macroadenoma lead to increase of bone resorption and spinal fractures. In hypopituitarism, disturbances in GH and gonadotropins secretion lead to osteopenia or osteoporosis. There is an increased fracture risk in GHD patients. Sometimes, additional effects of secondary hypogonadism, hyperprolactinemia and GHD are observed in hypopituitarism due to pituitary tumor.

KEYWORDS: pituitary disorders, bone metabolism, disruption, osteoporosis.

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MODERN PRINCIPLES OF TREATING OBESITY

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In the last couple of decades obesity rapidly increased together with obesity related co-morbidities. Comprehensive lifestyle interventions, including nutrition, physical activity and behavioral therapy are the foundation for obesity management. Drug treatment, medical devices or bariatric surgery for obesity are indicated when diet, physical exercise and behavioural methods did not achieve satisfactory results. Pharmacotherapy for obesity is introduced in patients with a body mass index ⩾ 30 kg/m2 and in patients with a body mass index ⩾27 kg/m^2 with co-morbidities. The FDA approved the following drugs for chronic therapy of obesity in the US: orlistat; lorcaserin; phentermine/topiramate; bupropion/naltrexone and liraglutide, while EMEA approved the following drugs for the treatment of obesity in Europe: orlistat; bupropion/naltrexone and liraglutide. Orlistat is a powerfull selective inhibitor of pancreas lipase which decreases fat absorption from the gut. Lorcaserin is a selective 5-HT 2 C receptor agonist. Activation of serotonin-2 C receptors in hypothalamus decreases the food intake. Combination of phentermine/topiramate decreases body weight in a way that phentermine suppresses apetite while topiramate affects energy homeostasis. Fixed combination of naltrexone (antagonist for opiate receptors) and bupropion (inhibitor of uptake for dopamine and norepinephrine) has a synergistic effect on apetite decrease and body mass decrease. Liraglutide is a GLP-1 analog which is injected in 3 mg dose daily to decrease hunger and induce fulness in stomach and satiety. Therapeutic efficacy for most of the obesity drugs is assessed by determining body weight decrease by ⩾5% of initial body weight after three months (for liraglutide ⩾4% after 16 weeks) and in case of having achieved such a response, therapy is continued. These data suggest the existence of specific responder phenotypes in which the use of adequate antiobesity therapy could result in a significant decrease of body weight. In the future we can expect that different drug combinations may be used, having different mechanisms in mind which are contributing in the rise of global obesity epidemic. Intragastric balloons are a newly developed endoscopic therapy for weight loss. Balloons occupy space in the stomach, inducing satiety and decreasing food intake. The implantable weight loss device was approved by FDA in 2015. The device works by interruption of vagus nerve signalling which leads to a delay in gastric emptying, early satiety and reduced hunger. Bariatric surgery is the most effective treatment for severe obesity and its comorbidities. Major clinical procedures are: adjustable gastric banding, vertical sleeve gastrectomy, Roux-en-Y gastric bypass and biliopancreatic diversion.

KEYWORDS: obesity, approved drugs, drug combination, efficacy criteria, intragastric balloons.

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BARIATRIC SURGERY: THE MESSAGE FROM SURGEON TO ENDOCRINOLOGIST (OR WHAT TO EXPECT FROM DIFFERENT SURGICAL TECHNIQUES)

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Diabetes mellitus is a chronic disease, 85% of all diabetics suffered from DM2. The expected spreading of DM2, high frequency of complications (nephropathy, retinopathy, polyneuropathy, angiopathy), early disability of patients, high mortality rate dictates a necessity of the effective treatment of DM2, which was called by WHO as a non-infectious epidemy. Bariatric (Metabolic) surgery initially intended for the treatment for severe (morbid) obesity proven to be very effective for the patients suffering from Diabetes Mellitus type 2 (DM2) — well-known obesity-related disease. Moreover, some kinds of metabolic operations were appeared to have «specific action» which means high probability of compensation of DM2 and correction of Hypercholesterolemia independently on weight loss. During the last decade metabolic surgery could extend its opportunities not only for severe obese patients but also for the patients suffering from DM2 with obesity class 1 (BMI 30—35) or even without obesity. The latest cohort of surgically — treated patients with DM2 is of high scientific interest. It is important to select appropriate patients whose prognosis for DM2 compensation would be high. The more obese is patient — the better prognosis of remission of DM2 he (she) has. Non-important factors for the prognosis of compensation of DM2 are: level of fasting glycemia, level of HbA_{1c} preoperatively, kind of hypoglycemic therapy including Insulin. Less optimistic prognosis for compensation of DM2 can be expected in patients with C-Peptide level <1.0 pmol/ml, anamnesis of DM2 >10 years, positive tests for autoimmune antibodies (GAD, beta-cels etc). However, in case of LADA-Diabetes or DM2 with severe impaired beta-cell secretory function metabolic surgery can also be helpful while lowering of doses of Insulin and providing more predictable limited

food consumption. The choice of kind of operation in the patient suffering from DM is a key factor for success and a discussible question among bariatric specialists. Although all kinds of operations are effective the effectiveness is in direct proportion with the complexity of surgery. Mechanisms of action of pure restrictive operations (Gastric Banding, Sleeve Gastrectomy, other Gastroplasties) are: 1) food restriction; 2) visceral fat loss. Mechanism of food restriction starts working since the first days after surgery. This can explain compensation of DM2 since the first weeks after surgery in many patients. Rather than other Gastroplasties Sleeve Gastrectomy has probably additional mechanism of action: 3) removal of Grelin-producing zone of the fundus. In general, restrictive operations can achieve 55—70 % rate of compensation of DM2 but chance of obesity and DM2 recidivism is high after pure restrictive procedures. Gastric Bypass is still a popular operation and currently is used in some modifications with addition of some degree of malabsorption (long-limb R-Y-Gastric Bypass, mini-Gastric Bypass etc). Gastric Bypass provides better compensation of DM2 (~ 80% of cases) than pure restrictive operation. Besides mentioned mechanisms of action Gastric Bypass includes additional ones: 4) incretine effect due to early release of small bowel peptides like GLP-1, PPY etc 5) duodenal exclusion with interruption of postprandial impulses from Duodenum to the pancreas. Some hormonal stimulus (GIP etc.) are proven to be of importance. Due to strong incretine effect episodes of hypoglycemias can occur after Gastric Bypass. Life-long vitamin – mineral supplementation is mandatory. Biliopancreatic Diversion (BPD) is the most «metabolically» effective operation (~ 95% of compensation of DM2 plus lowering of LDL-Cholesterol) and currently is used in some modifications (Scopinaro's type, BPD/Duodenal Switch, SADI's BPD). Together with other mechanisms of action BPD has «specific» mechanism of action: 6) selective malabsorption of fats leading to low concentration of FFA in the portal vein system. To our data compensation of DM2 was achieved in 98.5% of 70 patients with obesity and DM2 and results were stable 5 and more years after surgery. Careful monitoring including blood tests and life-long Vitamin-mineral supplementation is necessary after BPD.

Metabolic surgery for treatment of DM2 has been promoting in Russia since 2000 but nowadays it becomes a reality. In standards — 2017 American Diabetes Association recommends metabolic surgery in patients with BMI >40 or BMI >35 when diet modification and medical treatment are ineffective. Metabolic surgery can also be considered in patients with BMI >30 when appropriate antidiabetic treatment including insulin therapy are non-effective in compensation of DM2.

KEYWORDS: bariatric surgery, obesity, biliopancreatic diversion, diabetes mellitus.

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CALCIUM METABOLISM AND BONE LOSS AFTER BARIATRIC SURGERY

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Bariatric surgery results in the most significant and stable weight reduction in MO patients. The most commonly performed bariatric procedures are RYGP and SG. RYGSB and BPD are hybrid bariatric surgical procedures incorporating gastric restrictive and extensive malabsorptive components. Consequently, digestion and absorption of macronutrients and micronutrients are largely limited. Weight loss after bariatric surgery lasts about 12—18 months postoperatively, with weight maintenance during the next period. Malabsorption is a result of the anatomic changes imposed by bariatric surgery, and most of the patients are predisposed to calcium and vitamin D deficiency. Secondary hyperparathyroidism (SHPT) and osteoporosis may occur in the absence of adequate supplementation. Postoperative nutritional deficiencies were studied mostly in patients who underwent RYGBP. During the 2 years after RYGBP, in spite of routine supplementation by standard multivitamin preparation, the incidence of specific nutrient deficiencies is reported to be up to 80% for vitamin B_{12}, 60% for iron, 60—80% for calcium and vitamin D and 40—45% for folic acid. The decrease of vitamin D level and progressive increase of PTH are related to the length of bypass limb and to the follow-up period after surgery. At the same time, not all patients whose vitamin D levels were lower than 30 ng/ml also had elevated PHT levels: only 49.0% of those who underwent short limb bypass and 78.9% of those who underwent long limb bypass. It is interesting that 42.1% of the individuals with laboratory normal vitamin D levels had an elevation in PTH. It is interesting that in morbidly obese patients there is a direct relationship between the level 25(OH)D and the level of PTH, but in patients who undergo bypass surgery the correlation between 25(OH)D and PTH can't be revealed. When patients undergo GBP, the preferential sites for the absorption of calcium, the duodenum and proximal jejunum are bypassed, so they have a risk of hypocalcaemia that only partially depends of vitamin D. In the study by R. Clements et al. patients were recruited one year after GBP: vitamin D deficiency was found in 23.6% cases, elevated PTH — in 25.7% cases. Only 28.6% patients with SHPT had low 25(OH)D and in patients with vitamin D deficiency only 36 % had PTH elevation. Bone metabolism changes and BMD loss after bariatric surgery are widely discussed. BMD loss is reported after malabsorbtive surgery, but also after restrictive operations such as SG.

KEYWORDS: bariatric surgery, vitamin D, secondary hyperparathyroidism, bone metabolism.

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