The Effects on Oxidative DNA Damage of Laparoscopic Gastric Band Applications in Morbidly Obese Patients

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INTRODUCTION

Oxidative stress is a disturbance in the oxidant-antioxidant balance leading to potential cellular damage. It is well known that ROS cause damage to DNA. Among the various forms of oxidative DNA damage, 7,8-dihydro-8-oxoguanine (8-oxoguanine, 8-oxo Gua) is a major form and a useful marker of cellular oxidative stress. The marker 8-hydroxydeoxyguanosine (8-OHdG) is useful in estimating DNA damage induced by oxidative stress. There are data that indicate the increased oxidative stress in human obesity that may further contribute to the development of atherosclerosis or other cardiovascular diseases (1-4). Protein and thiol oxidative stress was improved by weight loss after LAGB in the short-term (5).

We were unable to find data in the literature regarding the effects of LAGB on oxidative DNA damage in morbidly obese patients. The objective of this study is the difference in oxidative DNA damage at post-operative month 6 to be determined in patients received gastric banding upon morbid obesity diagnosis. We consider it as a contribution for the studies headed to the treatments for the morbid obesity, one of the current health issues, and accompanying diseases.

MATERIAL AND METHODS

In this study conducted in I.U. Cerrahpasa Faculty of Medicine, Department of General Surgery, 20 patients with BMI: 46.82 ± 4.47 who have received laparoscopic gastric banding upon morbid obesity diagnosis and a control group of 20 healthy volunteers with normal BMI (22.52 ± 2.08 kg /m²) were enrolled. The study was approved by the Ethical Committee on human research of Istanbul University, Cerrahpasa Medical Faculty. Written informed consent was obtained from all subjects. Blood and urine samples were collected preoperatively and at postoperative month six for the patient group, and once for the control group. 8-OHdG levels have been evaluated by ELISA method.

Statistical analyses

Data were analysed by using the SPSS for Windows (Version 10, SPSS) statistical software package. Data are presented as the mean ± standard deviation (SD). Student's t-test was used for comparing results. The two-sample paired Wilcoxon signed rank test was used to compare the pre-op and post-op values of parameters of morbidly obese group. Correlations were calculated using Spearman rank-order correlation coefficients. P< 0.05 was considered statistically significant.

RESULTS

The principal anthropometric and biochemical data of the morbidly obese and control are summarized in Table 1 and Table 2. There were no correlations between pre- or postoperative BMI and 8-OHdG levels.

Table 1. Clinical measurements and plasma characteristics in controls and morbidly obese patients (baseline)

	Controls (M/F: 10/10)	Morbidly obese Baseline (M/F: 8/12)	P*
Age (year)	40.70±12.38	44.25±12.04	NS
Body weight (kg)	65.55±9.86	132.40±16.28	0.001
BMI (kg/m²)	22.52±2.08	46.82±4.47	0.001
Serum 8-OHdG (ng/ml)	1.86±1.92	2.10±2.32	NS
Urinary 8-OHdG (ng/ml)	7.84±7.04	21.02±28.84	0.014

Values are presented as (mean ± SEM)
BMI: Body Mass Index
P<0.05 statistical significance
NS: Not Significant

Table 2. Plasma Ghrelin, leptin and Orexin-A levels in morbidly obese patients baseline (preoperative) and 1 after laparoscopic gastric band applications.

	Baseline (n: 20)	Six month after operation (n: 20)	p
Body weight (kg)	132.40±16.28	107,20±16,47	0.000
BMI (kg/m²)	46.82±4.47	37,89±4,84	0.000
Serum 8-OHdG (ng/ml)	2.10±2.32	1,175±0,30	0.000
Urinary 8-OHdG (ng/ml)	21.02±28.84	8,70±8,12	0.000

8-OHdG: 8-hydroxy-2-deoxyguanosine

CONCLUSION

- *The oxidative DNA damage was increased by the morbid obesity, but this increase is not related to weight gain, and it is more evident than serum when determined from urine samples.*
- *After LAGB surgery due to the morbid obesity the 8-OHdG levels is declined by surgery both in serum and urine.*
- *Additionally, LAGB improved oxidative DNA damage by weight loss in the short-term.*
- *Although more studies are needed, the evidence available favours the former explanation.*

REFERENCES

1. *Bray GA, Tartaglia LA. Medicinal strategies in the treatment of obesity. Nature 2000;404:672-77.*
2. *Kasai H, Kawai K, Li YS. Analysis of 8-OH-dG and 8-OH-Gua as Biomarkers of Oxidative Stress. Genes and Environment 2008;30: 33–40.*
3. *Heather K.V, Innes K.E, Vincent K.R. Oxidative stress and potential interventions to reduce oxidative stress in overweight and obesity. Diabetes, Obesity and Metabolism 2007; 9: 813–839.*
4. *Sjöström L, Gummesson A, Sjöström C.D, Narbro K, Peltonen M, Wedel H et al. Effects of bariatric surgery on cancer incidence in obese patients in Sweden (Swedish Obese Subjects Study): a prospective, controlled intervention trial. Lancet Oncol 2009; 10: 653–62.*
5. *Uzun H, Konukoglu D, Gelisgen R, Zengin K, Taskin M. Plasma protein carbonyl and thiol stress before and after laparoscopic gastric banding in morbidly obese patients. Obes Surg. 2007;17:1367-73.*