



ORIGINAL ARTICLE

# Differential effects of gastric bypass and banding on the cardiovascular risk profile in morbidly obese subjects: The correlation with plasma apolipoprotein A-IV concentration

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Received 29 May 2012; accepted 8 July 2012

Available online 1 September 2012

## KEYWORDS

Obesity;  
Bariatric surgery;  
Apo A-IV;  
Weight loss;  
Cardiovascular risk factors;  
HOMA-IR

**Abstract** *Background:* Weight loss (5–10%) improves obesity-associated cardiovascular risk factors. The aim of this work was to study the effect of 2 commonly performed bariatric surgical procedures; laparoscopic Roux-en-Y gastric bypass (RYGBP) and laparoscopic gastric band (BAND), on the cardiovascular risk profile in morbidly obese patients and its correlation with the plasma apolipoprotein (apo) A-IV level.

*Patient and method:* This study was carried prospectively on 34 patients scheduled for bariatric surgery. They were randomly assigned into two groups; group 1 = BAND (18 cases), group 2 = gastric bypass RYGBP (16 cases). Both groups were studied preoperatively and twelve months after surgery. Data collected included changes of body mass index (BMI), blood pressure, fasting blood sugar, fasting serum insulin, insulin resistance (HOMA-IR) and lipid profile. In addition, apo A-IV was determined by the Western blot technique.

*Results:* The results demonstrated a highly significant reduction in body weight as determined by reduction in the BMI in both groups I & II compared to preoperative measurements. Moreover, both groups had a significantly lower systolic blood pressure, fasting blood glucose (FBG), fasting serum insulin and HOMA-IR twelve months after operation. The changes in BMI, systolic blood pressure; FBG and HOMA-IR were significantly more in group II than in group I. The lipid profiles in group I & II before surgery were similar. The HDL-cholesterol was significantly higher in both

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Peer review under responsibility of Alexandria University Faculty of Medicine.



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groups I & II 12 months after surgery. In addition, apo A-IV levels increased after surgery in both groups.

*Conclusion:* Both gastric band and gastric bypass are associated with significant improvement of the cardiovascular risk profile, although it is more pronounced after gastric bypass. The improvement correlates well with the increase of apo A-IV in both groups.

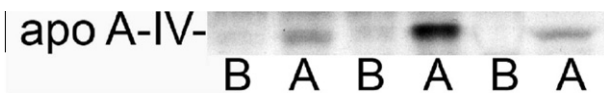
Thus Apo A-IV may play a positive role in improving the cardiovascular risk profile after bariatric surgery.

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**1. Introduction**

Overweight and obesity are rapidly growing to an epidemic proportion all over the world. Severe obesity (BMI  $\geq 40$  Kg/m<sup>2</sup>) is associated with significant medical co-morbidities as well as reduced life expectancy. Health service use and medical costs associated with obesity related diseases have increased dramatically in the last years.<sup>1</sup> Obesity may affect the heart through its influence on known risk factors such as dyslipidemia, hypertension, impaired glucose tolerance, inflammatory markers, obstructive sleep apnea/hypoventilation, and the prothrombotic state. It is well known that weight reduction improves obesity-related cardiovascular risk factors.<sup>2</sup> The use of conventional weight-loss diets and drug therapy has been shown to decrease the risk for conversion from impaired glucose tolerance to overt diabetes and can maintain blood pressure reductions over prolonged periods of follow-up. However, they may be associated with toxic effect, also they are usually ineffective for severe obesity, and bariatric surgery has been proposed as an alternative therapy.<sup>3</sup> More dramatic weight loss after bariatric surgery has been associated with even greater health benefits, especially patients with diabetes<sup>4</sup> (Figs. 1 and 2).

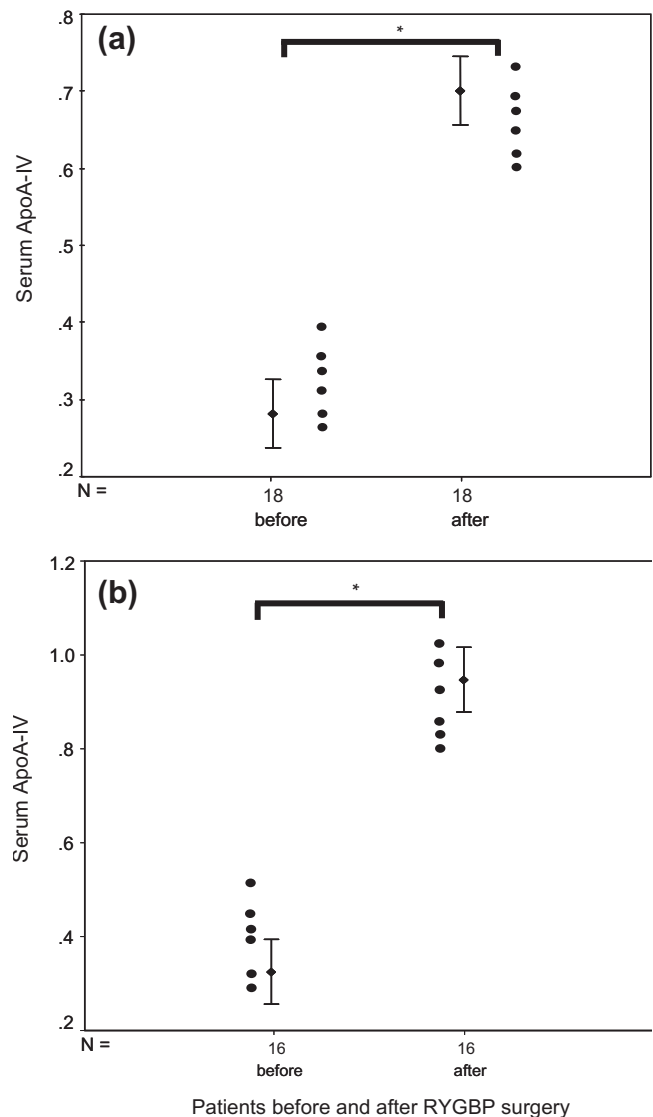
Apolipoproteins, are the protein components of lipoprotein particles, they play an active role in the lipid metabolism. In addition to the well-known apolipoproteins, apo A-IV apolipoprotein is a 46-KD glycoprotein. It is synthesized by the small intestine in response to lipid absorption and the formation of chylomicrons.<sup>5</sup> The majority of apo A-IV in the circulation exists as free protein while the remainder is associated with circulating HDL. It is also produced in the hypothalamic arcuate nucleus. Despite its responsiveness to lipid intake, the exact function for apo A-IV has not yet been widely recognized. It has been proposed to play many functions in vivo including: food intake regulation, demonstrating it to be a satiety factor,<sup>6,7</sup> gastrointestinal motility, structural constituent of lipoproteins, protection against lipid oxidation and atherosclerosis, recently identified as an anti-inflammatory protein and can also mimic many of the roles of apo A-I in terms of lipid binding and cholesterol efflux.<sup>8</sup>



**Figure 1** Shows changes in apo A-IV after surgery as determined by the western blotting technique and detected by densitometry. The Apo A-IV was significantly increased after surgery in both groups, however, the increase (estimated in arbitrary values) was significantly greater in group II (Table 3).

**2. Aim of the work**

The aim of this work was to study the effect of 2 commonly performed bariatric surgical procedures; laparoscopic Roux-en-Y gastric bypass (RYGBP) and laparoscopic gastric band



**Figure 2** (a) Serum apo A-IV densitometric changes (vertical axis) before and after BAND procedure. (b) Serum apo A-IV densitometric changes (vertical axis) before and after RYGBP procedure.

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