Modern approach to diagnostics and management of pregnant women with placenta previa

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ABSTRACT

Relevance. Placenta previa occurs in 1.5% of all pregnancies and predisposing factors for the development of placentation anomalies are the so-called "diseases of the operated uterus" - dystrophic changes in the endometrium due to the presence of multiple damages to the integrity of the layers of the uterine wall against the background of previous cesarean sections, conservative myomectomies, abortions. It has been established that the course of pregnancy with placenta previa is accompanied by a large number of complications, such as miscarriage, placental disorders, fetal growth retardation syndrome (Shmakov R.G. et al., 2018; Yashchuk A.G. et al., 2020; Bushtyrev A.V. et al., 2016). Despite the fact that in the structure of obstetric bleeding, bleeding associated with uterine hypotension is the most common, bleeding associated with placenta previa ranks among the causes of massive obstetric bleeding.

Purpose of the study. Systematic analysis of data from modern Russian and foreign literature, modern methods of diagnosis and therapy of placenta previa.

Material and methods. The study includes data from domestic and foreign literature sources published over the past 10 years.

Results. Placenta previa, especially invasive forms (placenta accreta spectrum - PAS) is one of the leading causes of massive obstetric hemorrhage. The etiology of abnormal placentation is unknown. The main risk factor for placenta accreta remains a cesarean section scar on the uterus, so the development of measures to reduce the frequency of operative delivery is a relevant area. Ultrasound is considered an effective method for prenatal diagnosis of placenta previa and accreta, but there is significant heterogeneity in the terminology and design of specialist reports. Histomorphological examination remains the "gold standard" for identifying PAS, but there are no generally accepted morphological criteria for accurate grading of the degree of villous invasion. There is no consensus on the optimal timing of delivery, the use of conservative therapy, the use of specialized multidisciplinary teams to improve outcomes in placenta accreta.

Conclusion. Large randomized prospective studies are needed to develop standardized protocols for ante- and postnatal diagnostics of placentation anomalies, to determine the safety and efficacy of various methods of treating patients with placenta accreta with detailed clinical and histomorphological data.

Keywords: Pregnancy, placenta, bleeding, placenta previa.

Relevance of the problem. Currently, there is a clear tendency to reduce the frequency of bleeding in the placental and postpartum periods [1, 2, 3]. At the same time, the percentage of bleeding associated with placenta previa and low location is increasing - a

diagnosis that requires organizational and diagnostic measures, since the risk of bleeding increases 13 times [7]. In 3-4% of cases, placental location anomalies are complicated by placenta accreta, and in the presence of a scar on the uterus after cesarean section, placenta accreta reaches 67% [4]. ARP is one of the main causes of massive obstetric bleeding both during pregnancy and during childbirth, and can lead to maternal morbidity and mortality [7]. In 44% of cases, ARP is complicated by bleeding during the gestation period [8]. In the absence of placenta accreta in patients with ARP, the frequency of hysterectomies is 5-6%, and with ARP accreta, hysterectomies are performed in 60-100% of cases [6]. Obstetric hemorrhage remains an important medical and social problem worldwide due to high maternal and perinatal morbidity and mortality. One of the main causes of massive bleeding in obstetric practice is placenta previa, especially in association with its accreta [1-4]. According to the meta-analysis of D. Fan et al. [5] The highest prevalence of postpartum obstetric hemorrhage due to placenta previa was recorded in North America (26.3%; 95% confidence interval (CI) 11.0–41.6), followed by Asia (20.7%; 95% CI 12.8–28.6), Australia (19.2%; 95% CI 17.2–21.1), and Europe (17.8%; 95% CI 11.5–24.0). There is evidence that more than 90% of women diagnosed with placenta accreta have placenta previa [6]. The preferred term, approved by FIGO (International Federation of Gynecology Obstetrics) [7], RCOG (Royal College of Obstetricians and Gynaecologists) [8], ACOG (The American College of Obstetricians and Gynecologists) and SMFM (Society for Maternal-Fetal Medicine) [9], to define abnormal placentation of all degrees of invasion is "placenta accreta spectrum" (PAS). This pathology necessitates abdominal operative delivery, is often accompanied by uncontrolled massive blood loss, blood transfusion, resuscitation measures, expansion of the scope of the operation to hysterectomy, and even death [3, 4, 10]. A. Nieto-Calvache et al. [10] indicate that the number of maternal deaths can reach 7% of PAS observations, with the main problem in providing assistance being the lack of experience and inadequate surgical intervention of the medical team [10]. The consequences of obstetric hemorrhage often cause severe anemia, Sheehan's syndrome (a combination of amenorrhea, atrophy of the genitals, agalactia, emotional lability with a predominance of melancholy and apathy, caused by necrosis of the adenohypophysis cells), require long-term rehabilitation, and disrupt the reproductive health of women [3, 4, 10]. Placenta previa is the localization of the placenta in the area of the lower uterine segment, when it completely or partially covers the area of the internal os of the cervix [4]. A number of authors also classify the location of the placenta within 2 cm from the internal os as an incomplete variant of placenta previa [4, 5]. The expert group of the American Institute of Ultrasound in Medicine recommended using the term "placenta previa" only if the placenta is localized directly above the internal os of the cervix [6]. With a low-lying placenta, its edge is less than 2 cm from the internal os of the cervix [7]. Placenta accreta is associated with pathological invasion of trophoblast beyond the area of the basal plate of the endometrium into the myometrium and beyond it with adhesion of the pelvic organs [3]. The first observation of "placenta accreta" was described in 1588 in a patient named Mrs. Galla who died in childbirth [cited from 3]. The first author to use the term "placenta accreta" was K. Zur Baisch (1907). R. Luke et al. in 1966 proposed a histological classification of placenta accreta based on the depth of penetration of placental villi into the myometrium [cited in 3, 4]. The prevalence statistics of PAS in world practice vary significantly in the range from 1 in 1000 to 1 in 40 thousand births, which is associated with problems of clinical and pathological diagnostic standards of PAS, which have remained virtually unchanged since 1937 [8].

Etiology of placenta previa. The main cause of placenta previa is unknown [7]. According to modern concepts, the formation of abnormal placenta localization is associated with impaired apposition and adhesion of the blastocyst, which is often associated with damage to the endometrium and cicatricial changes in the uterus [1]. A possible cause of implantation of the fertilized egg in such

unfavorable conditions is the state of ischemia in the scar tissue, since the hypoxic environment stimulates cytotrophoblast invasion and placental villus growth through the expression of hypoxia-inducible factor-1α and -2α and, probably, erythropoietin [3]. It should be noted that implantation requires a collagen-rich environment, the content of which is increased in scar tissue [7]. In addition, excessive expression of integrin-β3 and leukemia inhibitory factor has been noted in the scar area, which further increase the susceptibility of the endometrium to implantation [4]. When using assisted reproductive technologies, in the presence of endometriosis or a uterine scar, the frequency and amplitude of uterine contractions during implantation are disrupted, which can lead to abnormal implantation of the embryo near the cervix [6]. The likelihood of placenta previa increases with placental hypertrophy caused by tissue ischemia due to the influence of carbon monoxide when the mother smokes cigarettes, with multiple pregnancies, in multiparous and elderly women [7]. The association of placenta previa with maternal age may be due to a higher number of pregnancies and the likelihood of previous interventions on the uterus, as well as infertility treatment. However, a connection with age-related hormonal changes and disruption of the implantation processes of the ovum cannot be ruled out [4]. Perhaps the main role is determined by the low concentration of oxygen in the scar tissue, since the hypoxic environment stimulates cytotrophoblastic invasion and the growth of placental villi. In the 2nd trimester of pregnancy, the placenta, located in the thickness of the scar tissue, experiences difficulties in development due to a decrease in the number of decidual cells and other maternal components of the basal endometrium and begins to include compensatory reactions [4]. It is important to understand that in the dynamics of pregnancy, the placenta is able to change its location - "migrate" [9]. But the placenta itself does not move, but continues to develop in the direction of more intense blood supply in the upper parts of the uterus, while the distal part of the placenta in the lower segment of the uterus with a relatively low blood supply regresses and atrophies (trophotropism). Migration can also occur due to the growing lower uterine segment, which causes an increase in the distance from the lower edge of the placenta to the internal os of the cervix [2]. Placenta accreta is characterized by abnormal trophoblast invasion into the uterine wall with direct contact of the villous tissue with the myometrium, which makes placental separation impossible [7]. Currently, there is no doubt about the relationship between the incidence of PAS, CS, and the number of CS in the anamnesis [2]. According to R. Silver et al. [3], in women with a previous CS and placenta previa during the current pregnancy, the risk of PAS is 3, 11, 40, 61, and 67% for the first, second, third, fourth, fifth, or more CS, respectively [3]. However, the steady increase in the incidence of PAS cannot be explained only by the increase in the number of CS operations [4]. Thus, placenta accreta can occur in primiparous women with a history of operative hysteroscopy, curettage, surgical abortion, and endometrial ablation [4]. In fact, any uterine pathology (bicornuate uterus, adenomyosis, submucous myoma, or any surgical procedure with damage to the uterine wall) can be accompanied by PAS [7]. There is evidence that in vitro fertilization, especially with cryopreserved embryos, increases the risk of PAS by 4-13 times [7]

Modern diagnostic capabilities of placenta previa and accreta. Ultrasound examination (US) in the first and second trimesters of pregnancy ensures early detection of placenta previa. However, the placenta is capable of "migrating", therefore almost 90% of placentas previa identified before 20 weeks of pregnancy can "change their location" by the third trimester [2]. Therefore, in the dynamics of observation, it is recommended to perform ultrasound at 28-32 weeks of pregnancy to diagnose "persistent" placenta previa [4]. If this pathology is detected, a transvaginal examination should be performed, which is more effective in determining the location of the placenta compared to a transabdominal examination, while being no less safe [4].

The main clinical manifestation of placenta previa is bleeding from the genital tract, which first appears during pregnancy and intensifies

during labor. Bleeding most often occurs during labor. Bleeding during pregnancy with placenta previa occurs in 34% of cases, during labor - in 66% [2]. The greater the degree of placenta previa, the earlier the bleeding appears. During ultrasound examination of placenta previa, it is also necessary to assess the presence of PAS, and from the early stages of gestation. Antenatal diagnosis of pathological placental invasion reduces the incidence of perioperative complications, especially the risk of surgical bleeding [3]. Visualization by a qualified specialist using his chosen method (usually ultrasound) allows for accurate localization of the placenta and is crucial in improving pregnancy outcomes [7]. However, population studies have shown that PAS remains undiagnosed before delivery in almost 2 /3 of observations [2], while the accuracy of antenatal diagnosis by specialists in expert centers can approach 90% [8]. However, the absence of ultrasound findings does not exclude the diagnosis of PAS, and clinical factors (history of CS and placenta previa) remain important prognostic markers in identifying women at high risk of pathological placental invasion [8, 9]. Standardized descriptions of ultrasound features associated with PAS were proposed in 2016 by the European Working Group on Anomalously Invasive Placenta [9], and a reporting form based on them is regulated by the International Expert Group on Anomalously Invasive Placenta [5]. However, as with clinical studies, there is wide heterogeneity in terminology and study designs in published reports on prenatal ultrasound diagnosis of PAS [5]. Magnetic resonance imaging (MRI) is increasingly used for antenatal detection of PAS and is reported to be useful in assessing the depth of myo- and parametrium invasion [8], but ultrasound and MRI have comparable prognostic parameters [5]. It is indicated that in more than 1/3 of observations, MRI can lead to a correction of the diagnosis, which can change the tactics of PAS management, but the correction is often incorrect [5]. MRI is less dependent on the specialist conducting the study, but the high cost and limited access to equipment and expert radiologists make it impractical as a PAS screening tool, especially in early pregnancy [5]. To improve maternal and neonatal outcomes, it is advisable to introduce standardized prenatal target ultrasound protocols in specialized centers for pregnant women with PAS risk factors. A promising addition to instrumental methods for diagnosing PAS is the use of serum markers of placenta accreta, but these methods are at the research stage. A.A. Lukashevich et al. [6] indicate that matrix metalloproteinases types 2 and 9 (MMP-2 and MMP-9), their inhibitors (TIMP-1 and TIMP-2), kisspeptin-1MMP-2, kisspeptin-1 are serum predictors of placenta accreta, with the accuracy of predicting the occurrence of pathological placental invasion during pregnancy being 81.4%, sensitivity being 78.8% and specificity being 84.0%. A.A. Khasanov [8] indicates that the Kiss1 gene and its proteins, involved in the mechanisms regulating trophoblast invasion into decidual and muscle tissue, may become an effective diagnostic target for detecting placenta accreta. The use of ghrelin and erythropoietin as effective diagnostic criteria for placenta accreta cannot be ruled out. Therefore, despite numerous developments and methods for optimizing care for pregnant women with placenta previa, the problem of providing specialized medical care to patients with placenta previa remains relevant and multifaceted due to the increase in this contingent of pregnant women and requires further research in order to minimize the volume of blood loss, ergonomics and safety of surgical intervention. Conclusions. Thus, the risk factors for placenta previa are a postoperative scar on the uterus, a history of curettage of the uterine cavity walls, infertility and the use of assisted reproductive technologies, multiple pregnancy, and smoking. In addition, the risk group includes multiparous women over 35 years of age. The primary pathogenetic factor for subsequent placenta previa is the presence of a scar or overlapping scars in the lower segment of the uterus. The reasons for blastocyst fixation and implantation under such unfavourable conditions remain unclear.

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