LABORATORY DIAGNOSIS OF TORCH INFECTION

Berdiyarova Shokhida Shukurullaevna,
Tursunov Feruz Uktamovich
Rakhmatov Jumanazar Abdurashid ugli,
Ismoilova E`tibor Mekhriddinovna
Berdiyarova Shokhida Shukurullaevna *- assistant at the Department of Clinical Laboratory Diagnostics*
Tursunov Feruz Uktamovich *- assistant at the Department of Clinical Laboratory Diagnostics*
Rakhmatov Jumanazar Abdurashid ugli *- Clinical Resident, Department of Clinical Laboratory Diagnostics*
Ismoilova E`tibor Mekhriddinovna *- cadet at the Department of Clinical Laboratory Diagnostics*
Samarkand State Medical University
Republic of Uzbekistan, Samarkand

Abstract: The article describes a comprehensive study of TORCH infections, which are a group of infections that can pose a serious threat to the mother and fetus during pregnancy. These infections include toxoplasmosis, rubella, cytomegalovirus, herpes simplex virus and others. Screening for TORCH infection is an important step in maintaining the health of pregnant women and their unborn children. In this article, we will take a detailed look at what effects TORCH infections can have on pregnancy and how important screening for these infections is. In the vast majority of cases, the mother is the source of infection for the fetus. However, the use of invasive methods has been observed. for women during pregnancy (amniocentesis, punctuation of umbilical cord vessels, etc.) and intrauterine administration (through umbilical cord vessels) of blood products to the fetus (erythrocyte mass, plasma, immunoglobulins) can lead to iatrogenic infection of the fetus

Key words: TORCH infection, differential diagnosis, pathogenesis, laboratory, herpes, cytomegalovirus.

ЛАБОРАТОРНАЯ ДИАГНОСТИКА TORCH ИНФЕКЦИИ

Бердиярова Шохида Шукуруллаевна, Турсунов Феруз Уктамович, Рахматов Жуманазар Абдурашид угли, Исмоилова Эътибор Мехриддиновна

Бердиярова Шохида Шукуруллаевна - ассистент кафедре клинической лабораторной диагностики
Турсунов Феруз Уктамович - ассистент кафедре клинической лабораторной диагностики
Рахматов Жуманазар Абдурашид угли – клинический ординатор кафедре клинической лабораторной диагностики
Исмоилова Эътибор Мехриддиновна - курсант кафедре клинической лабораторной диагностики
Самаркандский государственный медицинский университет
Республика Узбекистон, г. Самарканд

Аннотация: В статье дана характеристика комплексное исследование TORCH инфекции представляют собой группу инфекций, которые могут представлять серьезную угрозу для матери и плода во время беременности. К этим инфекциям относятся токсоплазмоз, краснуха, цитомегаловирус, вирус простого герпеса и другие. Обследование на TORCH инфекции является важным шагом в поддержании здоровья беременных женщин и их будущих детей. В этой статье мы подробно рассмотрим, какие последствия могут иметь TORCH инфекции для беременности и как важен скрининг на эти инфекции. При этом в подавляющем большинстве случаев источником инфекции для плода является мать. Однако использование инвазивных методов наблюден. за женщинами в период беременности (амниоцентез, пунктиро- вание сосудов пуповины и др.) и внутриматоч- ное введение (через сосуды пуповины) препаратов крови плоду (эритроцитарная масса, плазма, иммуноглобулины) могут привести к ятрогенному инфицированию плода.

Ключевые слова: TORCH инфекция, дифференциальная диагностика, патогенез, лаборатория, герпес, цитомегаловирус.

TORCH infections come from the first letters of the most common infections: Toxoplasmosis, Rubella, Cytomegalovirus (CMV) and Herpes simplex Virus (HSV). These infections can cause birth defects, physical and mental disabilities, or even fetal death. The advantages of the TORCH test.The main advantage of the TORCH test is the early detection of infections. These are tests that should be carried out in the early stages of pregnancy in order to take the necessary preventive measures in a timely manner. [1, 3, 10-14].

1. Early detection: The TORCH test allows you to detect infections in the early stages of pregnancy, which significantly reduces the risks to the fetus.

2. Protection of fetal development: Detection of infections at an early stage helps protect fetal development by preventing congenital pathologies.

3. Prevention of congenital diseases: Medical recommendations and timely examination can prevent the development of congenital diseases and various abnormalities.

4. Preventive treatment: If TORCH infection is detected, it is possible to carry out preventive and therapeutic measures to protect the mother and fetus.

5. Prevention of complications during pregnancy: Undetected TORCH infections can cause complications both during and after childbirth. The TORCH test allows you to minimize such risks. In this article, we will take a detailed look at each of the TORCH infections, their effect on pregnancy and possible ways of prevention.

TORCH infections are perinatal diseases that, when a woman is initially infected during pregnancy, have a negative impact on the intrauterine development of the child and can lead to various congenital fetal abnormalities, stillbirth or miscarriage.

Intrauterine infections (IUI) (synonym: congenital infections) is a group of infectious and inflammatory diseases of the fetus and young children that are caused by various pathogens, but are characterized by similar epidemiological parameters and often have the same type of clinical manifestations. Congenital infections develop as a result of intrauterine (antei/or intranatal) infection of the fetus. The true frequency of congenital infections has not yet been established, but, according to a number of authors, the prevalence of this pathology in the human population can reach 10%.

Herpesviruses general information: Diseases caused by herpesviruses have been the companions of mankind for many millennia. The term "herpes" (from the Greek herpes – creeping) It was used by Herodotus as early as 100 BC to describe blisters accompanied by fever.

Currently, more than 100 viruses belong to the Herpesviridae family, these are viruses of various vertebrates (monkeys, horses, cattle, sheep, pigs, rabbits, cats, dogs, mice, rats, birds, guinea pigs and humans). Each type of host can be affected by viruses of the herpes family with different properties. Viruses are subdivided depending on the type of cells involved in the infectious process and the persistence of their natural hosts. All herpesviruses have a cycle of intracellular parasitization in the nucleus and cytoplasm of the affected cell, while inclusions of viral particles accumulate in the nucleus, which increases both the size of the nucleus itself and the cell as a whole (pathogenesis of the appearance of giant cells). In humans, herpesviruses can cause a variety of diseases (see the table). The unique biological properties of all human herpesviruses are tissue tropism, the ability to persist and latency in the body of an infected person. TORCH refers to severe diseases and largely determines the infant mortality rate. At the same time, the relevance of the TORCH problem is due not only to significant peri- and postnatal losses, but also to the fact that children who have suffered severe forms of congenital infection very often develop serious health disorders, often leading to disability and a decrease in the quality of life in general.

Taking into account the widespread and serious prognosis, it can be concluded that the development of high-precision methods of early diagnosis, effective treatment and effective prevention of congenital infections is one of the priorities of modern pediatrics [1, 2, 8, 10-14, 18]. Epidemiology, etiology, pathogenesis. The main source of infection in IUI, as already noted, is the mother of the child, from whom the pathogen enters the fetal body during the antei/or intrapartum period (vertical transmission mechanism). At the same time, vertical transmission of infection can be carried out by ascending, transplacental and transovarial routes during the antenatal period, as well as by contact and aspiration directly during childbirth [1, 10, 18]. Antenatal infection is more typical for agents of a viral nature (cytomegaly viruses (CMV), rubella, Coxsackie, etc.) and intracellular pathogens (toxoplasma. less often — representatives of the mycoplasma family). Intranatal contamination is more typical for agents of a bacterial nature. At the same time, the spectrum of potential pathogens is individual and depends on the characteristics of the microbial landscape of the mucous membranes of the birth canal of the mother.

Most often during this period, the fetus is infected with microorganisms such as streptococci (group B), enterobacteria, as well as herpes simplex viruses (HSV) types 1 and 2, mycoplasmas, ureaplasmas, chlamydia, etc. [1, 10, 11, 18] Until recently, it was believed that the most common pathogens of VUI are viruses CMV. HSV types 1 and 2 and Toxoplasma gondii. However, the results of studies conducted in the last decade have largely changed our understanding of both the etiological structure of IUI and the frequency of intrauterine infection in general. Thus, it has been shown that the prevalence of intrauterine infection among newborns is significantly higher than previously thought, and in some cases may exceed 10%. At the same time, it was found that the etiology of intrauterine infection is represented by a wider range of microorganisms, among which, in addition to traditional pathogens, enteroviruses, chlamydia (Chlamydia trachomatis), some representatives of the family of Trash Plasmatacae (Ureaplasma urealyticum, Mycoplasma hominis), as well as influenza viruses and a number of other infectious agents play a certain role. The results of our own research indicate a high level of intrauterine infection (22.6%). At the same time, we most often noted intrauterine transmission of Ureaplasma urealyticum, while vertical CMV infection was detected only in isolated cases [3, 5]. In addition, in recent years, independently of S. V. Hall and co-authors (2004), we have shown the possibility of intrauterine infection with type 4 herpes viruses (Human Herpes Virus IV (Epstein-Barr virus)) and type 6 (Human Herpes Virus VI) [3. 5, 17]. It should be particularly noted that the potential threat of intrauterine transmission of infectious agents from the mother to her unborn child increases significantly in cases where a woman has a burdened somatic, obstetric-gynecological and infectious history. At the same time, risk factors for intrauterine infection are: inflammatory diseases of the

urogenital tract in the mother, an unfavorable course of pregnancy (severe gestosis, threat of termination, pathological condition of the uteroplacental barrier, infectious diseases). A comprehensive study identifies the main intrauterine infections (TORCH infections): herpes, cytomegalovirus, as well as rubella and toxoplasmosis. At the stage of pregnancy planning, it minimizes the risk of complications for the fetus. Laboratory diagnostics. The absence of specific symptoms and the uniformity of clinical manifestations of congenital infections justify the need for timely use of special laboratory methods aimed at reliable verification of the etiology of TORCH. At the same time, the examination of newborns and children of the first months must necessarily include methods aimed both at directly detecting the causative agent of the disease, its genome or antigens ("direct") and at detecting markers of a specific immune response ("indirect" diagnostic methods). Direct diagnostic methods include classical microbiological techniques (virological, bacteriological), as well as modern molecular biological methods (polymerase chain reaction (PCR), DNA hybridization) and immunofluorescence. With the help of indirect diagnostic methods, specific antibodies to pathogen antigens are detected in the child's blood serum. In recent years, enzyme immunoassay (ELISA) has been most widely used for this purpose. In order to obtain reliable results of serological examination of newborns and children of the first month of life and adequately interpret these data, certain rules must be followed. Serological examination should be performed before the administration of blood products (plasma, immunoglobulins, etc.). Serological examination of newborns and children of the first months of life should be carried out with simultaneous serological examination of mothers (to clarify the origin: "maternal" or "own"). Serological examination should be carried out by the method of "paired serums" with an interval of 2-3 weeks. In this case, the study must be performed using the same technique in the same laboratory. It should be especially noted that in cases where blood preparations (immunoglobulin, plasma, etc.) were administered to the child after the initial serological examination, the study of "paired serums" is not carried out. The evaluation of the results of serological studies should be carried out taking into account the possible characteristics of the nature and phase of the immune response. It should be emphasized that seroconversion (the appearance of specific antibodies in a previously seronegative patient or an increase in antibody titers in dynamics) appears later than the debut of clinical manifestations of infection. Diagnosis should be carried out 1-2 months before planned conception or the first two weeks after pregnancy. Laboratory tests are carried out once at the time of registration of the expectant mother in the women's clinic. It is possible to determine the content of antibodies to pathogens of dangerous diseases in the body during a biochemical blood test. In case of infection, so-called IgM antibodies are detected in the serum, the concentration of which reaches a maximum at the end of the first month after infection. During the analysis, after 2-3 months, the level of

immunoglobulins decreases sharply, so it is almost impossible to identify them. IgG class antibodies are detected in plasma 14-20 days after penetration of pathogenic bacteria and viruses into the body. The peak concentration of immunoglobulins is reached 4 weeks later than IgM antibodies. Subsequently, their level decreases, but a small part of immunoglobulins is still determined by repeated examination of patients. The detection of IgM-type immunoglobulins signals that the immune system has previously "met" with pathogens of this type and developed antibodies to them. Qualitative and quantitative indicators for each type of intrauterine infections are determined in the laboratory. A particular danger for the unborn child is the primary infection of the mother's body with TORCH infections. In the presence of antibodies to pathogens, women can safely plan conception and pregnancy without fear of complications. The lack of immunity to pathogenic microorganisms is the basis for preventive measures aimed at reducing the likelihood of infection [13, 15].

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