PECULIARITIES OF ANTIOSTEOPOROTIC TACTICS FOR THE MANAGEMENT OF ELDERLY PATIENTS WITH DIABETES MELLITUS TYPE 2 WITH CONCOMITANT SARCOPENIA AND OBESITY

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Osteoporosis is a bone metabolic disease characterized by disturbance of bone microarchitectonics and its fragility, resulting in osteoporotic fractures.

The decision on the need for medical intervention is made at a high probability of osteoporotic fractures or / and the presence of osteoporosis. Predicting the risk of osteoporotic fractures is crucial for determining patient management tactics and treatment strategies. The risk of fractures in osteoporosis is determined by the bone strength and other factors and secondary diseases that are included in the models developed by the World Health Organization. In the management of patients with a high risk of osteoporosis, it is recommended to use various instruments - minute test for osteoporosis; FRAX algorithm (to calculate the 10-year probability of a major osteoporotic fracture and the 10-year probability of a hip fracture in a patient), QFracture algorithm (with an additional opportunity to calculate the risk of fracture from 1 to 10 years, including more advanced than FRAX, the list of conditions associated with fractures, as well as the patient's tendency to fall). The main instrumental method of diagnosis of osteoporosis is dual-energy x-ray absorptiometry, DEXA.

To date, diabetes mellitus is recognized as a risk factor for secondary osteoporosis [2], but data on the increased risk of osteoporotic fractures on the background of diabetes mellitus are contradictory. Possible, but unproven (due to contradictory data) mechanisms that realize the connection between diabetes mellitus

and the risk of osteoporotic fractures are BMD, age, gender, and body mass index [1,3]. Patients with type 2 diabetes and obesity often have normal bone mineral density while they have a high risk of fractures due to a high risk of falls (due to lack of coordination and balance as a result of neuropathy and hypoglycemic conditions, visual impairment due to retinopathy, etc.) and DEXA in this case is not informative. Considering that health care resources are limited, the decision on whether to conduct dual-energy absorptiometry to assess bone mineral density is reasonable when there is a high probability of osteoporotic fractures.

Identifying additional risk factors for osteoporotic fractures is especially necessary in situations where there is a violation of bone quality with normal bone mineral density or when densitometry cannot be performed for various reasons.

The goal is to assess the impact of sarcopenia, obesity and visceral obesity on the threshold of anti-osteoporotic intervention in elderly patients with type 2 diabetes.

Materials and methods. 49 elderly people with type 2 diabetes were examined (mean age was 65±2.8 years). Estimation of 10-year probability of a major osteoporotic fracture and the 10-year probability of a hip fracture in a patient were calculated using FRAX and QFracture models specific to the respective ethnic group. Dual-energy X-ray absorptiometry was performed for all patients which determined the bone mineral density and the visceral fat content in the body. Diagnosis of sarcopenia was based on the assessment of the content of muscle mass (bioimpedance method) and the determination of the index of muscle strength (hand dynamometry). The statistical significance of differences in the studied parameters was evaluated by the nonparametric method (with the calculation of the $\chi 2$ criterion).

Results. All patients with type 2 diabetes were divided into two groups depending on body weight: group I - 30 people with obesity or overweight, group II - 19 patients with normal body weight on the background of type 2 diabetes. Visceral obesity was detected in all patients of the first group and 68.8% of patients of the second group. Sarcopenia was present in 60% of patients in I group and 36.8% of patients in group II.

To study the effect of sarcopenia on the state of bone tissue and the 10-year probability of osteoporotic fractures in patients with type 2 diabetes, we divided the examined patients into 2 subgroups depending on the presence or absence of sarcopenia (25 people were in group I and 24 patients - in group II). We found a significant difference in the distribution of the frequency of osteodeficiency between the groups. In I group of patients in 20 (80%) people there was a decrease in bone mineral density, while in group II patients - in 12 (50%) ($\chi2$ = 4.864, df = 1, p = 0.027). We did not reveal a significant difference in the probability of osteoporotic fractures between these groups of patients when evaluating with FRAX®, while there was a significant difference in identifying high or medium 10-year risk of major osteoporotic fractures using QFracture - 19 (76%) patients of the first group and 8 (33.3%) patients of the second group had high or medium values of fracture probability ($\chi2$ = 9.01, df = 1, p = 0.003).

The next stage of our research was to divide patients into subgroups on the basis of the absence / presence of visceral obesity. The first group included 43 people with type 2 diabetes and visceral obesity, the second group consisted of 6 patients with type 2 diabetes and normal visceral fat. We identified a significant difference in the distribution of bone mineral density values and the 10-year probability of osteoporotic fractures in these groups of patients. A decrease in the BMD index corresponding to osteodeficiency (osteopenia of different severity and osteoporosis) was observed in 31 (72.1%) people of the first group and in 1 (16.7%) patient from the second group ($\chi2$ = 7.139, df = 1, p = 0.007). In the same groups of patients, we calculated the number of patients with an average FRAX® value for major fractures and its value above the threshold of therapeutic intervention. We identified a high / medium risk of major osteoporotic fractures in only 10 (23.2%) patients of the first group, while in the second group - in 5 (83.3%) patients ($\chi2$ = 8.947, df = 1, p = 0.003).

Conclusions. In 61.2% of elderly patients with type 2 diabetes, overweight or obesity occurs, while visceral obesity occurs much more frequently (87.8%), and sarcopenia is detected in 51% of patients with type 2 diabetes.

In the presence of visceral obesity, the risk of osteoporotic fractures is significantly lower than with the normal content of visceral fat in the body, but osteodeficiency is more common.

Elderly patients with type 2 diabetes mellitus and sarcopenia have significantly lower bone mineral density and higher probability of major osteoporotic fractures when evaluated by the QFracture calculator.

Sarcopenia and visceral obesity contribute to the lowering of the threshold antiosteoporotic intervention in these patients, and they are potential factors contributing to the development of osteodeficiency and increase the probability of osteoporotic fractures.

Thus, in order to make a decision on the initiation of anti-osteoporotic therapy in elderly patients with type 2 diabetes, it is advisable to assess the content of visceral fat in the body and diagnose sarcopenia.

In patients with visceral obesity, there is a discrepancy between the lowered risk of osteoporotic fractures and low BMD indices, thus in this category of patients, an additional determination of bone mineral density is recommended.

A more sensitive tool for assessment of osteoporotic fracture probabilities in the presence of sarcopenia is QFracture tool.

References.

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