

Predicting Intrauterine Retention and Fetal Death in Case of Coronavirus Infection

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ABSTRACT

Among the risk groups for COVID-19 infection, pregnant women occupy a special place. Ultrasound examinations with suspicion of coronavirus infection and antenatal fetal death should be carried out upon admission to the maternity hospital to clarify the age of delay or death of the fetus, to determine the cranial and placental index, the nature of amniotic fluid, the location and nature of the placenta to select the method of induction of labor and delivery.

KEYWORDS: coronavirus infection, intrauterine fetal retention, ultrasound.

INTRODUCTION

Infection of the fetus and newborn can be caused by both acute and chronic persistent bacterial or viral infections. The clinical manifestations of intrauterine infection depend, on the one hand, on factors such as the type and virulence of the pathogen, the massive seeding, through the penetration of the infection, on the other hand, on the gestational age during infection and the immunological reactivity of the mother. The influence of a viral infection on the course of pregnancy and the state of the fetus is characterized by possible infection of the placenta, amniotic membranes, as well as the fetus itself. In most women with a burdened obstetric history, a persistent mixed viral infection is found[1, 8, 15].

Pregnant women are characterized by a protracted course of ARVI in the absence of severe clinical manifestations. This is due to the ability of viruses of the respiratory group to reproduce in the placenta.

A systematic review and meta-analysis of mostly small case series showed that a significant proportion of women with confirmed COVID-19 infection had a preterm birth before 37 weeks in 22% and a caesarean section in 48%. The estimated rates of hospitalization in the intensive care unit among pregnant women (7%) were higher than among non-pregnant women (4%), and about 1.9% of infants born to these women tested positive for SARS-CoV-2 [8, 13, 16].

In this epidemic, it is essential to standardize the screening, hospitalization and case management of all suspected / confirmed pregnant women with COVID-19 and to best prepare maternity wards. Management should be in accordance with local, federal and international guidelines, and strategies have been proposed for the rapid establishment of obstetric units[6,7, 14, 19].

Coronavirus infection leads not only to maternal complications, but also, unfortunately, possible various perinatal diseases and pathologies, which are often complicated spontaneous miscarriages (12%), fetal lag syndrome, antenatal fetal death(10%) and premature birth (39%)[3,5, 11, 18].

The purpose of the study is an echographic prediction of possible intrauterine fetal death (IHP) during coronavirus infection.

MATERIALS AND METHODS

The main group consisted of 50 (42.9%) women, a comparison group of 50 women (42.9%) who underwent various viral infections. The control group included 50 (14.3%) patients with a physiological course of pregnancy and childbirth who gave birth to a live child.

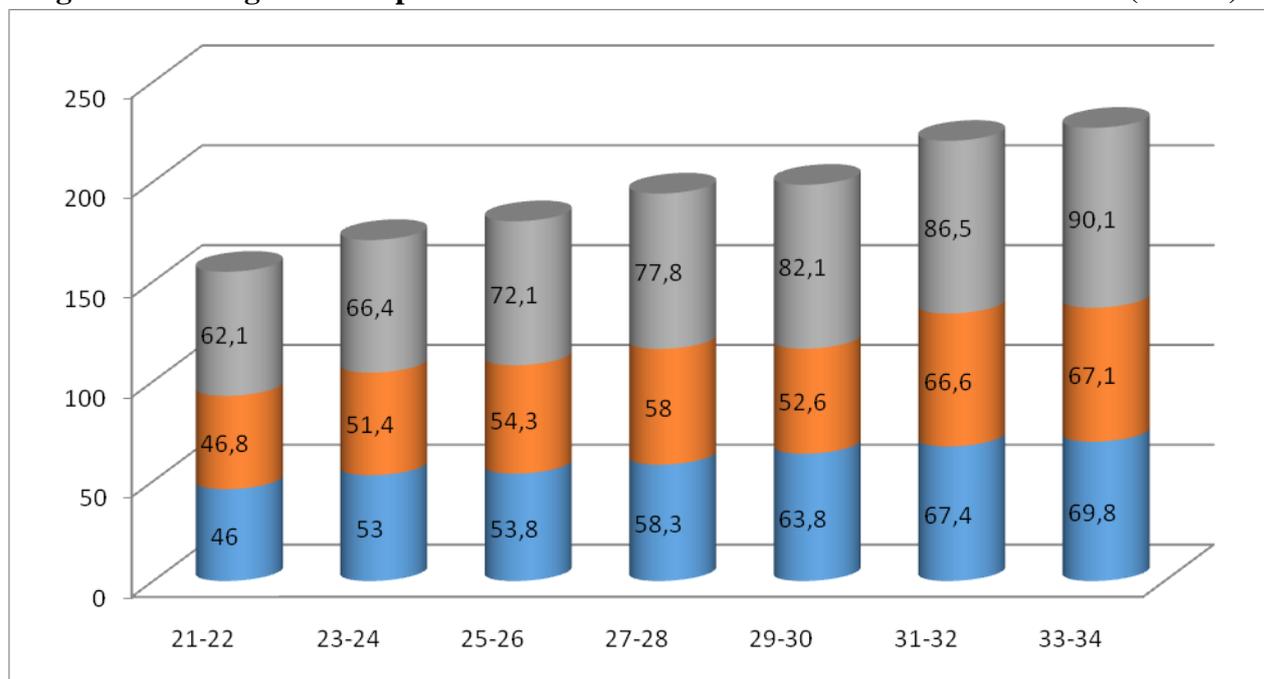
In turn, the main group of women with AIV (n = 50) was divided into 2 subgroups: subgroup 1a - 25 pregnant women with AIV at 22-27 weeks, subgroup 1b -25 pregnant women with AIV at 28-42 weeks

An important diagnostic method for determining abnormalities in the size of the fetal head in fetopathies of various echopathologies is the cranial index (Y), which is the ratio of the biparietal size (BPD) of the fetal head to the fronto-occipital size (FIR) and multiplied by a factor of 100. Index Y as a threat detector intrauterine lag and fetal death were first used by Hadlock F.P. et al. in 1981[1,5]. With physiologically ongoing pregnancy, with an increase in the gestational age of the fetus, the BPD of the fetal head gradually increases. On the contrary, a decrease in BPD and a parallel increase in the LHR with a relatively unchanged head circumference indicates intrauterine suffering of the fetus[2,4,12].

RESULTS

Our studies to study changes in the bipolar disorder of the head of an intrauterine dead fetus in the main group (Fig. 1) and the comparison group (Fig. 2) show that during physiological pregnancy, it gradually increases with an increase in the gestational age of the fetus (control group).

Figure: 1. Change in the biparietal size of the head of an intrauterine dead fetus (M ± m)



In this case, the parameters of bipolar disorder are from 62.12 ± 1.07 mm at a gestation period of 21-22 weeks to 90.11 ± 1.56 mm at a gestational age of 33-34 weeks.

Figure: 2. Change in the biparietal size of the head of an intrauterine dead fetus ($M \pm m$)

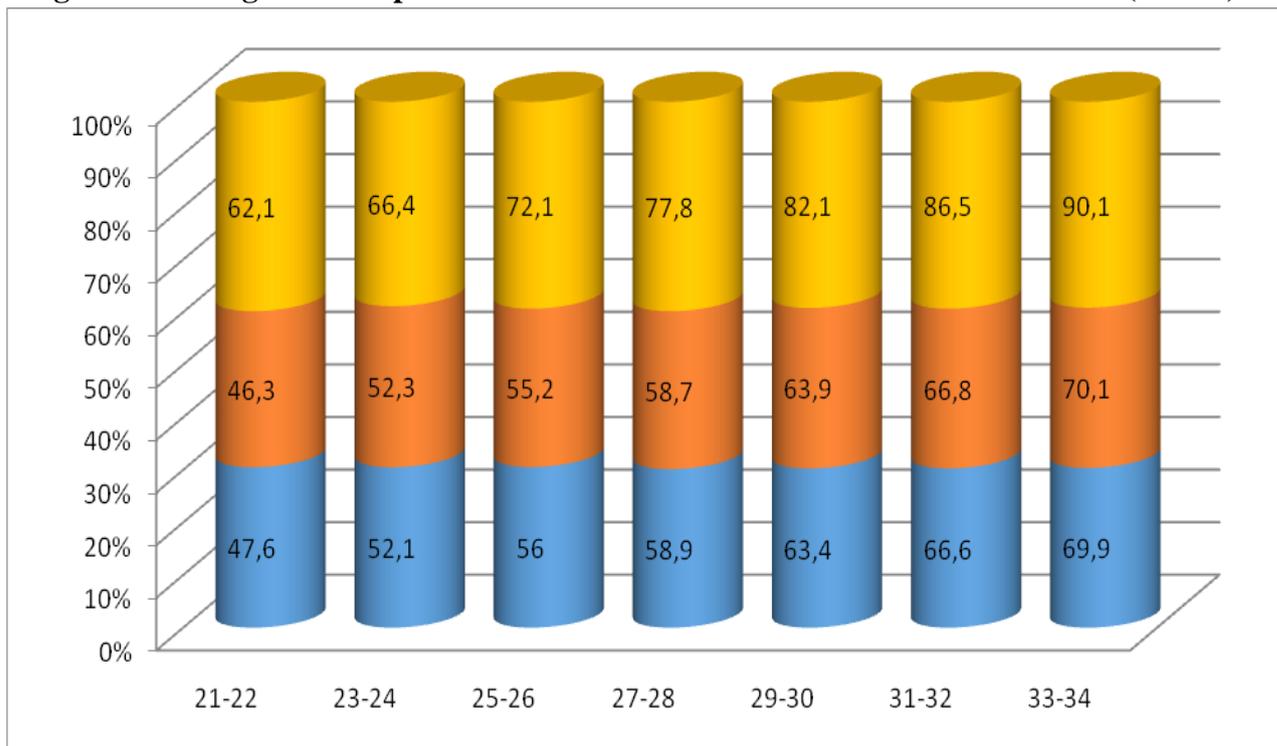


Figure: 3. Changes in the frontal-occipital size (LZR) of the head of the prenatally dead fetus ($M \pm m$)

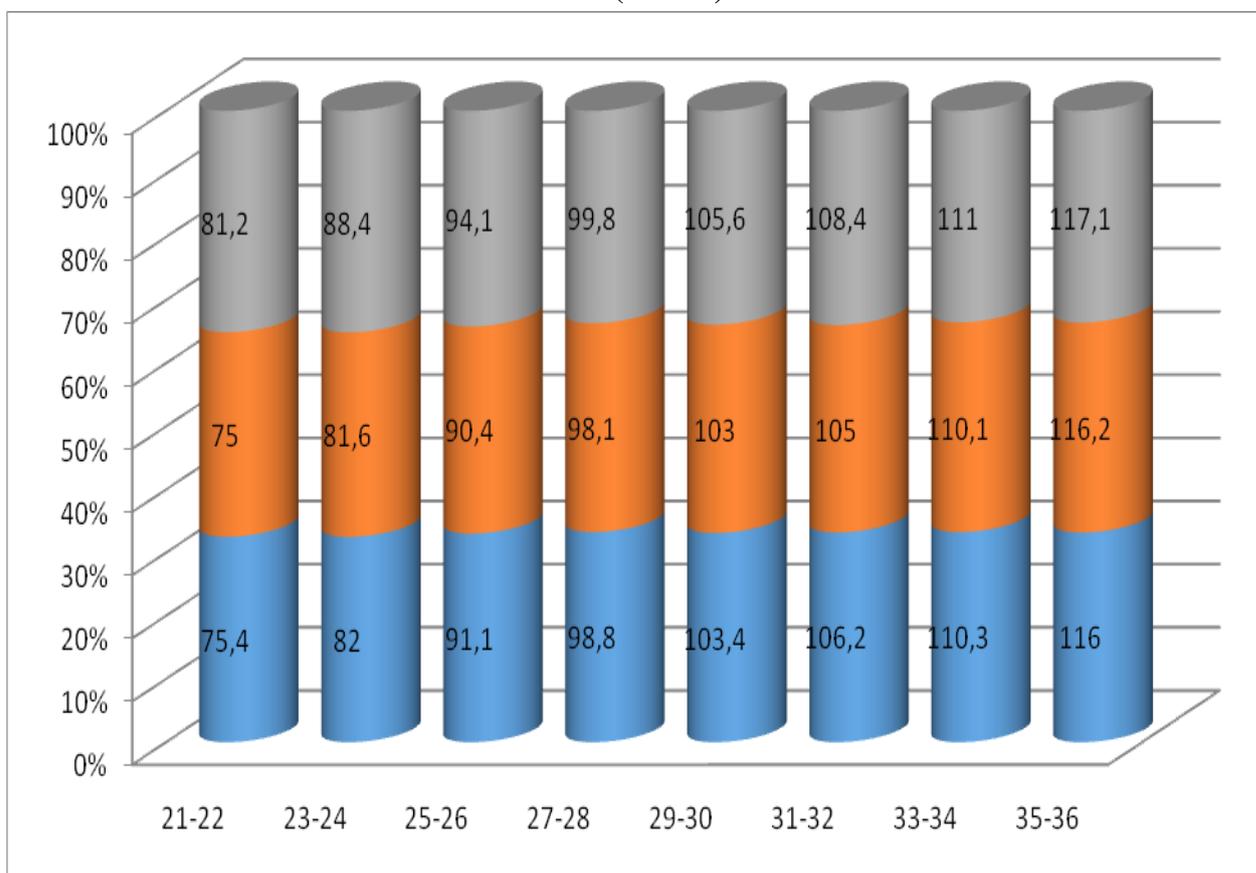
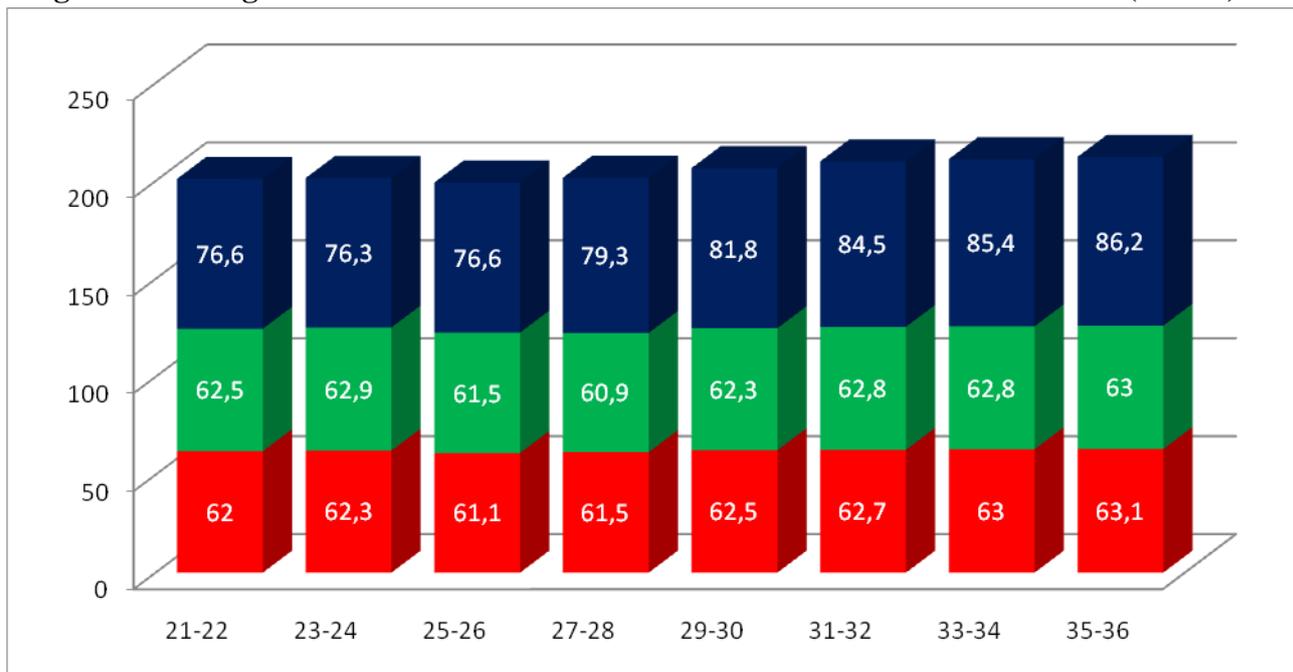


Figure: 4. Changes in the cranial index of the head of an intrauterine dead fetus ($M \pm m$)



In each segment of the gestational period, the gradual increase ranged from 3.60 mm (between gestational ages 31-32 and 33-34 weeks) to 5.75 mm (between gestational ages 23-24 and 25-26 weeks). We took these data as a standard for comparison with the data of the main group ($n = 25$) and the comparison group ($n = 25$).

Figure: 5. Double contour of the fetal head. Cranial index of the fetal head -54. Pregnant I. (case history No. 136). Diagnosis: antenatal fetal death at 27 weeks (the fetus died 2 weeks ago)

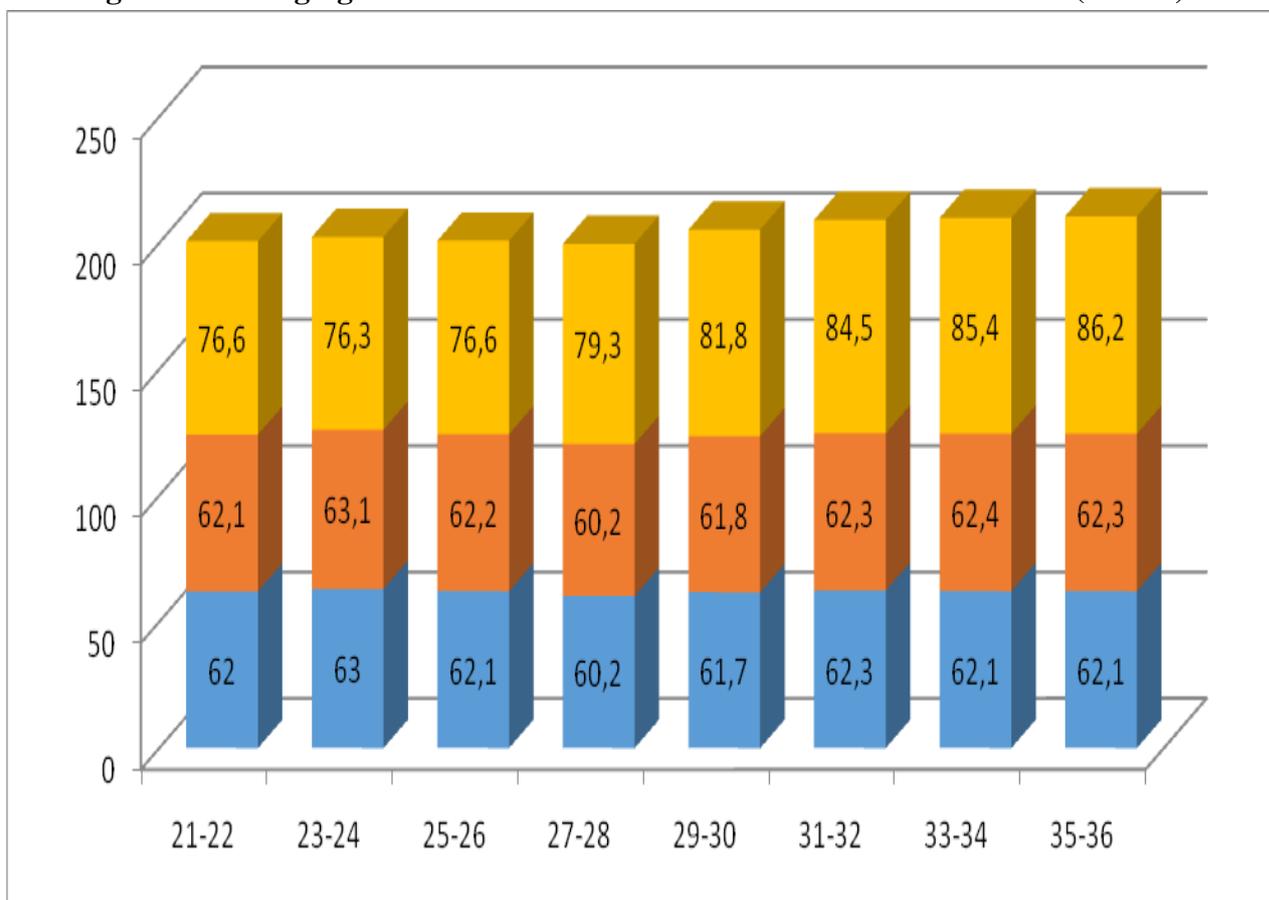


During pregnancy without clinically significant complications (control group), Y ranged from 75 to 84. Analyzing the dynamics of ultrasound examination indicators depending on the gestational age, we came to the conclusion that the cranial index Y in the II trimester is significantly less than in III trimester (75.87 ± 81.83 , respectively, at $P < 0.001$) (Fig. 4).

With fetopathies, the digital Y values are reduced to 70-73. A rapid (within 1-1.5 weeks) decrease in Y indices to $63.24-0.51$ ($P < 0.001$) is a reliable sign of inevitable intrauterine fetal death. It should be noted that with intrauterine retention of the ovum in the uterus for less than 2 weeks, the average value of Y is 60.05 ± 0.46 ; with a long delay (more than 3 weeks), Y decreased to 54.12 ± 0.36 ($P < 0.001$).

Analyzing the dynamics of ultrasound examination indicators depending on the gestational age, we came to the conclusion that the Y index in the II-nd trimester is significantly lower than in the III-th trimester (75.9 ± 0.17 and 81.8 ± 0.32 , respectively, at $P < 0.001$) (Fig. 4., 5.).

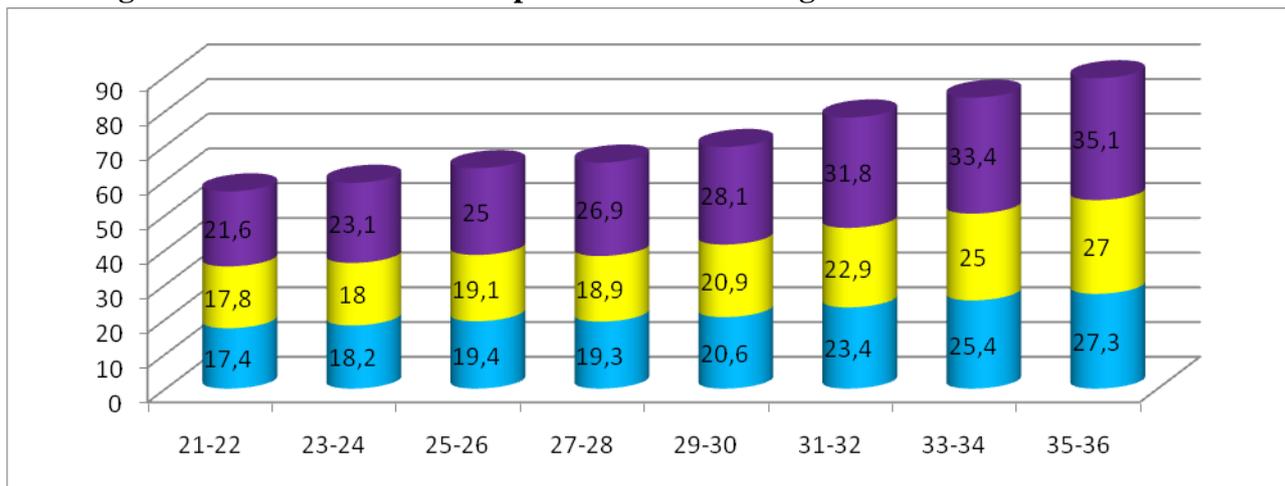
Figure: 6. Changing the cranial index of the intrauterine headdead fetus ($M \pm m$)



Our sonographic placentometry detected a significant decrease in the thickness of the placenta compared to the gestational norm by 2-5 mm in 40% and by 5-8 mm in 30% of women with intrauterine fetal or embryonic death ($P < 0.05$) (Fig. 7).

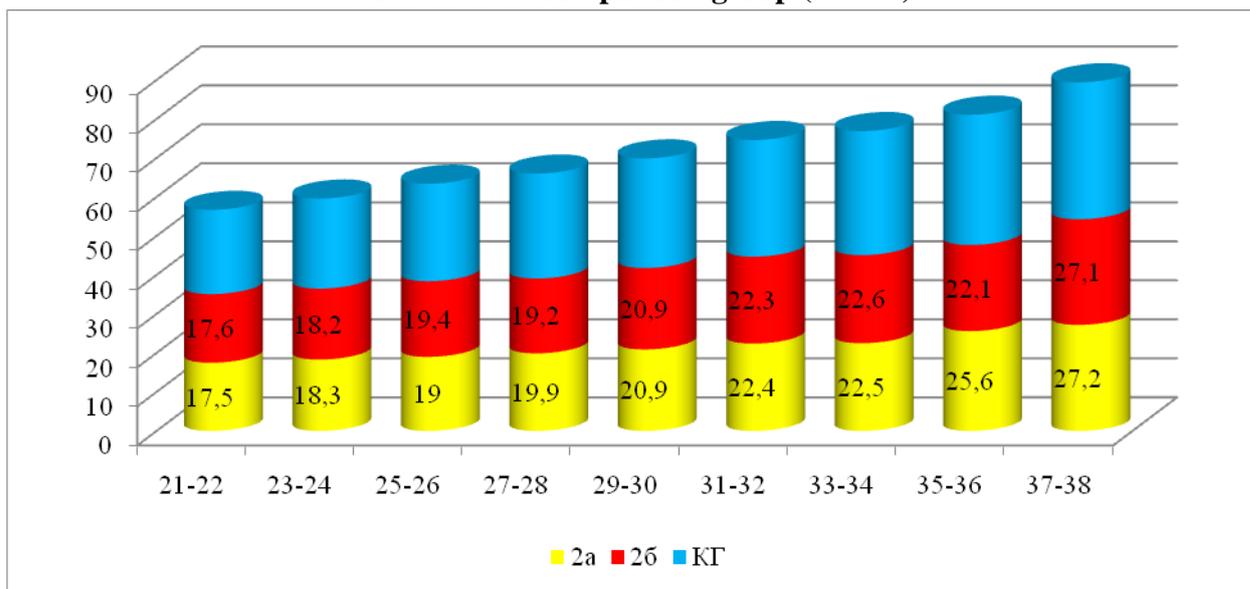
The placental index J, which is the ratio of the main measurements of the placenta, is calculated by the formula:

Figure: 7. The thickness of the placenta at different gestational times with VGP



A decrease in the placental index and placental mass in terms of gestation indicated intrauterine suffering of the fetus and the prescription of fetal death.

Figure: 8. Placenta thickness at different gestational times with intrauterine fetal death in women of the comparison group (M ± m)



CONCLUSION

Thus, ultrasound examinations for antenatal fetal death should be carried out upon admission to the maternity hospital to clarify the prescription of fetal death, determine the cranial and placental index, the nature of amniotic fluid, the location of the placenta for choosing the method of induction of labor and delivery.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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