Analysis and risk factors for chorioamnionitis in women with prenatal fetal rupture (Literature review)

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ABSTRACT

During pregnancy, the fetus develops in a sterile environment because the placenta and fetal membranes act as a barrier to bacterial infection throughout gestation. Rupture of the fetal bladder is a serious condition fraught with a number of maternal and fetal complications, and as the waterless interval lengthens, regardless of the cause of the ruptured membranes, the risk of intrauterine infection increases [4]. Chorioamnionitis (CA) is an acute inflammation of the placental membranes and chorion, usually due to an ascending polymicrobial bacterial infection in a ruptured membrane. Chorioamnionitis can occur with intact membranes, and this, occurs with genital mycoplasmas (Ureaplasma urealiticum and Mycoplasma hominis), found in the lower genital tract in over 70% of women [17].

Keywords:

During pregnancy, the fetus develops in a sterile environment because the placenta and fetal membranes act as a barrier to bacterial infection throughout gestation. Rupture of the fetal bladder is a serious condition fraught with a number of maternal and fetal complications, and as the waterless interval lengthens, regardless of the cause of the ruptured membranes, the risk of intrauterine infection increases [4]. Chorioamnionitis (CA) is an acute inflammation of the placental membranes and chorion, usually due to an ascending polymicrobial bacterial infection in a ruptured membrane. Chorioamnionitis can occur with intact membranes, and this, occurs with genital mycoplasmas (Ureaplasma urealiticum and Mycoplasma hominis), found in the lower genital tract in over 70% of women [17].

A number of authors clearly trace the role of infection in the etiopathogenesis of prenatal rupture of membranes. It should be noted that prenatal rupture of membranes is a complex obstetric problem, many aspects of which remain largely unresolved due to the lack of consensus on the outcome of pregnancy for the mother and fetus [9]. In modern obstetrics, the search for the rational management of labor in prenatal rupture of fetal membranes remains relevant.

To date, there is no clear definition of chorioamnionitis during pregnancy. Authors studying this problem present chorioamnionitis as the presence of an infectious and inflammatory process in the uterus of pregnant women, which can localize between maternal tissues and fetal membranes, directly in fetal

membranes, in the placenta, in amniotic fluid, within the umbilical cord, as well as affect the fetus with the development of intrauterine infection [5,6].

In foreign literature, the term chorioamnionitis corresponds to "amniotic infection syndrome", "fetal membrane infection syndrome", combining amnionitis, chorioamnionitis, villitis, placentitis, funiculitis and fetal infection [7]. However, the clinical diagnosis of chorioamnionitis is made only in 1 to 5% of all pregnancies. According to the authors, a striking clinical picture in histologically confirmed Subscribe to DeepL Pro to edit this document. Visit www.DeepL.com/profor more information. chorioamnionitis occurs in only 13.8% of women [5]. Symptoms of clinically significant CA or AIS include leukocytosis (86%), fever (85%), fetal tachycardia (37%), and tachycardia in the pregnant woman (33%), which is associated with antenatal fetal rupture in 98% of cases. A number of authors add to these signs sensitivity on pressure on the uterus, uterine tension, amniotic fluid with odor, increased uterine contractions. Hematological and biochemical signs of infection are also almost always noted [12].

The greatest number of studies is devoted to premature and prenatal rupture of fetal membranes. In the authors' studies of pregnancy complications with ruptured membranes, genital infection is detected in 96% of women, and the inflammatory process in the uterus in 100% of cases [4]. According to O.S. Pobedinskaya, morphological examination of uterine cavity scrapings in all women with chorioamnionitis after delivery reveals histological signs of parietal and basal deciductitis.

The frequency of histological CA in the placentas of stillborn infants according to large-scale studies was 65%, in the placentas of live birth - 40.7% of cases [9]. At the same time, according to other authors, histological signs of an infectious process in placentas were recorded in 60 - 70% of cases in which pregnancy and delivery were complicated by rupture of membranes. Spontaneous early termination of pregnancy associated with CA occurs the more frequently, the shorter the gestational age: at 20-24 weeks, 66- 80% of cases, at 34-36 weeks, 16- 20% of cases.

At the same time, there are reports that prenatal rupture of fetal membranes in preterm pregnancy may be accompanied by histological signs of intrauterine inflammation in 18% of cases [2]. It has been suggested that the inflammatory reaction within the decidual and chorionic plates is a physiological process due to damage to the membranes during normal labor. According to the authors, aseptic inflammation in the afterbirth is observed in 3-5% of all on-time deliveries [10].

There are works indicating differences in the mechanisms of "sterile" and infectious inflammation. However, even in physiological labor, the role of microbial invasion from the lower parts of the genitals into the uterine cavity during labor, especially during a prolonged waterless period, is not excluded. There are several ways of infecting the feto-placental complex during pregnancy: the ascending route - from an infected woman's reproductive tract; the transplacental or hematogenous route - from bacteremia, viral and parasitemia in pregnant women; the descending (percontinuitatem infection) - from infected endometrium to the decidua and on to the fetus. According to the authors, in pregnancy failure, the persistence of microorganisms in the endometrium is found in 68% of women, and histological signs of chronic endometritis are verified in 73% of cases [14]. In 80% of cases, the development of chorioamnionitis in pregnant women is due to the mechanism of ascending infection in the presence of genital infection of the lower reproductive tract. Whatever methodological approaches have been used to study the role of genital infection in the development of pregnancy complications, the results of these studies unequivocally show their close relationship [1]. Some authors point to a high frequency of genital infection of the lower reproductive tract in such obstetric complications as amniotic fluid breakdown, preeclampsia, placental insufficiency, and intrauterine infection of the fetus. Others, on the contrary, point to a high percentage of complicated pregnancy and early neonatal

period in groups of infected women [2]. The ascending route of infection becomes major from the beginning of the second trimester of pregnancy, when the predisposing factor for it is the fusion of deciduasvera and deciduascapsularis into a single complex deciduasparietalis and the internal cervical canal can come into contact with the fetal aqueous membranes. Hematogenous infection in these terms occurs rarely due to a decrease in the permeability of syncytiotrophoblast and the predominance of proliferative inflammatory reactions in the placental tissues, limiting the spread of the infectious process [3]. In ascending infection, microorganisms, spreading through the membranes and between them, reach the basal plate of the placenta (deciductitis). Further spread of the inflammatory reaction leads to the development of chorionitis (placentitis), manifested by leukocytic infiltration of the intravillous space and endoviscultures in the chorionic plate [5]. Microbial invasion can affect only maternal tissues, but colonizing the decidual and fetal membranes, microorganisms can penetrate into the amniotic fluid [11]. The main morphological sign of ascending infection of the placenta is an exudative inflammatory reaction, which develops sequentially first in the fetal membranes (stage 1 - membranitis), then in the placenta (stage 2 - placentitis) and then involves the umbilical cord (stage 3) [12,13]. The authors identified 4 stages of microbial invasion in pregnant women: Stage I - disruption of lower reproductive tract biocenosis; Stage II - decidual infection (endometritis); Stage III - intraamniotic infection; Stage IV - systemic intrauterine infection of the fetus. The development of dysbiotic processes in the lower reproductive tract is the leading pathogenetic link in the mechanism of ascending infection. In many respects, the efficiency of the local antimicrobial protection of the lower genital region largely depends on the colonization resistance, a set of mechanisms that maintain the stability of the population qualitative and quantitative composition of the components of the normal biocenosis [15]. According to the authors, who studied mucosal colonization resistance in women with threatened miscarriage, its low indicators were found in 70% of patients. At the same time, in patients with a physiological course of pregnancy, vaginal mucous membranes had high colonization resistance in 73% [16]. Thus, impaired colonization resistance is the first step in the development of an infectious and inflammatory process and the cause of the unimpeded penetration of microorganisms into the upper parts of the reproductive system. According to the authors, only 17.3% of the examined pregnant women have vaginal normocenosis. In the authors' studies, normocenosis was detected in 21% of women in the first trimester, in 12.8% in the second trimester, and in 27.4% in the third trimester. Some authors found that vaginal infections and vaginal dysbiosis occur in every fourth pregnant woman [13]. According to the authors' study, reproductive tract biocenosis disorders are observed in 71-77% of pregnant women. Infectious-inflammatory diseases of the genitals occur in 36.7% of pregnant women in the first and 44.7% in the second half of the gestation. Foreign authors indicate approximately the same incidence of vaginal and cervical infection in pregnant women, 35.5% [17]. Most studies investigating the pattern of genital infection during pregnancy present the incidence of bacterial vaginosis (BV), candidiasis, and aerobic (nonspecific) vaginitis [14;15]. There are few data on the incidence of cervicitis in pregnant women, although there are studies confirming the positive impact of rational therapy of cervical inflammatory diseases during pregnancy on reducing the risk of antenatal infection [17]. In the authors' targeted screening of pregnant women for cervical diseases, the incidence of cervicitis was 52% [16]. There are no data in the literature on the incidence of chorioamnionitis in various forms of lower reproductive tract infectious pathology in pregnant women. There are studies confirming that complications such as prenatal rupture of fetal membranes, preterm delivery, postpartum endometritis and childbirth with infection are observed with equal frequency both in women with clinically pronounced inflammatory processes in the vagina and cervix and in women with dysbiosis (asymptomatic

bacterial carriage // pathological infestation) [10]. Given that the cervix is the main barrier to ascending infection, according to many authors, it has the main role in the protection of the female reproductive tract. According to the authors, vaginal microcenosis disorders in pregnant women in 40- 60% of cases lead to cervical diseases with subsequent inflammation of fetal membranes, penetration of infectious agent into the amniotic cavity and the development of amniotic fluid infection [11;16]. According to the authors' study, 37.4% of pregnant women with genital infections have bacterial contamination of amniotic waters [2]. Currently, the etiological structure of genital infections in pregnant women, as well as the infectious morbidity of the fetus and the newborn, has undergone significant changes. On the one hand, this is associated with a reassessment of views on certain pathogens, on the other hand - with greater diagnostic capabilities. All microorganisms responsible for high perinatal morbidity can be conventionally divided into 2 large groups depending on the dominant mechanism of infection transmission: in ascending mode, bacterial infection; in hematogenous mode, mainly viral and protozoal infection [2]. In recent years, representatives of nonspecific opportunistic flora have come to the forefront in the case of sluggish, asymptomatic infectious processes in the genitals. Bacterial vaginosis (BV) in pregnant women has been the focus of most publications. BV is one of the manifestations of a dysbiotic process in the lower genital region and is defined as a noninflammatory infectious syndrome. It is traditionally verified using the Amsel criteria: presence of abnormal whites; positive amine test; detection of key cells in smears; pH of the vaginal discharge>4.5. A massive number of microflora with predominance of obligate anaerobes such as Gardnerella vaginalis, Mobiluncus, Mycoplasma hominis are detected [10]. As a result of epidemiological studies, the prevalence of BV among pregnant women varies from 10 to 40% of cases, and some authors emphasize the higher incidence of BV in women with a history of a history of a history of BV. According to numerous reviews, BV can lead to preterm delivery, prenatal rupture of membranes, spontaneous abortion, increased risk of CA and postpartum endometritis. One of the mechanisms determining the adverse effect of BV on the course and outcome of pregnancy is the ability of BV-associated bacteria to produce lytic enzymes (sialidase, mucinase) that weaken the protective properties of cervical mucus, thereby contributing to bacterial invasion of the upper genital tract [1;10]. According to the authors, 79% of women with ruptured fetal membranes have inflammatory changes in the lower reproductive tract caused by a conditionally pathogenic group of microorganisms: Candida albicans (61%), Enterococcus faecalis (44%),Streptococcus agalactiae (41%), Escerichia coli (24%), Ureaplasma urealiticum (23%), Staphylococcus aureus (24%), Staphylococcus epidermidis (18%), Peptostreptococcus spp. (14%), Gardnerella vaginalis (10%), Corynebacterium spp. (8%), Bacteroides (8%). A similar species composition of microorganisms was obtained in the cultural examination of newborns in another study. According to the results of T.E. Karapetyan's work, in IUI neonates of bacterial etiology, their mothers were found to have disorders of the species composition of the vaginal microflora during pregnancy (in 55.4% of cases) to a greater or lesser extent. Another study on the analysis of pathogens isolated from neonates with severe IUI showed a predominance of Staphylococcus epidermidis and Gram-negative bacteria: Klebsiella pneumoniae, Proteus vulgaris, Providencia [1;10]. In the same study in 38% of neonates cultures from all loci were sterile, which indirectly indicated a limited role of aerobic microflora in the development of severe forms of IUI. In studies on neonatal sepsis, the most frequent pathogens were named: coagulasenegative Staphylococci (CoNS), Enterobacteria, Streptococcus B (GBS) [17]. Group B Streptococcus was also found to be one of the most significant pathogens in spontaneous termination at 16-26 weeks' gestation, being associated with the development of CA in 94% of cases with preserved amniotic membrane integrity. There is evidence that in 80% of cases of histologically confirmed chorioamnionitis, its viral etiology

(CMV, HPV, human papillomaviruses 6, 11,16, 18, adenovirus, etc.) is proved. In targeted examination of women with ruptured fetal membranes, according to different authors' conclusions, the contribution of herpes-virus infection to this complication ranges from 10 to 67%. According to the authors' study [7], the incidence of combined genital infections in fetal IUI reaches 68.7%, and viral pathogens and their associations reach 52%. At the same time, it cannot be ruled out that changes in the immune system leading to secondary activation of bacterial flora may be a direct cause of adverse outcomes in viral persistence. Different data have been obtained on the frequency and role of chlamydial infections in pregnant women. According to some studies, the prevalence of urogenital chlamydia among pregnant women is no more than 7-8%. According to other authors, in the group of pregnant women suffering from habitual miscarriage, chlamydia is detected in 30% of cases. There are numerous studies highlighting the role of chlamydial infection in the development of such complications as preterm delivery, polyhydramnios, progressive feto-placental insufficiency and fetal growth restriction syndrome. The etiological significance of genital mycoplasmas in the development of adverse pregnancy and childbirth outcomes remains controversial to date. A number of authors believe that genital mycoplasmas under certain conditions may be involved in the known complications of pregnancy and childbirth. Thus, the high significance of genital mycoplasmas in the development of inflammatory processes in the placenta, the formation of fetal and neonatal pathology, and the induction of preterm birth have been confirmed in their works by the authors [17]. Other researchers express a completely opposite opinion, arguing that these microorganisms are nothing more than commensals and have no adverse effects on the course of pregnancy, childbirth and the postpartum period. The authors confirm the participation of mycoplasmas in the development of a number of pathological processes in pregnancy, but at the same time, they suggest that genital mycoplasmas can influence the occurrence of some complications only under certain conditions [8]. Data on the frequency of mycoplasmas in pregnant women are also inconsistent. According to the authors, the frequency of Ureaplasma urealyticum in pregnant women is 50-75%, M. hominis 20-25%. In another study, mycoplasmas were detected in 42.7% of pregnant women: U. parvum (40%), U. urealyticum (7%), M. hominis (4.6%), M. genitalium (0.5%) [1;10]. In the vast majority of pregnant women, mycoplasmas were combined with other opportunistic microorganisms, and only in 10% of cases were isolated as a monoculture. This circumstance becomes the key in determining the true etiological significance of genital mycoplasmas in the development of a number of obstetric complications. In contrast to these conclusions in the study of G. Randelovic showed that it is U. Urealyticum in 63% of cases occurs in prenatal effusion, and in 33% of cases as a monoinfection [16]. U. Urealyticum and/or M. Hominis were found with histological signs of acute inflammation in the membranes in 76.9%, the chorionic plate in 74.4%, and the umbilical cord in 51.3% of cases. Thus, at the present stage, the role of almost all microorganisms tropic to its epithelium in the development of the inflammatory process in the female reproductive tract has been confirmed. And if the diagnosis of dysbiotic and inflammatory processes in the lower genital tract has already been perfected due to the availability of standard methods of examination - bacterioscopy, bacteriology, PCR, ELISA diagnosis, etc. and the availability of material sampling, the diagnosis of chorioamnionitis in labor and during pregnancy presents significant difficulties. Accurate verification of chorioamnionitis is possible only through morphological examination of the afterbirth, that is, retrospectively, when in most cases the associated effects have already been realized. Moreover, if the diagnosis of CA occurring with a systemic inflammatory response and a "bright" clinical picture is not difficult, then the subclinical course of the inflammatory process in the uterus during pregnancy requires further development of diagnostic search methods [1,17].

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