeni F, Giordano M, Masetti C, Guerrera B, Amelia A, et al. Clinical features and natural history of cryptogenic cirrhosis compared to hepatitis C virus-related cirrhosis. World J Gastroenterol. 2017; 23: 1458-1468. https://goo.gl/SrZnKJ

4. Kleiner DE, Brunt EM, Van Natta M, Behling C, Contos MJ, Cummings OW, et al. Design and validation of a histological scoring system for nonalcoholic fatty liver disease. Hepatology. 2005; 41: 1313-1321. https://goo.gl/hbVyo8

5. Mechanick JI, Youdim A, Jones DB, Garvey WT, Hurley DL, McMahon MM, et al. Clinical practice guidelines for the perioperative nutritional, metabolic, and nonsurgical support of the bariatric surgery patient--2013 update: cosponsored by American Association of Clinical Endocrinologists, The Obesity Society, and American Society for Metabolic & Bariatric Surgery. Endocr Pract. 2013: S1-27. https://goo.gl/XRmcdw

6. Diamantis T, Apostolou KG, Alexandrou A, Griniatsos J, Felekouras E, Tsigris C. Review of long-term weight loss results after laparoscopic sleeve gastrectomy. Surg Obes Relat Dis. 2014; 10: 177-183. https://goo.gl/kWtf5N

7. Alexandrou A, Athanasiou A, Michalinos A, Felekouras E, Tsigris C, Diamantis T. Laparoscopic sleeve gastrectomy for morbid obesity: 5-year results. Am J Surg. 2015; 209: 230-234. https://goo.gl/p4u494

8. Himpens J, Dobbeleir J, Peeters G. Long-term results of laparoscopic sleeve gastrectomy for obesity. Ann Surg. 2010; 252: 319-324. https://goo.gl/CqUYje

9. Manco M, Mosca A, De Peppo F, Caccamo R, Cutrera R, Giordano U, et al. The Benefit of Sleeve Gastrectomy in Obese Adolescents on Nonalcoholic Steatohepatitis and Hepatic Fibrosis. J Pediatr. 2016. https://goo.gl/Dk8jgm

10. Aldoheyan T, Hassanain M, Al-Mulhim A, Al-Sabhan A, Al-Amro S, Bamehriz F, et al. The effects of bariatric surgeries on nonalcoholic fatty liver disease. Surg Endosc. 2016. https://goo.gl/o8qppb

11. Praveen Raj P, Gomes RM, Kumar S, Senthilnathan P, Karthikeyan P, Shankar A, et al. The effect of surgically induced weight loss on nonalcoholic fatty liver disease in morbidly obese Indians: "NASHOST" prospective observational trial. Surg Obes Relat Dis. 2015; 11: 1315-1322. https://goo.gl/UKk1hM

12. Calvo N, Beltran-Debon R, Rodriguez-Gallego E, Hernandez-Aguilera A, Guirro M, Marine-Casado R, et al. Liver fat deposition and mitochondrial dysfunction in morbid obesity: An approach combining metabolomics with liver imaging and histology. World J Gastroenterol. 2015; 21: 7529-7544. https://goo.gl/125L5W

13. Billeter AT, Senft J, Gotthardt D, Knefeli P, Nickel F, Schulte T, et al. Combined Non-alcoholic Fatty Liver Disease and Type 2 Diabetes Mellitus: Sleeve Gastrectomy or Gastric Bypass?-a Controlled Matched Pair Study of 34 Patients. Obes Surg. 2016; 26: 1867-1874. https://goo.gl/X6JNkN

14. Froylich D, Corcelles R, Daigle C, Boules M, Brethauer S, Schauer P. Effect of Roux-en-Y gastric bypass and sleeve gastrectomy on nonalcoholic fatty liver disease: a comparative study. Surg Obes Relat Dis. 2016; 12: 127-131. https://goo.gl/P7ihE6

15. Algooneh A, Almazeedi S, Al-Sabah S, Ahmed M, Othman F. Non-alcoholic fatty liver disease resolution following sleeve gastrectomy. Surg Endosc. 2016; 30: 1983-1987. https://goo.gl/GsriJa

16. Wolter S, Dupree A, Coelius C, El Gammal A, Kluwe J, Sauer N, et al. Influence of Liver Disease on Perioperative Outcome After Bariatric Surgery in a Northern German Cohort. Obes Surg. 2016. https://goo.gl/EpD51S

17. Berry MA, Urrutia L, Lamoza P, Molina A, Luna E, Parra F, et al. Sleeve Gastrectomy Outcomes in Patients with BMI Between 30 and 35-3 Years of Follow-Up. Obes Surg. 2017. https://goo.gl/S5KYft

18. Tariciotti L, D'Ugo S, Manzia TM, Tognoni V, Sica G, Gentileschi P, et al. Combined liver transplantation and sleeve gastrectomy for end-stage liver disease in a bariatric patient: First European case-report. Int J Surg Case Rep. 2016; 28: 38-41. https://goo.gl/DT7UUu

19. Moon Han S, Kim WW, Oh JH. Results of laparoscopic sleeve gastrectomy (LSG) at 1 year in morbidly obese Korean patients. Obes Surg. 2005; 15: 1469-1475. https://goo.gl/46XXoU

20. Cottam D, Qureshi FG, Mattar SG, Sharma S, Holover S, Bonanomi G, et al. Laparoscopic sleeve gastrectomy as an initial weight-loss procedure for high-risk patients with morbid obesity. Surg Endosc. 2006; 20: 859-863. https://goo.gl/eJGHRv

21. Ren CJ, Patterson E, Gagner M. Early results of laparoscopic biliopancreatic diversion with duodenal switch: a case series of 40 consecutive patients. Obes Surg. 2000; 10: 514-523. https://goo.gl/q4oCCK

22. Karmali S, Johnson Stoklossa C, Sharma A, Stadnyk J, Christiansen S, Cottreau D, et al. Bariatric surgery: a primer. Can Fam Physician. 2010; 56: 873-879. https://goo.gl/rpr3YW

23. Non-alcoholic Fatty Liver Disease Study G, Lonardo A, Bellentani S, Argo CK, Ballestri S, Byrne CD, et al. Epidemiological modifiers of non-alcoholic fatty liver disease: Focus on high-risk groups. Dig Liver Dis. 2015; 47: 997-1006. https://goo.gl/xEpb2z