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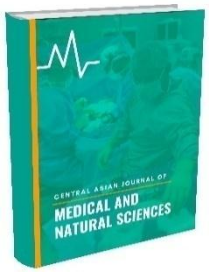

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The Umbilic Cord Attachment Anomality and Discordant Growth of Fetus in Twin Pregnancy

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Abstract: In the modern world, the reduction of maternal and perinatal morbidity and mortality remain as the main problems. One of the causes of perinatal complications is the pathology of the umbilical cord. The purpose of the study was to determine the relationship between abnormal cord attachment and fetal discordant growth in twin pregnancies. In 73 (46.8%) cases were found marginal attachment of the umbilical cord, in 26 (14%) cases were sheathing attachment and normal attachment occurred in 87 (46.8%) cases. The relationship between abnormal attachment of the umbilical cord with the type of placentation was determined. In women with MCh and DCh type, marginal attachment was detected in 28 (41.2%) and 45 (38.1%), sheath attachment in 14 (20.6%) and 12 (10.2%) cases, respectively. The relationship between the discrepancy between body weight at birth and the type of umbilical cord attachment was determined. There was a high percentage of discordance by birth weight >25% in 23.6% in pregnancies with sheath attachment of the umbilical cord. Determination of chorionism, amniogenecity and detection of placental abnormalities are key issues for adequate management of multiple pregnancies.

Key words: fetal growth discordance, pathology of umbilical cord attachment, sheath attachment of the umbilical cord, twins.

Introduction. In recent years, throughout the world with the help of assisted reproductive technologies, the frequency of multiple pregnancies has increased. The risk of complications and adverse outcomes in such pregnancies is higher than in singleton pregnancies. One of the main problems of modern obstetrics is the reduction of perinatal morbidity and mortality. Despite the fact that in the field of obstetrics there were made many advances, multiple pregnancies still are associated with an increased risk of perinatal and maternal morbidity and mortality. In twin pregnancies have vulnerability to higher risk of miscarriage, fetal malformations, and low birth weight (due to intrauterine growth retardation and preterm birth). There are also a number of specific complications

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in twins that contribute to higher morbidity and mortality, especially those associated with the type of chorionism. Monochorionic (MCh) twins have a risk of developing severe complications, such as feto-fetal transfusion syndrome (FFTS), reverse arterial perfusion syndrome (RAPS), anemia-polycythemia due to unbalanced blood transfusion between twins through placental vascular anastomoses [1,2]

One of the causes of perinatal complications is the pathology of umbilical cord. According to a number of authors, the incidence of umbilical cord pathology fluctuated from 15 to 38%, and in 7.7-21.4% cases it causes asphyxia of the newborn, in 1.7-4.3% - stillbirth, in 1.5- 1.6% - postnatal mortality [3,4] One of the pathologies of the umbilical cord is placental attachment anomalies, which are more common in twin pregnancies comparing to in singleton pregnancies. Sheath attachment of the umbilical cord is occurred in 2% of cases in singleton pregnancies, 7% in dichorionic and 12% in monochorionic twins. All of them are associated with an unequal distribution of placental territory, which, in turn, can cause discordant fetal growth. It is believed that in twins with a monochorionic diamniotic type, this phenomenon is a risk factor for the development of Fetal growth retardation syndrome (FGRS), and FFTS. Whereas a number of scientific works have confirmed this association, others have assumed conflicting data [5,6]. Thus, the relationship between abnormal cord attachment, in particular sheath attachment, and specific complications during twin pregnancies remain to be accurately characterized.

The aim of the work: to determine the association between abnormal cord attachment and discordant fetal growth in twin pregnancies.

Materials and methods.

To achieve to the putting goal, we analyzed the course of pregnancy and the outcome of childbirth in 186 pregnant women during 2019-2021 years. 68 women had monochorionic diamniotic (MChDA) and 118 women had dichorionic diamniotic (DChDA) twins. Pregnancies complicated by fetal abnormality, FFTS, aneuploidy, and antenatal death: of one of the fetuses were excluded.

In the first trimester of pregnancy, the gestational age, type of chorionicity and amniality were determined by ultrasound method by checking the number of fetal eggs and amnions, "T-sign" or "lambda-sign". After delivery, the placenta was examined to confirm the type of chorion, amniality, and to identify the pathology of the placenta and umbilical cord. The place of attachment of the umbilical cord was divided into three groups: marginal (marginal), sheathing and normal. Marginal attachment is when the umbilical cord insertion was less than 2 cm from the nearest edge of the placental disc. Sheath attachment is, when the cord was attached to the sheath before reaching the placental disc, with clear signs of passage of vessels through the sheaths to connect with the placental disc. All of the other cord insertions (eg, central, paracentral, eccentric) which were more than 2 cm from the proximal edge of the placental disc were considered normal. Chorionicity was confirmed by microscopy of the placental membranes. Placentas were collected to the groups according to the presence of abnormal cord attachment (marginal or sheathing). The marginal cord insertion group was defined as a marginal insertion pregnancy in one or both fetuses with no sheath attachment.

As appears, abnormal attachment of the umbilical cord associated with impaired development and function of the placenta and thus affects to fetal growth. One of the most common complications of multiple pregnancy is discordant fetal growth, which associated with delayed development of one of the fetuses. Altered development of the placenta with abnormal attachment of the umbilical cord may influence the relationship between birth weight and placental weight, but this has required to be confirmed. Birth weight discrepancy was calculated by subtracting the weight of the smaller twin from the weight of the larger one. Then dividing by the weight of the larger twin and expressed as a percentage. According to the information of a number of authors, the difference in the level of

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dissociation more than 20% and 25% is a prognostic factor for perinatal complications with an increased risk of morbidity and mortality [4,7].

Results.

As shown by our analysis during the research period, twin births accounted for about 2.7% of the total number of births.

The age of the women who were examined by us ranged from 20 to 40 years and averaged 28±0.9 and 29±0.85 years. Of these, the primigravidas were 38.2% and 31.4%, and the recurrents were 61.8% and 68.6%, respectively.

Table 1. Characteristics of the examined groups depending on the type of chorion

Parameters	Group with MChDA type of placentation (n=68)	Group with DChDA type of placentation (n=118)
Age of pregnants, years	28±0,9	28,9±0,84
Primigravida, n (%)	26 (38,2)	37 (31,4),
Re-pregnants, n (%)	42 (61,8)	81 (68,6).
Preterm birth, n (%)	30 (44,2)	45 (38,1)
Operative delivery, n (%)	53 (78)	87 (73,7)
Indications for childbirth n (%)		
Fetal	31 (45,6)	34 (28,8)
Maternal	10 (14,7)	39 (33)
Generic activity	27 (39,7)	45 (38,2)
Discordance, n (%)		
<15%	22 (32,4)	42 (35,6)
>20 и ≤25%	11 (16,2)	9 (7,6)
>25%	12 (17,6)	7 (6)

During the study, symmetrical fetal growth was established during pregnancy in 33.8% of MChDA patients and in 50.8% of patients with DChDA type of placentation. The detected discordance of fetal weight up to 15% showed no prognostic value for the risk of perinatal complications. Whereas discordance from -15 to 25% occurred 3 times more often-in monochorionic diamniotic type of placentation than in dichorionic diamniotic type of placentation. In our study the discordance of the fetal weight, more than 25% was 17.6% for the monochorionic type, and 6% for the dichorionic type (Table 1).

The most common method of delivery was caesarean section: in 78% cases in the group with MChDA, and in 73.7% cases in the group with DChDA, indications for delivery were fetal, maternal factors and abnormal delivery. Most pregnant women were delivered prematurely before 37 weeks 44.2% and 38.1%. The mean gestational age for the monochorionic type was 35.2±0.5 weeks, for the dichorionic type it was 37.2±0.2 weeks.

After delivery, the placenta and umbilical cord were assessed, of which cord attachment was marginal in 73 (46.8%) cases, sheathing in 26 (14%) and normal in 87 (46.8%) cases. The prevalence of abnormal umbilical cord insertion was significantly higher in monochorionic compared to dichorial twin pregnancies. Marginal attachment of the umbilical cord was registered in 28 (41.2%) pregnant women with MCH and 45 (38.1%) with DCH, while sheath attachment of the umbilical cord was observed in 14 (20.6%) and 12 (10.2%) %), respectively (Fig. 1).

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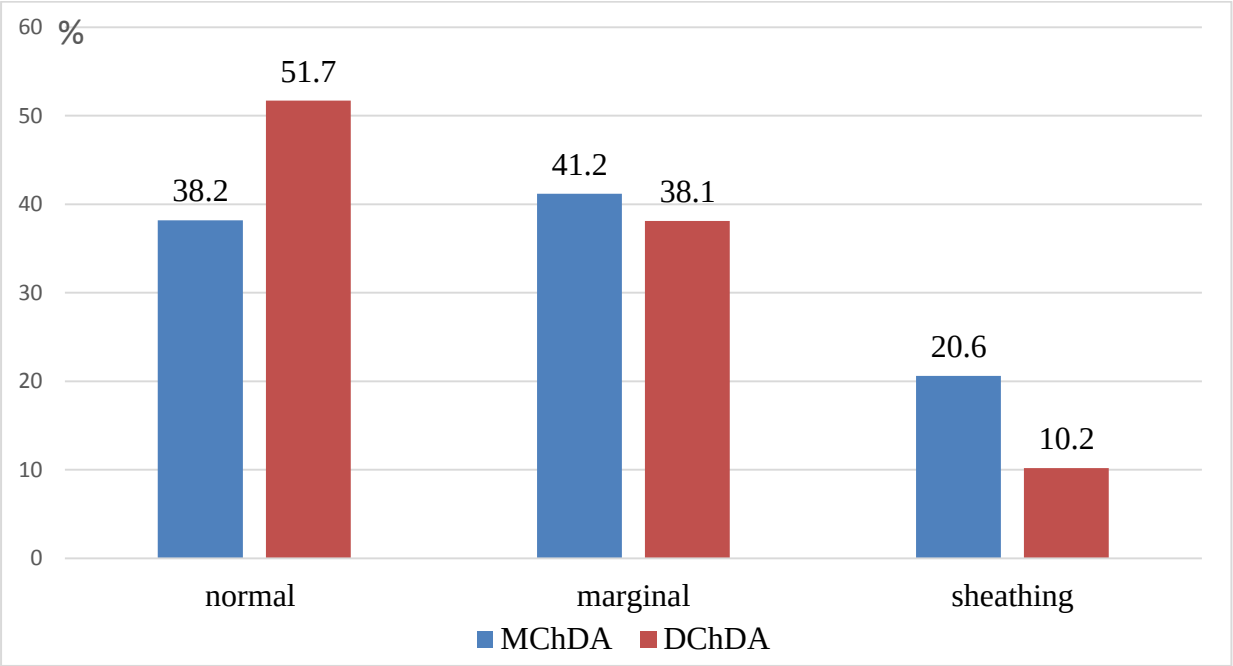

Pic. 1. Characteristics of the examined groups depending on the place of attachment of the umbilical cord to the placenta

The percentage of preterm births with varying degrees of discordance in terms of fetal weight had significant differences in groups depending on the type of chorion and anomaly of umbilical cord attachment. With discordance >20 and ≤25% and with marginal attachment of the umbilical cord, the rate of preterm birth was 13.3% in the MCh group and 11.2% in the DCh type group. Moreover, with discordance >25% where sheath attachment of the umbilical cord was detected, the frequency of preterm birth was 16.7% and 8.9%, respectively, which proves the relationship between the discordance degree of the fetus and anomaly attachment of the umbilical cord and the percentage of preterm birth in the group with the MCh type of placentation.

Discussion.

In the research of a number of authors was reported an association of the umbilical cord insertion site with either FGRS, birth weight discordance, or FFTS in multiple pregnancies with MCh type of placentation. The published literature reports a significant association between abnormal cord attachment, in particular sheath attachment, and birth weight mismatch between twins of 20% or 25% and FGRS in pregnancy with MChDA twins [1,8,9].

The relationship between the discrepancy between body weight at birth and the type of umbilical cord attachment was revealed. In twins with discordance, the prevalence of umbilical cord attachment pathology (sheath and marginal) was higher compared with concordant fetal growth. Pregnancies with sheath cord insertion compared with normal cord insertion had a significantly higher percentage of birth weight discordance >25% in 23.6% (n=19) of cases. There was a relationship between the pathology of the umbilical cord and the type of chorion, not only on the growth and development of the fetus, but also on the percentage of premature births. Gestational age at delivery was significantly lower in groups with abnormal cord attachment compared to normal cord attachment.

Our results also show a significant association between abnormal umbilical cord attachment and birth weight mismatch in twins overall and this was most notable in twins with MChDA. In MChDA pregnancies, sheath attachment of the umbilical cord has been associated with the development of discordant growth (≥ 25% or ≥ 20%) but not with the development of FFTS. With a weight

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discordance of 25% or more, the smaller twin was more likely to have abnormal cord attachment than the larger twin was. The insertion site of the umbilical cord was not significantly associated with adverse pregnancy outcomes in twins with DCh type of placentation. In MChDA twin pregnancies, the literature reports a consistently significant association between abnormal cord attachment, in particular sheath attachment, and birth weight mismatch (≥ 25% or ≥ 20%) and FGRS [5,9,10].

The analysis showed a high percentage of operative delivery in the MChDA group (78%), indications were fetal, maternal factors and pathological births. Other studies on cord attachment anomalies have found an association of sheath attachment with adverse pregnancy outcomes such as an increased rate of emergency caesarean sections, fetal growth retardation, prematurity, congenital anomalies, low Apgar scores, and placental abruption [11,12].

Conclusion.

Discordant fetal growth does not necessarily mean growth restriction, as it may have different clinical implications at different gestational ages. In multiple pregnancies, it is recommended to diagnose the mass discordance of the fetuses on the basis of ultrasound performed at intervals of 1 time in 2 or 4 weeks, depending on the type of placentation. The higher the level of noncompliance, the higher the risk of a poor outcome. Discordant growth of fetuses, which occurs in the group with monochorionic type of placentation more often than in dichorionic type, is a risk factor for perinatal complications. With an increase in the degree of discordance, the frequency and severity of fetal growth retardation, hypoxia and asphyxia, and CNS lesions increase. Discordant fetal weights of more than 20% and 25% require careful antenatal care to address the issue of management tactics and early delivery.

The aim of antenatal care for multiple pregnancies is to identify pregnant women with increased risk of complications. The definition of chorionism, amniogenicity and placental abnormalities are key issues for the adequate management of multiple pregnancies. Pathological examination of the placenta after delivery can help in assessing the presence of abnormalities of the placenta and umbilical cord, as well as it provides not only with information about the chorion, but also insight into potential disease mechanisms affecting twin pregnancy. Evaluation of umbilical cord abnormalities by ultrasound is important and should be included in recommendations for the perinatal management of multiple pregnancies. Improvements in ultrasound visual equipment and clinical experience lead to better and earlier diagnosis of umbilical cord anomalies and therefore, developing an appropriate management strategy for monitoring and delivering these high-risk pregnancies.

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