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EVALUATION OF IMMUNOLOGICAL PARAMETERS OF PATIENTS WITH OSTEOARTHROSIS

Babamuradova Zarrina Bakhtiyarovna
PhD, Head of the Department of Internal Medicine of the Pediatrics Faculty
Samarkand State Medical University, Samarkand, Uzbekistan
Email: dr.zarrina.b.b@mail.ru ORCID: 0000-0003-0468-2910

Akhmedzhanova Diyora Marufovna
master's degree resident, Department of Internal Medicine of the Faculty of Pediatrics, Samarkand State Medical University, Samarkand, Uzbekistan. Mail: diyorka_akhmedjanova@mail.ru

Shavazi Ramiz Nuraliyevich
Student of 4th course Medical Faculty
Samarkand State Medical University, Samarkand, Uzbekistan. Mail: ramiz.shavazi@bk.ru

Summary
The data of immunological examination of 159 patient's osteoarthritis of the knee joint of various etiologies aged from 29 to 72 years are presented. The obtained results of the study indicate that the development of inflammatory changes in the joint cavity is accompanied by signs of systemic inflammation and cytokine imbalance. Immunological indicators of 29 volunteers of similar age, who did not have clinical signs of osteoarthritis, were used as controls. The results obtained show etiology affects the immune status of patients with stage II-III coxarthrosis and gonarthrosis, which must be taken into account when laboratory immunological monitoring of endoprosthesis or other types of surgical interventions used to treat osteoarthritis in the late stages of the pathological process.

Keywords: osteoarthritis, immune system, immunoglobulins, cytokines.

INTRODUCTION

Diagnosis and treatment of severe forms of osteoarthritis are among the most urgent tasks of modern medicine. Many researchers agree that the factors contributing to the chronization of the pathological process in osteoarthritis are disorders in the immune system, but their specific mechanisms have not been fully studied [4, 5, 7, 8, 9]. Data on changes in immune status in the same nosological forms are ambiguous, contradictory and do not allow the development of a single concept for their assessment.

The purpose of this study is to study the effect of the etiological factor on the immune status of patients with osteoarthritis of the knee joints.

Methods and Materials

The results presented in the work were obtained from the examination of 159 patients with stage II-III osteoarthritis aged 29 years – 72 years, of these, 21 with idiopathic osteoarthritis of the hip joint, 42 with idiopathic osteoarthritis of the knee joint, 12 – with hypoplastic osteoarthritis of the knee joint, 13 – with post-traumatic osteoarthritis of the hip joint, 28 – with post-traumatic osteoarthritis of the knee joint, 32 – with the outcome of aseptic necrosis of the hip head (ANGB) and 11 – with osteoarthritis of large joints, frolicking against the background of rheumatoid arthritis. Peripheral blood lymphocyte typing was performed by laser flow cytometry on the BECKMAN COULTER EPICS XL cytometer (USA) [3]. T cells (CD3 + CD19-), helper T cells (CD3 + CD4 +), cytotoxic T cells (CD3 + CD8 +), B cells (CD3-CD19 +), natural killer cells (CD16 + CD56 + CD3-), natural killer cells/T cells (Immunotech MKAT kit (France) was used. Quantitative definition of immunoglobulins of classes A, M, G was carried out by the IFA method on the immunoenzymatic analyzer of BIO-TEK Instruments Inc, ELx808 (USA) with use of set of reagents of CJSC Vektor-Best (Novosibirsk), IL-6, TNFα cytokines by IFA method on the immunoenzymatic analyzer BIO-TEK Instruments Inc, ELx808 (USA) with use of diagnostic test systems of BioSource Europe (Belgium). The determination of the CEC level was carried out by precipitation of 3.5% PEG (MM 6000).

Immunological indicators of 29 volunteers of similar age, who did not have clinical signs of osteoarthritis, were used as controls. The examined sample did not include carriers of hepatitis B and C viruses, persons with an aggravated allergic history. Blood was drawn from the ulnar vein on an empty stomach.

The data were processed using non-parametric statistics using Wilcoxon's U-test for independent samples (Gelfgat E.L. et al., 2000; Glantz S., 1998; Gubler E.V., 1978). Statistical hypotheses were considered confirmed at a pu significance level < 0.05. Considering the application of non-parametric statistical methods, the study results were presented in the form of medians and interquartile ranges. When processing the obtained data, the AtteStat 1.0 software was used, developed in the information and computing center of the Federal State Budgetary Institution RNC WTO named after Academician G. A. Ilizarov and made as an add-on to Microsoft Excel.

Study Results

Analysis of the study results showed the following: in the synovial fluid of patients with osteoarthritis, regardless of the etiology of the disease, an increase in the content of immunoglobulins of classes A and G (IgA, IgG) was observed (Fig. 1, 2), IgM was detected, which, according to literature, is absent in the synovial environment of a healthy joint (Fig. 3) [3]. The concentration of cytokines in synovial fluid of patients

with osteoarthritis of various etiologies was significantly higher than in peripheral blood (Tables 1, 2). According to the literature, the imbalance of cytokines leads to the destruction of the structural and functional integrity of the cartilaginous extracellular matrix. Cytokines required in small amounts to maintain homeostasis begin to be detected in excess in the synovial fluid, their increased production contributes to the progression of the pathological process, and, as a result, the development of degenerative-dystrophic and inflammatory changes in the articular tissues [2, 6]. Synovial fluid osteoarthritis showed an increase in the content of TNFα, which is one of the main mediators of bone resorption and local inflammatory response. An increase in the concentration of IL-6, one of the most active cytokines involved in the implementation of the immune response, which is characterized not only by pro-inflammatory effects, but also by anti-inflammatory properties mediated on the one hand by inhibition of IL-1 and TNFα production, and on the other hand by activation of the synthesis and secretion of proinflammatory cytokine antagonists IL-1pa and soluble TNFα receptors (Tables 1, 2).

The content of T and B lymphocytes in peripheral blood in all groups did not exceed the regulatory limits (Table 3). At the same time, in patients with post-traumatic coxarthritis and gonarthrosis, a statistically significant decrease in the amount of CD3 + CD19 was detected in comparison with the indicators of patients with osteoarthritis of another etiology, mainly due to the T-helper population (CD3 + CD4 +). We regarded these changes as a prolonged immunological response to the consequences of traumatic destruction of joint tissues. In patients with post-traumatic, hypoplastic, idiopathic osteoarthritis, coxarthritis – outcome, the ANGB ratio of CD3 + CD4 + to CD3 + CD8 + did not significantly differ from the values of the control group (Fig. 4). In patients with osteoarthritis frolicking on rheumatoid arthritis, an increase in this index was observed due to higher than in control values of CD3 + CD4 + and lower values of CD3 + CD8 +.

In the peripheral blood of patients with idiopathic, post-traumatic osteoarthritis, coxarthrosis – the outcome of ANS, rheumatoid arthritis, an increase in the content of EKT (CD3 + CD56 + CD16 +) was noted – a special category of lymphoid cells, the biological role of which is realized through their cytotoxic effects. An increase in the absolute and relative number of ECTs in this category of patients can serve as indirect evidence of the participation of microorganisms in the development of pathological changes in articular and near-articular tissues in osteoarthritis.

In the peripheral blood of patients with large joint osteoarthritis, regardless of the etiology of the disease, we found higher values of activation marker expressing lymphocytes (HLA-DR) than in the control group. Given the important role of HLA-DR molecules in the processes of antigenic recognition and the launch of a cascade of molecular processes for the formation of a specific immune response, it can be assumed that an increase in the number of T-lymphocytes expressing these glycoproteins is a reflection of the processes of systemic activation of immune system

cells during the recognition of their own antigens of connective tissue, as well as microbial peptides, which in osteoarthritis can be considered as antigens of endogenous tissue An increase in the number of CD3 + HLA-DR cells was detected in patients regardless of the etiology of the disease, which indicates its pathogenetic significance, confirming the involvement of autoimmune processes in the development of pathological changes in osteoarthritis.

Significant increases in CEC, IgM, and IgG concentrations were observed in patients with rheumatoid arthritis due to inflammatory response and a pronounced autoimmune component (Fig. 5) (Table 4). A statistically significant increase in serum CEC compared to the control group was also detected in patients with idiopathic, post-traumatic osteoarthritis of the knee and hip joints, coxarthrosis – the outcome of ANGB. However, despite the reliable differences, in this category of patients, the content of the CEC did not go beyond the boundaries of the physiological norm. The closest to the values of the control group were the indicators of the immunity system in patients with hypoplastic coxarthritis, since this pathology is characterized primarily by anatomical – biomechanical inferiority of the joint with preserved hyaline cartilage and less pronounced degenerative and inflammatory changes in the synovial environment than in osteoarthritis of another etiology. The most pronounced were changes in immune status in patients with osteoarthritis that developed against the background of rheumatoid arthritis, the pathogenesis of which is based on genetically determined autoimmune processes caused by the deficiency of T-suppressor function of lymphocytes. Cytokine levels in synovial fluid in patients with knee and hip OA of various etiologies (median values and interquartile ranges).

Conclusions

Thus, etiology affects the immune status of patients with stage II-III coxarthrosis and go- narthrosis, which must be taken into account when laboratory immunological monitoring of endoprosthesis or other types of surgical interventions used to treat osteoarthritis in the late stages of the pathological process.

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