

Modern Approaches in the Diagnosis of Premature Rupture of Membranes in Pregnant Women

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Abstract

This study investigates the role of matrix metalloproteinases (MMPs) in premature rupture of membranes (PROM) during pregnancy. Findings suggest elevated MMP levels and decreased tissue inhibitors of metalloproteinases (TIMPs) in PROM cases, indicating potential extracellular matrix degradation. These insights could inform early diagnostic markers and therapeutic strategies for improving perinatal outcomes.

Keywords: modern approach, Diagnosis premature, rupture, membrane, pregnant women

Introduction

Premature rupture of membranes (PROM) is a pregnancy complication characterized by the disruption of the integrity of the fetal membranes and the leakage of amniotic fluid before the onset of labor, regardless of the gestational age. According to literature, more than 35-60% of preterm births, regardless of the characteristics of the etiological factors, begin with premature rupture of membranes and untimely leakage of amniotic fluid. The desire to improve perinatal outcomes, in the context of the development of pregnancy complications such as PROM, has been the reason for searching for additional early informative biomarkers of pathological pregnancy progression, development of principles for early prevention, and therapy.

Materials and Methods: A total of 110 patients were examined. The main group consisted of 80 pregnant women, and 30 of them were in the control group. Predictions of PROM in preterm labor based on the materials of birth histories included the medical history of the pregnant women, examinations and treatments, as well as their prevention. In analyzing the obtained data, along with the traditional clinical characteristics, the presence of somatic pathology, gynecological history, including the onset of menarche, menstrual function, the course and outcome of previous pregnancies and childbirth were considered. Over the period from 2017 to 2019, 320 birth histories were reviewed, retrospectively including pregnant women with PROM. To identify the most effective methods of predicting and preventing PROM, 93 pregnant women from 30 to 34 weeks of gestation with a high risk of pregnancy termination based on the history of previous pregnancy outcomes and childbirth were observed dynamically. The selection criterion was pregnant women at 30-34 weeks, in whom the diagnosis of the threat of pregnancy termination was clinically and via ultrasound confirmed.

According to the methodological approach in the course of prospective research, we examined 110 women with the threat of preterm birth. Of these, 30 women were not observed for pregnancy and were admitted with the onset of preterm labor and PROM (control group).

The women were divided into 3 groups: 1st group – low risk (n=15); 2nd group - medium risk (n=25); and 3rd group - high risk (n=40) of developing PROM. The age of the women ranged from 19 to 37 years old. In all three groups, the women were predominantly Uzbek. Every fifth woman was

from the countryside, and every second was from the city. Regarding social status among the examined, there were students (21%), employed (32%), and over half (47%) were housewives.

In this study, research methods included anamnestic, clinical, and laboratory approaches. Among the pregnant women examined with the threat of preterm birth and PROM, a thorough study of both general and specific (gynecological) medical history was conducted: past somatic and gynecological diseases, features of menstrual function, and the course of previous pregnancies and childbirth were carefully reviewed. A fibronectin test was conducted. The history of pregnancies, blood group, and Rh factor of the patients were studied.

Special analysis was applied to the results of general clinical examinations (complete blood count, blood coagulation system state, HIV, biochemical blood tests and liver function tests, general urine analysis, Nechiporenko's urine analysis, bacterial study of vaginal flora). During the examination and treatment, special attention was given to the repeated fibronectin test as well as examination for metalloproteinases 1 and 9 types..

Ultrasound examination was used to determine the condition of the cervix, its length and width, as well as (in dynamics, the condition of the cervix: length and width), the state of the placenta and its circulation. The thickness, maturity level, localization, and structure of the placenta, and the presence of amniotic fluid were considered.

The studies were conducted using "Aloka500" (Japan) and "Mindray" (Germany) devices. During the prospective study, complaints upon admission, reasons contributing to preterm labor and PROM, the condition of the birth canal, and concomitant diseases were analyzed. Pregnant women were prescribed treatment and evaluated after therapy. An improvement in the condition of the pregnant woman, dynamics of blood parameters, and ultrasound data were noted. A negative result in the fibronectin test after therapy was achieved in 43 cases.

Results: The extracellular matrix undergoes constant changes during pregnancy, including the degradation of the matrix and the synthesis of a new, organized one that fully meets the necessary functions. The alteration of the intracellular matrix is a biologically complex process, as collagens, which make up a large part of the extracellular matrix, are highly resistant to proteolytic enzymes. Two groups of enzymes deserve the most attention - matrix metalloproteinases (MMP) and their tissue inhibitors (TIMP). MMPs are a large family of zinc- and calcium-dependent endopeptidases.

In our study, the choice of MMP-1, an interstitial collagenase, and MMP-9, acting on the collagens of the basal membranes, was made considering the fact that the extracellular matrix and the basal membrane have different structure and composition, and TIMP-1 is capable of inhibiting both mentioned proteinases.

Biochemical serum markers in pregnant women with PROM are presented in Table 1. A significant increase in MMP-1 levels was noted in pregnant women with PROM, as the main enzyme that carries out the denaturation of fibrillar collagen of the extracellular matrix. Similar changes were observed in the study of MMP-9 levels, which were 1.6 times higher in patients of the main group compared to the comparison group, which according to N.I. Solovyeva and O.S. Ryzhakova (2010), may indicate the activation of type IV collagen hydrolysis. The concentration of TIMP-1 decreased in cases of PROM compared to the control group. The increase in the MMP-9/TIMP-1 ratio confirms the possibility of exceeding the rate of matrix collagen degradation by matrix proteinases over its synthesis rate..

MMP-3, an interstitial collagenase that cleaves fibrillar collagen of corresponding types, as well as proteoglycans, laminin, fibronectin, and amorphous collagens, is also represented in the MMP groups. In our studies, as shown in Table 1, a significant increase in MMP-3 in pregnant women with PROM was observed compared to the control group..

The identified imbalance of types I and III collagens, due to the high activity of metalloproteinases, indicates a predominance of type III collagen synthesis, which belongs to embryonic proteins with low strength, correlating with the systemic reduction of collagen level that determines the integrity of the connective tissue in the fetal membranes and the mucous membrane of the endometrium. The reduction in the synthesis of total collagen and the predominance of its immature fraction, with a deficit of components of the intracellular matrix, leads to weakening and overstretched connective tissue. The established differences in the quantity, distribution character, and localization of collagen and elastic fibers, along with the disruption of gene expression of encoding proteins, particularly the MMP and TIMP families, determine the multilevel changes in the microarchitecture of the fetal membranes and the uterine wall in pregnant women with PROM.

Conclusion: Thus, in pregnant women with PROM, there is a change in the activity of matrix metalloproteinases types 1, 3, 9 in the serum, indicating the remodeling of connective tissue, which is one of the causes of PROM in pregnant women.

References

- хтамова Н. А., Шавази Н. Н. PREDICTION OF OBSETRIC BLOOD LOSS IN WOMEN WITH PRETERM BIRTH (LITERATURE REVIEW) //УЗБЕКСКИЙ МЕДИЦИНСКИЙ – 2022. – Т. 3. – №. 5.
- авази Н.Н., Алимова П.Б. СОВРЕМЕННЫЕ АСПЕКТЫ АКУШЕРСКИХ КРОВОТЕЧЕНИЙ (ОБЗОР ЛИТЕРАТУРЫ) //ЖУРНАЛ РЕПРОДУКТИВНОГО ЗДОРОВЬЯ И УРОН-НЕФРОЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ. – 2022. – Вып. 3. – № 2
- kramova, P. X., & Mansurova, M. (2023). VULVOVAGINITIS WITH HELMINTHOSIS:
5. . Shavazi N., Akhtamova N., Katkova N. Perinatal risk of premature birth: New obstetric opportunities //E3S Web of Conferences. – EDP Sciences, 2023. – Т. 413. – С. 03035.
- хтамова Н. А., Шавази Н. Н. PREDICTION OF OBSETRIC BLOOD LOSS IN WOMEN WITH PRETERM BIRTH (LITERATURE REVIEW) //УЗБЕКСКИЙ МЕДИЦИНСКИЙ – 2022. – Т. 3. – №. 5.
- АБАЗИ Н. Н. и др. TOTAL GISTEREKTOMIYANING SUBTOTAL GISTEREKTOMIYADAN USTUNVORLIGINI TAHLILLASH //ЖУРНАЛ БИОМЕДИЦИНЫ И ПРАКТИКИ. – 2022. – Т. 7. – №. 3.
- asyrovich S. S. et al. PREDICTORS OF BLEEDING IN PRETERM LABOR: RETROSPECTIVE OBSERVATIONAL //Journal of Modern Educational Achievements. – 2023. – Т. 5. – №. 5. – С. 185-196.
- uraliyevna S. N., Dilshodovna J. M. MORPHOFUNCTIONAL STRUCTURE OF THE PLACENTA IN PREMATURE LABOR //Galaxy International Interdisciplinary Research Journal. – 2022. – Т. 10. – №. 4. – С. 381-384.

10. Nuralievna S. N., Akbarjonovna A. N., Farkhodovna R. N. Management of the Reatening Preterm Birth //Texas Journal of Medical Science. – 2023. – T. 17. – C. 25-38.
uralievna S. N., Akbarovna A. N. FETAL STANDING AND PERINATAL OUTCOMES OF PREMATURE BIRTH //Confrencea. – 2023. – T. 10. – №. 1. – C. 14-16.