A study of the effect of vertical banded gastroplasty on plasma ghrelin secretion in obese patients

Thesis

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Introduction

Obesity represents a global epidemic and is a leading cause of illness and death worldwide. Morbid obesity is the harbinger of many other diseases that affect essentially every system causing serious diseases . Morbid obesity is also a social problem. Obesity bias and discrimination starts in the earliest social contacts of preschool children and progresses through childhood and adolescence into adulthood. This prejudice may contribute to depression, eating disorders, body image disturbance, and other suffering (Suter and giusti ,٢٠٠٥).

Bariatric surgery, is the most effective weight loss therapy available for patients with morbid obesity. Bariatric surgery results in marked and long-lasting weight loss and elimination or improvement of most obesity-related medical complications (Santry et al. ٢٠٠٥).

The vertical banded gastroplasty, introduced in the early ١٩٧٠s, is a relatively fast and simple operation to perform. It consists of the creation of a small upper gastric Pouch with a restricted orifice to the rest of the stomach. It has the advantage of not bypassing, resecting, or rearranging any part of the gastrointestinal tract (Perez et al. ٢٠٠٥).

Ghrelin is a recently discovered orexigenic hormone that is secreted primarily by the stomach and duodenum and has been implicated in both meal time hunger and the long-term regulation of bodyweight. In humans, plasma ghrelin levels rise shortly before and fall shortly after every meal, a pattern that is consistent with a role in the urge to begin eating. Ghrelin receptors are present on the cells in the pituitary that secrete growth hormone, and also have been identified in the hypothalamus, heart and adipose tissue (Patterson et al. ٢٠٠٥).

Ghrelin was discovered as the peptide hormone that potently stimulates release of growth

hormone from the anterior pituitary. It was subsequently determined that ghrelin, along with several other hormones, has significant effects on appetite and energy balance (Kojima and Kangawa ٢٠٠٥).

Aim of the work

The aim of the work is to study the effect of vertical band gastrplasty on the fasting plasma Ghrelin level before and after surgery. To conclude the mechanism by which this procedure causes weight loss in addition to its restrictive effect.

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obesity

OBESITY

History:

In several human cultures, plumpness was associated with physical attractiveness, strength, and fertility. Some of the earliest known cultural artifacts, known as Venus figurines, are pocket-sized statuettes representing an obese female (figure ١). Although their cultural significance is unrecorded, their widespread use throughout pre-historic Mediterranean and European cultures suggests a central role for the obese female form in magical rituals, and suggests cultural approval of this body form. This is most likely due to their ability to easily bear children and survive famine. A large, well-fed body was occasionally considered a symbol of wealth and social status in cultures prone to food shortages or famine. Well into the early modern period in European cultures, it often served this role. But as food security was realized, it came to serve more as a visible signifier of "lust for life", appetite, and

immersion in the realm of the erotic. This was especially the case in the visual arts, such as the paintings of Rubens (١٥٧٧–١٦٤٠), whose regular use of the full female figures gives us the description *Rubenesque* for plumpness. (Carole, ١٩٩٧).

Metrics

In the clinical setting, obesity is typically evaluated by measuring body mass index, waist circumference, and evaluating the presence of risk factors and co morbidities. In epidemiological studies, body mass index alone is used to define obesity. (Little et al.٢٠٠١)

Body Mass Index:

Body mass index, is a simple and widely used method for estimating body fat. In epidemiology body mass index alone is used as an indicator of prevalence and incidence. Body Mass Index was developed by the Belgian statistician and anthropometrist *(Adolphe Quetelet*). It is

calculated by dividing the subject's weight in kilograms by the square of his/her height in meters. The current definitions commonly in use establish the following values, agreed in ١٩٩٧ and published in ٢٠٠٠:

- **A body mass index less than ١٨.٥ is underweight.**
- **A body mass index of ١٨.٥ - ٢٤.٩ is normal weight.**
- **A body mass index of ٢٥.٠ - ٢٩.٩ is overweight.**
- **A body mass index of ٣٠ - ٣٩.٩ is obese.**
- **A body mass index of ٤٠.٠ or higher is severely (or morbidly) obese.**
- **A body mass index of ٣٥.٠ or higher in the presence of at least one other significant co morbidity is also classified as morbidly obese.**

Body mass index as an indicator of a clinical condition is used in conjunction with other clinical assessments, such as waist circumference. In a clinical setting, physicians take into account race, ethnicity, lean mass, age,

sex, and other factors which can affect the interpretation of body mass index . Body mass index overestimates body fat in persons who are very muscular, and it can underestimate body fat in persons who have lost body mass (e.g. many elderly) (Little et al.٢٠٠١).

Waist circumference

Body mass index does not take into account differing ratios of adipose to lean tissue; nor does it distinguish between differing forms of adiposity, some of which may correlate more closely with cardiovascular risk. Increasing understanding of the biology of different forms of adipose tissue has shown that visceral fat or central obesity (male-type or apple-type obesity) has a much stronger correlation, particularly with cardiovascular disease, than the index alone. The absolute waist circumference (>١٠٢ cm in men and >٨٨ cm in women) or waist-hip ratio (>٠.٩ for men and >٠.٨٥ for women) are both used as measures of central obesity (Little *et al.* ٢٠٠١).

Body fat measurement

An alternative way to determine obesity is to assess percent body fat. Doctors and scientists generally agree that men with more than ٢٥% body fat and women with more than ٣٠% body fat are obese. However, it is difficult to measure body fat precisely. The most accepted method has been to weigh a person underwater, but underwater weighing is a procedure limited to laboratories with special equipment. Two simpler methods for measuring body fat are the skin fold test, in which a pinch of skin is precisely measured to determine the thickness of the subcutaneous fat layer; or bioelectrical impedance analysis, usually only carried out at specialist clinics(Barlow et al.١٩٩٨).

Co-morbid conditions associated with obesity

Obesity contributes to numerous and varied co morbid conditions. Complications can occur in many organ systems, ranging from cardiovascular to respiratory to orthopedic and even ophthalmologic. Overweight and obesity are known risk factors for heart disease, diabetes, hypertension, gallbladder disease, osteoarthritis, sleep apnea and other breathing problems, and some cancers (uterine, breast, colorectal, kidney, and gallbladder). In addition, obesity is associated with pregnancy complications, high blood cholesterol, menstrual irregularities, hirsutism, stress incontinence, psychological disorders, and increased surgical risk. Social discrimination against obese persons has a strong negative effect on their quality of life.

Insulin Resistance Syndrome (Syndrome X).

Obesity is one of a constellation of markers for coronary heart disease and type ٢ diabetes collectively known as Syndrome X, metabolic syndrome, or insulin resistance syndrome. Visceral, or abdominal, fat is believed by many researchers to be more strongly associated with Syndrome X than subcutaneous fat. Abdominal adiposity is an active metabolic tissue and releases fatty acids, which accumulate in the liver and peripheral tissues, reducing the effect of insulin on liver and muscle cells. The free fatty acids are utilized by the muscles at the expense of glucose, causing elevated levels of glucose in the blood that in turn result in increased insulin output by the pancreas . Those individuals unable to produce the large amounts of insulin needed to manage the elevated glucose levels in the blood go on to develop type ٢ diabetes. However, even those individuals who do not develop type ٢ diabetes are at increased risk for coronary heart disease; hyperinsulinemia is associated with the