Analysis of the Risk Factors of the Development of Purulent-Inflammatory Diseases

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Editorial

In recent years, the incidence of postpartum purulent-inflammatory diseases has continued to be high. Particularly interesting is the fact, that the increase of their frequency occurs not only in low-income countries, but also in high-developed countries. This relates to the increase of surgical delivery, pregnancy at a late reproductive age, when the incidence of extragenital pathology, including its severe forms, grows. The frequency of postpartum purulent-inflammatory diseases after labour per vias naturales is approximately 1-3%, while after caesarean section, it is 5-15%, and after urgent caesarean section, it is 15-20%. Particular attention should be focused on the increase in the number of pregnant women with obesity and diabetes in high-developed countries, which contributes to the increased risk of postpartum purulent-septic complications. Obesity can adversely affect a woman’s health, cause insulin resistance, dyslipidemia, hormonal and psychological problems, and during menopause it can also cause sexual problems [1].

The Aim of the article is to substantiate the need for effective pre-gravidar preparation and pregnancy management in terms of prevention of postpartum purulent-inflammatory diseases.

It should be noted that 6% of Blood Serum (BS) albumin molecules in healthy donors are glycosylated. At the same time, in patients with diabetes due to the presence of hyperglycemia in the glycosylated state their amount is 9-12% [2]. In this case the rest of the sugar is attached in most cases to the amino group, which plays an important role in the binding of organic anions. This may affect the properties of the albumin binding center.

Thus, in patients with diabetes due to the increased content of glycosylated albumin in the BS the number of free amino groups reduces, because they are attached to the rest of the sugar. So, the ability of albumin to bind organic anions can be reduced.

Perhaps, that is why patients with diabetes tend to prolong the course of purulent-septic complications. It is a logical hypothesis that "sugar-laden albumin" is not able to bind completely and to eliminate toxic products from the body, which leads to an aggravation of Endogenous Intoxication (EI). Therefore, pregnant women with diabetes constitute to be a risk group for the formation of postpartum purulent-inflammatory diseases.

It is also known that Body Mass Index (BMI) is determined by the ratio of body weight in kilograms and height in meters, raised to the square, and ranges from 18.5 to 24.9. An increase in BMI in the range of 25.0-29.9 indicates an overweight body and an increased risk of diabetes and cardiovascular disease. BMI in the range of 30.0-34.9 indicates the first grade of obesity and a high risk of developing the above-mentioned diseases. BMI 35.0-39.9 is a sign of second grade of obesity and a very high risk of developing...
cardiovascular disease and diabetes. Its rise above 40.0 is a criterion for third grade of obesity and indicates an extremely high level of development of the above-mentioned diseases.

Therefore, it is important to note the important role of pre-gravid preparation in order to preserve the good health status of women in reproductive age and to prevent the development of extragenital pathology, the possible complications of pregnancy and childbirth. Modern methods of diagnosis and prevention should be used to assess effectively women’s health. Modern diagnostic methods should be effective, accurate, with the possibility to monitor patients’ status on the background of treatment.

In order to develop and to implement effective diagnostic methods it is necessary to understand the processes that occur in the body in normal and pathological conditions at the molecular level. That’s why, the use of physical research methods, may allow to solve the above tasks. It is important to carry out effectively the early diagnosis of pathological conditions that occur in the human’s body.

One of the methods of diagnostics of inflammatory diseases of pelvic organs and other obstetric-gynecological pathology are Laser Correlation Spectroscopy (LCS). It can be used for spectral analysis of integral biological fluids and for studying the characteristics of the internal environment of the organism [3,4]. Also, perspective is the method of evaluation of Endogenous Intoxication (EI) syndrome in pelvic inflammatory diseases [2]. Pathological changes in the body in patients with EI depend on the balance of two opposite processes: the rate of formation and release into the blood of endotoxins, on the one hand, and detoxification of these substances by the body’s protection, on the other hand [2].

In recent years new studies involve the use of the Electron Paramagnetic Resonance (EPR) in medical practice. It is proposed the use this method for the prediction of endometritis in the postpartum period, based on the results of the study of the albumin Detoxification Activity (DTE) [5]. Statistical processing of the obtained experimental results was carried using the logistic regression method.

Within the study researches determine DTE in the BS in women after childbirth. At the level $DTE \leq 40\%$ they conclude a high risk of Postpartum Endometritis (PE), and at the level $DTE \geq 70\%$ - the absence of this risk.

In general, the amount of albumin in the blood is one of the most important biochemical indicators. But the level of albumin within the normal range doesn’t guarantee its normal functioning. Impaired conformation of protein molecules may be even more important, than altering the concentration of the protein itself. It is well known, that recording changes in albumin binding centers provides valuable information about the nature of the disease, its severity and prognosis. In some cases, it is significantly more important, than routine biochemical and general blood tests [2]. During the development of purulent-inflammatory diseases, conformational changes of albumin molecules occur in the body. It was mentioned that normal serum albumin concentration doesn’t guarantee its normal functioning yet. In the presence of endogenous intoxication structural changes of albumin molecules occur, which cannot properly perform their functions, including transport. And currently standard diagnostic methods don’t allow to evaluate the effectiveness of serum albumin in purulent-septic complications. Thus, it is not possible to obtain true information about the satisfactory functioning of the body where there are already significant deviations from the norm.

The significant role of new effective research methods is largely related to the increasing frequency of erased and atypical forms of PE. In such forms of the disease there are no clear signs of inflammation, high fever, leukocytosis in the general blood test. Also, the overall condition of the patients does not change significantly. At the same time, a characteristic feature of PE course may now be a mismatch between the patient’s satisfactory general condition and the severity of the disease; lack of correlation between the clinical form of the disease and morphological changes in the organs; discrepancy between the clinic and the data of laboratory research methods. Therefore, it is possible to underestimate the severity of the patient’s condition by the medical professionals. Also, patients themselves do not often visit their physicians in the postpartum period. The exceptions usually are high fever, bleeding or severe pain in abdomen and breasts. In the cases of atypical and erased forms of PE, they sometimes underestimate the severity of their condition and do not seek for medical care. They attribute the general manifestations of asthenic syndrome to stress, fatigue while caring for a newborn baby, and don’t consult a doctor in time. At this stage, it is important to note the important preventive role of a family physician, who carries out the patronage of a newborn and monitors the health of the woman after childbirth.

Also, obstetrician-gynecologist in the hospital should clearly discuss with the patient the symptoms that may alert in the postpartum period and require immediate medical care. After all, the classic form of PE occurs at 3-5 days of the postpartum period and erased - at 8-9, when the patient is already discharged from the obstetric hospital and monitoring of her health is difficult for medical professionals. Therefore, it is necessary to emphasize the need for a preventive postpartum checkup even in the absence of significant complaints.

In fact, ineffective treatment of PE or its absence, may cause developing of the chronic endometritis. In this case, not only the functional, but also the basal layer of the endometrium is involved in the inflammatory process. This form of endometritis is associated with the formation of infertility, pregnancy miscarriage. In this case ia significant threat to the reproductive health of women. After all, in the presence of chronic endometritis, even when planning in vitro fertilization, there is a need for a large amount of examination.
Their aim is to evaluate the completeness of the endometrium and to determine the reasons, that caused the disturbance. Also, it is necessary to identify ways of the preparation of the endometrium for a replanted embryo. Thus, forehanded diagnosis, treatment and prevention of PE are very important for maintaining reproductive health of women after childbirth.

In order to provide the solution of this problems, we used physical research methods which respond the modern standards for the diagnosis in medical practice. Fluorescence spectroscopy (MFS) is one of the most significant methods in biological spectroscopy. This method has been successfully used in the world medical practice to conduct the latest prospective studies, based on the latest advances in molecular biology. They allow to identify certain genetic mutations in humans and their tendency to develop certain pathological conditions. Such successful studies open the way to the development of “personal medicine” with an individual assessment for the prognosis of risk of the development of various diseases for each patient. MFS is successfully used for diagnostics in onomatology for detection of the genetic mutations, that cause an increased predisposition of the human’s body to the occurrence of myeloproliferative disease, polycythemia and other myeloproliferative diseases, acute lymphoma, acute promyelocytic leukemia and acute myeloid leukemia [6].

The great number of mutations in the tumor cell genome may prognose more aggressive course of the cancer. This approach has also been well established for assessing the pathological condition associated with changes in prothrombin and V coagulation factor of BS, which predispose the increased susceptibility of the human body to the appearance of venous thrombosis [7].

We have already mentioned that conformational changes in albumin molecules occur in patients with endogenous intoxication. That’s why even if the total concentration of albumin is within normal range, its “effective” concentration may be significantly reduced. Among the standard methods of diagnosis that are currently widely used in medical practice, there are no ones that can detect this “effective” concentration. We have conducted a study of blood serum of patients with sepsis and pre-septic pathology (the patent of Ukraine №76953) [8] and in patients with postpartum purulent-inflammatory complications (the patent of Ukraine №133472) using MFS [9]. Changes in the spectral-fluorescence characteristics of patients with sepsis and purulent-septic complications were recorded 24-48 hours before the onset of manifesting clinical signs of infection.

Therefore, we recommend on the stage of planning pregnancy in women to carry out effective pre-gravid preparation with treatment of foci of infection, extragenital and gynecological pathology, normalization of body weight, control of level of glucose in blood serum. At the stage of pregnancy, it is also necessary to treat foci of infection in the body, to monitor the condition of organs and systems and to remember about the risks of gestational diabetes and pyelonephritis of pregnant women. It is recommended to perform invasive manipulations and surgical delivery in obstetric hospitals if there are clinical indications, following clinical guidelines of antibiotic prophylaxis and antibiotic therapy.

We recommend studying the fluorescence spectra of blood serum in women after childbirth before the discharge from the obstetrics hospital (diagnosis before the onset of clinical manifestations). If there are deviations from the norm (decrease in the fluorescence intensity of blood serum, the presence of shift of the fluorescence spectra to the longwave region), such patients require additional diagnostic and treatment measures, because they are at risk group of postpartum purulent-inflammatory diseases. We propose to use the method of fluorescence spectroscopy for their further monitoring in addition to the standard algorithm.

References