Surgical Management of Obesity in Adolescents

Essay

Submitted for fulfillment of master degree in ***general surgery***

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Mohamed Aly Abdelhamid Abdelbaky

Contents

List of Abbreviations

ACCP	:	American College of Chest Physicians
AGB	:	Adjustable gastric band
BDNF	:	Brain-derived neurotrophic factor
BMI	:	Body mass index
CCK	:	Cholecystokinin
DS	:	Duodenal switch
FBT	:	Family-based behavioral treatment/
FTT	:	Failure to thrive
GLP-1	:	Glucagon-Like Peptide -1
GOAT	:	Gastric o-acyl transferase
IIH	:	Idiopathic intracranial hypertension
IR	:	Insulin resistance
LAGB	:	Laparoscopic adjustable gastric band
LEPR	:	Leptin receptor
LSG	:	Laparoscopic sleeve gastrectomy
MC4R	:	Melanocortin4 receptor
MCP-1	:	Monocyte chemo-attractant protein-1
MDT	:	Multidisciplinary team
MI	:	Middle-income
NAFLD	:	Nonalcoholic fatty liver disease

List of Abbreviations (Cont.)

OFC	:	Orbital frontal cortex
PCOS	:	Polycystic ovary syndrome
PP	:	Pancreatic polypeptide
PWS	:	Prader-Willin
PYY	:	Peptide YY
RGB	:	Roux-en-Y gastric bypass
SES	:	Socio-economic status
TNF- α	:	Tumor necrosis factor- α
VBG	:	Vertical banded gastroplasty
VTA	:	Ventral tegmental area

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Surgical Management of Obesity in Adolescents

Abstract

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Introduction: No doubt childhood obesity is a problem. Many have labeled it as an epidemic. In the past, the term "obesity" has only been associated with adults, but this idea has changed, as cases of child obesity are increasing every day. Studies show that childhood obesity has more than tripled in the past 30 years Obesity is a progressive, chronic, and often fatal disease, refractory to most currently available medical interventions. The terms overweight (BMI for age and gender >85th percentile), obese (BMI for age and gender >95th percentile),and extreme obesity (BMI for age and gender >99th percentile) have been used to refer to the increasing weight problem in children. The operations that have been used primarily can be classified as either purely restrictive or a combination of restriction and malabsorption the laparoscopic adjustable gastric band (AGB) and laparoscopic vertical sleeve gastrectomy (LSG) are purely restrictive procedures, and the degree of weight loss with these operations in adults has generally been satisfactory. The LSG is a relatively new operation that produces significant initial weight loss with low operative risk in both adult and pediatric studies. Because it likely does not affect micronutrient absorption, it may be a safe alternative with fewer nutritional risks than Roux-en-Ygastric bypass (RYGB), and also may avoid device-related long-term risks inherent in the AGB procedure **Aim of the work :**The study is conducted to review the best time for intervention, regarding physiological and pshycological maturation, the criteria of selection of the patients for surgical management which are mainly physical and psychological, the best surgical procedure and the outcome of these procedures e.g. of weight loss ,electrolyte and vitamins deficiency and effect on skeletal growth. **Summary** Obesity is defined as abnormal or excessive fat accumulation that may impair health. Pediatric obesity as BMI greater than the 95th percentile for age and sex. Overweight, or at risk for overweight, has been defined as a BMI > 85th percentile. Human obesity is due to a complex interaction among environmental, behavioral, developmental and genetic factors. Risk factors include lack of physical activity, watching television, family history of obesity and socio-economic status. Fat metabolism is controlled through different hormones. Leptin hormones which is produced by adipocytes reduces appetite and its deficiency decrease appetite. Also, gut hormones have important role in fat metabolism .Ghrelin which is neropeptide hormone which is produced from gastric oxyntic glands. Ghrelin is the only gut hormone known to increase our appetite. Both obesity itself and its related co morbidities are all highly heritable. For thorough obesity can be classified according to genetics into: monogenic obesity, syndromic obesity, polygenic obesity and epigenetic obesity. As the prevalence of obesity increases, complications and Co morbidities related to obesity also increases. Complications include type 2 DM, hypertension, nonalcoholic fatty liver disease, skeletal deformities and obstructive sleep apnea.

Key words: Surgical Management ; Obesity ; Adolescents

Introduction

No doubt childhood obesity is a problem. Many have labeled it as an epidemic. In the past, the term "obesity" has only been associated with adults, but this idea has changed, as cases of child obesity are increasing every day. Studies show that childhood obesity has more than tripled in the past 30 years Obesity is a progressive, chronic, and often fatal disease, refractory to most currently available medical interventions ***(Strauss and Pollack, 2001).***

The terms overweight (BMI for age and gender >85th percentile), obese (BMI for age and gender >95th percentile),and extreme obesity (BMI for age and gender >99th percentile) have been used to refer to the increasing weight problem in children ***(Flega et al., 2000).***

Bariatric surgery is currently the most effective means to achieve durable weight loss and amelioration, if not resolution, of most obesity-related comorbidities in severely obese individuals ***(Flum and Dellinger , 2004).***

The earliest report of pediatric bariatric surgery was Randolph and Weintraub's experience with jejunal ileal bypass. Their reported outcomes were similar to those in adults. More specifically, the weight loss was dramatic and sustained and the improvements in quality of life were viewed as excellent. However, the metabolic complications were significant and considered unacceptable by today's standards. Of the many procedures that have been advocated for weight loss ***(Randolph et al.,1974).***

The operations that have been used primarily can be classified as either purely restrictive or a combination of restriction and malabsorption the laparoscopic adjustable

gastric band (AGB) and laparoscopic vertical sleeve gastrectomy (LSG) are purely restrictive procedures, and the degree of weight loss with these operations in adults has generally been satisfactory. The LSG is a relatively new operation that produces significant initial weight loss with low operative risk in both adult and pediatric studies. Because it likely does not affect micronutrient absorption, it may be a safe alternative with fewer nutritional risks than Roux-en-Ygastric bypass (RYGB), and also may avoid device-related long-term risks inherent in the AGB procedure ***(Aggarwal et al., 2007).***

Aim of the work :

The study is conducted to review the best time for intervention, regarding physiological and pshycological maturation, the criteria of selection of the patients for surgical management which are mainly physical and psychological, the best surgical procedure and the outcome of these procedures e.g. of weight loss ,electrolyte and vitamins deficiency and effect on skeletal growth.

Etiology and Risk Factors

Obesity is defined as abnormal or excessive fat accumulation that may impair health. Obesity affects people of all ages in all countries. Paralleling the epidemic of adult obesity are increasing trends in the prevalence and incidence of childhood obesity. The prevalence of overweight children and adolescents doubled from 1980 to 1994 **(Troiano and Flegal, 1998).**

Overall, 1.9 billion adults were overweight and 600 million of them were obese in 2014 covering 39% and 13% of total world's population respectively. This terrifying clinical picture also holds true for children. In year 2013, 43 million children under the age 5 were overweight/obese and this figure expected to reach 60 million by the year 2020 **(de Onis *et al*., 2010).**

Once considered as a problem of developed world, some of the developed countries, succeeded in stopping or slowing down obesity epidemic in children and adolescents owing mostly to the effect of awareness campaigns and public health measures taken to prevent obesity. The prevalence of obesity in USA increased dramatically from 1970's to year 2000 (from 6.5 to 18.0 percent in children, and from 5.0 to 18.4 percent in adolescents) after which time it seems to stabilize and even decrease in some subgroups **(Atay and Bereket, 2016).**

Reviewing the weight and height records of 11.1 million children aged 2-4 years who participated in federally funded health and nutrition programs in 40 states, it was found that from 2008 through 2011, the aggregated obesity prevalence decreased by 0.4-0.9% among all racial/ethnic

groups except American Indians/Alaska Natives **(Pan *et al*., 2015)**

On the contrary, obesity trend is still on rise in low-income and middle-income countries. It has been noted that the prevalence of overweight/obesity in low and middle income countries is similar to that in many western European countries 40 years ago **(Poskitt, 2014)**.

Urbanization, so called westernization with greater possession of domestic appliances as televisions, cars and electronic equipment leading to a sedentary life; food secure environment, easy access to processed food and sugar-sweetened beverages which increases caloric intake could somehow explain this rising trend. The fact that the prevalence tends to be higher in low socioeconomic groups in affluent countries (where calorie-dense processed food are cheap, but healthy fresh food are expensive) whereas higher in high socioeconomic groups in low and middle income countries (where healthy local food (low calorie) and water are more available than processed food, sugar-beverages, fast-food) supports this. Unfortunately, cultural perceptions of obesity indicating good nutrition, wellbeing and beauty together with public unawareness about the future problems related to obesity are the other factors that add to the rising tide of obesity in those countries **(Atay and Bereket, 2016).**

In the Middle-Eastern countries, figure are more heterogenous. Obesity rates are alarmingly high in oil-rich countries, whereas they are lower in the middle-and low income countries **(Atay and Bereket, 2016).**

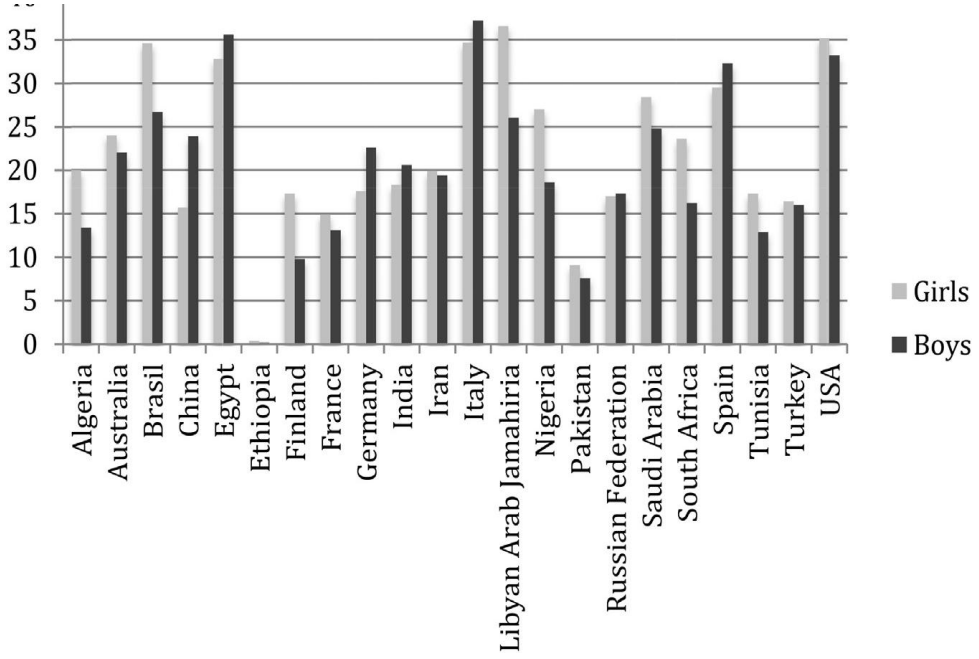

Fig. (1). (data available from http://www.worldobesity.org/resources/trend-maps/).

It is well known that many of the today's obese children and adolescents will become future's obese adults**.** The likelihood of persistence of childhood obesity into adulthood (tracking) depends on the age, the presence of parental obesity and severity of obesity **(Singh *et al*., 2008)**

Obesity affects both physical and emotional health**.** Overweight adolescents develop type II diabetes and cardiovascular problems much more so than their lean peers during childhood and the medical consequences of excess weight among adults (e.g., cardiovascular disease, cancer) are significantly greater in those who were overweight as adolescents **(Hilbert *et al*., 2013)**

In addition, overweight adolescents, as well as overweight adults, suffer from a remarkably unfavorable