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METABOLIC SYNDROME – THEORY AND PRACTICE

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ABSTRACT

Introduction: Due to sedentary lifestyles and excessive calorie intake, metabolic syndrome is becoming increasingly common health problem in the world, as well as in our country, and it is estimated to occur in 30% of the population of middle and older age. The metabolic syndrome is a combination of disorders that include: obesity, insulin resistance, glucose intolerance, impaired regulation of body fat and high blood pressure. Complications resulting from metabolic syndrome significantly reduces quality of patient's life and represents a huge socio-economic burden. Metabolic syndrome therapy is directed to reduce all risk factors, and that means the change of lifestyle, which includes a reduction of body weight, physical activity, antiatherogenic diet and smoking cessation. Medical therapy is aimed to the individual risk factors. **Case report:** In case of our patient, despite the optimal standard therapy, including drugs for the regulation of LDL and HDL cholesterol and triglycerides, an intensive control of blood pressure and glucose, failure to implement the recommended treatment led to a myocardial infarction. **Conclusion:** The fundamental problem is not the lack of efficacy of available therapeutic measures, medications and procedures, but in insufficient implementation.

Key words: metabolic syndrome, obesity, atherogenic dyslipidemia, insulin resistance, hypertension, statins, fibrates.

1. INTRODUCTION

The metabolic syndrome is a combination of disorders that include: obesity, insulin resistance, glucose intolerance, impaired regulation of body fat and high blood pressure. The two most significant risk factors for development of the metabolic syndrome are a large amount of fat around the abdomen (visceral obesity) and resistance of peripheral tissue cells to the effects of insulin. Metabolic syndrome is a collection of high-risk factors that lead to development of coronary disease and diabetes type 2 (1).

Due to sedentary lifestyles and excessive calorie intake, metabolic syndrome is becoming increasingly common health problem in the world (2, 3), as well as in our environment, and it is estimated to occur in 30% of the population of middle and older age. Complications related to the metabolic syndrome significantly reduce quality of life of the patients, and represents a huge socio-economic burden.

Criteria for clinical diagnosis of the metabolic syndrome:

- Any three out of the five listed parameters has to be met
- Increased waist circumference (specific for certain population);
- Elevated triglyceride (medication treatment of hypertriglyceridemia) ≥ 1,7 mmol/L, Reduced HDL (< 1,0 mmol/L (male) < 1,3 mmol/L (female);
- Increased blood pressure (antihypertensive therapy) Systolic ≥ 130 mmHg and/or Diastolic ≥85 mmHg;
- Elevated fasting plasma glucose (medication treatment of hyperglycemia) ≥ 5,6 mmol/L;

The values of the IDF used to measure waist circumference (WS *(waist size)* <94 cm for male; WS <80 cm for female) correspond to the values of body mass index (BMI) of 25 kg/m^2, while the value used by the AHA/NHLBI (WS <102 cm for male, WS <88 cm for female) correspond to the values of BMI 30 kg/m^2.

Various guidelines were developed with the aim of reducing the incidence of metabolic syndrome, and their fundament is change of bad habits that lead to the development of metabolic syndrome. Many risk factors for the metabolic syndrome are well known. It is believed that central-obesity and insulin resistance are the key indicators for its development (4, 5, 6), but also environmental and genetic factors have an influence too. The most significant risk factors of the environment include lack of physical activity, smoking and fast food consumption, that is rich with fats and carbohydrates, which consequently leads to obesity. Lower socioeconomic status is associated with an increased risk of metabolic syndrome development, as well as some psy-

chosocial factors, depressive symptoms and exposure to stressful life events (7, 8).

2. CASE PRESENTATION

Male, age of 46, works in a construction company, a laborer, married, has two children. Has not been examined for a longer period of time, wants to do laboratory tests.

Currently is feeling well, but sometimes he feels anxiety in the body, weakness, headache, and in the last month is getting tired more quickly, with occasional choking sensation, has swollen legs below the knees. He has been smoking 20-25 cigarettes a day, from the age of twenty, with dinner drinks 3-4 beers, have irregular meals, but likes to eat abundantly, has low physical activity. Concerned about his job, because the company operates poorly. His father has suddenly died at the age of 59, mother has diabetes and younger brother has developed a problem with high blood pressure. Body height = 174 cm, Body weight = 105 kg, BMI =34kg/m^2, Waist size = 112 cm. Blood pressure–140/95 mmHg, rhythmical heart beat, clear tones, without pathological murmurs, lungs produce a normal respiratory sound. Abdomen above the chest - without palpable mass and organomegaly. Legs below knees - discreet oedema, without varices, toenails atrophic. ECG: sinus rhythm, freq. 80/min, LVH (Left Ventricular Hypertrophy). Patient was given a referral for laboratory tests, advised weight reduction by changing lifestyles, diet with a lower calorie and salt intake, increased physical activity, smoking cessation and limited alcohol consumption. Medical therapy (metformin, ACE inhibitors, statins) is planned to be introduced after the results of the laboratory tests.

Early in the morning, on the second day, the patient felt choking and chest pains. He reported to the emergency service and was referred to the Department of Internal Medicine where he was hospitalized at the Department of Cardiology.

Laboratory tests were conducted during hospitalization, with the results as follows: CBC values in the reference range, CRP 3.4, BG (Blood Glucose) 6.4, BUN (Blood Urea Nitrogen) 6.6, CREA 67, K (Potassium) 3.9, Na (Sodium) 137, CHOL 6.5, LE 3.1, HDL 0.92, LDL 4.26, urine normal, markers of cardiac necrosis negative. OGTT (Oral Glucose Tolerance Test): 0 min - 5.9; 30 min - 8.8; 60 min - 14.4; 120 min - 8.2 mmol/L. ECG: sinus rhythm, freq. 100/min, LVH. Echocardiography: LVH and diastolic dysfunction of the first degree. Ultrasound of abdomen: hepatic steatosis. X-ray Pulmo/Cor: accentuated pulmonary pattern, cardio vascular shadow emphasized at the expense of the left ventricular segment. Phlebography of the right leg - did not show signs of pathological changes.

Diagnosis at the release form: METSy, Hypertensio Art., Hyperlipidemia, Oedema Cruris bill. p.p. dex. Therapy: Metformin 850 2x1, Ramipril 5mg, ASA 100mg 1x1, Atorvastatin 20mg, Fenofibrate 160mg 1x1, Omega-3 fatty acids 1x1

At the follow-up examination, within a month after release from the hospital, patient has lost 2 kg of weight. He was using the recommended therapy regularly. Notes that he feels well and that he thought his therapy is no longer required. The patient was advised to continue with the recommended medications, lifestyle changes (limited carbohydrates, fats, salt, to regularly exercise, to reduce stress as much as possible, to quit smoking and limit alcohol consumption.

In the following period, the patient's wife regularly came for therapy, but she noted that the patient does not adhere to the recommendations, is not physically active, has not lost any weight and there is still stress present because he has lost his job. Also, he does not want to come to the scheduled control appointment.

Four months later, his wife brought Release form from the hospital with the following Diagnosis: Infarctus Myocardii Parietis Inferioris.

3. DISCUSSION

The metabolic syndrome, prediabetes and type 2 diabetes are closely connected and are overlapping in a large amount. Almost 75% of people with prediabetes and about 85% of people with type 2 diabetes have metabolic syndrome. In people with the metabolic syndrome, relative risk for developing cardiovascular disease is 1.9 to 3, depending on the criteria that was used in defining.

Therapy of metabolic syndrome is aimed at reducing all risk factors. The basis of treatment is lifestyle changes, which include body weight reduction, physical activity, anti-atherogenic diet and smoking cessation. Medical therapy focuses on the individual risk factors. Includes drugs for lipid disorders, antihypertensives, oral hypoglycemic agents, antiplatelet therapy, medications for endothelial dysfunction treatment and treatment of obesity, as well as surgical intervention.

The drug of first choice in the treatment of hyperglycemia is metformin due to it's pharmacological advantages, such as good blood glucose control with minimal side effects and a reduced potential for interactions with other medications. After 3-6 months of the treatment with metformin, if Hba1c <6,5%, an additional oral antidiabetics (Acarbose, Sulfonylureas, Pioglitazone, Glipizide, DPP-4 inhibitors, GLP-1 analogs) or insulin (if HbA1c > 7.5%) will be included in therapy. For antihypertensive pharmacotherapy of patients with metabolic syndrome, advantage will be given to ACE inhibitors and angiotensin receptor blockers for blocking the RAAS (renin-angiotensin-aldosterone system).

In the treatment of lipid disorders, primarily atherogenic dyslipidemia, the drugs of choice will be those that can reduce macrovascular residual risk, which is attributed to elevated levels of triglycerides and reduced HDL cholesterol value. This is typical lipid profile in patients with type 2 diabetes, metabolic syndrome and the patients with pre-existing cardiovascular disease (9). Remaining macrovascular risk was present in diabetic patients, as well as in non-diabetics, but patients with diabetes were significantly more vulnerable. In the treatment of atherogenic dyslipidemia, which involves elevated levels of triglycerides and low HDL cholesterol value, fibrates are the drugs of choice, which may be used together with statins, in the case of combined dyslipidemia.

Lifestyle changes or addition of fibrates, and/or omega-3 fatty acids in the statin treatment, improves the regulation of lipid parameters, significantly delays development of atherosclerosis and reduces the residual vascular risk (10, 11).

Lowering LDL by 1 mmol/L using statins reduces the risk of a major coronary event by 23%, and 77% of the remaining cardiovascular risk remains "uncovered" (12). In the case of our patient, despite the optimal standard therapy that included drugs for the regulation of LDL and HDL cholesterol and triglycerides, an intensive control of blood pressure and glucose, failure to implement the recommended treatment led to a myocardial infarction.

4. CONCLUSION

The prevalence of metabolic parameters that make up metabolic syndrome could be drastically reduced by changing lifestyle. It is necessary to educate patients about the reductive healthy diet, importance of physical activity, was for treating hyperglycemia, hypertension, dyslipoproteinemia by a rational use of drugs, when the effect of primary treatment is not enough. The fundamental problem is not the lack of efficacy of available therapeutic measures, medication and treatments, but in insufficient implementation.

Family history (anamnesis) is particularly important, the attention should be given to children at-risk, and these children are from the families who's members suffered from metabolic syndrome, diabetes mellitus or gestational diabetes, obese boys and girls, visceral obesity form or ovarian hyperandrogenism.

Early detection of metabolic syndrome factors is likely to reduce not only it's incidence in the childhood, but it could also significantly reduce the prevalence of this condition in the adult population.

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REFERENCES

1. Haffner S. Diabetes and the metabolic syndrome - When is it best to intervene to prevent. Atherosclerosis supplements. 2006; 7: 3-10.
2. Hu FB, Stampfer MJ, Haffner MJ. Elevated risk of cardiovascular disease prior to clinical diagnosis of type 2 diabetes. Diabetes Care. 2002; 25: 1129-34.
3. Grundy SM. Metabolic syndrome pandemic. Arteriosclerosis Thrombosis and Vascular Biology. 2008; 28: 629-36.
4. Carr DB, Utzschneider KM, Hull RL, et al. Intra-abdominal fat is a major determinant of the National Cholesterol Education Program Adult Treatment Panel III criteria for the metabolic syndrome. Diabetes. 2004; 53: 2087-94.
5. Hu G, Qiao Q, Tuomilehto J, et al. Plasma insulin and cardiovascular mortality in non-diabetic European men and women: a meta-analysis of data from eleven prospective studies. Diabetologia. 2004; 47: 1245-56.
6. Anderson PJ, Critchley JA, Chan JC, et al. Factor analysis of the metabolic syndrome: obesity vs insulin resistance as the central abnormality. Int J Obes Relat Metab Disord. 2001; 25: 1782-88.
7. Zhu S, St-Onge MP, Heshka S, Heymsfield SB. Lifestyle behaviors associated with lower risk of having the metabolic syndrome. Metabolism. 2004; 53: 1503-11.
8. Raikkonen K, Matthews KA, Kuller LH. Depressive symptoms and stressful life events predict metabolic syndrome among middle-aged women: a comparison of World Health Organization, Adult Treatment Panel III, and International Diabetes Foundation definitions. Diabetes Care. 2007; 30: 872-77.
9. Ninomiya JK et al. Circulation. 2004; 109: 42-62.
10. Nambi V , Balllantyne CM. Am J Cardiol. 2006; 98: 34-8.
11. Marchioli R. et al. Circulation. 2002; 105: 1897-903.
12. Baigent C. et al. Lancet. 2005; 366: 1267-78.
13. Pavlić-Renar I. Medikamentna terapija metaboličkog sindroma. Medicus. 2004; 2: 103-9.
14. Kassi E, Pervanidou P, Kaltsas G, Chrousos G. Metabolic syndrome: definitions and controversies. BMC Med. 2011; 9: 48.