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POTENTIAL ADDITIONAL EFFECT OF SURGICAL REMOVAL OF OMENTAL FAT ON METABOLIC MARKERS AND BODY MASS INDEX IN EARLY STAGE GYNECOLOGIC MALIGNANCIES

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Abstract

Obesity is an important cause of death globally. By the year 2015, approximately 2.3 billion adults will be overweight. It is an independent risk factor for many chronic diseases. To protect from these complications many medical and surgical treatment strategies were implemented for weight reduction. The purpose of the present study is to determine whether surgical reduction in VAT through omentectomy has therapeutic metabolic advantages in overweight or obese patients.

Introduction

Obesity is defined by the body mass index (BMI: weight (kg) / height^2 (m^2) ; BMI : 25 – 29.9 kg/m^2 overweight , BMI ≥30 kg/m^2 obese). Obesity is an important cause of death globally. By the year 2015, approximately 2.3 billion adults will be overweight [1].

Adiposity is defined as excessive adipose tissue. Those with adiposity are characterized as being overweight or obese. It is an independent risk factor for many chronic diseases like hypertension, dyslipidemia, lower extremity degenerative joint disease and diabetes mellitus(DM). To protect from these complications many medical and surgical treatment strategies were implemented for weight reduction [2,3,4 and 5].

There are two groups of fat depots in human body; visceral adipose tissue (VAT) and subcutaneous adipose tissue (SAT). The VAT is more metabolically active than SAT and these adipose tissues differ in processes involving lipolysis, lipogenesis and differ in the secretion of cytokines, enzymes, hormones, immune molecules and proteins[6].

Recent studies showed that reduction of subcutaneous adipose tissue through large volume of liposuction had no effect in humans [7], but omentectomy resulted in marked improvements in the metabolic parameters in animal studies [8,9 and 10]. Effects of omentectomy in humans are controversial. Some studies showed significant improvements in oral glucose tolerance, BMI, insulin sensitivity, fasting glucose and insulin levels, while other studies failed to demonstrate an improvement [11,12 and 13].

A lot of major abdominal surgical procedures are undertaken every year worldwide in obese patients. This may be an opportunity for performing omentectomy to improve their metabolism. The purpose of the present study is to determine whether surgical reduction in VAT through omentectomy has therapeutic metabolic advantages in overweight or obese patients.

Materials and methods

This study was conducted at Izmir Ege Gynecology and Obstetrics Teaching and Research Hospital. Patient records of women who had omentectomy between January 2011 and January 2013 were collected from hospital database. These women were checked for the presence of metabolic markers [glucose, C-reactive protein(CRP), total cholesterol, LDL- cholesterol, HDL- cholesterol, triglyceride) and BMI. Women with adequate metabolic marker and BMI levels, measured before and 3 and 12 moths after omentectomy were included in the study.

The study population was consisted of women with early stage (stage 1) gynecologic malignancies (including ovary, endometrium and cervix cancer), between 32 and 73 years old, with or without type 2 DM and with a body mass index between 24 and 34. Exclusion criteria were as follows: Advanced stage gynecologic malignancy, adjuvant chemotherapy or radiotherapy and insufficient data.

None of the participants took medications that can affect metabolism other than diabetes medications. Participants who had type 2 DM were being treated with oral hypoglycemic agents and none of them were taking insulin during metabolic tests.

The study was approved by the local ethics committee. Analyses were carried out with Predictive Analytics Software, version 18.0. (SPSS, Chicago, IL). All datas were tested for normality according to the Kolmogorov-Smirnov test. The effect of omentectomy was assessed by using repeated measures analysis of variance. Differences between time points (before, 3 and 12 months after surgery) were assessed with statistical contrasts. Results are reported as means with 95% confidence intervals. A p value<0.05 was considered statistically significant.

Results

A total of 79 omentectomy was performed between year 2011 and 2013. A total of 28 patients excluded from study due to advanced stage malignancy (n=14) and adjuvant therapy necessity and due to insuffient datas (n=14). Omentectomies were performed with tissue sealing system LigaSure Atlas™. No intraoperative complications related to the omentectomy occurred during or after the operations. The mean weight of the omentum tissue removed was 495.8 g (230-880). Effect of omentectomy on BMI and metabolic variables before and after the operation were summarized in Table 1.

None of the metabolic variables improved after omentectomy compared with baseline. The BMI of the subjects were stable during the study (maximum 5% change). The mean serum glucose, total cholesterol, CRP, HDL-cholesterol and triglyceride levels decreased but LDL-cholesterol levels were incresed after omentectomy but these results were not statistically significant.

Discussion

Several clinical studies have focused on the metabolic effect of the reduction in the VAT [14,15 and 16]. In multiple animal studies omentectomy resulted in marked improvements in the metabolic parameters but human studies have mixed results [10, 13]. In most of the human studies omentectomy has been performed with bariatric surgery such as laparoscopic gastric banding or laparoscopic Roux-en-Y gastric bypass . So it is difficult to determine the pure effect of omentectomy in metabolic parameters. A previous study by Fabbrını et al. only performed laparoscopic omentectomy to 10 obese adults but body weight and metabolic variables did not change 3 months after omentectomy [13].

Our study is the first that examine the therapeutic metabolic advantages of omentectomy performed for other than obesity indication. The advantage of our study is that BMI of all subjects were stable during the study period that BMI did not act as a confounding factor to the impact of omentectomy on metabolic variables. But none of the metabolic variables improved 3 months or 12 months after omentectomy in our study. This is likely attributable to previous findings that ; VAT is not a major source of free fatty acids (FFA) in systemic circulations, and is unlikely to cause metabolic dysfunction by an FFA-mediated mechanism because most of the FFA in the portal vein are derived from lipolysis of subcutaneous fat, which enter the portal circulation after passage through the splanchnic bed[17,18].These findings are consistent with our observation that omentectomy does not improve metabolic variables.The mechanism responsible for the relationship between VAT and metabolic dysfunction is not known.

Instead of VAT removal, large amounts of SAT removal with abdominal liposuction have been studied in many studies. But the procedure does not significantly improve insulin sensitivity, serum concentrations of

inflammatory markers, or other metabolic markers [17,18]. Porter et al. demonstrated that, subcutaneous abdominal fat is not associated with a linear increase in the prevalence of risk factors for cardiovascular diseases [17].
An important limitation of our study is that we were only able to remove the greater omentum, which weighed approximately 495.8 gr. Therefore, it is possible that removing a greater amount of VAT could have resulted in beneficial metabolic effects. However, we believe this is unlikely because our results do not even show a slight improvement in metabolic parameters after omentectomy.
In conclusion, our data demonstrate that reducing VAT by omentectomy is not a useful approach for improving the metabolic variables. These results suggest that increased VAT mass is not an important cause of metabolic dysfunction and omental weight which was removed is not important for the metabolic improvement.

Conclusion

Our study is the first that examine the therapeutic metabolic advantages of omentectomy performed for other than obesity indication. Our data demonstrate that reducing VAT by omentectomy is not a useful approach for improving the metabolic variables.

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Table 1. Effect of Omentectomy on Body Weight and Metabolic Variables

Variables	Before omentectomy	3 months after omentectomy	12 months after omentectomy	*P* value
Body mass index	26.5 (22-33)	26.3 (23-33)	26.6(24-31)	0.708
C-reactive protein (µg/mL)	2.48(1-6)	1.98(1-4)	2.32(1-6)	0.692
Glucose (mg/dL)	111(76-321)	105 (68-201)	102(69-172)	0.076
Total cholesterol (mg/dL)	203 (104-288)	194(112-294)	199(128-265)	0.522
HDL-cholesterol (mg/dL)	51(38-85)	53(29-81)	48(28-74)	0.148
LDL-cholesterol (mg/dL)	132(55-195)	119(68-163)	139(65-222)	0.218
Triglyceride (mg/dL)	188(65-336)	154(76-241)	180(74-255)	0.386