

RESEARCH ARTICLE

Long-term Changes in Liver Enzymes and Coagulation factors Following Bariatric Surgery

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ABSTRACT

Background: Changes in metabolic and hepatic parameters following weight loss therapeutic interventions, especially bariatric surgery, have been shown in various studies, however, the results of the reduction or increase in liver markers and enzymes have been highly controversial. The aim of this study was to evaluate the changes in liver enzymes and coagulation parameters over five years after bariatric surgery.

Methods: This retrospective cohort study was conducted on 40 consecutive morbid obese patients who underwent bariatric surgery at the two educational hospitals in Tehran between 2006 and 2016. In initial laboratory assessment, the serum levels of direct and total bilirubin, aspartate aminotransferase (AST), alanine aminotransferase (ALT), and alkaline phosphatase (ALP), as well as coagulation factors (PT and INR) were assessed and the tests were repeated about five years later.

Results: The changes in all indices remained insignificant 5 years after bariatric surgery as compared to before operation. Regarding the findings in liver fibroscan, the mean Fibroscan score was 6.07 ± 0.98 and the mean CAP score was 15.34 ± 14.13 .

Conclusion: Liver function markers such as liver enzymes and coagulation factors turned to normal range over five years of bariatric surgery. In other words, changes in the above parameters occur in the short term after surgery leading compensatory recovery in long-term.

KEYWORDS:

Long-term Changes, Liver Enzymes, Coagulation, Bariatric Surgery.

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INTRODUCTION

Despite the development of health systems and economic burdens on societies, obesity remains a global problem [1]. In 2005, 23.2% of the adult population in the world was overweight and about 9.8% were obese. Projections are expected to increase the prevalence of overweight and obesity to 1.35 billion and 573 million people by 2030 [2]. Obesity is associated with a range of chronic diseases such as fatty liver, cardiovascular and renal disorders, in which hepatic and metabolic disorders are at the forefront of these diseases [3]. The onset of liver disorders resulted from obesity sometimes

extends to advanced stages of liver failure and even cirrhosis [4, 5]. By introducing therapies for obesity, such as bariatric surgery, the possibility of decreasing the prevalence of obesity and its consequences are also provided. In this regard, specialists have always considered the occurrence of liver disorders, especially liver cirrhosis following the surgical treatment of obesity. A study among bariatric surgeons shows that about 39% of them during the course of bariatric surgery unexpectedly discover cirrhosis in the patient [6]. More importantly, the presence of cirrhosis often interferes with surgical outcomes. Recent studies mainly focused on the effect of bariatric surgery on liver function. There are still many

uncertainties about the mechanism of bariatric surgery that affects liver dysfunction or even liver cirrhosis. Even sometimes, not only bariatric surgery has not resulted in or exacerbates liver dysfunction, but also led to its improvement. Overall, it seems that the relationship between bariatric surgery and the occurrence of liver dysfunction can be described from three perspectives: 1) acute and sudden weight loss, 2) acute protein-calorie malabsorption, and 3) digestive microbiota dysfunction and bacterial overgrowth.

It can be pointed out as a general conclusion that because of the nature of the bariatric surgery itself and also because of the sudden change in weight following this surgery, the occurrence of progressive liver function impairment and even liver failure in the context of bariatric surgery is inevitable. This can be created and exacerbated by the accumulation of hepatic fatty acids, the exacerbation of the fatty acid peroxidation, the activity of inflammatory processes, and the change in the function of the hepatic-intestinal axis. Overall, the change in liver function especially liver enzymatic condition following bariatric surgery should be more studies. The present study aimed to assess the postoperative change in liver enzymes and other biomarkers related to liver function following bariatric surgery.

METHODOLOGY

This retrospective cohort study was conducted on 40 consecutive morbid obese patients who underwent bariatric surgery at the two educational hospitals in Tehran between 2006 and 2016. Baseline characteristics including demographics and anthropometric indices were collected on admission. In initial laboratory assessment, the serum levels of direct and total bilirubin, aspartate aminotransferase (AST), alanine aminotransferase (ALT), and alkaline phosphatase (ALP) were assessed and the tests were repeated about five years later. To determine the liver functional status, liver fibroscan test was also reviewed.

For statistical analysis, results were presented as mean \pm standard deviation (SD) for quantitative variables and were summarized by absolute frequencies and percentages for categorical variables. Normality of the data was analyzed using the Kolmogorov-Smirnoff test. The change in liver functional parameters after surgery compared to before treatment was assessed by the paired t test or Wilcoxon test. For the statistical analysis, the statistical software SPSS version 16.0 for windows (SPSS Inc., Chicago, IL) was used. P values of 0.05 or less were considered statistically significant.

RESULTS

In total, 40 patients were studied and the changes in hepatic parameters 5 years following procedure were assessed. The mean age of participants was 37.33 ± 8.37 years, the mean BMI was 42.24 ± 2.13 kg/m² and 62.5% were male. As shown in (Table 1), with regard to the changes in both liver enzymes and coagulation factors, the changes in all indices remained

insignificant 5 years after bariatric surgery as compared to before operation. Regarding the findings in liver fibroscan, the mean Fibroscan score was 6.07 ± 0.98 and the mean CAP score was 15.34 ± 14.13 . The (Table 2) describes the details of fibroscan study.

DISCUSSION

Changes in metabolic and hepatic parameters following weight loss therapeutic interventions, especially bariatric surgery, have been shown in various studies, however, the results of the reduction or increase in liver markers and enzymes have been highly controversial. In other words, in both the short and long term, some studies have seen an increase in the level of liver enzymes (exacerbation of liver dysfunction), and in some other studies, we have seen reduce of liver enzymes (liver function improvement). The aim of this study was to evaluate the changes in liver enzymes and coagulation parameters over five years after bariatric surgery. Liver function tests were also evaluated through liver fibroscan. The findings showed that changes in liver enzymes (ALT, AST), changes in total bilirubin and direct bilirubin concentrations, and changes in PT and INR coagulation indices after 5 years of bariatric surgery were not statistically significant. This finding can be interpreted in two ways. Firstly, as evidenced by some studies, the decrease or increase in changes in liver markers after bariatric surgery is mainly transient and reversible, and since the time of surgery, liver status returns to normal. This, of course, does not include the rare cases of liver cirrhosis. Because our study evaluates the five-year variation of these markers after surgery, therefore, the return of liver status during this period will also be expected. The second issue is that the selection of candidates for bariatric surgery was mainly focused on the selection of people who had no evidence of a history of chronic systemic diseases, especially liver and metabolic diseases, and therefore the risk of changes in liver function in these patients will be minimized. It should be noted that, of course, the insignificant changes made during this period can be influenced by some study limitations, such as the small volume of the study, and thus achieving more reliable results will depend on a higher sample size employment.

As previously mentioned, the results of previous studies were in favor of exacerbation of liver dysfunction and some benefited to improve liver function following bariatric surgery. In the study of Motamedi et al., changes in the level of liver enzymes in the months 0, 6, 12 and 24 after surgery were evaluated. In this study, a decrease in liver enzymes levels in both Sleeve and Bariatric techniques was developed within 24 months, but no information was available on enzyme changes over the years after surgery [7]. In Johansson et al study, BMI, ESR, WBC, ALT, and GGT showed a significant reduction in surgery after 1 year, while magnesium levels showed a significant increase [8]. In a study by Burza et al., compared with the non-surgical group, bariatric surgery led to a decrease in ALT and AST levels during 10 years of operation, which was completely in contradiction with our study [9]. In a study by

Eilenberg et al., the patients had a liver dysfunction after about 15 months of surgery. The increase in AST and ALT, coagulation impairment, thrombocytopenia and hypoblastoma were observed in 70%, 80%, 70% and 100% of patients, respectively [10], which was very significant in our study. In the study of Saranita et al., liver function impairment was observed after the operation, and remained within three weeks, but then returned to normal function [11] which was more or less consistent with our study. Firstly, changes in the level of early liver enzymes are predictable after obesity surgery, but are mainly restored to a normal condition in a short time period, except in some limited cases that can aggravate the disorder and ultimately lead to cirrhosis. Of course, in assessing the effect of surgery on liver function, some important factors including type of surgical technique, the status of liver markers before surgery, surgeon's experience, preoperative metabolic status, and also the type of surgery, including open or laparoscopic, should also be considered.

CONCLUSION

As a final result, liver function markers such as liver enzymes and coagulation factors turned to normal range over five years of bariatric surgery. In other words, changes in the above parameters occur in the short term after surgery leading compensatory recovery in long-term.

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Table 1: The change in liver parameters following bariatric surgery

Parameter	Before surgery	5 years after surgery	P value
ALT	32.05 ± 10.87	31.85 ± 11.82	0.877
AST	36.10 ± 12.91	36.52 ± 11.46	0.805
ALP	201.85 ± 58.44	188.57 ± 45.60	0.120
Total bilirubin	1.06 ± 0.24	0.19	0.196
Direct bilirubin	0.41 ± 0.12	0.39 ± 0.08	0.291
INR	2.42 ± 5.60	1.18 ± 0.27	0.165
PT	17.87 ± 4.67	19.05 ± 3.14	0.136

Table 2: The results of liver fibro scan

Fibroscan score	6.07 ± 0.98
Metavir histological index	
F0	84.4%
F1	12.5%
F2	3.1%
CAP score	259.12 ± 14.32
steatosis percent	15.34 ± 14.13
steatosis stage	
Stage 0	75.0%
Stage 1	9.4%
Stage 2	12.5%
Stage 3	3.1%