

Clinical Research

Features of Clinical Course of Pregnancy and Childbirth in Cases of Extremely Low Birth Weights Babies in Western Siberian Region

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Abstract

The aim of this study is to evaluate the risk factors involved in the pregnancy and delivery outcomes of extremely low birth weight (ELBW) fetuses in the West Siberian region. The termination of pregnancy between 22 and 27 weeks is undoubtedly associated with a notably complicated obstetric history. Patients with a history of ELBW suffered a high frequency of gynecologic and extragenital diseases, including hereditary thrombophilia and hemostatic disorders. Survival of fetuses with ENMT was determined by the gestational age at birth. All the fetuses between 22-23 weeks of gestational age were born still, whereas those at 24-25 weeks of age died during the early neonatal period. From among a group of fetuses born at 26-27 weeks' gestation, only 65.2% survived. IJBM 2011; 1(4):204-209. © 2011 International Medical Research and Development Corporation. All rights reserved.

Key words: *delivery outcomes, risk factors, extremely low birth weight fetuses, complications of pregnancy, birth complications.*

Introduction

In the Russian Federation obstetric hospitals, more than 3000 children are born every year with extremely low birth weight (ELBW) [5]. Termination of pregnancy at 22-27 weeks entails a number of pressing problems, such as unclear statistics of very early preterm births (VEPB), wavering attitudes of the doctors to the nursing of ELBW neonates, poor material and technical base in some regions, and the lack of training of health personnel to nurse very preterm fetuses [4, 9]. Unquestionably, the high cost of nursing of premature babies cannot be minimized [6-8].

The perinatal mortality of fetuses and neonate with birth weight between 500 and 999 g is about 702-776‰ [3, 9]. Antenatal infection is a major cause for spontaneous

birth during the second trimester and severe consequences for both maternal and newborn health [7, 8, 12]. Threatening complications in VEPB is considered chorioamnionitis with the development of systemic inflammatory response syndrome and septic complications, occurring in 0.9 and 10.5% [5, 10] of cases. The development of chorioamnionitis in the second trimester results from incomplete infection defense mechanisms in the fetoplacental system [10, 13].

Thus far, no single approach has been developed for the management of pregnancy with water breaking and chorioamnionitis occurring in the second trimester [9, 12, 14]. Severe consequences for both mother and newborn make obstetric strategies, for 22 to 27 weeks' pregnancy particularly problematic. [13-15]. Management of pregnancy with water breaking in the second trimester involves reducing the incidence of complications and improving perinatal outcomes.

The aim of this study is to evaluate the risk factors involved in the pregnancy and delivery outcomes of extremely low birth weight (ELBW) fetuses in the West Siberian region.

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Objectives

To study risk factors, clinical development of pregnancy, VEPB and birth outcomes.

A prospective study was conducted during the course of the pregnancy and birth outcomes in 189 women. Group I (main group) included 64 mothers of gestational age 22-27 weeks. Patients had undergone a comprehensive survey to identify the causes of premature birth, and perinatal outcomes were evaluated. Group II (comparison group) consisted of 63 patients with threatened preterm pregnancy termination at 22-27 weeks' gestation. In 56 patients from Group II, pregnancy was maintained until term time; 7 resulted in preterm births, at 36-37 weeks' gestation, with a favorable outcome for the fetus. To identify the risk factors for delivery in the second trimester and for a comparative analysis of pregnancy, childbirth, postpartum and perinatal outcomes, Group III was chosen as control (control group). In Group III, there were 62 pregnant women with totally uncomplicated pregnancies.

The results of all the observations and examinations were recorded in a specially designed thematic map. Statistical data and analysis of the results were done on a

personal computer using the «Microsoft Office» 2000, expanded edition (Premium Edition) program.

Results and discussion

The age of the women with VEPB ranged from 14 to 45 years. The age in all groups did not differ significantly. The control group was dominated by multiparous women (54.8%).

The number of nulliparous women with VEPB in the main group did not differ much from the comparison group (62.5% and 60.3%, $p>0.05$) but was significantly higher than in the control group (62.5% and 45.2%, $p=0.027$). Among the nulliparous women, primiparous women in the main group formed 28.1% while multiparous were 32.8%. In the comparison group, these figures corresponded to 33.3% and 27.0%, $p>0.05$, while in the control group, they were 32.3% and 12.9%, respectively. Thus, the number of multiparous women in the control group was 2.5 times lower than in the main group, $p<0.001$. In the main group, the number of multiparous women (from 3 to 7 parity) was also higher than in the

Table 1

Grouping women based on obstetric history

Obstetric history	main group		comparison group		control group	
	n	P±m	n	P±m	n	P±m
Medical abortions	31	48.4±6.2	23	35.5±6.0 $p=0.078$	12	19.0±4.9 $p=0.001$
Spontaneous abortions	10	15.6±4.5	6	9.5±3.7 $p=0.15$	2	3.2±2.2 $p=0.01$
Preterm labor	5	7.8±3.3	2	3.2±2.2 $p=0.12$	1	1.6±1.6 $p=0.048$
Unsafe abortions	1	1.6±1.6	-	-	-	-
Total	47	73.4±9.2	31	49.2±6.2 $p=0.003$	15	24.2±5.4 $p<0.001$

Note: evaluating the differences was performed related to the main group.

control group: 7.8±3.3% and 3.2±2.2%, $p=0.013$.

An analysis of the outcome of the previous pregnancies in women with VEPB revealed a more complicated obstetrical history, as against those in the comparison group and control group (Table 1). Of the women with preterm labor with ELBM fetuses medical abortions, spontaneous abortions at different stages of pregnancy or preterm delivery occurred significantly more frequently than in the control group.

The frequency of gynecological diseases at the time of the survey and in history of patients with VEPB was significantly higher in group I than among those in the comparison group and control group (Table 2). The most common gynecological disorders found among the women in the main group were mostly bacterial vaginosis and specific vaginitis.

Mycoplasma and ureaplasma infections were

detected in 62.5% of the women from the main group, β -hemolytic streptococcus in 19%, while the association of β -hemolytic streptococcus with ureaplasma was seen in 48.4%.

Extragenital pathology was detected in all the women in the main group and the comparison group, as against those in the control group. Most frequent occurrences of extragenital pathology included renal failure (37.5%), chronic iron deficiency anemia (32.8%), cardiovascular disease (26.6%) and hereditary thrombophilia (25%) were found in women with VEPB the, which were significantly higher than the frequency of such pathology in the control group.

In the comparison group, compared with the control group, significant differences in the incidence of pathology of the blood and cardiovascular system were detected. Influenza and herpes infection during pregnancy were

Table 2

The frequency of gynecologic disease occurring among women in the groups (per 100 surveyed)

Nosological form	main group		comparison group		control group	
	n	P±m	n	P±m	n	P±m
Bacterial vaginosis	24	37.5±6.1	20	32.3±5.8	5	8.1±3.5 p=0.0001
Specific vaginitis	10	15.6±4.5	9	14.3±4.4	1	1.6±1.6 p=0.003
Inflammatory diseases of the pelvic organs	7	10.9±3.8	6	9.5±3.7	2	3.2±2.2 p=0.047
Cervical ectopy complicated	5	7.8±3.3	2	3.2±2.2	1	1.6±1.6 p=0.05
Uterine leiomyoma	5	7.8±3.3	3	4.8±2.7	-	3.2±2.2
Infertility	4	6.3±3.0	3	4.8±2.7	1	1.6±1.6
Surgery on the ovaries	2	3.2±2.2	1	1.6±1.6	-	-
Dysmenorrhea	2	3.2±2.2	2	3.2±2.2	1	1.6±1.6
Cervical polyp	1	1.6±1.6	1	1.6±1.6	-	-
Malformation of sexual organs	1	1.6±1.6	-	-	1	1.6±1.6
Another pathology	2	3.2±2.2	1	1.6±1.6	-	-
Total	63	98.4±1.6	48	76.2±5.4 p=0.0001	14	22.6±5.3 p=0.0001

Note: evaluating the differences was performed related to the main group.

important risk factors for VEPB. Among the factors causing termination of pregnancy, complications of gestation ranks very high [6, 8, 10, 14]. Of the various types of the complications during gestation (Table 3) the main group of women were found to be predominantly affected by placental insufficiency (62.5%), there being twice the number more likely in the main group than in the comparison group (30.2%, $p=0.0002$) and 13 times more than in the control group (4.8%, $p=0.0000$). Among women in the main group there was also a significantly greater number of threatened preterm pregnancy termination in the first trimester, delayed fetal development (DFD), polyhydramnios, the classic symptoms (triad) of preeclampsia, edematous form of preeclampsia, premature detachment of the normally situated placenta (PDNSP) and congenital malformations of the fetus (CMF).

On analysis, the nature and frequency of birth complications in cases of preterm births in the second trimester were examined. Preterm labor is significantly different from labor at term, and usually requires medical or surgical intervention [3, 5, 7, 11]. Vaginal delivery was noted in 82.8% of the women in the main group, whereas cesarean delivery was performed in 17.2% of women. Cesarean section was carried out during PDNSP, preeclampsia and placenta previa. The main preferences for the cesarean section were the minimal invasiveness involved with respect to the fetus, sufficient incision and choice of incision location, which as a rule was isthmic-

corporal. Whenever possible, the fetus was removed with amnion.

During labor with ELBM fetuses, finger extension of vulvar ring was usually employed. Episiotomy was performed in 26.6% of the women in the study group, in 17.2% of women in the comparison group and in 14% of women of the control group ($p<0.001$).

Labor complications (Table 4) were observed in all the women with VEPB as against the comparison and control groups. Untimely amniorrhea was triggering premature delivery in the second trimester. In women from the main group, a significantly more frequent prolonged dry period, chorioamnionitis and fast delivery were noted. The latter, obviously, was due to the isthmic-cervical insufficiency, as well as a small mass of the fetus that does not require increased uterine activity or the intensity of contractions.

Prevention of fetal respiratory distress syndrome (RDS) was performed at 25-27 weeks of gestation. This was achieved following the usual method of treatment, which included administering betamethasone or dexamethasone in a dose of 8-24 mg. The fetus was assessed using computed tomography and Doppler of the blood vessels of the uterus, umbilical cord and fetal middle cerebral artery.

In the case of an immature cervix and the need for preinduction (in cases of chorioamnionitis or an existing infection) mifepristone was administered (a synthetic steroid that blocks the action of progesterone at the

Table 3*Complications of pregnancy in women with urgent delivery (per 100 surveyed)*

Complications of pregnancy	main group		comparison group		control group	
	n	P±m	n	P±m	n	P±m
Placental insufficiency	40	62.5±6.1	19	30.2±5.8 p=0.0002	3	4.8±2.7 p=0.0000
Threat of abortion in the first trimester	17	26.6±5.5	16	25.4±5.5 p=0.06	6	9.8±3.7 p=0.007
Delayed fetal development	12	18.8±4.9	6	9.5±3.7 p=0.05	-	-
Polyhydramnios	11	17.2±4.7	5	7.8±3.3 p=0.05	1	1.6±1.6 p=0.002
Fetal breech presentation	10	15.6±4.5	9	14.1±4.4	8	12.9±4.2
Early toxemia	9	14.1±4.3	7	11.1±4.0	3	4.8±2.7 p=0.038
Edematous form of preeclampsia	8	12.7±4.1	2	3.2±2.2 p=0.002	1	1.6±1.6 p=0.001
Classic triad of preeclampsia	4	6.3±3.0	1	1.6±1.6 p=0.08	-	-
Premature detachment of the normally situated placenta	5	7.8±3.3	-	-	-	-
Twins	5	7.8±3.3	2	3.2±2.2 p=0.12	1	1.6±1.6 p=0.067
Scar on the uterus	4	6.3±3.0	2	3.2±2.2 p=0.12	1	1.6±1.6 p=0.11
Placenta previa	2	3.1±2.2	1	1.6±1.6	-	-
Congenital malformations of the fetus	2	3.1±2.2	-	-	-	-
Total pregnancy complications	129	201.6	70	111.1	24	38.7±6.2 p=0.0000

Note: evaluating the differences was performed related to the main group.

receptor level). This product, used to prepare the cervix for labor, is registered by the Pharmacological Committee of the Russian Federation and is approved for clinical use, [6]. There is also evidence of the effectiveness of mifepristone in the cases of preterm amniorrhea [2].

We have proposed a "Method of labor induction at 22-27 weeks of gestational age, accompanied by amniorrhea (patent number 2,423,973, registered 07.20.2011). This method of induction of labor includes administration of mifepristone 200 mg orally, three times every 4 hours during the first day, and one day after the mifepristone an injection of 1 mg of dinoprostone in the posterior vaginal vault. The method was applied in 30 women with prolonged amniorrhea. The method of labor induction described above facilitated the preparation of the cervix for delivery, as well as the development of spontaneous labor in 83.3% of the cases. This method was successfully employed in situations requiring rapid preparation of the cervix for delivery, as in the premature amniorrhea at 22-27 weeks of gestation, combined with a high risk of infectious complications.

The total number of neonates born was 69 (two of which were twins). At 22-23 weeks of gestation all fetuses were stillborn (10 observations – 14.5%). At 24-25 weeks

of gestation 14 fetuses were born alive (20.3%), but all died in the early neonatal period (the first 168 hours of life). At 26-27 weeks of gestation, 45 fetuses were born alive (65.2%). The final result, including those fetuses born dead, as well as those born alive but which died within the first 168 hours of life, was 24 (34.8%) ELBM fetuses. Perinatal mortality, taking into account the body weight of the newborns with ELBM was 347.8 ‰. Higher rates of perinatal mortality were noted by other authors in their studies [9,12]. In general, the survival rate of ELBM fetuses was determined by the gestational age.

In the second stage of nursing, between 7 and 14 days of life (through 168 hours after birth) the total number of fetuses equaled 49.3%, registered as newborns.

All the dead fetuses were subjected to postmortem autopsy, establishing the major causes of death. The main causes of death in fetuses with ELBM born dead were intrauterine hypoxia and asphyxia. The most common causes of death in fetuses with ELBM born alive were respiratory disorders (87.5%) developed against a backdrop of intrauterine pneumonia. Intrauterine pneumonia was confirmed in 91.7% of the neonates who died, including intrauterine sepsis in 4.2%. CMFs were detected in 8.3% of the fetuses. Intraventricular

Table 4

Rates of birth complications in women of all three groups (per 100 surveyed)

Labor complications	main group		comparison group		control group	
	n	P±m	n	P±m	n	P±m
Untimely amniorrhea:	44	68.7±5.8	15	24.2±5.4 p=0.0000	15	24.2±5.4 p=0.0000
including premature amniorrhea (less than 12 hours);	12	18.7±4.9	11	17.2±4.7	13	20.9±5.2
including prolonged dry period (more than 12 hours).	32	50.0±6.3	4	6.3±3.1 p=0.0000	2	3.2±2.2 p=0.0000
Chorioamnionitis	11	17.2±4.7	2	3.2±2.2 p=0.005	1	1.6±1.6 p=0.002
Fast delivery	10	15.6±4.5	5	7.8±3.3 p=0.087	2	3.2±2.2 p=0.009
Uterine inertia	5	7.8±3.3	2	6.3±3.1 p=0.37	2	3.2±2.2 p=0.11
Premature detachment of the placenta	5	7.8±3.3	-	-	-	-
Total	75	117.2	39	38.1 p=0.0000	20	32.3 p=0.0000

Note: evaluating the differences was performed related to the main group.

hemorrhage led to the death of 12.5% of the fetuses.

All surviving babies showed the presence of the disease, while 77.8% of them had multiple abnormalities (RDS combined with cerebral ischemia or intrauterine infection). The most frequent (86.6%) and severe complication of postnatal life in very preterm babies was RDS. Cerebral ischemia was diagnosed in 22.2% of the preterm infants. Intrauterine infection accounted for the deaths of 28.9% of the infants with ELBM, while pneumonia was responsible for 6.7% of the deaths. On summarizing the results of the study, termination of pregnancy between 22 and 27 weeks is noted to be quite a polyetiological obstetric syndrome. In this case, the perturbations in the fetoplacental hemodynamics, occurring against the background of extragenital pathology, changes in hemostasis and the systemic inflammatory response led to the total failure of the endothelium and the subsequent development of preterm birth.

Conclusion

Termination of pregnancy at periods of 22-27 weeks of gestation is characterized by multifactorial reasons. First of all, it includes a complicated obstetrical history, high frequency of gynecological and extragenital diseases, hereditary thrombophilia and hemostatic disorders.

Survival of fetuses with ELBM is determined by the gestational age at birth, gestation of at least 27 weeks duration suggests a favorable prognosis for survival.

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