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Факультет VI по підготовці іноземних студентів**

ЗАТВЕРДЖЕНО

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Зав. кафедри _____ д.мед.н., професор Л.В. Журавльова

МЕТОДИЧНІ ВКАЗІВКИ

для самостійної роботи студентів

**з дисципліни «Внутрішня медицина (в тому числі з ендокринологією)
студенти 4 курсу I, II, III медичних факультетів, V та VI факультетів по підготовці
іноземних студентів**

Obesity and its outcomes

Харків 2016

Learning Objectives

After reading this methodical recommendations, students should be able to:

1. Use body mass index (BMI) and waist circumference as routine vital signs for identifying patients who are overweight or obese.
2. Implement a systematic and practical approach to the management of overweight and obesity.
3. Use evidence-based interventions to help patients improve their nutrition and physical activity habits.
4. Select and prescribe anti-obesity medications in appropriate patients as adjuncts to lifestyle interventions.
5. Identify patients who are candidates for bariatric surgery and refer as appropriate.

Actuality of the problem.

The prevalence of obesity exceeds 30% in adults and is associated with increased risk of such serious health problems as cardiovascular disease, type 2 diabetes, and various types of cancer. These comorbid conditions are associated with greater use of health care services among obese patients. Obesity is also associated with an increased risk of premature death in adults younger than 65. The leading causes of death in obese adults include ischemic heart disease, diabetes, respiratory diseases, and cancer (i.e., liver, kidney, breast, endometrial, prostate, and colon). Weight loss in obese individuals is associated with a lower incidence of health problems and a reduced risk of premature death.

Consequences of Obesity

Physical	Psychosocial	Functional
Cancer	Depression	Absenteeism from work
Cardiovascular disease	Discrimination	Disability
Cholestasis	Low self-esteem	Disqualification from fire/ police services
Dyslipidemia	Negative body image	Low physical fitness
Gallbladder disease	Negative stereotyping	Mobility limitations
Insulin resistance	Social marginalization	Reduced productivity
Hepatic steatosis	Stigmatization	Unemployment
Hypertension	Teasing and bullying	
Hyperuricemia and gout		
Menstrual abnormalities		
Orthopedic problems		
Reduction of cerebral blood flow		
Sleep apnea		
Type 2 diabetes		

Epidemiology and Impact

Overweight is defined as a body mass index (BMI) in the 25 to 29 kg/m² range, whereas obesity is a BMI in excess of 30 kg/m². Overweight and obesity result from an energy surplus over time that is stored in the body as fat. How genetic and environmental factors contribute to overweight and obesity is not well understood. Some of the leading causes of preventable death among adults are obesity-related conditions such as heart disease, stroke, type 2 diabetes, and some types of cancer (endometrial, breast, colon). Excess weight also increases the risk of liver and gallbladder disease, sleep apnea, osteoarthritis, and gynecologic problems such as infertility.

Screening and Diagnosis

The USPSTF recommends that all adults be screened for obesity. Thus, BMI should be measured and recorded at each visit, as with any other vital sign. Although BMI correlates with the amount of body fat, it must be recognized that BMI does not directly measure body fat, nor does it differentiate fat from muscle. This limits the accuracy of BMI in diagnosing obesity, particularly in the intermediate range, as well as in men and older adults in general. A BMI cutoff of 30 kg/m² or greater has good specificity but misses many patients with excess body fat. Nevertheless, BMI is recommended for use in clinical practice as a practical way to identify individuals who are overweight or obese. Furthermore, calculating BMI is still a good way to evaluate changes over time, because incremental increases most likely represent gains in body fat. Recognizing that BMI is just one indicator of potential health risks associated with being overweight or obese, the National Heart, Lung and Blood Institute (NHLBI) recommends that physicians also look at the following factors: 1) Risk factors for diseases associated with obesity, such as high blood pressure and physical inactivity. 2) Waist circumference as a measure of abdominal adiposity.

Waist Circumference

Abdominal adiposity is an important independent risk factor for cardiovascular disease, type 2 diabetes, dyslipidemia, and hypertension. The NHLBI defines abdominal obesity as:

- Waist circumference greater than 40 in (102 cm) in men
- Waist circumference greater than 35 in (88 cm) in women

Individuals with larger waist circumferences have more than a fivefold greater risk of multiple cardiometabolic risk factors, even after adjusting for BMI, compared with individuals with waist measurements in the normal range. As with BMI, waist circumference should be assessed regularly. Although there is no universally accepted method for measuring waist circumference, federal guidelines recommend measuring at the superior border of the iliac crest.

Medications That Promote Weight Gain

Assessment of the obese patient should include a complete medication history. Many agents, including

beta blockers, corticosteroids, diabetes drugs, and psychoactive drugs, are known to cause weight gain.

Most of these medications cause weight gain by increasing appetite. Prescribing these medications may

be unavoidable, but patients should be told that weight gain is a side effect and encouraged to take steps to prevent it (e.g., increase physical activity).

Anticonvulsants - valproic acid, carbamazepine.

Antidepressants – amitriptyline, imipramine, phenelzine.

Antihypertensives – clonidine, methyldopa, guanabenz, prazosin, propranolol.

Antipsychotics – chlorpromazine, haloperidol, olanzapine, clozapine, risperidone, quetiapine.

Corticosteroids –dexamethazon, prednizolon.

Psychotropics – lithium.

Sulfonylureas – glipizide, glyburide.

Abdominal obesity is also one of five diagnostic criteria for metabolic syndrome. Approximately 34% of adults meet the criteria for metabolic syndrome, and the risk increases with age. Men ages 60 years or older are more than four times as likely and women ages 60 years and older are more than six times as likely to be diagnosed with metabolic syndrome compared with younger adults (ages 20 to 39 years).

Most cases of obesity are not due to a medical disorder, but rather to a combination of hereditary predisposition and lifestyle factors. Nevertheless, the initial evaluation should include a review of the medication list and a thorough medical history, including age at onset of weight gain, previous weight-loss efforts, dietary and exercise habits, and history of smoking.

In patients with a BMI of 25 kg/m² or greater, or a waist circumference greater than 35 in (88 cm) in women or 40 in (102 cm) in men, further evaluation of risk factors is required. Blood pressure and lipid levels should be measured, and fasting glucose tested.

*The presence of **three** or more of the following risk factors confers a high absolute risk:*

- **Age 45 years or older for men or 55 years or older for women**
- **Cigarette smoking**
- **Family history of premature coronary heart disease (myocardial infarction or sudden death at or before age 55 years in father or age 65 years in mother)**
- **High-density lipoprotein (HDL) cholesterol less than 35 mg/dL**
- **Impaired fasting glucose (110 to 125 mg/dL)**
- **Hypertension (systolic blood pressure 140 mm Hg or greater or diastolic blood pressure 90 mm Hg or greater)**
- **Low-density lipoprotein (LDL) cholesterol 160 mg/dL or greater.**

Addressing modifiable cardiovascular risk factors is an important addition to weight reduction therapy. Amelioration of risk factors will reduce the risk for cardiovascular disease.

Classification of Overweight and Obesity, and Associated Disease Risk

Disease risk (for type 2 diabetes mellitus, hypertension, and cardiovascular disease).

Classification	BMI (kg/m ²)	Obesity Stage	Waist Circumference Men: <40 in (102 cm) Women: <35 in (88 cm)	Waist Circumference Men: >40 in (102 cm) Women: >35 in (88 cm)
Underweight	<18.5	-	-	-
Normal	18.5 to 24.9	-	-	-
Overweight	25.0 to 29.9	-	Increased	High
Obesity	30.0 to 34.9	I	High	Very high

Obesity	35.0 to 39.9	II	Very high	Very high
Extreme obesity	≥40.0	III	Extremely high	Extremely high

Amelioration of risk factors will reduce the risk for cardiovascular disease regardless of whether efforts to lose weight are successful. Conditions such as osteoarthritis, gallstones, stress incontinence, amenorrhea, and menorrhagia are also associated with obesity and are often the reasons patients visit their physicians. These visits provide a valuable opportunity to help patients understand the connections between nutrition, physical activity, and health. For example, an office visit during which an overweight patient complains of knee pain or is diagnosed with sleep apnea may be a “teachable moment” in which the patient is likely to be receptive to the idea of making healthier choices.

Metabolic Syndrome

Diagnostic Criteria for Metabolic Syndrome

Measure (any 3 of 5 criteria constitute diagnosis of metabolic syndrome)	Categorical Cut Points
Elevated waist circumference	>102 cm (>40 in) in men >88 cm (>35 in) in women
Elevated TG	>150 mg/dL (1.7 mmol/L) or drug treatment for elevated TG
Reduced HDL-C	<40 mg/dL (1.03 mmol/L) in men <50 mg/dL (1.3 mmol/L) in women or drug treatment for reduced HDL-C
Elevated BP	>130 mm Hg systolic >85 mm Hg diastolic or drug treatment for hypertension
Elevated fasting glucose (or treatment for elevated fasting glucose)	>100 mg/dL (5.6 mmol/L) or drug treatment for elevated glucose

The predominant underlying risk factors for metabolic syndrome are abdominal obesity and insulin resistance. Although many patients may be genetically susceptible to metabolic syndrome, it rarely develops in the absence of obesity and physical inactivity. Consequently, the key emphasis in management is mitigation of modifiable risk factors, specifically obesity, physical inactivity, atherogenic diet, and smoking, through lifestyle changes. Informing a patient that he or she has metabolic syndrome can generate a valuable counseling opportunity. For example, understanding the likely progression from metabolic syndrome to type 2 diabetes may motivate patients to take steps to reduce their weight and increase their physical activity.

Approach to Management

The connection between excess body fat and health risks such as type 2 diabetes, hypertension, dyslipidemia, and coronary heart disease has been well-documented and provides the rationale for management of obesity. Although significant weight loss may be ideal, even a modest reduction in weight (5% to 10% of total body weight) can have significant health benefits. Support for aggressively pursuing lifestyle modification in high-risk individuals comes in part from the Diabetes Prevention Program (DPP), a rigorously conducted randomized trial that compared usual care, metformin use (850 mg two times per day), and intensive lifestyle modification in more than 3,000 individuals with impaired glucose tolerance. The goal of the intensive lifestyle program in DPP was to help patients lose a minimum of 7% of their body weight and add a minimum of 150 minutes of exercise per week.

Behavioral interventions included meeting with individual case managers, group and individual counseling sessions, self-management training, individualized adherence strategies, and clinical support. In the trial, intensive lifestyle modification decreased progression to diabetes by nearly 60% while metformin resulted in a 31% decrease, compared with usual care. Although many family physicians are pessimistic about their ability to influence patients to make necessary lifestyle changes in order to achieve weight loss, research suggests that patients are more likely to attempt weight loss when their primary care physicians recommend it. For example, a recent study found that patients who had been told by a physician that they were overweight had a more realistic perception of their weight and were more likely to express interest in losing weight. In another study, patients who lost weight credited their physicians with having helped them by explaining the health risks of obesity, making physical activity recommendations, and providing referrals to weight-loss groups or programs.

Behavioral Treatment

The goal of behavioral therapy is to enable patients to reduce and manage their weight by monitoring and modifying their food intake, increasing their physical activity level, and recognizing and controlling cues that trigger overeating. A 2010 USPSTF evidence review found that behavioral interventions result in an average of 6% reduction in body weight, compared with little or no weight loss in a usual-care group after one year. In addition, higher treatment intensity was associated with greater weight loss. Higher intensity interventions include self-monitoring, goal setting, and planning to address barriers to maintaining lifestyle changes over time.

The 5 A's for Evaluation and Treatment of Obesity

Assess	<ul style="list-style-type: none"> - Severity of obesity with calculated BMI, waist circumference, and comorbidities - Food intake and physical activity in context of health risks and appropriate dietary approach - Medications that affect weight or satiety - Readiness to change behavior and stage of change
Advise	<ul style="list-style-type: none"> - Diagnosis of overweight, obese, or severe obesity - Caloric deficit needed for weight loss - Various types of diets that lead to weight loss and ease of adherence - Appropriateness, cost, and effectiveness of meal replacements, dietary supplements, over-the-counter weight aids, medications, surgery - Importance of self-monitoring
Agree	<ul style="list-style-type: none"> - If patient is not ready, discuss at another visit - If patient is motivated and ready to change, develop treatment plan - If patient chooses diet, physical activity, and/or medication, set weight-loss goal at 10% from baseline - If patient is a potential candidate for surgery, review options
Assist	<ul style="list-style-type: none"> - Provide a diet plan, physical activity guide, and behavior modification guide - Provide Web resources based on patient interest and need - Identify method for self-monitoring (e.g. diary) - Review food and activity diary on follow-up

	(reassess if initial goal is not met)
Arrange	<ul style="list-style-type: none"> - Follow-up appointments to meet patient needs - Referral to registered dietitian and/or behavioral specialist for individual counseling/monitoring or weight-management class - Referral to surgical program - Maintenance counseling to prevent relapse or weight regain

Components and Examples of Motivational Interviewing

Component	Sample Statements	Rationale
Agenda setting	"Would you mind if I talked with you about your weight?"	Asking permission emphasizes patient autonomy
Exploration Patient's desire	"Are you interested in being more active?"	Assesses value of changing
Patient's ability	"Would you be able to walk for 30 minutes each day?"	Assesses patient self-efficacy
Patient's reasons	"You mentioned that you're now more open to adding exercise to your routine. What makes you open to it now?"	Assesses current sources of motivation
Patient's need	"How important is it that you get more fit?"	Assesses degree of motivation
Providing information	"Obesity has been linked to a greater risk of diabetes and heart disease. Losing even a modest amount of weight can lower your risk. There are several options available to help you."	Conveys hope; relates risk behavior to long-term health outcomes; indicates that there are treatment options
Listening and summarizing	"What do you think about that idea?". "It sounds like you are interested in seeing a dietitian for nutrition advice but are worried about finding the right one."	Elicits view of personal health risk and acceptable interventions; identifies sources of ambivalence
Generating options and contracting	"It sounds like you have several good ideas about how to reduce your calorie intake. Which one do you think would work best? I look forward to hearing about it at our next appointment."	Patient selects specific plan, which will be reevaluated at an agreed-on time

Physicians can help motivated patients identify specific, measurable, and realistic goals to decrease calorie intake and increase physical activity. During follow-up visits, progress toward goal achievement should be assessed, and additional support and education provided as appropriate. Imperfect goal attainment is to be expected and should be handled with empathy and tact. This can be achieved by communicating that the goal, not the patient, is at issue. It's crucial to focus on positive changes and take a problem-solving approach to help patients overcome setbacks. In the end, longterm success

depends on the degree to which patients embrace the goals, and the extent to which the goals satisfy their needs for autonomy and competency.

Self-Monitoring

Self-monitoring is associated with improved outcomes and is a key element in any successful behavioral weight-loss program. Patients are asked to observe and record target behaviors. Self-monitoring tools include food diaries, physical activity logs, and weight records. According to data from the National Weight Control Registry, self-monitoring is one of the techniques frequently used by patients who are successful in maintaining weight loss. Indeed, patients often rank self-monitoring as one of the most helpful weight-loss tools, and the addition of free or low-cost smart phone applications and online calorie-tracking programs has made self-monitoring infinitely easier.

Stimulus Control.

Another key to successful weight loss is stimulus control — identifying and modifying cues that trigger unhealthy habits such as overeating and inactivity. Learning to control these cues is helpful not only for short-term weight loss but also for long-term maintenance. Although the evidence is less robust, the following behavioral tools may also increase the likelihood of success with weight-loss efforts:

- Cognitive restructuring — changing negative thought patterns such as “all or nothing” thinking that undermine efforts at behavior change
- Problem solving — anticipating challenging situations and preparing strategies for dealing with them
- Stress management — identifying and reducing life stressors and developing strategies for coping with unavoidable causes of stress

Behavioral interventions in conjunction with dietary or drug therapy are more effective than routine care alone. This finding has been documented in multiple studies, including the DPP. It has also been demonstrated in the primary care setting by a randomized trial that compared usual care (quarterly office visits), brief lifestyle counseling (monthly sessions with lifestyle coaches in addition to quarterly office visits), and enhanced lifestyle counseling (quarterly visits, brief lifestyle counseling, and meal replacement or pharmacotherapy). Outcomes were significantly better in the enhanced lifestyle counseling group compared with the usual-care group.

Nutrition Counseling

Taking a nutrition and physical activity history is an important step in helping overweight and obese patients identify and adapt healthier behaviors. Many excellent resources exist to help patients make healthier food choices and manage their weight. One such resource is the website www.ChooseMyPlate.gov, which is based on the 2010 Dietary Guidelines for Americans. The website includes interactive tools for patients to determine calorie needs for weight loss or maintenance, as well as calorie trackers and menu planners. The Academy of Nutrition and Dietetics (formerly the American Dietetic Association) is a resource for finding registered dietitians. Another excellent resource for physicians is the Weight Management Research to Practice Series from the Centers for Disease Control and Prevention (CDC). This series summarizes the evidence base for dietary recommendations such as controlling portion sizes, increasing fruit and vegetable consumption, and decreasing saturated fat. These summaries often include patient education materials. When discussing these recommendations with patients, it is essential to convey that these tips will aid weight loss only when accompanied by an overall reduction in caloric intake.

Ultimately, the best diet is one that the patient will be able to follow consistently over time.

Lessons From the National Weight Control Registry

Patients need reassurance that they can be successful in managing their weight. Thus, it may be helpful to share data from the National Weight Control Registry. The registry includes individuals who have lost an average of 67 pounds and maintained the weight loss for an average of 5 years by making permanent changes to diet and physical activity levels. Individuals who lost weight and maintained the weight loss had the following habits in common:

- Being physically active for at least 60 to 90 minutes per day
- Eating a low-fat diet that is rich in complex carbohydrates
- Eating breakfast every day
- Weighing themselves frequently (most at least weekly)

Physical Activity

Physicians should routinely recommend regular physical activity to all patients, not only to those who are overweight or obese. The American College of Sports Medicine has begun an initiative to recommend that assessment of physical activity be considered a vital sign and be incorporated into routine health screening and maintained in the medical record. The 2008 Physical Activity Guidelines for Americans recommend that adults perform at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic activity per week (or an equivalent combination of these). Aerobic activity should be performed for at least 10 minutes per session and should be spread throughout the week. For additional health benefits, adults should increase their aerobic physical activity to 300 minutes of moderate-intensity or 150 minutes of vigorous-intensity aerobic activity per week. Adults should also engage in muscle-strengthening activities of moderate to high intensity that involve all major muscle groups on two or more days per week. Even without weight loss, however, exercise can mitigate the damaging effects of obesity and a sedentary lifestyle. Increasingly, “sitting time” is being recognized as an independent risk factor for the development of metabolic risk factors. This appears to be true even in individuals who achieve the recommended amount of physical activity per week if they are sedentary for long periods during the day. Adults with very low fitness levels can start with 10-minute increments of light-intensity aerobic activity such as walking. All activities —not just formal exercise — count and can be beneficial for weight control. Small changes that most patients can incorporate into their regular routines include taking the stairs rather than the elevator; parking at a distance from the mall, supermarket, or work entrance; and adding short periods of walking to the day. Physical exercise and activity are particularly important for maintaining weight loss over the long term (and for preserving lean body mass during dieting). Maintenance of weight loss has a graded relationship to the amount of exercise that individuals need after weight loss. Thus, patients who have lost considerable weight may need to engage in higher amounts (more than 300 minutes a week) or more vigorous exercise to maintain their weight loss.

Pharmacotherapy

Prescription anti-obesity drugs can be useful adjuncts to diet and exercise for obese adults who have failed to achieve weight loss with diet and exercise. Prescription weight-loss drugs are approved for patients who meet the following criteria:

- BMI of 30 kg/m² or greater
- BMI of 27 kg/m² or greater and an obesity- related condition (such as hypertension, type 2 diabetes, or dyslipidemia)

Anti-obesity Medications Approved for Long-term Use

Drug	Mechanism of Action	Possible Adverse Effects
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Lorcaserin (Belviq)	Decreases appetite, increases feeling of fullness	Headache, dizziness, fatigue, nausea, dry mouth, constipation
Orlistat (Xenical)	Blocks absorption of fat	Intestinal cramps, gas, diarrhea, oily spotting
Phentermine and topiramate extended release (Qsymia)	Decreases appetite, increases feeling of fullness	Increased heart rate, birth defects, tingling of hands and feet, insomnia, dizziness, constipation, dry mouth

Drugs	Status	Mechanism	Dosing	Response evaluation	Warnings	Contra-indications	Side-effects
Orlistat	FDA & EMA approved	pancreatic, gastric lipase inhibitor	120 mg tid 60 mg tid (OTC)	2.9–3.4% 1 year	hepatitis, liver failure (rare), concomitant multivitamin advised	pregnancy, breast feeding, chronic malabsorption syndrome, cholestasis	decreased absorption of fat soluble vitamins, steatorrhea, faecal urgency
Lorcaserin	FDA approved	5HT _{2c} R agonist	10 bid	3.6% 1 year stop if <5% weight loss at 12 weeks	serotonin syndrome, cognitive impairment, depression, valvulopathy hypoglycaemia, priapism	pregnancy, breast feeding, use with caution: MAOIs, SSRIs, SNRIs	headache, nausea dry mouth, dizziness fatigue, constipation
Phentermine/topiramate	FDA approved	NE release (P) GABA modulation (T)	starting dose: 3.75/23 qd recommended dose: 7.5/46 qd *high dose: 15/92 qd	6.6% (recommended dose) 1 year 8.6% (high dose) 1 year stop if <5% weight loss at 12 weeks	fetal toxicity, acute myopia, cognitive dysfunction, metabolic acidosis, hypoglycaemia	pregnancy, breast feeding, glaucoma, hyperthyroidism, use with caution: MAOIs	insomnia, dry mouth constipation, paresthesia, dizziness, dysgeusia
Bupropione/naltrexone	FDA & EMA approved	DA/NE reuptake inhibitor(B) opioid antagonist (N)	8/90 mg tb 2 tb bid	4.8% 1 year stop if <5% weight loss at 12 weeks	fetal toxicity, increased seizure risk, glaucoma, hepatotoxicity	uncontrolled hypertension, seizure, anorexia nervosa / bulimia, drug or alcohol withdrawal, use with caution: MAO inhibitors	nausea, constipation, headache, vomiting, dizziness
Liraglutide	FDA & EMA approved	GLP-1 agonist	3 mg sc	5.8 kg 1 year stop if <4% weight loss at 14 wks	acute pancreatitis, acute gall bladder disease	medullary thyroid cancer history, MEN type 2 history	nausea, vomiting, pancreatitis

Obesity-related health risks and complications

I. Metabolic complications

Diabetes

insulin resistance

Dyslipidaemia

Metabolic syndrome

Hyperuricaemia

Gout

Low-grade inflammation

II. Cardiovascular disorders

Hypertension

Coronary heart disease

Congestive heart failure

Stroke

Venous thromboembolism

III. Respiratory disease

Asthma

Hypoxemia

Sleep apnoea syndrome

Obesity hypoventilation syndrome

IV. Cancers

Oesophagus, small intestine, colon, rectum, liver, gallbladder, pancreas, kidney, leukaemia, multiple myeloma, and lymphoma

In women: endometrial, cervix uteri, ovary, breast cancer after menopause

In men: prostate

V. Osteoarthritis

Knee and an increase in pain in the weight bearing joints

VI. Gastrointestinal

Gallbladder disease

Non-alcoholic fatty liver disease

Non-alcoholic steatohepatitis

Gastro-esophageal reflux

Hernia

VII. Genitourinary system /reproductive health

Urinary incontinence

Menstrual irregularity

Infertility

Hirsutism

Polycystic ovary disease

Miscarriage

Gestational diabetes

Hypertension

Preeclampsia

Macrosomia

Foetal distress

Malformation (i.e. neural tube defect)

Dystocia and primary caesarean section

VIII. Psychological and social consequences

Low self-esteem

Anxiety and depression

Stigmatisation

Discrimination in employment, college acceptance, job earning etc.

IX. Miscellaneous

Idiopathic intracranial hypertension

Proteinuria

Nephrotic syndrome

Skin infection

Lymphoedema

Complications from anaesthesia

Periodontal disease

Obesity is a chronic metabolic disease characterised by an increase of body fat stores.

It has become one of the leading causes of disability and death, affecting

not only adults but also children and adolescents worldwide. In clinical practice, the

body fatness is estimated by BMI, and the accumulation of intra-abdominal fat (marker for higher metabolic and cardiovascular disease risk) can be assessed by waist circumference.

Complex interactions between biological, behavioural, social and environmental factors are involved in regulation of energy balance and fat stores. A comprehensive history, physical examination and laboratory assessment relevant to the patient's obesity should be obtained. Appropriate goals of weight management emphasise realistic weight loss to achieve a reduction in health risks and should include promotion of weight loss, maintenance and prevention of weight regain. Management of co-morbidities and improving quality of life of obese patients are also included in treatment aims. Balanced hypocaloric diets result in clinically meaningful weight loss regardless of which macronutrients they emphasise. Aerobic training is the optimal mode of exercise for reducing fat mass while a programme including

resistance training is needed for increasing lean mass in middle-aged and overweight/obese individuals. Cognitive behavioural therapy directly addresses behaviours that require change for successful weight loss and weight loss maintenance. Pharmacotherapy can help patients to maintain compliance and ameliorate obesity-related health risks. Surgery is the most effective treatment for morbid obesity in terms of long-term weight loss. A comprehensive obesity management can only be accomplished by a multidisciplinary obesity management team. We conclude that physicians have a responsibility to recognise obesity as a disease and help obese patients with appropriate prevention and treatment. Treatment should be based on good clinical care, and evidence-based interventions; should focus on realistic goals and lifelong multidisciplinary management.

Introduction

Obesity is a metabolic disease (ICD-10 code E66) that has reached epidemic proportions. The World Health Organization (WHO) has declared obesity as the largest global chronic health problem in adults which is increasingly turning into a more serious problem than malnutrition. Obesity is a gateway to ill health, and it has become one of the leading causes of disability and death, affecting not only adults but also children and adolescents worldwide [1]. In 2014, more than 1.9 billion adults (18 years and older) were overweight. Of these over 600 million were obese. 42 million children under the age of 5 were overweight or obese in 2013 [2]. The WHO world health statistics report in 2015 shows that in the European region the overall obesity rate among adults is 21.5% in males and 24.5% in females. The same report states that the prevalence for overweight among children under the age of 5 is 12.4%. It has been further projected that 60% of the world's population, i.e. 3.3 billion people, could be overweight (2.2 billion) or obese (1.1 billion) by 2030 if recent trends continue [4]. Obesity has important consequences for morbidity, disability and quality of life and entails a higher risk of developing type 2 diabetes, cardiovascular diseases, several common forms of cancer, osteoarthritis and other health problems [5]. In 2010, overweight and obesity were estimated to cause 3.4 million deaths, 4% of years of life lost, and 4% of disability-adjusted life years (DALYs)

Definition and Classification

Obesity is a chronic disease characterised by an increase of body fat stores. In clinical practice, the body fatness is usually estimated by BMI. BMI is calculated as measured body weight (kg) divided by measured height squared (m^2). In adults (age over 18 years) obesity is defined by a BMI ≥ 30 kg/ m^2 and overweight (also termed pre-obesity) by a BMI between 25 and 29.9 kg/ m^2 . Lower BMI cut-off points apply for some ethnic groups (e.g. Southeast Asians).

Accumulation of intra-abdominal fat is associated with higher metabolic and cardiovascular disease risk. The amount of abdominal fat can be assessed by waist circumference (WC) which highly correlates with intra-abdominal fat content. The WC is measured in the horizontal plane midway in the distance of the superior iliac crest and the lower margin of the last rib. The most recent International Diabetes Federation (IDF) consensus defined central obesity (also known as visceral, android, apple-shaped or upper body obesity) in Europeans as a WC of ≥ 94 cm in men and ≥ 80 cm in non-pregnant women. Lower cut-off points for central obesity are proposed for different ethnic groups.

Pathogenesis of Obesity

The cause of obesity is complex and multifactorial. At the simplest level, obesity develops as a result of a period of chronic energy imbalance and is maintained by a continued elevated energy intake sufficient to maintain the acquired higher energy needs of the obese state. Complex interactions between biological (including genetic and epigenetic), behavioural, social and environmental factors (including chronic stress) are involved in regulation of energy balance and fat stores. The rapid increase in the prevalence of obesity over the past 30 years is mainly a result of cultural and environmental influences. High energy density diet, increased portion size, low physical activity and adoption of a sedentary lifestyle as well as eating disorders are considered as important risk factors for the development of obesity. These behavioural and environmental factors lead to alterations in adipose tissue structure (hypertrophy and hyperplasia of adipocytes, inflammation) and secretion (e.g. adipokines). Weight loss surgery has proven to be a convenient and proper research tool facilitating insights into the pathogenesis of obesity as well as regulation of hunger and satiation. Gut hormones communicate information from the gastrointestinal tract to the regulatory appetite centres within the CNS via the so-called 'gut-brain axis'. Obesity is associated with changes in the composition of the intestinal microbiota. Products of intestinal microbes may induce beneficial metabolic effects through enhancement of mitochondrial activity, prevention of metabolic endotoxaemia and activation of intestinal gluconeogenesis via different routes of gene expression and hormone regulation. The role of thermogenesis of brown adipose tissue and its contribution to energy expenditure is being investigated mainly to develop strategies to recruit and activate energy-dissipating brown adipose tissue as a preventive or remedial measure for weight control in obesity.

Clinical Evaluation of the Obese Patient

A comprehensive history, physical examination and laboratory assessment relevant to the patient's obesity should be obtained.

History Taking

- Ethnicity
- Family history
- Dietary habits
- Physical activity frequency and nature
- Eating pattern and possible presence of an eating disorder (binge eating disorder, night eating syndrome, bulimia)
- Presence of depression and other mood disorders
- Other determinants, e.g., genetic, drugs, endocrine abnormalities, psychosocial factors, chronic stress, smoking cessation etc.

- Health consequences of obesity
- Patient expectations and motivation for change
- Previous treatments for obesity.

Physical Examination

- Measure weight and height (from which BMI is calculated), WC, blood pressure (appropriate size cuff)
- Assess the presence and impact of obesity-related diseases (diabetes, hypertension, dyslipidaemia; cardiovascular, respiratory and joint diseases; non-alcoholic fatty liver disease (NAFLD), sleep disorders etc.)
- Look for the presence of acanthosis nigricans as a sign of insulin resistance

Laboratory Examinations

The minimum data set required will include:

- Fasting and postprandial blood glucose (glucose tolerance test)
- Serum lipid profile (total, HDL and LDL cholesterol, triglycerides)
- Uric acid
- Thyroid function (thyroid-stimulating hormone (TSH) level)
- Liver function (hepatic enzymes)
- Cardiovascular assessment, if indicated
- Endocrine evaluation if Cushing's syndrome or hypothalamic disease suspected
- Liver investigation (ultrasound, biopsy) if abnormal liver function tests suggest NAFLD or other liver pathology
- Sleep laboratory investigation for sleep apnoea.

Body Composition Analysis

WC can be used as a proxy for abdominal fat. With the development of devices and equipment to more accurately measure body fat, including dual energy X-ray absorptiometry (DEXA), air-displacement plethysmography (BodPod), bioimpedance analysis (BIA) and body scanning procedures – replacing the cumbersome underwater weighing – it has become possible to more easily classify individuals according to the degree of body fat, independently of BMI. This approach has also drawn attention to the function of non-adipose tissue – that is, fat-free mass (FFM) or lean mass – and the contribution made by FFM to physiological functioning, pathology and well-being. Assessment of body composition is not essential for the management of obesity in routine clinical practice, but may be a useful tool in measuring fat and FFM before and during treatment.

Comprehensive Obesity Management

Appropriate goals of weight management emphasise realistic weight loss to achieve a reduction in health risks and should include promotion of weight loss, maintenance and prevention of weight regain. Patients should understand that, since obesity is a chronic disease, weight management will need to be continued lifelong.

Aims of Treatment

The management and treatment of obesity have wider objectives than weight loss alone and include risk reduction and health improvement. Significant clinical benefits may be achieved even by modest weight loss (i.e. 5–10% of initial body weight), and lifestyle modification (improved nutritional content of the diet and modest increases in physical activity and fitness). Obesity management cannot focus only on weight (and BMI) reduction. More attention is to be paid to WC and the improvement in body composition which is focusing on ameliorating or maintaining FFM and decreasing fat mass. Management of co-morbidities, improving quality of life and well-being of obese patients are also included in treatment aims. Appropriate management of obesity complications in addition to weight management should include management of dyslipidaemia, optimizing glycaemic control in type 2 diabetic patients, normalising blood pressure in hypertension, management of pulmonary disorders such as sleep apnoea syndrome (SAS), attention to pain control and mobility needs in osteoarthritis, management of psychosocial disturbances including affective disorders, eating disorders, low self-esteem and body image disturbance. Obesity management may reduce the need to treat co-morbidities by drugs.

Prevention of Further Weight Gain

In overweight patients (BMI 25.0–29.9 kg/m²) without overt co-morbidities, prevention of further weight gain (through dietary advice and increase in physical activity) rather than weight loss per se may be an appropriate target. Weight loss objectives should be realistic, individualised and aimed at the long term.

Practical Weight Loss Objectives

A 5–15% weight loss over a period of 6 months is realistic and of proven health benefit [39, 40] {level 1}. A greater (20% or more) weight loss may be considered for those with greater degrees of obesity (BMI ≥ 35 kg/m²) {RBP}. Maintenance of weight loss and prevention and treatment of co-morbidities are the two main criteria for success.

Failure to Lose and Maintain Weight

Referral to an obesity specialist (or an obesity management team) should be considered if the patient fails to lose weight in response to the prescribed intervention. Weight cycling, defined by repeated loss and regain of body weight, is more frequent in women and may be linked to increased risk for hypertension, dyslipidaemia and gallbladder disease. It has been associated with psychological distress and depression and may require appropriate psychological care and/or antidepressant therapy.

Patient Follow-Up

Obesity is a chronic disease. A follow-up and continued supervision is necessary to prevent weight regain, and to monitor disease risks and treat co-morbidities (e.g. type 2 diabetes mellitus, cardiovascular disease).

Nutrition and Dieting

The use of self-recorded food diary allows a qualitative assessment of the diet. In addition, it can be used to help the patient identify meal frequency (night eating, snacking, meal skipping) perceptions and beliefs about emotional eating behaviour (cognition), eating habits

(behaviour) and environmental challenges to following a healthy diet. Before giving dietary advice it might be useful to address motivation for change: How important is weight loss for the patients, and how confident the individual patient is to successfully and sustainably achieve body weight reduction? Dietary advice should encourage healthy eating and emphasise the need to increase consumption of vegetables, beans, legumes, lentils, grain, unsweetened cereals and fibre, and to substitute low-fat dairy products and meats for high-fat alternatives. It should also emphasise increased intake of seafood. It is recommended to avoid foods containing added sugars and solid fats, as well as consumption of sugary drinks and alcohol-containing beverages. An appropriate dietary regimen can be achieved in a number of ways:

General Advice

- Decrease energy density of foods and drinks
- Decrease the size of food portions
- Avoid snacking between meals
- Do not skip breakfast and avoid eating in the night time
- Manage and reduce episodes of loss of control or binge eating.

Specific Advice

Energy (calorie) restriction should be individualised and take account of nutritional habits, physical activity, co-morbidities and previous dieting attempts. Prescribing an energy-restricted diet may require the intervention of a nutritionist (dietitian). Balanced hypocaloric diets result in clinically meaningful weight loss regardless of which macronutrients they emphasise. An emphasis put on the macronutrient proportion in the various diets (low fat, low carbohydrate or high protein etc.) has not proved better than a balanced hypocaloric diet, except for low-glycaemic load diets (carbohydrate content of the diet \times glycaemic index) in the short term. Despite various ranges of macronutrient composition, these diets have beneficial effects on reducing risk factors for cardiovascular disease and type 2 diabetes as well as on promoting adherence, diet acceptability and sustainability, satiety and satisfaction. Balanced hypocaloric diets can be tailored to individual patients on the basis of their personal and cultural preferences and may therefore have the best chance for long-term success (e.g. Mediterranean diet).

A 15–30% decrease in energy (calorie) intake from habitual intake in a weight-stable individual is sufficient and appropriate. However, underreporting of energy intake by obese patients is common. There is a great variation in energy requirements between the individuals which is dependent on the individual's gender, age, BMI and physical activity level.

Tables predicting energy requirements taking into account gender, age, BMI and physical activity ratio can be used. An easy rule of thumb is a daily energy requirement of 25 kcal/kg for either gender but, for the same body weight, this creates a greater energy deficit in men. The recommended weight-reducing dietary regimen tailored to an individual's need usually provides an energy deficit of 600 kcal/day. A 600 kcal (2,600 kJ) daily deficit will predict a weight loss of about 0.5 kg weekly. Thus for an obese sedentary woman with a BMI of 32 kg/m² and with an estimated daily intake of 2,100 kcal (8,800 kJ), a diet prescribing 1,400–1,600 kcal (6,000–7,000 kJ) would be appropriate.

Diets providing 1,200 kcal/day or more are classified as hypocaloric balanced diets (HBD) or balanced deficit diets. Diets providing less than 1,200 kcal/day might yield micronutrient deficiencies, which could exert untoward effects not only on nutritional status but also on the weight management outcome. However in clinical practice a further reduction in caloric intake might be required. In this case the appropriate use of dietary supplements may prevent such nutritional deficits. In clinical practice low-calorie diets (LCDs) and very-low-calorie diets (VLCDs) are used. LCDs, consisting of normal meals and partial meal replacements, have an energy content between 800 and 1,200 kcal/day. VLCDs usually provide less than 800 kcal/day and may be used only as part of a comprehensive program under the supervision of an obesity specialist or another physician trained in nutrition and dietetics. Their administration should be limited for specific patients and for short periods of time. VLCDs are unsuitable as a sole source of nutrition for children and adolescents, pregnant or lactating women and the elderly. Meal replacement diets (substitution of one or two daily meal portions by VLCD) may contribute to nutritionally well-balanced diet and weight loss maintenance.

Physical Activity

Exercise is considered an important component of a weight reduction program in conjunction with caloric reduction. Several studies report additive benefits of combining exercise with caloric restriction on reducing body weight and body fat and preservation of FFM as compared to diet alone. In balancing time commitments against health benefits, it appears that aerobic training is the optimal mode of exercise for reducing fat mass and body mass while a program including resistance training is needed for increasing lean mass in middle-aged and overweight/obese individuals. However, if we limit the discussion to the outcome 'weight loss' or 'fat mass loss', only aerobic exercise has solid evidence supporting its efficacy in the literature. There is enough evidence which suggests that aerobic and resistance exercises are beneficial for patients with obesity and related morbidities. For this reason, all scientific guidelines recommend that at least 150 min/week of moderate aerobic exercise (such as brisk walking) should be combined

with three weekly sessions of resistance exercise to increase muscle strength. Increasing physical activity reduces intra-abdominal fat and increases lean (muscle and bone) mass, while it attenuates the weight loss-induced decline of resting energy expenditure, reduces blood pressure, improves glucose tolerance, insulin sensitivity, lipid profile and physical fitness, ameliorates compliance to the dietary regimen, has a positive influence on the long-term weight maintenance, improves feeling of wellbeing and self-esteem, and reduces anxiety and depression. Further objectives should be to reduce sedentary behaviour (e.g. television viewing and computer use) and increase daily activities (e.g. walking or cycling instead of using a car, climbing stairs instead of using elevators). Patients should be advised and helped in undertaking (or increasing) physical activity. Exercise advice must be tailored to the patient's ability and health and focus on a gradual increase to levels that are safe.

Cognitive Behavioural Therapy

Cognitive Behavioural Therapy (CBT) is a blend of cognitive therapy and behavioural therapy and aims to help a patient modify his/her insight and understanding of thoughts and beliefs concerning weight regulation, obesity and its consequences; it also directly addresses behaviours that require change for successful weight loss and weight loss maintenance. CBT includes several components such as self-monitoring (e.g. dietary record), techniques controlling the process of eating, stimulus control and reinforcement as well as cognitive and relaxation techniques. CBT elements should form part of routine dietary management or, as a structured program, form the basis of specialist intervention. This care can be in part delivered in a group setting or using self-help manuals. CBT can be provided not only by registered psychologists but also by other trained health professionals such as physicians, dieticians, exercise physiologists or psychiatrists.

Psychological Support

Physicians should recognise where psychological or psychiatric issues interfere with successful obesity management, e.g. depression. Psychological support and/or treatment will then form an integral part of management; in special cases (anxiety, depression and stress), referral to a specialist may be indicated. Self-help lay groups and the support of the obesity treatment group may all be useful in this setting.

Pharmacological Treatment

Pharmacological treatment should be considered as part of a comprehensive strategy of disease management. Pharmacotherapy can help patients to maintain compliance, ameliorate obesity-related health risks and improve quality of life. It can also help to prevent the development of obesity co-morbidities (e.g. type 2 diabetes mellitus). Current drug therapy is recommended for patients with a BMI ≥ 30 kg/m² or a BMI ≥ 27 kg/m² with an obesity-related disease (e.g. hypertension, type 2 diabetes mellitus, sleep apnoea). Drugs should be used according to their licensed indications and restrictions. The efficacy of pharmacotherapy should be evaluated after the first 3 months. If weight loss achieved is satisfactory (>5% weight loss in non-diabetic and >3% in diabetic patients), treatment should be continued. Treatment should be discontinued in non-responders.

Orlistat

Orlistat is a potent and selective inhibitor of pancreatic lipase that reduces intestinal digestion of fat. The drug is available over the counter at a dose of 60 mg and a prescription dosage of 120 mg. Both forms are given before each meal and produce a moderate absolute and placebo-subtracted weight loss. The efficacy and safety of the drug were assessed in the following RCTs: XENDOS and X-PERT. Faecal fat loss and related gastrointestinal symptoms are common. It may cause small decreases in fat-soluble vitamins; thus a multivitamin can be prescribed.

Lorcaserin

Lorcaserin is a serotonin type 2C receptor agonist with hypophagic effects. Lorcaserin has been available in the USA since June 2013. The recommended dose is 10 mg twice daily. The product licence requires 5% weight loss after 12 weeks of treatment. *If a patient does not reach this target, the drug should be discontinued.* The efficacy and safety of the drug were assessed in the following RCTs: BLOOM, BLOOM-DM and BLOSSOM. In the BLOOM-DM trial, both fasting blood glucose and haemoglobin A1C (HbA1c) levels were improved. No statistically significant differences in the incidence of cardiac valvulopathy between the placebo and lorcaserin groups were found. The most common adverse events associated with lorcaserin included blurred vision, dizziness, somnolence, headache, gastrointestinal disturbance and nausea. The results of the ongoing cardiovascular outcomes trial CAMELLIA TIMI 61 will determine the role of lorcaserin in primary prevention of diabetes in overweight/obese individuals and its use in the high-risk population of patients with established cardiovascular disease or multiple cardiovascular risk factors.

Phentermine/Topiramate

Phentermine and extended-release topiramate (PHEN/TPM-ER) is based on the principle of a synergistic combination of two drugs at a lower dose to obtain efficacy with less toxicity. Phentermine is an atypical amphetamine analogue that suppresses appetite by norepinephrine agonism in the CNS. Topiramate is an atypical anticonvulsant drug previously evaluated as a potential anti-obesity drug after reports of weight loss occurring in epileptic patients taking this drug. The mechanisms by which topiramate induces a weight loss are unknown and may include carbonic anhydrase inhibition of taste or influences on GABA transmission, thus reducing appetite. After approval by the Food and Drug Administration (FDA), the drug was launched in the USA in September 2012. The recommended dosage is 7.5 mg phentermine / 46 mg topiramate once a day. The product licence requires 5% weight loss after 12 weeks of treatment. If a patient does not reach this target, the drug should be discontinued. The efficacy and safety of the drug were assessed in the following RCTs: EQUIP, CONQUER, SEQUEL and EQUATE. Adverse events associated with PHEN/TPM-ER treatment were dry mouth, constipation, insomnia, palpitations, dizziness, paraesthesia, disturbances in attention, metabolic acidosis and renal calculi, headache, dysgeusia (distortion of sense of taste), alopecia and hypokalaemia. The combination is contraindicated during pregnancy due to its teratogenic potential. The FORTRESS (Fetal Outcome RetrospectiveTopiRamate Exposure Study) has estimated that women taking this combination had a two times increased risk of giving birth to children with oral clefts when compared to non-users. Owing to this risk, the drug has been approved with a risk evaluation and mitigation strategy recommendation by the FDA.

Bupropion/Naltrexone

Bupropion/naltrexone combines two centrally acting medications that had already been approved. Bupropion is used for treating depression and to aid smoking cessation. It is a nonselective inhibitor of the dopamine and norepinephrine transporters. Naltrexone is an opioid receptor antagonist widely used to treat alcohol and opiate dependence syndromes. The anorectic effect of the bupropion/naltrexone combination is believed to result from activation of POMC neurons in the arcuate nucleus. POMC neurons release a melanocyte stimulating hormone (α -MSH), which is a potent anorectic feeding neuropeptide, and these neurons project to other hypothalamic areas involved in feeding and body weight control. After approval by the FDA and the European Medicinal Agency (EMA), the drug is available in the USA since September 2012 and will be launched in Europe in approximately mid-2016. The recommended dosage is 16 mg naltrexone / 180 mg bupropion twice a day. The product licence requires 5% weight loss after 12 weeks of treatment. If a patient does not reach this target, the drug should be discontinued. The efficacy and safety of the drug were assessed in the following RCTs: COR-I, COR-II, COR-BMOD and COR-DM. The most common reported adverse event was nausea, which in most cases was transient for the first few weeks of treatment. Along with nausea, headache, dizziness, insomnia and vomiting were the most common adverse events that led to discontinuation. **The**

Cardiovascular Outcomes Study of Naltrexone SR/Bupropion SR in Overweight and Obese Subjects with Cardiovascular Risk Factors (The Light Study) is still ongoing.

Liraglutide

Liraglutide is an injectable long-acting GLP-1R agonist designed to resist rapid metabolism by dipeptidyl peptidase-IV. While glucose-induced insulin release is stimulated, the glucagon response is reduced and appetite suppressed with additional effects on gastric emptying. It has already successfully been introduced in type 2 diabetic patients (1.2–1.8 mg) once daily. After approval by the FDA and EMA, the drug (in a dosage of 3 mg once daily) was launched for obesity treatment in the USA in November 2014 and in Europe in March 2015. The product licence requires 5% weight loss after 12 weeks of treatment. If a patient does not reach this target, the drug should be discontinued. The efficacy and safety of the drug were assessed in the following RCTs: SCALE-Maintenance, SCALE-Obesity and LEADER. Liraglutide is generally well tolerated. Nausea and vomiting are the main, usually transient, side-effects, but they may actively contribute to weight loss.

Bariatric and Metabolic Surgery

Surgery is the most effective treatment for morbid obesity in terms of long-term weight loss, improvements of co-morbidities and quality of life and decreases of overall mortality. A comprehensive overview of surgical treatment options for obesity and obesity related co-morbidities is provided in the Interdisciplinary European Guidelines on Metabolic and Bariatric Surgery, published in 2013 by joint effort of the European Association for the Study of Obesity (EASO), and the International Federation for the Surgery of Obesity and Metabolic Disorders – European Chapter (IFSO-EC). Surgery should be considered for patients aged 18–60 years with a BMI ≥ 40.0 kg/m² or with BMI between 35.0 and 39.9 kg/m² and co-morbidities, in whom surgically induced weight loss is expected to improve the disorder (such as type 2 diabetes and other metabolic disorders, cardiorespiratory disease, severe joint disease and obesity-related severe psychological problems). BMI criterion may be the current BMI or a documented previous BMI of this severity. Bariatric surgery is clearly confirmed to be beneficial in type 2 diabetes remission – at least in the short and medium term. Thus, patients with BMI >30 and <35 kg/m² with type 2 diabetes may also be considered for bariatric surgery on an individual basis, as there is evidence-based data supporting bariatric surgery benefits in regards to type 2 diabetes mellitus remission or improvement in this group. Multidisciplinary skills are needed to support surgical interventions. Patients should only be referred to units able to assess patients prior to surgery, to offer a comprehensive approach to diagnosis, assessment and treatment, and to provide long-term follow-up. A decision to offer surgery should follow a comprehensive interdisciplinary assessment. The core team providing such assessment should optimally consist of the following specialists experienced in obesity management and bariatric surgery:

- Physician
- Surgeon
- Anaesthetist (anaesthesiologist)
- Psychologist or psychiatrist
- Nutritionist and/or dietitian, and
- Nurse practitioner/social worker.

A laparoscopic technique should be considered as the first treatment choice in bariatric surgery. In all situations the bariatric surgeon's experience is a key issue for an immediate successful outcome. It is not advisable to perform bariatric techniques on an occasional basis. Morbid obesity is a lifelong disease. The treating physician and surgeon are responsible for the treatment of co-morbidities before the

operation and for the follow-up after the operation. However, the patient takes lifelong responsibility for adhering to the follow-up rules. In the past several years, better understanding of substantial metabolic changes induced by different surgical interventions to the alimentary tract was achieved. Therefore, the former classification of operations according to their influence on food ingestion, defined as limiting stomach capacity (restrictive), limiting absorption of nutrients (malabsorptive) or combined procedures does not appropriately reflect the current level of knowledge about early and weight-independent metabolic effects of these operations. Nowadays, most of the standard surgical interventions are being mostly referred to as metabolic operations. The focus when treating obese patients is gradually shifting from the primary goal of weight loss outcomes to the metabolic effects of the operations.

Treatment of Co-Morbidities

Active treatment of obesity-related co-morbidities should be integral part of the comprehensive management of the obese patients. Appropriate management of obesity complications in addition to weight management should include:

- Management of dyslipidaemia
- Optimising glycaemic control in type 2 diabetics
- Normalising blood pressure in hypertension
- Management of pulmonary disorders, such as SAS
- Attention to pain control and mobility needs in osteoarthritis
- Management of psychosocial disturbances, including affective disorders, eating disorders, low self-esteem and body image disturbance.

The presence of obesity and the effects that treatments have on body weight, body composition or metabolic status should be taken into account in the selection of the drugs used to treat obesity-related co-morbidities or even non-obesity-related diseases occurring in a patient with obesity. Drugs increasing body weight and/or with negative metabolic effects should be possibly avoided or substituted. Weight-losing and weight-neutral medications should be preferred. Specific guidelines for the management of hypertension in obese patients have been released by the EASO in conjunction with the European Society of Hypertension.

Alternative Therapies

Obesity treatment has often been unsuccessful. As a result, unorthodox and unproven treatments flourish and are often offered. There is insufficient evidence to recommend in favour of herbal medicines, dietary supplements or homoeopathy for obesity management in the obese person. Physicians should advise patients to follow evidence-based treatments and recommend treatments only where evidence of safety and efficacy has been established.

Collaborating Centre for Obesity Management

A comprehensive obesity management can only be accomplished by an appropriate obesity management team which is multidisciplinary and comprises different professionals who are able to tackle the different aspects of obesity and its related disorders. In accordance with this vision the EASO has developed a network of Collaborating Centres for Obesity Management. This European networking comprises education and training, research initiatives and contemporary obesity care.

Conclusion

Physicians have a responsibility to recognise obesity as a gateway disease and help patients with appropriate prevention and treatment schemes for obesity and its co-morbidities. Along with physicians all care givers have the same responsibility. Obesity care needs to be delivered by certified obesity experts in specialised and accredited obesity centres. Treatment should be based on good clinical care and evidence-based interventions and it should be individualised and multidisciplinary, focus on realistic goals, weight maintenance and prevention of weight regain. Everybody in the field, including the patients, should understand that, since obesity is a chronic disease, weight management will need to be lifelong.

Conclusions:

- Screen all adults for obesity. Offer or refer patients with a body mass index (BMI) of 30 kg/m² or greater to intensive, multicomponent behavioral interventions.
- A 5% to 10% weight loss can reduce risk of heart disease and diabetes and should be encouraged for all patients who are overweight and obese.
- Regardless of body weight or weight loss, all patients should be encouraged to be physically active for improved health and weight maintenance.
- Consider pharmacotherapy in adults who have not been able to lose weight through diet and physical activity alone and who have:
 - 1) BMI of 30 kg/m² or greater
 - 2) BMI of 27 kg/m² or greater, and obesity-related comorbidity
- Consider bariatric surgery in adults who have not been able to lose weight through diet and physical activity alone and who have:
BMI of 40 kg/m² or greater
BMI of 35 kg/m² or greater, and obesity-related comorbidity

Control of initial level of knowledge's:

Task 1. Clinical symptoms of obesity?

- A. overweight, dyspnea
- B. chill, constipation
- C. polydipsia, polyuria
- D. exophthalmos, tachycardia

Task 2. The normal level of body mass index is:

- A. 30-35%
- B. 35-40%
- C. 18-20%
- D. 20-25%

E. 15-18%

Task 3. The normal percentage of body fat in men:

A. 20-25%

B. 11-17%

C. 25-30%

D. 5-10%

E. 30-35%

Task 4. The normal percentage of body fat in women:

A. 30-35%

B. 15-23%

C. 5-10%

D. 25-30%

E. 11-17%

Task 5. Normal waist circumference in men:

A. to 104 cm

B. 80cm

C. 90 cm

D. 100 cm

E. to 110 cm

Task 6. Normal waist circumference in women:

A. 90 cm

B. 80cm

C. 85 cm

D. 75 cm

E. to 100 cm

Task 7. The main etiological factor of primary obesity?

A. insulin resistance

B. over-eating and sedentary behavior

C. dysfunction of the hypothalamic-pituitary system

D. genetically caused disorder of monoamines metabolism in the brain

E. impairment of lipid metabolism.

Task 8. What kind of diet should be used for obesity?

- A. №5
- B. №8
- C. №10
- D. №7
- E. №9

Task 9. Prevention of obesity

- A. limitation of physical exercise
- B. increased consumption of fats
- C. increased carbohydrate intake
- D. rational nutrition

Task 10. Which drugs are used for treating obesity?

- A. antimicrobial
- B. anorexigenes
- C. glucocorticoids
- D. cytostatics

Tests to control initial level of knowledge

1. **Obesity is spread in developing countries because of such eating habits:**
 - A. **Cheap food with increased amount of simple carbohydrates**
 - B. **Excessive amount of animals fats in food**
 - C. **Protein deficiency in the diet**
 - D. **Fiber deficiency in the diet**
 - E. **Excessive amount of protein in food**
2. **Alimentary factors of obesity development, all mentioned, except:**
 - A. **Binge eating**
 - B. **Eating mostly in the evening and at night**
 - C. **Excessive consumption of carbohydrate**
 - D. **Excessive consumption of fiber**
 - E. **Excessive consumption of animals fats**
3. **Obesity can develop in all cases, except:**
 - A. **tumor destruction of ventromedial nucleus of the hypothalamus**
 - B. **tumor destruction of ventrolateral nucleus of the hypothalamus**
 - C. **neuroinfections**
 - D. **traumatic brain injury**
 - E. **metastasis of malignant tumors in the hypothalamus**
4. **Obesity develops in all of endocrine diseases, except:**
 - A. **insulinoma**
 - B. **hypothyroidism**
 - C. **Cushing disease**

- D. *hypocortisism*
 - E. *hypogonadism*
5. *Obesity is the result of all the mentioned, except:*
- A. *Binge eating*
 - B. *reduction of physical activity*
 - C. *changes in metabolism*
 - D. *reduced lipolysis*
 - E. *frequent low-calorie eating*
6. *All of mentioned contributes to obesity, except:*
- A. *High consumption of carbohydrates*
 - B. *Eating high-calorie foods*
 - C. *Excessive consumption of animal fats*
 - D. *Rare meals mainly in the afternoon*
 - E. *low-calorie meals 5-6 times a day*
7. *All of mentioned contributes to obesity, except:*
- A. *hyperinsulinism*
 - B. *hypoinsulinism*
 - C. *hypoprolactinemia*
 - D. *low secretion of STH*
 - E. *hypercortisism*
8. *All these endocrine disorders are caused by obesity, except:*
- A. *Glucose intolerance, development of diabetes mellitus*
 - B. *Menstrual cycle disorders*
 - C. *Infertility*
 - D. *Prevalence of diabetes mellitus of the 1 type*
 - E. *Higher frequency of fetal death*
9. *Hypothalamic-pituitary obesity is characterized by all mentioned, except:*
- A. *Rapid increase of body weight*
 - B. *Bulimia*
 - C. *Polydipsia*
 - D. *Organic brain syndrome*
 - E. *Slow increase of body weight*
10. *Obesity is a risk factor of all mentioned diseases, except:*
- A. *Diabetes mellitus*
 - B. *Coronary heart disease*
 - C. *Arterial hypertension*
 - D. *Arterial hypotension*

Tests for final control of knowledge:

1. *For II stage of obesity BMI will be:*
- A. *18,5-24,5*
 - B. *> 40*
 - C. *30,0- 34,5*

D. 25,0-29,9

E. 35,0-39,9

2. Lipid profile in obesity is characteristic of everything mentioned, except:

- A. hypercholesterolemia**
- B. hypertriglyceridemia**
- C. elevation of unsaturated fatty acids**
- D. elevation of B-lipoproteins**
- E. hypocholesterolemia**

3. Cushing's disease is characterized by all mentioned, except:

- A. fatty tissue deposits around the midsection and upper back, moon face, buffalo hump**
- B. pink or purple stretch marks (striae)**
- C. osteoporosis**
- D. hyperplasia of adrenal glands**
- E. arterial hypotension**

4. Hypothyroid obesity is characteristic by all mentioned, except:

- A. diffuse fatty tissue deposits**
- B. somnolence**
- C. dry skin**
- D. bradycardia**
- E. red colour of face**

5. Hypothalamic obesity is characterized by all mentioned, except:

- A. rapid development of obesity**
- B. gynoid fat distribution**
- C. neurological symptoms**
- D. diabetes mellitus of the 1 type**
- E. bulimia, polydipsia**

6. Pickwickian syndrome is characterized by all mentioned, except:

- A. severe obesity**
- B. somnolence**
- C. bulimia**
- D. pulmonary hypoventilation**
- E. epileptiform electroencephalographic patterns**

7. Diet therapy for obesity includes all mentioned, except:

- A. Restriction of simple carbohydrates**
- B. Consumption of plant fats**
- C. 5-6-low caloric meals per day**
- D. 2-3 meals per day**
- E. restriction of calories, but not volume of food**

8. Diet therapy for obesity includes all mentioned, except:

- A. Decrease amount of carbohydrates**
- B. Consumption enough protein**
- C. Decrease consumption of protein**
- D. Decrease consumption of animal fats**

E. Consumption of physiological doses of vitamins and minerals

9. Patients with obesity are recommended all mentioned, except:

- A. caloric deficiency 500 kkal per day***
- B. 5-6-low calorie meals per day***
- C. fasting days***
- D. restriction of water consumption to 1 liter per day***
- E. alcohol consumption***

10. Physical exercises contribute to all mentioned, except:

- A. increase of glucose utilization***
- B. insulin resistance***
- C. dyslipidemia correction***
- D. decrease of arterial pressure***
- E. increase of cardiovascular risk***

11. All mentioned groups of patients need obesity prevention measures, except:

- A. hereditary predisposition to obesity***
- B. older than 40 years***
- C. sedentary behaviour***
- D. sedentary because of chronic disease***
- E. oncological patients***

Correct answers for initial level of knowledge: 1-A, 2-D, 3-A, 4-D, 5-E, 6-E, 7-B, 8-D, 9-E, 10-D.

Correct answers for final level of knowledge: 1-C, 2-E, 3-E, 4-E, 5-D, 6-E, 7-D, 8-C, 9-E, 10-B, 11-E.

Situational tasks for the topic "Obesity and its complications".

Task 1.

Patient R., 36 years old. Complains of severe obesity, which developed in the last 2 years (from 72 to 106 kg, height 173 cm), decrease of sexual function. Appetite is increased. Does not keep any diet. Carbohydrates are prevalent. Complains of headache, somnolence, general weakness. Deterioration is not linked with anything. Often has exacerbation of tonsillitis.

General examination: Prevalence of fat tissue deposits on abdomen, back, neck and face. Dry skin, oedema is absent. Pulse 72 per minute, regular. Arterial pressure - 150/105 mm. Hg. Left border of heart dullness is in V intercostal space, +1 cm lateral from left midclavicular line.

Heart sound are diminished, S2 accent in the aortic area. Complete blood count and complete urinary count are without changes. Glucose tolerance test: fasting glucose - 5,4 mmol / l, postprandial - 6,2 mmol / l.

Questions and tasks:

1. Formulate and substantiate the diagnosis
2. Assign additional examination to make more precise diagnosis.
3. Give diet recommendations.
4. Does the patient need drug therapy and which.

Task 2.

Patient L., 32 years old. Complains of obesity, fatigue, periodically pain in right subcostal region, which increases after meal. Appetite is not elevated. Can keep food diet without discomfort. Body weight increased significantly 5 years ago after pregnancy and delivery. The patient was predisposed to obesity since childhood. During puberty there were no abnormalities. Menstruation since 15 years old. Prefers foods rich with sugar and wheat. Parents are obese.

General examination: Height - 168 cm, weight - 96 kg. Fatty tissue distribution is diffuse. Skin has normal colour, moist. Pulse - 78 per 1 min, regular. AP -135/80 mm. Hg. Left border of heart dullness is in V intercostal space, +1 cm lateral from left midclavicular line. Heart sounds are diminished. Breath sounds are normal. Lower margin of the liver + 2 cm under the edge of costal arch, painful.

Orthner's symptom is positive. Secondary sexual signs are developed normally.

Thyroid gland is not enlarged.

Additional examination: oral glucose tolerance test: fasting glucose - 5,6 mmol / l, postprandial (2 hours after meal) -5,8 mmol / l. Lipid profile: elevation of total cholesterol, triglycerides, decrease of HDLP.

Questions and tasks:

1. Formulate and substantiate the diagnosis.
2. Prescribe diet therapy. Count calories, amount of nutrients for the diet.
3. Prescribe drug therapy: A. anorexigenes; B. biguanides; C. sulfonureas; D. diuretics; E. hypolipidaemic; F. thyroid hormones.

Task 3.

Patient S., 58 years old, does not work. Complains of fatigue, general weakness, dyspnea during slight physical exercise, headaches, polydipsia, polyphagia, somnolence. Menopause for 12 years. Severe obesity developed 10 years ago, previously was slightly overweight. General examination: general condition is satisfactory. Height-169 cm, weight - 116 kg. Fatty tissue distribution predominantly on face and trunk. Cyanosis of face, extremities.

Skin is moist. Pulse- 98 per min., arterial pressure - 170/100 mm. Hg. Left border of heart dullness is in V intercostal space, +1 cm lateral from left midclavicular line, right - +1 cm lateral from right edge of the sternum in IV intercostal space. Heart sounds are significantly diminished. Breath sounds are vesicular, diminished.

Additional examination. Fasting blood glucose is normal. Glucose in urine is absent. Oral glucose tolerance test: fasting glucose - 5,2 mmol/l, postprandial (2 hours after meal) -12,8 mmol/l.

Questions and tasks:

1. Which disorders are hidden under such symptoms as polydipsia, somnolence, polyphagia.
2. How to evaluate elevated blood pressure in this patient: a) essential hypertension b) symptomatic arterial hypertension
3. Formulate and substantiate the diagnosis.
4. Prescribe diet therapy. Count calories, amount of nutrients for the diet.
5. Prescribe pathogenetic and symptomatic therapy.

Task 4.

Patient L., 42 years old. Complains of fatigue, loss of memory, somnolence, chills, constipation, increase of body weight. Appetite is satisfactory. Does not keep any diet. Mentioned complaints developed 6 years ago without provoking factors. Since that time body weight increased from 76 kg to 112 kg, height 168 cm. Menstruation is regular. Fat tissue distribution is diffuse.

General examination: Skin is dry, cold. Slight edema of palms, face. Pulse - 58 per minute, regular. Blood pressure – 145/85 mm. Hg. Borders of heart dullness: left - +1,5 cm lateral from left midclavicular line, right – in the IV intercostal space +1 cm lateral from right border of the sternum. Heart sounds are significantly decreased. Breath sounds are vesicular, diminished. Abdomen is enlarged, meteorism. Liver has normal size. Dence edema on legs. Thyroid gland is palpable, tender, not painful.

Additional examination. Total cholesterol - 8,8 mmol / l. Oral glucose tolerance test: fasting glucose – 5,2 mmol/l, postprandial glucose – 4,8 mmol/l. TSH – 12,8 mIU/l.

Questions and tasks:

1. Formulate and substantiate the diagnosis.
2. Additional examination for more accurate diagnosis.
3. Explain pathogenesis of edema.
4. Evaluate results of blood cholesterol test.
5. Prescribe drug therapy: A. dygoxine; B. diuretics; C. anorexigenes; D. biguanides; E. thyroid hormones; F. hypolipidaemic drugs

Control questions:

1. Definition of obesity. Types of obesity. Regulation of lipid metabolism. Features of metabolic obesity. The causes of obesity.
2. Classification of obesity. The most common forms of obesity.
3. Clinical characteristics of alimentary obesity.
4. Endocrine diseases, which cause secondary obesity, general characteristics.
5. Laboratory and instrumental methods of diagnostics of obesity, expectations.
6. Description of pituitary-hypothalamic obesity.
7. General principles of treatment of patients with obesity.
8. Which are rare forms of obesity. Give a brief clinical description.
9. Supervision of patients with obesity.
10. Complications that occur in patients with obesity.
12. The main ways to prevent obesity.

Practical tasks to the theme

1. Examine patients with obesity. Evaluate type of obesity by proportions of patient's body.
2. Compose a program of instrumental and laboratory examination of a patient with obesity. Give interpretation of laboratory methods. (Complete blood count, fasting blood glucose and urine glucose levels, followed by an oral glucose tolerance test (OHTT) (glucose - 1.75 g / kg body weight, but not more than 75 grams), blood lipid profile (cholesterol, triglycerides, b- lipoproteins, HDL cholesterol, atherogenic index), bilirubin, AST, ALT, alkaline phosphatase (ALP), amylase, prothrombin index (PTI), urea, creatinine, coagulation.
3. Identify the metabolic syndrome. Assess cardiovascular risk. Make a plan of diagnostics of diabetes.

4. Give interpretation of instrumental methods. (Definition of BMI, waist-hip ratio, definition of obesity type).

4. Make a program to treat obesity (make dietary recommendations - to determine calories and make a program of gradual slow decrease caloric intake, define and adjust the percentage of consumed proteins, fats and carbohydrates, make a program of gradual transition patients to healthier versions of his favorite foods, make recommendations the gradual increase in physical activity).

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