

## Modern Diagnostic Methods for Prediction of Complications of Preterm Premature Rupture of Membrane

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### Abstract

The article presents the data of a prospective analysis of 106 pregnant women, in whom childbirth was complicated by chorioamnionitis and prenatal rupture of membranes (PROM), delivered in maternity complex of the Bukhara for the period 2018-2020. The results indicate a significant role of chorioamnionitis in the development of obstetric and perinatal complications, especially in women with a burdened somatic and gynecological history.

**Keywords:** *Preterm Labor; Labor Induction; Amniotic Membrane; Intrauterine Growth Retardation*

Among the problems of modern obstetrics and perinatology, rupture of amniotic fluid before delivery and complications with chorioamnionitis occupy one of the leading places [1-11]. Prenatal rupture of amniotic membrane occurs during term pregnancy before labor begins. Amniotic fluid, which plays an important role in the biomechanism of childbirth, is of great physiological importance for the state of the fetus, as it creates conditions for its free development and movement, and also protects the fetus from negative effects [12-31]. Chorioamnionitis is a pathological process caused by inflammation of amniotic fluid, placenta, fetus, fetal membranes or uterine decidual membrane during pregnancy and childbirth [32-48].

### Purpose of the Study

To study the complaints, obstetrical, gynecological, somatic anamnesis and perinatal results of pregnant women complicated by chorioamnionitis.

### Research Materials and Methods

We examined 119 pregnant women with term pregnancies and preterm rupture of membrane (PROM). Complete anamnesis and a set of complaints of all pregnant women who were observed with PROM were collected. The diagnosis of preterm rupture of membrane was confirmed after the detection of fluid from the cervix or in the posterior fornix of the vagina using a vaginal speculum. Because of the high risk of spread of infection for pregnant women with PROM, vaginal examinations were not performed frequently (according to the protocol).

**Results of the Study**

Analysis of the level of complications during pregnancy showed that one of the first toxicosis vomiting, in the anamnesis of pregnant women, was observed in almost every third of the women of the group with advanced chorioamnionitis (CA) - 11 (28.2%), in every sixth of the women of the group with complications of PROM - 13 (16.25%) and control was observed in 4 (13.3%) women from the group. But the interesting fact is that the risk of preterm birth was observed in almost every third woman in the group with complications of PPROM, 23 (28.75%), and the indicator in the control group was 1 (3.3%). The following risk factors that may occur in the group of women with complications of PROM with CA were identified: according to the results of clinical examination, pathological blood loss during childbirth and in the early postpartum period is associated with anemia (97.4%), which is 4.2 times more than women with physiological bleeding. and 9 times more. This indicates a clear effect of anemia on the development of amniotic fluid rupture before birth and CA. Acute respiratory infection was observed 4 times more often in the group of women who developed PROM and CA than in the control group. Hypertensive cases in pregnancy compared to the control group were observed in pregnant women with PROM (17.5%) and 28.2% in women with PROM and CA. It follows that hypertensive diseases are also an important risk factor for the development of CA when water breaks before delivery (Table 1).

Pathologies of pregnancy	PROM group, n = 80		PROM +CA group, n = 39		Control group, n = 30		Total n = 149	
	abs.	%	abs.	%	abs.	%	abs.	%
Early toxicosis in pregnant women	13	16,25	11	28,2	4	13,3	28	18,8
Anemia	74	92,5	38	97,4	3	10	115	77,2
ARI	54	67,5	25	64,1	6	20	85	57
Risk of premature birth	23	28,75	10	25,6	1	3,3	34	22,8
Hypertensive conditions in pregnancy	14	17,5	11	28,2	--	--	25	16,8
Antenatal death of the fetus	5	6,25	6	15,4	--	--	11	7,4

**Table 1:** The incidence rate of complications during pregnancy and childbirth, (abs, %).

Pregnant women were observed to assess the nature and amount of discharge. All women underwent ultrasonography, and most (115) were found to have oligohydramnios with complaints of PROM. In pregnant women with complications of PROM, the tactics of labor management depended on the choice of the patient (active or waiting). Of the 80 pregnant women who participated in the study with complications of PROM, 34 women had no contraindications to waiting tactics and because the cervix was “ripened”, all women were delivered by natural birth. Of the 13 pregnancies with complications of PROM, 9 had preinduction after 24 hours due to “unripe” cervix, and 4 had labor induction as a result of prolonged labor. Dynamic control was carried out, the mother’s body temperature and pulse, LII, maternal leukocytosis, fetal heart rate were checked every 4 hours, uterine tone and secretions from the genitals were observed (taking into account the smell and color). Antibiotic prophylaxis was started in pregnant women with a period of more than 18 hours of oligohydramnios (according to the protocol, 2 grams of ampicillin or cefazolin every 8 hours before delivery).

Symptoms of chorioamnionitis (CA) were detected in 39 pregnant women with PROM. Clinically, 15 (38.5%) women had a foul-smelling vaginal discharge, 24 (61.5%) had an increase in body temperature up to 38 - 39°C, of which 9 women had a temperature above 39°C and 15 pregnant women had a body temperature of 38°C. Tachycardia was observed in all women with an increase in body temperature. Fetal tachycardia was observed in 25 (64%) of pregnant women with PROM and CA symptoms. Because pregnancy and labor were complicated by chorioamnionitis, antibiotic therapy was started according to the protocol (III-IV generation cephalosporins 2.0 g i/v every 8-12 hours + metronidazole 500 mg i/v every 8 hours). Therapy was continued for 24 hours until normal body temperature and labor induction. A

late symptom of CA - increased uterine tone was observed only in 4 (10.3%) pregnant women. Among the women of the group complicated by CA, 3 of them gave birth based on waiting tactics. Pregnant women with CA underwent induction of labor depending on the condition of the cervix. 10 (25.6%) had an “unripe” cervix (Bishop’s scale <6 points) and intravaginal prostaglandin (Glandin E2) was administered to “dilate” the cervix, and the remaining 8 (20.5%) women had a “ripe” cervix. was not used, but when labor pains subsided, stimulation of labor with oxytocin was started (according to the protocol). Fetal heartbeat was auscultated every 15 minutes in the first stage of labor during induction with oxytocin and every 5 minutes in the second stage of labor. All pregnant women in the control group gave birth by natural birth through wait-and-see tactics (Table 2).

Method of delivery	PROM group, n = 80		PROM+CA group, n = 39		Control group, n = 30		Total, n = 149	
	abs.	%	abs.	%	abs.	%	abs.	%
Active, of which:	13	16,2	18	46,2	--	--	31	20,8
prostaglandin E2	9	11,25	10	25,6	--	--	19	12,8
Oxytocin	4	5	8	20,5	--	--	12	8
Waiting tactics	34	42,5	3	7,7	30	100	67	45

Table 2: Tactics of childbirth in the studied women, (abs., %).

The diagnosis of chorioamnionitis was made when 2 or more signs were found, which were as follows: increased maternal body temperature (> 37.5°C); fetal tachycardia (> 160 beats/min); maternal tachycardia (>100 beats/min); foul-smelling vaginal discharge is a late symptom; increased uterine tone is a late symptom; leukocytosis (more than 9 thousand/ml) - has a low prognostic value.

When analyzing the outcome of childbirth, almost every second pregnant woman in the first main group (CA) - 18 (46.2%), every third woman in the 2nd main group (PROM) - 33 (41.2%) had a cesarean delivery. Natural childbirth was performed in all of the control group (Table 3). Thus, natural childbirth prevailed in all studied groups.

Indicators	PROM group, n = 80		PROM+CA group, n = 39		Control group, n = 30		Total n = 149	
	abs.	%	abs.	%	abs.	%	abs.	%
Childbirth through natural birth canals	47	58,7	21	53,8	30	100	98	65,8
Caesarean section	33	41,2	18	46,1	-	-	51	34,2

Table 3: Birth outcomes (abs., %).

It was found that the duration of the dehydration interval up to 6 hours was observed in the first main group (complicated by chorioamnionitis) 1.2 times more than in the second main group (64.1% and 50%, respectively). However, in the second main group, the period of dehydration was from 6 to 12 hours - in 22 (27.5%) women, and in the first main group (CA) 1 times more than in the second main group - in 11 (28.2%) pregnant women.

Dehydration period duration up to 24 hours was observed in 7.7% of women of the first main group (Table 4). It follows that increasing the interval of dehydration increases the risk of complications with chorioamnionitis.

Dehydration period	PROM n = 80		PROM+CA n = 39		Total n = 119	
	abs.	%	abs.	%	abs.	%
Up to 6 hours	40	50	25	64,1	65	54,6
6 - 18h	22	27,5	11	28,2	33	27,7
24h and more	18	22,5	3	7,7	21	17,6

**Table 4:** The duration of the dehydration period, (abs., %).

It was found that the average length of labor in women in the first main group was 1.3 times longer than in the control group, and in the second main group it was 1.2 times longer (8 hours 29 minutes, 7 hours 50 minutes and 6 hours 19 minutes).

When the main group analyzed the additional obstetric instructions for cesarean section of pregnant women, the unsatisfactory condition of the fetus was observed in women of the first main group (CA) - 11 (28.2%) indicators, and it was not observed in women of the second main group and the control group. Placental abruption was observed in singleton pregnancies in both main groups of women (2.6% and 1.25%) and in 3 (7.7%) women in the group with severe preeclampsia complicated by CA and in 4 (5%) women in the group with PROM, these are there was an indication for cesarean section. Malposition of the fetus, which is breech, leg and transverse presentation, was not found in the group with CA complications, and in women with PROM complications - 6 (7.5%) were indications for cesarean delivery. In almost every sixth woman, the presence of a scar on the uterus was detected in 14 (17.5%) women from the second main group, only in 1 woman from the CA group, however; unsatisfactory labor performance as an indication for cesarean section in the second main group - 5 (6.25%), CA was observed in 8 (20.5) women of the developed group (Table 5).

	PROM group n = 80		PROM+CA group n = 39		Total n = 119	
	abs.	%	abs.	%	abs.	%
% CS in groups	33	41,25	18	46,2	51	43
Placental abruption	1	1,25	1	2,6	2	1,7
Severe preeclampsia	4	5	3	7,7	7	6
Uncertain condition of the fetus	--	--	11	28,2	11	9,2
Fetal malposition (pelvis, legs, transverse)	6	7,5	--	--	6	5
Burdened obstetric history, uterine scar	14	17,5	1	2,6	15	12,6
Extragenital disease	3	3,75	1	2,6	4	3,4
Disproportion of fetal head and maternal pelvis	5	6,25	8	20,5	13	11

**Table 5:** Additional obstetric indications for cesarean section in the main group of pregnant women (abs., %).

Thus, all indicators of cesarean delivery were correct and in accordance with national standards. It should be noted that the increase in physiological blood loss, as well as the possibility of infection during childbirth, is a defect in the placental tissue (7.7% and 1.25%), injuries in the intercostal space (18% and 7.5%) and rupture of the cervix (5.1% and 1.25%). With such complications was higher in the first and second main groups, respectively, compared to women in the control group, while only 1 (3.3%) woman from the control group had rupture of the diaphragm.

In women of the first and second main groups, blood loss through natural childbirth, including cesarean section, ranged from 150.0 to 800.0 ml, but in the first group, the average volume of blood loss was  $327.1 \pm 159.0$  ml. In the second group, this indicator was  $276.7 \pm 140.0$  ml. Blood loss in women with physiological delayed delivery ranged from 150.0 to 500.0 ml, and the average was  $207 \pm 60.9$  ml, which is almost 100 ml lower than the main group of women who had antepartum amniocentesis ( $P < 0.05$ ), it is very important with a high frequency of anemia in women in the two main groups (Table 6).

Complications	PROM group n = 80		PROM+CA group n = 39		Control group, n = 30		Total n = 149	
	abs.	%	abs.	%	abs.	%	abs.	%
Uterine atony	4	5	2	5,1	-		6	4
Placental defect	1	1,25	3	7,7	--	--	4	2,7
Perineal and vaginal wall tears	6	7,5	7	18	1	3.3	14	9.4
Tearing of the cervix	1	1,25	2	5,1	--	--	3	2
Average amount of blood loss (ml)	$276,7 \pm 140,0^*$		$327,1 \pm 159,0^*$		$207 \pm 60,9$		$270,3 \pm 119,9$	
Unsatisfactory state of labor, from which:	8	10	5	12,8	1	3.33	14	9,4
Prolongation of birth periods	5	6,25	3	7,7	1	3.33	9	6
Disproportion of fetal head and mother's pelvis	3	3,75	2	5,1			5	3,4

**Table 6:** The occurrence of complications during childbirth and the amount of blood loss in the studied group of women, (abs., %).

\*  $P \geq 0.05$ -significant difference compared to the control group.

It is known that the complication of PROM is associated with an increased risk of infection in the mother and newborn. Prospective observation of the labor process made it possible to identify disorders of the contractile activity of the uterus, which is the risk of bleeding during labor against the background of rupture of amniotic fluid, which are characterized by prolongation of labor periods. In 12.8% and 10% of women, a high frequency of anomalies of the labor process and labor forces was determined. In the second main group, it was 3 times more than in the control group - 3.33%. Thus, labor force anomalies were often observed in women with complications of PROM. Unsatisfactory labor in the form of long duration of I-II stages of labor (7.7% and 6.25%) and disproportion of the mother's pelvis and fetal head was observed more often in women with PROM and CA complications (5.1% and 3.75%).

When analyzing the assessment of newborns on the Apgar scale, the number of babies born with 8-10 points was 9 (23%) 3 times less in the first main group, and 41 (51.25%) in the second main group and 21 (70%) compared to controls, in comparison, it was found to be 1.4 times less (Table 7).

	PROM group n = 80		PROM+CA group n = 39		Control group, n = 30		Total n = 149	
	abs.	%	abs.	%	abs.	%	abs.	%
1-3	--	--	--	--	--	--	--	--
4-5	--	--	1	2,6	--	--	1	0,7
6-7	39	48,75	29	74,4	9	30	77	51,7
8-10	41	51,25	9	23	21	70	71	47,6
Average Apgar 1 min	$7,34 \pm 0,65$		$6,51 \pm 0,5$		$7,63 \pm 0,49$			
Average Apgar 5 min	$8,34 \pm 0,65$		$7,51 \pm 0,5$		$8,63 \pm 0,49$			

**Table 7:** Apgar scores of newborns (abs., %).

\*  $P > 0.05$ - significant difference compared to the control group.

At the same time, newborns with 4-5 points were observed only in 1 newborn (2.6%) in the first main group. 6-7 points in 1 minute were recorded in almost every second newborn born to women of the first main group - 29 (74.4%) and the second main group - 39 (48.75%), in 9 (30%) of the control group observed. At the same time, in 5 minutes, this indicator was lower than that of the control group (Table 7).

Thus, antepartum rupture of the amniotic membrane causes a low score in the newborn, regardless of gestational age.

Newborn babies	PROM group, n = 80	PROM+CA group, n = 39	Control group, n = 30	Total, n = 149
Average weight, gr.	3316,6 ± 400,1	2416,2 ± 224,2	3422,4 ± 452,5	
Average height, cm.	51,1 ± 1,9	46,7 ± 0,7	51,3 ± 2,4	

**Table 8:** Anthropometric indicators of newborns.

\*P > 0.05- significant difference compared to the control group.

Analyzing the anthropometric indicators of newborns, it was found that the average weight of newborns in the first main group was 2416.2 ± 224.2 gr, which is caused by the failure of the function of the fetoplacental system, and the average height was 46.7 cm and weight, respectively, compared to the control group (3422.4 ± 452.5 gr. and 51.3 ± 2.4 cm.) is 1.4 times less. However, in the second main group, compared to the control, the weight and length indicators were almost the same (3316.6 ± 400.1g and 51.1 ± 1.9 cm) (Table 8).

The diagnosis of fetal infection was observed only in the first main group of newborns, 3 out of every 5 women (7.7%) were born newborn, who complicated with respiratory failure - 1 (2.6%). Hemolytic disease of the newborn according to Rhesus conflict was found in 7.7% of newborns in the first main group and in 3.75% in the second main group (Table 9).

	PROM group, n = 80		PROM+CA group, n = 39		Control group, n = 30		Total, n = 149	
	abs.	%	abs.	%	abs.	%	abs.	%
Fetal growth restriction syndrome	1	1,25	2	5,1	--	--	3	2
Intrauterine infection	1	1,25	3	7,7	--	--	4	2,7
Respiratory depression	--	--	1	2,6	--	--	1	0,7
Hemolytic disease of the newborn	3	3,75	3	7,7	2	6,7	8	5,4
Asphyxia, of which:	39	48,75	30	77	9	30	78	52,3
Mild	39	48,75	29	74,4	9	30	77	51,7
Medium	--	--	1	2,6	--	--	1	0,7
Severe	--	--	--	--	--	--	--	--

**Table 9:** Prevalence of the early neonatal period (abs., %).

Mild asphyxia of newborns was observed in the first and second primary groups (48.3% and 74.4%, respectively) and in the control group - 9 (30%) newborns. Whereas, babies born with moderate asphyxia were observed only in the first main group (2.6%).

### Summary

Thus, the results of the study showed that 39 of the pregnant women whose amniocentesis went before delivery had complications of chorioamnionitis. Chorioamnionitis was clinically manifested by the following symptoms, in particular: foul-smelling vaginal discharge in 15 (38.5%) women, an increase in body temperature up to 38 - 39°C in 24 women (61.5%), of which 9 had a body temperature of 39. It was found that the body temperature increased above 38°C in 15 women, and tachycardia was observed in all women with the increase in body temperature. Fetal tachycardia was observed in 25 (64%) of pregnant women complicated by chorioamnionitis against the background of preterm discharge of amniotic fluid. In the group of women with developed PROM and CA have risk factor for the development of intrauterine infection and newborns born with respiratory depression and severe asphyxia in the early postpartum period.

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