Cytokines and Growth Factors in Acute Coronary Syndrome

Kodirov M. D.
Bukhara State Medical Institute

Summary

The authors studied immunological parameters in acute coronary syndrome, vascular endothelial growth factor (VEGF -1) and cytokines (IL-1ß and IL-10), acute phase proteins (CRP) and complement C3. As a result of the study, the possibility of predicting the outcomes of acute coronary syndrome is presented, since the determination of protein growth factors (CRP, C3 and VEGF) in dynamics makes it possible to prevent the development of acute myocardial infarction.

KEYWORDS: *acute coronary syndrome, myocardial infarction, growth factors, cytokines.*

Relevance: Acute coronary syndrome (ACS) is a clinical form of coronary heart disease (CHD) in its critical phase in cases when coronary artery stenos is acquires a hemodynamically significant character and is accompanied by the manifestation of anginous pain syndrome. Atherosclerosis of the coronary arteries underlying ACS is characterized by a wave-like clinical course with alternating stages of exacerbation and relative remission. In most cases, the critical phase of coronary artery disease is a consequence of morphofunctional instability of the atherosclerotic plaque, causing occlusive thrombosis or thromboembolism of the coronary artery with the formation of necrosis of the corresponding myocardial vascularization basin [1.3.5.7.9.11].

In cases of survival of patients admitted to cardiac intensive care units with a diagnosis of ACS and subsequent relative stabilization of ischemic, necrobiotic and necrotic changes in the myocardium, the main outcomes of ACS are formulated in the form of clinical diagnoses

Q-myocardial infarction, not Q-specific myocardial infarction

localization, unstable angina, stable angina of the corresponding functional class (FC) and non-coronary artery disease. In this regard, it is extremely important to have a reliable personalized prognosis of clinical outcomes of ACS even at the hospital stage, since the choice of patient management protocols, as well as the optimization of methods and means of treatment depends on it[2.4.6.8.10.12.14.16].

The purpose of the study: to study cytokines and growth factors in ACS.

Material and methods of research: To study the parameters of immunity, 120 patients were selected who were hospitalized in the Bukhara branch of the RNCEMP with ACS in the department of cardio therapeutic resuscitation during the period 2020-2021.

Statistical analysis of the obtained results was carried out using methods of variational statistics. The reliability of the differences in the mean values was evaluated on the basis of the Student's criterion (t) with the calculation of the probability of error (P) when checking the normality of the distribution and the equality of the general variances (F – Fisher criterion).

The results of the study and their discussion. The study included 120 patients with ACS aged 30 to 65 years (mean age 44.0 ± 1.0). The transformation of ACS in patients with S-T elevation (67 patients) into acute myocardial infarction (AMI) was established: with a Q wave in 5 patients (8.3%),

in AMI without a Q wave - in 2 patients (3.33%) and in progressive angina (PS) - in 53 (88.3%).

Acute ST segment elevation in MI, both anterior and diaphragmatic, is most common in men aged 54-59 years.

In the studied group of patients with ACS, mortality was 11.2%, while in the group of patients with MI with a Q wave; it was 10%, with a significant frequency of anterior myocardial lesion and blockage of the Gis bundle leg in men.

The analysis of the cytokine profile and growth factors showed statistically significant shifts in the studied parameters (Table 1). Cytokines in acute coronary syndrome (M±m)

Indicators	Controlgroup n=35	OIM n=67 PS n=53	OIM n=67 PS n=53
IL-1β, пг/мл	72,8±0,76	83,8±1,3**	90,5 ±1,71**
IL-10, пг/мл	25,1±0,46	15,6 ±0,5***	44,3±0,59***
VEGF	57,50 ±1,0	147,92±1,5***	90,2± 1,0***
СРБ, мг/л	1,78±0,09	5,7 ± 0,06***	8,90 ± 0,19***
С3, нг/мл	34,2 ± 1,02	55,5 ± 0,9***	62,8 ± 1,19***

Note: * - differences relative to the control group data are significant (* - $P<0.05$, ** - $P<0.01$, *** - $P<0.001$)

Cytokines are known to induce the formation of acute phase proteins in the liver-CRP. The main cytokines involved in inflammation are TNF, IL-1, and adipose tissue becomes the main source of TNF, which disrupts insulin sensitivity and stimulates lipolysis [1].

The studies showed an increase in the level of IL-1 to 83.8 ± 1.3 pg/ml in patients with the transition of ACS to AMI, to 90.5 ± 1.71 pg/ml in patients with the transformation of ACS to PS against control indicators-72.8±0.76 pg/ml ($P<0.01$).

The study of the concentration of IL-10-as an anti-inflammatory cytokine showed its decrease during the transformation of ACS into AMI to 15.6 ± 0.5 pg/ml ($P< 0.001$), and during the transition of ACS to PS, its increase was found to 44.3±0.59 pg/ml ($P<0.001$).

Vascular Endothelial Growth Factor (VEGF)-activator of angiogenesis, responsible for restoring oxygen supply to tissues in a situation where blood circulation is insufficient. In physiological concentrations, endothelia (ET) acts on endothelial receptors, causing the release of relaxation factors, in higher concentrations it activates receptors on smooth muscle cells, stimulating persistent vasoconstriction primarily at the level of microcirculation [13.15.17.18].

The constrictor activity of endothelin-1 can

to be a factor of vasospasm enhancement, closing the vicious circle of path biochemical reactions and aggravating cerebral ischemia [6.12.11].

In our studies, the study of VEGF concentration showed a sharp increase, regardless of the clinical form of ACS transformation, to 147.92±1.5 and 90.2± 1.0 relative to the control-57.50 ± 1.0 in patients in critical condition with AMI and PS, respectively (Table 1).

The established phenomenon indicates vascular inflammation during the first 3 days in patients of the observed group. At the same time, a higher concentration of VEGF, as well as its increase in dynamics, indicates the state of vasoconstriction and the risk of developing AMI.

C-reactive protein (CRP) is an acute phase protein, a sensitive indicator of tissue damage in inflammation, necrosis and trauma. It is a marker in acute phases of various inflammatory processes.

It is absent in the blood serum of a healthy person.

Protein is synthesized in the liver. IL-6, IL-8 and TNF-α regulate the formation process. The concentration of CRP in the blood has a high correlation with the activity of the disease, the stage of the process.

In the absence of obvious causes, a slight increase in CRP indicates chronic subclinical inflammation of the vascular wall. This can be a factor in cardiovascular catastrophes: atherosclerosis, heart attack, thromboembolism and stroke. The informative value of the CRP index determined by highly sensitive methods is higher in this regard than the determination of low-density lipoprotein cholesterol. The risk of cardiovascular complications in patients with increased CRP increases with parallel increased other risk factors: cholesterol, fibrinogen, homocysteine, etc. CRP reflects the severity of the immune-inflammatory process, correlating with markers of T-cell activation, and can serve as an indicator of the activity of the disease, the severity of cutaneous and pulmonary fibrosis [2].

In patients with ACS, a statistically significant increase in its level was found to 5.7 ± 0.06 mg/l with the development of AMI (P<0.001) and to 8.90 ± 0.19 mg/l with the development of PS (P<0.001) versus the control - 1.78 ± 0.09 mg/l.

The established significant increase in the level of CRP in ACS indicates chronic subclinical inflammation of the vascular wall. At the same time, an increase in CRP was noted depending on the clinical form of ACS transformation: a progressive increase in its level from 3.2 times in AMI to 5.0 times in PS.

The complement system is a cascade system of proteolytic enzymes for humoral support of the body and maintenance of homeostasis. The complement consists of 11 serum proteins, which make up 9 components of the complement (C1-C9). C3 and C5 are involved in the regulation of the inflammatory reaction.

In the study, patients with ACS showed an increase in the level of C3 by 1.63 times (55.5 ± 0.9 ng/ml, P< 0.01) in AMI and by 1.84 times (62.8 ± 1.19 ng/ml, P <0.01) in PS, against the control - 34.2 ± 1.02 ng/ml, which indicates the activation of the inflammatory process in the body.

Conclusions: ACS is very diverse in terms of the clinical form of transformation and clinical outcomes. The study of growth factors and immunity parameters in ACS in the first hours allows predicting the outcome. At the same time, IL-10 acts as an indicator for predicting the transformation of ACS into AMI. By studying protein growth factors (CRP, C3 and VEGF) in dynamics, it is possible to prevent the development of AMI.

List of literature

1. Гаврилюк Е.В., Конопля А.И., Караулов А.В. Роль иммунных нарушений в патогенезе артериальной гипертонии. Иммунология. 2016; 37 (1): 29–35. DOI: 10.18821/0206-4952-2016-37-1-29–35].

2. Клиническое значение высокочувствительного С-реактивного белка при системной склеродермии Т.А. Невская, А.А. Новиков, Е.Н. Александрова, Э.С. Мач, М.Н. Запрягаева, А.И. Сперанский, Н.Г. Гусева, Л.П. Ананьева НАУЧНО现ПРАКТИЧЕСКАЯ РЕВМАТОЛОГИЯ № 4, 2007/-с/10-17].

3. Латфуллин И.А., Ким З.Ф. Острый коронарный синдром с депрессией сегмента ST на ЭКГ: новый взгляд на старую проблему. Кардиология.2010; 1: 51–9.

4. Прогностическая ценность кардиоспецифических изменений в иммунной системе при клинических исходах острого коронарного синдрома Саидов М.З., Алиева М.Г., Абдуллаев А.А., Хасаев А.Ш., Адуева С.М.// Иммунология. 2015; 36(2):с.110-115.

5. Руда М.Я. Острый коронарный синдром: система организации лечения. Кардиология. 2011; 3: 4–8.

6. Степанова Ю.И., Гончар И.А. Эндотелин-зависимые эффекты при цереброваскулярной патологии ишемического генеза Медицинские новости. – 2013. – № 10. – С. 12–18.

7. Kawanabe Y., Nauli S.M. // Cell. Mol. Life Sci.– 2011. – Vol.68 (2). – P.195–203, Schaller B.J. // Arch. Med. Sci. – 2006. – Vol.2, 3. –P.146–158.

8. NavruzovaSh.I, Akhmedov A.T. AUTOIMPLANTATION OF THYMUS IN SURGICAL CORRECTION OF CONGENITAL HEART DEFECTS . CAJMNS [Internet]. 2021May26 [cited 2021Oct.28];2(3):88-. Available from: http://cajmns.centralasianstudies.org/index.php/CAJMNS/article/view/178

9. Ibragimova F.I. CLINICAL-RESEARCH BASED AND MORPHOLOGICAL EVIDENCE OF FEATURES OF THE COURSE AND TREATMENT EFFECTIVENESS OF PERIODONTAL TISSUES AND ORAL MUCOSA IN ANIMALS UNDER THE IMPACT OF SODIUM HYPOCHLORITE// ACADEMICIA. An International Multidisciplinary Research Journal. - India. Kurukshetra, 2020.-№10.-C.1948-1959.

10. Ibragimova F. I. Gafforov S. A., Idiev G.E. APPROACHES TO THE DIAGNOSIS OF THE DYSFUNCTIONAL STATE OF THE TEMPOROMANDIBULAR JOINT // EUROPEAN JOURNAL OF MOLECULAR & CLINICAL MEDICINE. - Volume 07, Issue 09, 2020.

11. Ibragimova F. I. Soliev A. A. MODERN METHODS OF ORTHOPEDIC TREATMENT OF PARODONTAL DISEASES// Journal For Innovative Development in Pharmaceutical and Technical Science (JIDPTS). - Volume 4, Issue 4, Apr. 2021.-P.38-40.

12. Ibragimova F. I. Hamroev SH. SH.CAUSAL RELATIONSHIP BETWEEN PRODUCTION RISK FACTORS AND THE DEVELOPMENT OF PARODONTAL DISEASES IN CHEMICAL PRODUCTION WORKERS // Journal for Innovative Development in Pharmaceutical and Technical Science (JIDPTS). - Volume 4, Issue 4, Apr. 2021.-P.41-42.

13. Ibragimova F. I. ArslanovK. S. Comparison of two impression methods for determining the neutral zone in edentulous patients // INTERNATIONAL JOURNAL OF HUMAN COMPUTING STUDIES (IJHCS). - Volume 3, Issue 2, March-April, 2021.-P.32-34.

14. Ibragimova F. I. Qurbonov D.F. A comparative evaluation of changes in facial parameters in partial secondary adentia // INTERNATIONAL JOURNAL OF HUMAN COMPUTING STUDIES (IJHCS). - Volume 3, Issue 2, March-April, 2021.-P.35-37.

15. Ibragimova F. I. YodgorovaSh.R. Manifestation of Diabetes Mellitus in the mucous membrane of the Oral Cavity // INTERNATIONAL JOURNAL OF HUMAN COMPUTING STUDIES (IJHCS). - Volume 3, Issue 2, March-April, 2021.-P.38-40.

16. Ibragimova F. I. AzimovaSh. Sh., Saidov A.A. Medical and Psychological Approach in the Early Diagnosis and Treatment of Cutaneous Bite in Children // Annals of the Romanian Society for Cell Biology. - Volume 21, Issue 4, March

17. Гаффоров С.А.Клинико-биохимическое обоснование течения и лечения заболеваний тканей пародонта и слизистой оболочки полости рта у рабочих производства синтетических моющих и чистящих средств //OʻZBEKISTON tibbiyot JURNALI. Медицинский ЖУРНАЛ УЗБЕКИСТАНА. Илмий-амалий журнал. - Тошкент, 2019.-№4.-С.45-50.

18. Ibragimova F.I. Arslanov K.S.COMPARISON OF METHODS FOR DETERMINING THE NEUTRAL ZONE IN PATIENTS WITH FULL ADETHIA//Proceedings of Online International Conference on Technological Developments in Systematic Research. «International Journal of Innovations in Engineering Research and Technology». - India, Maharashtra, Pune, 2020.-P.33-34.