Recent Modalities in the Surgical Management of Morbid Obesity

Essay

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Table of Contents

List of Abbreviations

ASGB	Adjustable silicon gastric banding
AGB	Adjustable gastric banding
alpha-MSH	Alpha-melanocyte-stimulating hormone
BMI	Body mass index.
BPD	Biliopancreatic diversion.
BPD-DS	Biliopancreatic diversion with duodenal switch.
BE	Band Erosion
CRH	Corticotropin releasing hormone
CCK	Cholecystokinin.
DGBP	Distal gastric bypass.
DVT	Deep venous thrombosis
ERCP	Endoscopic retrograde cholangio-pancreatography
ECL	Enterochromaffin like cells.
FDA	Food and Drug Administration
GE	Gastro esophageal.
GERD	Gastroesophageal reflux disease.
GABA	Gamma aminobutyric acid
GLP1	Glucagon-like peptide-1
GI	Gastro intestinal.
GIA	Gastro intestinal anastomosis.
GRP	Gastrin releasing peptide.
GB	Gastric bypass.
HDL	high-density lipoprotein
IGB	Intragastric ballon.
IGS	Implantable gastric stimulator.
JIB	Jejuno-ileal bypass.

LCD	Low calorie diet
LAGB	Laparoscopic adjustable gastric banding.
LRYGBP	Laparoscopic Roux-en Y gastric bypass
LES	Lower esophageal sphincter.
LGCP	Laparoscopic greater curvature plication.
LASGB	Laparoscopic adjustable silicone gastric banding.
LSG	Laparoscopic sleeve gastrectomy.
LDL	Low-density lipoprotein
LMWH	Low molecular weight heparin
MC4	Melanocentin 4
MCH	Melanocortin Hormone
NASH	Nonalcoholic steatotic hepatitis
NPY	Neuropeptides Y
NSAIDs	Non steroidal anti-inflammatory drugs
PVN	Paraventricular nuclei
POMC	Proopiomelanocortin
PE	Pulmonary embolism
POMC	Proopiomelanocortin
RYGB	Roux-en Y gastric bypass.
SITU	Single-incision trans umbilical.
SILS	Single-incision laparoscopic surgery.
T2DM	Type 2 Diabetes mellitus.
TSH	Thyroid stimulating hormon
VLDL	Very low-density lipoprotein
VLCD	Very low calorie diet
VMN	Ventromedial nuclei
VBG	Vertical banded gastroplasty.
VIP	Vasoactive intestinal peptide.
VTE	Venous thromboembolism.

List of Tables

List of Figures

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Introduction

Obesity is defined by the World Health Organization as abnormal or excessive fat accumulation that may impair health. It is considered a chronic disease. Obesity is now considered to be the second leading cause of preventable death behind cigarette smoking. (***Schauer PR et al., 2007***)

Obesity is defined as a BMI >30 kg/m2, Patients who have a BMI >25 are considered overweight, while a BMI >40 is considered morbidly obese. **(*Cottam et al., 2004*)**

The prevalence of obesity continues to grow at an escalating rate. The World Health Organization estimates that 1.5 billion adults are overweight and that 500 million are defined as clinically obese. **(*Ahima, 2011*)**

Of the several methods for measuring obesity, the most popular and probably most convenient is the body mass index (BMI) .It is calculated by dividing the weight (in kilograms) by the square of the height (in metres). A BMI <18.5 kg ⁄m2 is considered underweight, 18.5–24.9 kg ⁄m2 is considered normal, 25–29.9 kg ⁄m2 is overweight and values >30 kg ⁄m2 are considered obese. Obesity is further divided into three categories, namely Class I (BMI 30–34.9 kg ⁄m2), Class II (BMI 35–39.9 kg ⁄m2) and Class III (BMI >40). The term 'morbid obesity' is reserved for those people with BMI values >40 kg ⁄m2. (***Eknoyan G, 2008***)

Obesity is associated with an increased risk for type 2 diabetes, hypertension, dyslipidaemia, cardiovascular diseases, musculoskeletal disorders (such as osteoarthritis), certain types of cancer, and mortality. **(*Picot J et al., 2009*)**

Despite massive efforts health care providers to influence weight through diet, physical activity, and lifestyle changes, the only effective long-term method for weight loss has been shown to be bariatric surgery. **(*O'Brien PE et al., 2010*)**

The number of bariatric procedures performed in the US increased from 13,386 in 1998 to 220,000 in 2008. Worldwide, 344,000 bariatric surgeries are performed annually. **(*Martin M et al., 2010*)**

Bariatric surgical procedures can be classified as primarily malabsorptive or primarily restrictive. The latter are defined based on mechanical restriction or limitation of the size of the stomach, and include surgical procedures such as laparoscopic adjustable gastric banding and laparoscopic sleeve gastrectomy.this procedure is irreversible, primarily malabsorptive bariatric surgical procedures such as Roux-en-Y gastric bypass. **(*Picot J et al., 2009*)**

Laparoscopic sleeve gastrectomy has recently been identified as an innovative approach to the surgical management of obesity. This procedure has quickly attracted considerable surgical interest because it does not require a gastrointestinal anastomosis or intestinal bypass and it is considered less technically challenging than Roux-en-Y gastric bypass. Laparoscopic sleeve gastrectomy also avoids implantation of an artificial device around the stomach in comparison to laparoscopic adjustable gastric banding. **(*Frezza EE, 2007*)**

Laparoscopic adjustable gastric banding is the least complex bariatric surgical procedure currently available, with a low overall morbidity rate. In addition, the relatively short duration of surgery and hospital stay has made it one of the most commonly performed bariatric surgical procedures in Europe. (***Franco JV et al., 2011*)**

Currently, Roux-en-Y gastric bypass is the most commonly performed bariatric procedure in North America. It functions as both a restrictive and malabsorptive bariatric surgical procedure that produces clinically significant weight loss. (***Suter et al., 2011***)

Aim of the Work

The aim of this work is to discuss and review the recent modalities in management of morbid obesity.

Physiology of Obesity

Regulation of food intake:

Appetite is influenced by many factors that are integrated by the brain, most importantly within hypothalamus. Signals that impinge on the hypothalamic centre include neural afferents, hormones and metabolites. Vagal inputs are particularly important, bringing information from viscera, such as gut distention. Hormonal signals include leptin, insulin, cortisol, and gut peptides such as cholecysto-kinin which sends signals to the brain through the vagus nerve. Metabolites; including glucose can influence appetite as seen by the effect of hypoglycaemia to induce hunger; however, glucose is not normally a major regulator of appetite. These different hormonal, metabolic, and neural signals act by influencing the expression and release of various hypothalamic peptides. ***(Flier, 2001)***

I - Central regulation of food intake:

(1) Sensory signals:

The sight and smell of food generate signals transmitted to the brain by sensory nerves. These signals can simulate eating of preferred foods, or stop ingestion of foods associated with danger of illness. ***(Bray, 2002)***

(2) Hunger and satiety centres:

Stimulation of the lateral hypothalamus, paraventricular nuclei (PVN) causes hyperphagia. On the other hand, stimulation of the ventromedial nuclei (VMN) of the hypothalamus causes complete satiety. Conversely, destructive lesions of the two areas cause opposite results to those caused by stimulation. Therefore, the lateral nuclei of the hypothalamus are known as a feeding centre and the ventromedial nuclei of the hypothalamus as a

satiety centre. The activity of the satiety centre is probably governed in part by the level of glucose utilization of cells within the centre. These cells have therefore been called glucostates. When their glucose utilization is low, and when the arteriovenous blood glucose difference across them is low, their activity is decreased and the individual feels hunger. Vice versa in the feeding centre, if the activity of glucose is increased, the feeding center is inhibited and the individual feels satisfied. ***(Xu et al., 2003)***

(3) Centres in lower brain stem:

The mechanical features of the feeding process (e.g. salivation, chewing of food and swallowing) are all controlled by a centre in the lower brain stem. The function of the hunger centre in the hypothalamus excites the lower centres to act. ***(Guyton and Hall, 1997)***

(4) Limbic system and other neural centres:

Higher centres than the hypothalamus also play important roles in the control of feeding, particularly in the control of appetite. These centres include the amygdale (amygloid nuclei) and the prefrontal cortex which are closely coupled with the hypothalamus. The most important effect of destruction of the amygdala on both sides of the brain is a psychic blindness in the choice of foods. In other words, the animals and presumably the human being as well lose or at least partially lose the appetite control of type and quality of food that they eat. ***(Sandoval et al., 2008)***