

Can We Consider Bariatric Bypass Surgery As A Definite Clue for NAFLD/ NASH Patients?

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Background: Obesity is a chronic disease that is increasing in prevalence worldwide leading to much co-morbidity and even pre-mature death, additionally the leading predisposing factor for none-alcoholic fatty liver disease (NAFLD) and non-alcoholic steatohepatitis (NASH). NASH is usually associated with increased risks of cirrhosis, liver failure, hepatocellular carcinoma, and the need for liver transplantation. Bariatric surgery is one of definitive solution for obesity; however, sleeve gastrectomy (SG) is the most common types of bariatric surgeries performed worldwide. Here, we investigated the use of a bariatric surgery in reversing the inflammation and liver damage associated with NAFLD/NASH and thus alleviating the patients' need for future liver transplantation.

Patients and Methods: 184 patients enrolled randomizely in the study, all of them had NAFLD diagnosed by 2 dimensional ultrasound (US) and or computed tomography (CT), 156 NAFLD patients treated with ELBANNA bypass operation, however 28 patients (control Group) treated with Sleeve gastrectomy.

Results: All 156 patients experienced Elbanna operation, significantly reversed NAFLD pattern in 118 (75.6 %), 131 (83.9 %), and 152 (97.4 %), 12, 24 and 36 months after ELBANNA operation, respectively. By contrast, among 28 NAFLD control patients, only 7 patients (25%) showed improved liver condition, 36 months after standard bariatric sleeve gastrectomy. P-Value is < .00001. **Conclusion:** Bariatric bypass operation would be highly recommended for obese patients who developed NAFLD /NASH to avoid further decompensation of the liver and alleviating the future need of liver transplantation and its complications.

Keywords: NASH, NAFLD, Liver cirrhosis, Liver Transplantation, Bariatric surgery, Elbanna operation.

1 Introduction

Nonalcoholic fatty liver disease (NAFLD) refers to the presence of hepatic steatosis when no other causes for secondary hepatic fat accumulation (e.g., heavy alcohol consumption) are present [1]. Patients with nonalcoholic fatty liver disease (NAFLD) may eventually develop cirrhosis. Cirrhosis develops when simple steatosis progresses to steatohepatitis and then fibrosis. Among patients with cryptogenic cirrhosis, up to 70 percent have risk factors for NAFLD [2-4]. Multiple therapies have been investigated for the treatment of nonalcoholic fatty liver disease (NAFLD). Weight loss is the only therapy with reasonable evidence suggesting it is beneficial and safe [5-7]. However no definitive-evidenced-based pharmacological therapy have been reported, additionally weight regain may stimulate NASH development with subsequent

complications. Bariatric surgery would decrease the NAFLD/ NASH by the mean of decreasing overall obesity. Here we will evaluate the role of different bariatric surgery to alleviate NAFLD/NASH in obese patients.

2 Patients and Methods

We tested our hypothesis on 184 patients; 28 patients underwent standard surgical sleeve gastrectomy (control group), while 156 patients underwent a novel-modified bariatric surgery, referred to as ELBANNA operation. This surgical intervention preserves the duodenum, proximal jejunum and the terminal ileum and thus preserving the anatomical biliary drainage and enterohepatic circulation (Figure 1). NAFLD and NASH were diagnosed and followed up by routine liver function tests (LFTs), sonographic imaging and CT. Additionally, the excessive weight loss (EWL) phase, nutritional supplements, intestinal motility disorders and liver condition were determined and followed

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up for the successive 3 years post-surgery.

NAFLD either with or without NASH significantly reversed

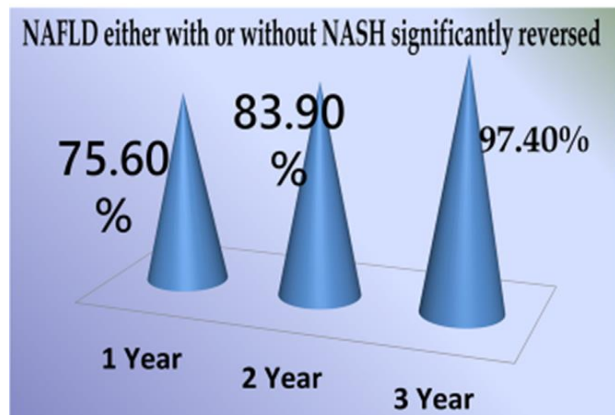


Figure 1: Elbanna Group at 12, 24 and 36 months.

3 Statistical Analysis

The descriptive data were summarized as frequencies, percentages, and mean with standard deviations (SD). We have applied Chi-square test to compare the associated factors quantitative variables. Difference were considered statistically significant when p-value <0.01. The model's discriminatory ability was verified through the operational characteristic curve, and the Hosmer-Lemeshow test was applied to check the calibration of model. All the statistical analysis were conducted using SPSS software, version 22.0 (IBM, Somers, NY, USA).

4 Results

We selected 184 patients randomizely, all of them had NAFLD /NASH, 156 NAFLD patients treated with ELBANNA Bypass operation, 122 females (78.2%), 34 males (21.8%). All 156 patients showed significant EWL with no significant decrease in minerals, vitamins or proteins level and no vitamins or albumin supplementation was required [15]. Importantly, NAFLD either with or without NASH significantly reversed in 118 (75.6 %), 131 (83.9 %), and 152 (97.4 %) of patients 12, 24 and 36 months after ELBANNA operation, respectively. By contrast, among 28 NAFLD control patients, only 7 patients (25%) showed improved liver condition 24 months after standard bariatric sleeve gastrectomy. P-Value is < .00001.

Table 1: Comparison between Elbanna and Sleeve Gastrectomy; 12, 24 and 36 months.

Follow Up	12 months	24 months	36 months
Elbanna Operation	75.5% (118/156)	83.9% (131/156)	97.4% (152/156)
Sleeve Gastrectomy	-	-	25% (7/28)

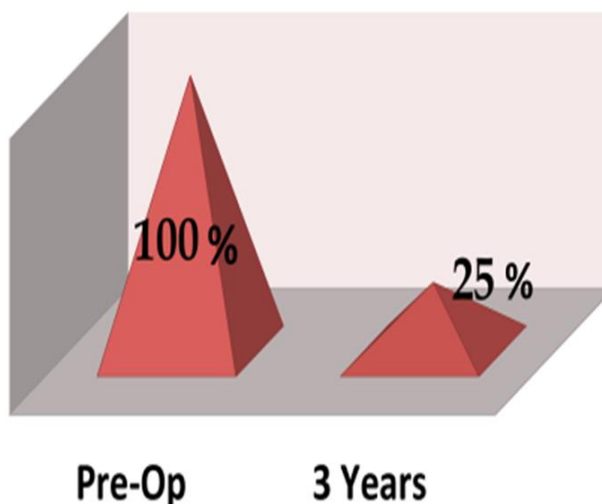


Figure 2: Sleeve Gastrectomy Group pre-operative and 24 months.

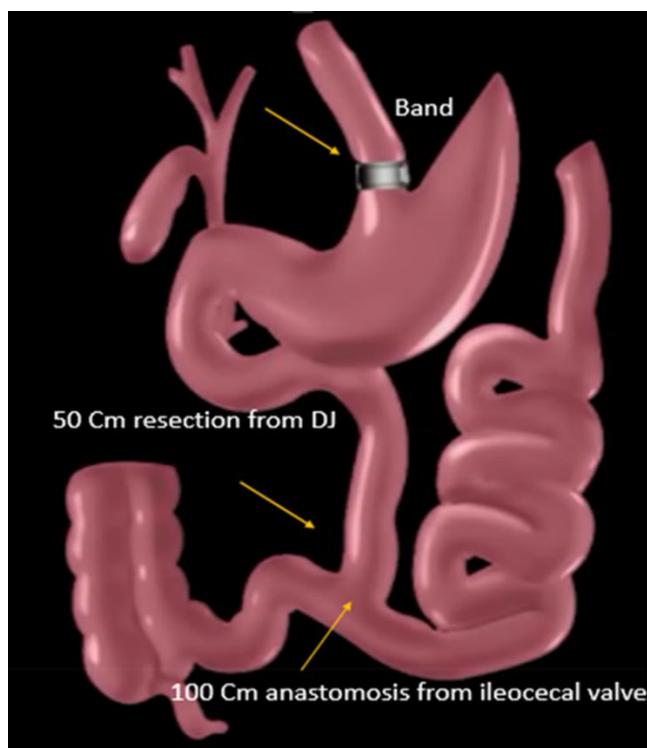


Figure 3: Elbanna bariatric Operation.

5 Discussion

Nonalcoholic fatty liver disease (NAFLD) is one of the most common causes of chronic liver disease worldwide, and morbid obesity is strongly associated with its development. NAFLD is subdivided into nonalcoholic fatty liver (NAFL), hepatic steatosis without inflammation, and nonalcoholic steatohepatitis (NASH) which is associated with inflammation and can be indistinguishable histologically from alcoholic steatohepatitis. Multiple therapies have been investigated for the treatment of nonalcoholic fatty liver

disease (NAFLD). Weight loss is the only therapy with sufficient evidence, furthermore regular coffee consumption may prevent liver inflammation/fibrosis. Patients with simple steatosis may still develop NASH and fibrosis progression. All patients with NAFLD should undergo periodic assessment and lifestyle modification. Weight reduction is associated with non-progressive disease. Furthermore those who develop cirrhosis and have complications (e.g., ascites, variceal bleeding) or a model for end-stage liver disease (MELD) score ≥ 10 , should be referred for a liver transplantation evaluation [8-10].

Recently, histologic improvement has also been observed in some patients with NAFLD or NASH after bariatric surgery. However, the data are inconsistent and possibly biased. In some observational studies, fibrosis may be progressive. At this time, it is generally uncertain whether it is advisable to perform a bariatric operation specifically for the purpose of improving NAFLD or NASH, nor is the optimal bariatric procedure yet identified [11]. Recently a novel bariatric surgical technique published in *Medicine*©, Baltimore, USA, by Elbanna and his colleagues showed the first ever bariatric bypass to treat complicated childhood obesity, additionally the child had fatty liver before the operation and six months post-operative the patient showed average liver condition. Elbanna operation shows promise in both adulthood and childhood bariatrics. This technique is designed to maintain good digestion, better satiety and selective absorption with fewer medical and surgical complications. The Elbanna procedure preserves the duodenum, proximal jejunum, and terminal ileum, along with the anatomical biliary drainage and enterohepatic circulation. In addition, fundal resection is performed to obtain the maximum weight loss. [12-15], Figure [3]. Presence of hyperechoic liver of fatty accumulation architecture with considerable enlargement is a radiological or / and sonographic picture of NAFLD of those denied alcohol consumption, furthermore hyperechoic liver and hepatic coarseness without explained elevation of liver enzymes is highly suggestive of NASH. Following up patients before and after bariatric surgeries of Elbanna operation and SG showed a significant improvement of NAFLD/NASH condition. We tested our hypothesis on 184 patients; 28 patients underwent standard sleeve gastrectomy bariatric surgery (control group) while 156 patients underwent a novel-Elbanna bariatric surgery, Among 156 NAFLD patients treated with ELBANNA operation, 122 females (78.2%), 34 males (21.8%).

All 156 patients showed significant EWL with no significant decrease in minerals, vitamins or proteins level and no vitamins or albumin supplementation was required post-operative [15]. Importantly, NAFLD either with or without NASH significantly reversed in (75.6 %), (83.9 %), and (97.4 %) of patients 12, 18 and 24 months after ELBANNA operation, respectively. By contrast, among 28 NAFLD control patients, only 7 patients (25%) showed improved liver condition 36 months after standard bariatric sleeve gastrectomy. The results may clue out progressive

NASH in obese patients, furthermore treatment obesity related -comorbidities such as cardiovascular diseases, hormonal, orthopedic and psychological disorders.

In conclusion, Bariatric bypass operation would be highly recommended for obese patients who develop NASH to avoid NASH related- cirrhosis and a future need of liver transplantation. We believe that Bariatric bypass surgical techniques may be considered the definitive clue in NAFLD/NASH conditions compared with SG in the near future .

6 Limitation of the Study

Hence we have not perform liver biopsy , our research findings depended mainly on clinical, laboratory and sonographic / radiological evaluation of NAFLD/NASH diagnosis, however we believe in another cohort study would perform liver biopsy to evaluate the degree of such hepatic inflammation or early cirrhosis pre bariatric with comparable histological degree of regression post bariatric surgery , SG group was evaluated only at 36 months post-operative. Moreover our clinical experience evaluated all the information mentioned in the study in details, furthermore multicenter study with different bypass techniques is much encouraged comparing Elbanna with other surgeries, additionally we suggest that patients' livers should be evaluated for more years followed Elbanna operation (e.g. ; 10-20 years), to evaluate the overall liver condition post ilio-Jujunal bypass, may lead to subsequent liver injury, furthermore the operation still in much controversial debate for such ilio-jejunal anastomosis.

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