CLINICAL AND METABOLIC PREDICTORS OF EARLY-STAGE AVASCULAR NECROSIS OF THE HIP AND THEIR SIGNIFICANCE FOR OPTIMIZING PREVENTIVE PROGRAMS

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Introduction. Avascular necrosis of the femoral head (ANFH) is a multifactorial disease in which local vascular disorders are closely associated with systemic metabolic, inflammatory, and endocrine changes. The most promising stage for active medical treatment is the initial stages of the disease, when there is no pronounced deformation of the articular surface, but mechanisms are already forming that determine further progression and reduced limb function. In this regard, it is of particular importance to study a complex of modifiable risk factors that can not only characterize the severity of the process, but also serve as guidelines for building targeted rehabilitation programs aimed at slowing down bone tissue destruction and stabilizing the clinical condition.

The purpose of the study. To study clinical, anthropometric and biochemical features of patients with initial stages of ANFH and to determine their significance for the development of a risk-oriented approach to the prevention of the progression of the pathological process.

Materials and methods. The study included 160 subjects divided into three groups: 32 practically healthy individuals in the control group, 66 patients with the asymptomatic stage of ANFH, and 62 patients with the early symptomatic stage of the disease. All participants underwent a comprehensive examination to assess their age, gender, body mass index, concomitant pathologies, carbohydrate and lipid metabolism parameters, markers of inflammatory activity, mineral and vitamin status, as well as a range of hormonal and metabolic characteristics. The analysis was performed taking into account the stage of the pathological process and the severity of clinical manifestations.

Results. It was found that as the transition from the control group to the asymptomatic and then to the early symptomatic stage of ANFH increases, a combination of unfavorable clinical and metabolic disorders increases. One of the most striking patterns was an increase in the body mass index: in the control group, it was 22.4, in

patients with the asymptomatic stage, it was 28.3, and in patients with the early symptomatic stage, it reached 34.9. This trend indicates the important role of excess body weight and obesity as factors that contribute to both mechanical overload of the hip joint and systemic metabolic disorders that can affect microcirculation and bone remodeling.

An analysis of concomitant pathology showed that the most frequent comorbid conditions in patients with the initial stages of ANFH were arterial hypertension, detected in 40.63% of cases, dyslipidemia - in 26.88%, and vitamin D deficiency - in 21.88% of cases. At the same time, patients with an early symptomatic stage had more pronounced signs of systemic metabolic maladaptation. This group was characterized by higher levels of C-reactive protein, hyperphosphatemia, hypertriglyceridemia, and hypercholesterolemia. The combination of these changes suggests that an unfavorable biochemical background is already formed at an early stage of the disease, creating conditions for further progression of the bone-destructive process.

Special attention should be paid to the identified link between the clinical manifestation of the disease and the accumulation of modifiable risk factors. More pronounced abnormalities in the lipid spectrum, systemic inflammatory activity, and vitamin and mineral status were observed in patients with symptomatic disease. This suggests that the clinical deterioration in the early stages of ANFH cannot be solely attributed to local joint damage. Instead, it is influenced by general metabolic disorders that should be considered when planning treatment and subsequent rehabilitation.

Discussion. The obtained data confirm the multifactorial nature of early ANFH and demonstrate that rehabilitation measures should go beyond standard functional recovery. In the presence of obesity, dyslipidemia, arterial hypertension, vitamin D deficiency, and laboratory signs of inflammatory activity, it is advisable to consider comprehensive correction of these conditions as an essential component of the treatment program. This approach allows not only to reduce the severity of symptoms and increase tolerance to exercise, but also to potentially influence the pathogenetic mechanisms of disease progression. Therefore, the assessment of clinical and biochemical indicators can be used as a tool for risk stratification and as a criterion for monitoring the quality of rehabilitation measures in this category of patients.

Conclusions. The initial stages of ANFH are accompanied by the formation of a complex of interrelated clinical and biochemical disorders, the severity of which increases as the disease progresses. The most significant adverse factors include an increase in body mass index, arterial hypertension, dyslipidemia, vitamin D deficiency, and increased levels of C-reactive protein, triglycerides, cholesterol, and phosphorus.

The identified patterns justify the need for early detection and targeted correction of metabolic disorders in the structure of rehabilitation programs, which can help improve the effectiveness of treatment and slow down the progression of ANFH.