SURGICAL MANAGEMENT OF OBESITY IN ADOLESCENCE

Essay

Submitted for partial fulfillment of Master Degree in

General surgery

By

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LIST OF ABBREVIATIONS

AGB	**:**	Adjustable gastric banding
ATP III	**:**	Adult Treatment Panel III
BMI	**:**	Body mass index
BPD	**:**	Biliopancreatic diversion
CDC	**:**	Centers for disease control
Cm	**:**	Centimeters
CRH	**:**	Corticotropin-releasing hormone
CRP	**:**	C-reactive protein
CVD	**:**	Cardiovascular disease
DL	**:**	Deciliter
DM	**:**	Diabetes mellitus
DNA	**:**	Deoxyribo-Nucleic Acid
DS	**:**	Duodenal switch
EBWL	**:**	Excess body weight loss
EEA	**:**	Enteroenteroanastomosis
EWL	**:**	Excess weight loss
FDA	**:**	Food and Drug Administration
FSH	**:**	Follicle stimulating hormone
FTO	**:**	Fat mass and obesity-associated gene
GB	**:**	Gastric bypass
GBP	**:**	Gastric bypass procedure
GEA	**:**	Gastroenteroanastomosis
GERD	**:**	Gastroesophageal reflux disease
GH	**:**	Growth hormone
GI	**:**	Gastrointestinal tract
GIP	**:**	Glucose-dependent insulinotropic polypeptide
GLP-1	**:**	Glucagon-like peptide-1
HDL	**:**	High-density lipoproteins

IB	**:**	Intra gastric Balloon
ICP	**:**	Increased intracranial pressure
IDD	**:**	Intellectual /developmental disabilities
IGF-1	**:**	Insulin like growth factor-1
IIH	**:**	Idiopathic intracranial hypertension
IU	**:**	International unit
K cal	**:**	Kilo-calories
Kg	**:**	Kilograms
Km	**:**	Kilometers
LAGB	**:**	Laparoscopic adjustable gastric banding
lb	**:**	Libra
LDL	**:**	Low-density lipoprotein
LH	**:**	Luteinizing hormone
LRYGBP	**:**	Laparoscopic Roux-en –Y gastric bypass
LSG	**:**	Laparoscopic sleeve gastrectomy
M^2	**:**	Meters squared
µg	**:**	Microgram
mg	**:**	Milligram
MGB	**:**	Mini-gastric bypass
ML	**:**	Milliliters
Mm	**:**	Millimeters
mmol	**:**	Millimole
NAFLD	**:**	Nonalcoholic fatty liver disease
NOTES	**:**	Natural orifice transluminal endoscopic surgery
NPY	**:**	Neuropeptide Y
NSAID	**:**	Non Steroidal Anti-Inflammatory Drugs
OSAS	**:**	Obstructive sleep apnea syndrome
PCOS	**:**	Polycystic ovarian syndrome
PYY	**:**	Peptide tyrosine tyrosine
RYGB	**:**	Roux en Y gastric bypass

RYGBP	**:**	Roux en Y gastric bypass procedure
SG	**:**	Sleeve Gastrectomy
SSS	**:**	Single site laparoscopic surgery
T1DM	**:**	Type 1 diabetes mellitus
T2DM	**:**	Type 2 diabetes mellitus
US	**:**	United States of America
VBG	**:**	Vertical banded gastroplasty
VSG	**:**	Vertical sleeve gastrectomy
WLS	**:**	Weight loss surgery

INTRODUCTION

The prevalence of adolescent obesity has almost tripled over the past 30 years, with an estimated 18% meeting current criteria of being at least overweight. **(Ogden et al, 2006)**

Obesity has been identified as the second most common cause of death after smoking from modifiable behavioral risk factors. **(Mokdad et al, 2005)**

Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health, leading to reduced life expectancy and/or increased health problem. **(Haslam, 2005)**

Like many other medical conditions, obesity is the result of interplay between genetic and environmental factors. Polymorphisms in various genes controlling appetite and metabolism predispose to obesity when sufficient calories are present. **(Poirier et al, 2006)**

Most of obesity related comorbidities are connected by a common thread of decreased insulin sensitivity; hyperlipidemia, hypertension, obstructive sleep apnea, polycystic ovarian syndrome, nonalcoholic steatohepatitis, elevated inflammatory markers, and type 2 diabetes; all have been strongly linked to insulin resistance. **(Reaven, 2005)**

Body mass index (B.M.I) is an indicator for human fat based on an individual's weight and height. B.M.I correlates significantly with body fat, morbidity and mortality; furthermore, recommendations for treatment of obesity are based on B.M.I. It was invented between 1830 and 1850 by Quetelet during the course of developing social physics. **(Eknoyan et al, 2008)**

Body mass index (BMI), which is calculated as weight (in kilograms) divided by the square of height (in meters), is used as a screening tool for both adult and childhood obesity. Although BMI cannot determine body fat content, it has been shown to accurately identify children and teenagers with increased adiposity in a population with fairly high specificity and moderate sensitivity. **(Freedman et al, 2009)**

Educating adolescents about healthy eating behaviors, the importance of physical activity, and sound nutritional practices is paramount to both the prevention and treatment of obesity in this age group. Sometimes, weight maintenance is the soundest course rather than initiating an aggressive weight-loss plan. **(Barlow & Dietz, 1998**)

Untreated overweight and obesity in childhood carries well documented physical and psychological consequences in both short and long term. **(Krebs et al, 2007)**

The current management tools against obesity consist of dietary therapy, pharmacologic therapy and surgical intervention. **(Moya, 2008)**

Bariatric surgery refers to a variety of different procedures that anatomically alter the gastrointestinal tract and result in restriction of stomach capacity, interference with progression of a meal, or diversion of ingested contents. By far, the most common procedures used for adolescents with severe obesity include gastric bypass (GB), adjustable gastric banding (AGB), and the more recently introduced vertical sleeve gastrectomy (VSG), which is being used with increasing frequency. **(Pallati et al, 2012**)

Given the limited effectiveness of lifestyle and pharmacological interventions and the severe degree of obesity in many patients, surgical procedures that have proven health benefits for adults are more commonly being considered for severely obese adolescents. **(Poirier et al, 2011)**

Bariatric surgery is restricted to morbidly obese adolescents and not a rule option for all obese adolescents. **(Woo, 2009)**

Studies suggest bariatric surgery should be considered for adolescent with BMI $\geq$ 40 kg/ m² or $\geq$ 35 kg/ m² with comorbid diseases. **(Michalsky et al, 2012)**

According to physical maturity of the patient, surgery is limited to those over 12 years of age, and should be psychologically mature. **(O'Brien et al, 2010)**

Studies show that bariatric surgery is an effective weight loss tool for adolescents, helping them lose an average of nearly 80% of excess weight and resolve or improve comorbid conditions such as high blood pressure, high cholesterol and metabolic syndrome. **(Inge, 2010)**

AIM OF THE WORK

The aim of the study is to highlight obesity in adolescence as a current disease discussing its definition, aetiologies, effect, and tools of management with special focusing in different surgical procedures applied and their evaluation.

Chapter 1

Definition of Obesity in Adolescence

Body mass index:

BMI and BMI percentile

Overweight and obesity are generally defined by an individual's weight in relation to height. Age and gender –adjusted BMI percentile, which are based on representative samples collected over a 30 year period, are used

BMI=weight (Kg) /height (m^2)

BMI percentile can be calculated by plotting a patient's BMI on age and gender specific growth charts developed by the centers for disease control (C.D.C) and prevention or by using an online BMI percentile calculator. Table (1)

Patients are then classified as underweight, overweight or obese. **(Stef & Wendelin, 2008)**

Table(1):CDC-age & gender-specific BMI recommended classification

BMI category	CDC classification	Recommended Classification
<5th percentile	Underweight	Underweight
5th-84th Percentile	Healthy weight	Healthy weight
85th-94th Percentile	At risk of overweight	Overweight
≥95th Percentile	overweight	Obese
≥ 99th Percentile		Classification of BMI in this percentile should be noted in the patients chart

BMI = Body mass index

CDC = centers for disease control and prevention **(Barlow, 2007)**

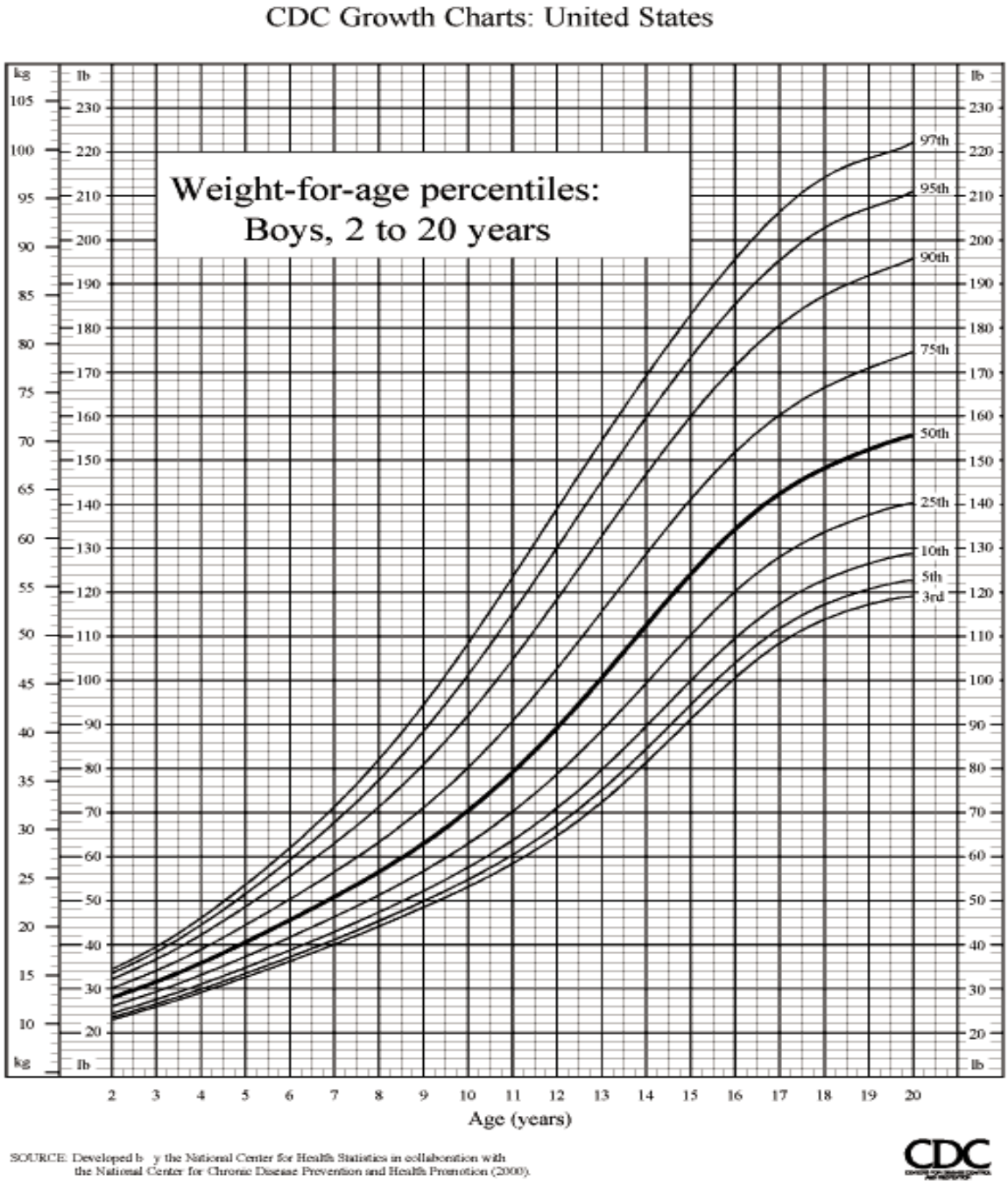

Figure (1): CDC Growth Charts: (Boys)

BMI for age percentile in 2 – 20 years old boys **(Dexter et al, 2008)**

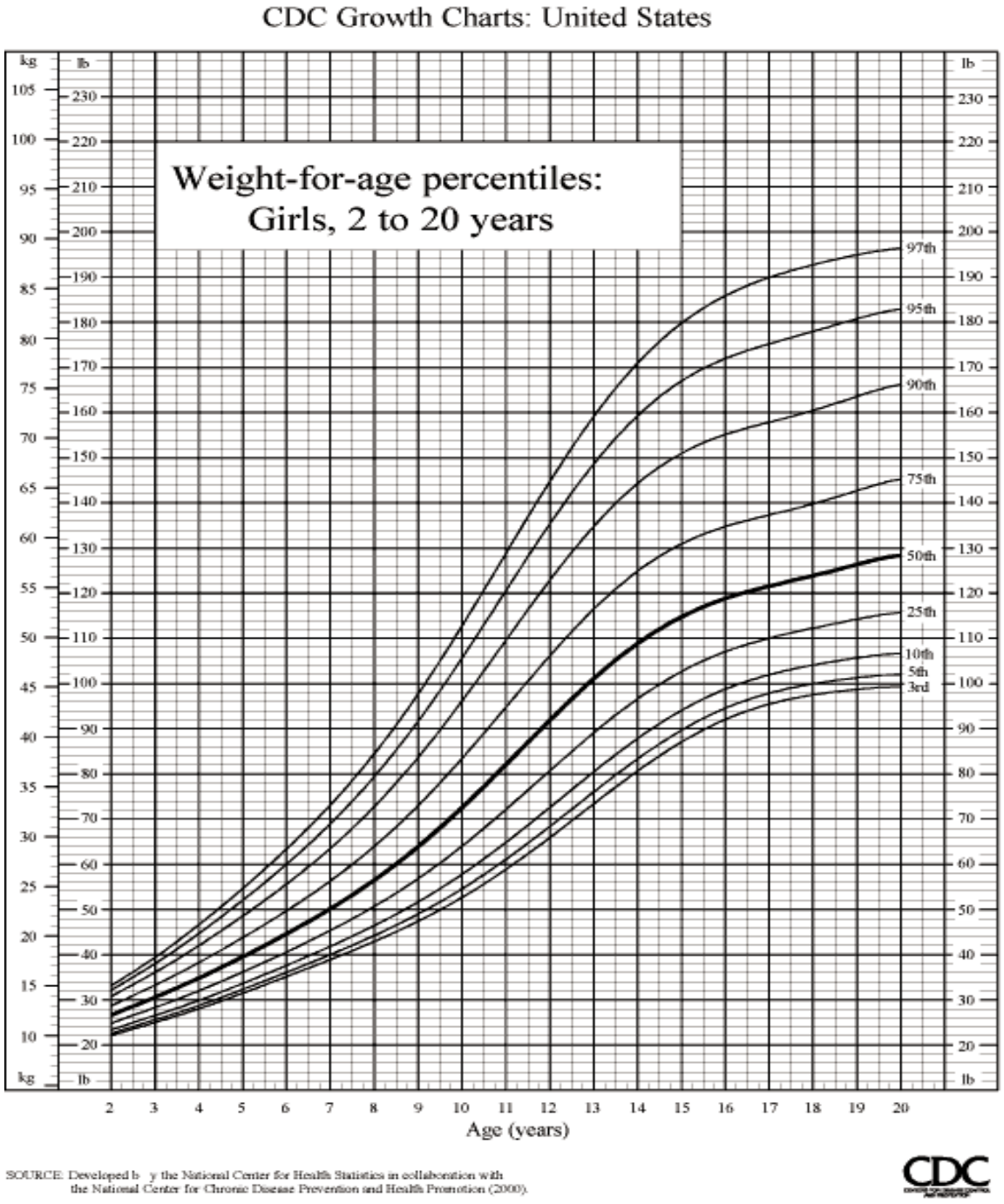

Figure (2): CDC Growth Charts: (Girls)

BMI for age percentile in 2 – 20 years old girls **(Dexter et al, 2008)**

BMI can also be determined by BMI chart, which displays BMI as a function of weight (horizontal axis) and height (vertical axis) using contour lines for different values of BMI or colors for different BMI categories. Figure (3)

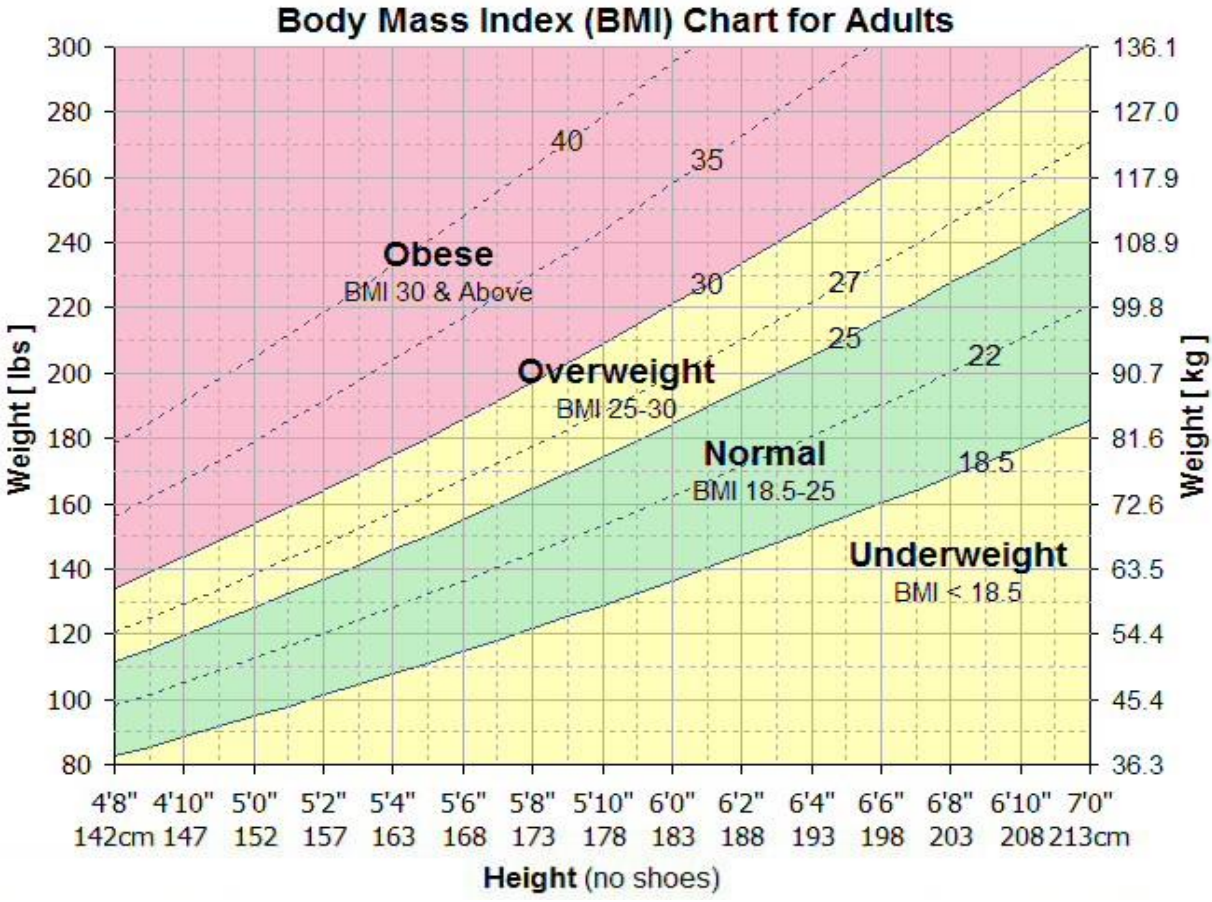

Figure (3): Body Mass Index (BMI) Chart for Adults

(Stef & Wendelin, 2008)

BMI that is less than the 5th percentile is considered underweight and above the 95th percentile is considered obese for people 20 or older. People under 20 with BMI between the 85th and 95th percentile are considered to be overweight. **(Stef & Wendelin, 2008)**