

ULTRASOUND DIAGNOSTICS OF POSTPARTUM ENDOMETRITIS

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✓ **Resume.** The data on the diagnosis of postpartum infections in women with chronic endometritis, which occurs against the background of the use of intrauterine devices and without the use of intrauterine devices, are presented. High levels of cytokines were found in women in both groups, and an immunomodulator was used for modern treatment.

Key words: chronic endometritis, inflammatory diseases of the pelvic organs, ultrasound examination, intrauterine adhesions, inflammation, fibrosis, antibiotic therapy, immunomodulation, bovyhialuronidase azoximer.

УЛЬТРАЗВУКОВАЯ ДИАГНОСТИКА ПОСЛЕРОДОВОГО ЭНДОМЕТРИТА

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✓ **Резюме.** Представлены данные по диагностике послеродовых инфекций у женщин с хроническим эндометритом, который возникает на фоне применения внутриматочных средств и без применения внутриматочных средств. У женщин в обеих группах был обнаружен высокий уровень цитокинов, и в целях современного лечения был использован иммуномодулятор.

Ключевые слова: хронический эндометрит, воспалительные заболевания органов малого таза, ультразвуковое исследование, внутриматочные сращения, воспаление, фиброз, антибиотикотерапия, иммуномодуляция, бовгиалуронидаза азоксимер.

ТУҒРУҚДАН КЕЙИНГИ ЭНДОМЕТРИТДА УЛЬТРАТОВУШ ТЕКШИРУВИНИНГ АҲАМИЯТИ

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✓ **Резюме.** Бачадон ичи воситасиз ва бачадон ичи воситаси фонида пайдо бўлган сурункали эндометрити бор аёлларда туғруқдан кейинги юқумли касалликлар диагностикаси тўғрисидаги маълумотларни тақдим этишдир. Иккала гуруҳдаги аёлларда ҳам цитокинларнинг юқори даражаси аниқланди ва замонавий даво мақсадида иммуномодулятордан фойдаланилди.

Калит сўзлари: сурункали эндометрит, тос аъзоларининг яллиғланиш касалликлари, ультратовуш диагностикаси, фиброз, антибиотик терапияси, иммуномодуляция, бовгиалуронидаза азоксимер.

Relevance

Postpartum infectious and inflammatory diseases are an important medical and social problem and are one of the main causes of maternal morbidity and mortality. The most common manifestation of postpartum infection is endometritis, its frequency in the general population is 3-8%, after pathological delivery it reaches 18-20%, and after cesarean section it reaches 25-34.4% [1-7]. In recent decades, ultrasound examination has been widely used to assess the state of the postpartum uterus, diagnose and predict complications of the postpartum period, one of the advantages of which is its absolute harmlessness and the possibility of repeated use. Echography can detect certain changes characteristic of postpartum endometritis, which helps confirm the clinical diagnosis. To characterize the size of the postpartum uterus, in most cases its linear parameters are used: length, width, anteroposterior size. Assessment of postpartum uterine involution is based on the dynamics of reducing its size. In this case, the involution of the uterus is most objectively reflected by a decrease in its length. This parameter changes by an average of 30% during the first seven days, while the dynamics of other linear indicators is less pronounced (2-6 times less). During the normal postpartum period, the uterine cavity retains a stable size (less than 1 cm) in the anterior-posterior direction. Often, a small amount of fluid is visualized in its lumen. The contour can be smooth and clearly defined, or uneven and blurry [8-10]. According to some data, the involution and contractility rate of the uterus in healthy puerperas of different mass-speed categories and the parity in childbirth differ at different periods of puerperia. At the same time, uterine involution первооccurs almost identically in first - and second-time puerperas with a lack of body weight and in first-time puerperas with an excess body weight, and in those with multiple pregnancies, despite the absence of a significant difference in indicators, it is slower. Uterine involution in the postpartum period differs insignificantly and unreliably from those in the comparison group in puerperas with anemia and untimely discharge of amniotic fluid, while in puerperas родоразрешенных delivered by cesarean section, it significantly differs throughout the postpartum period [11]. Ultrasound examination, usually performed on the 4th-5th day of the complicated postpartum period, reveals subinvolution of the uterus, which is characterized by an increase in the length, width, anterior-posterior size and volume of the uterus in comparison with the data characteristic of the physiological course of the postpartum period. Some researchers для оценки have suggested using the uterine involution coefficient (CIM) and the endovolumometry reduction coefficient (ERE) to assess postpartum uterine involution. The coefficient of uterine involution is equal to the

ratio of the uterine muscle volume on the 2nd day of puerperium to the uterine muscle volume on the 5th day of the postpartum period. Endovolumometry reduction coefficient it is equal to the ratio of the relative volume of the uterine cavity on the 2nd day of the postpartum period to the relative volume of the uterine cavity on the 5th day. If the CMR is >1.5 , then the process of reverse development of the postpartum uterus should be recognized as adequate. If CIM is 1.9, the process of involution of the postpartum uterus should be recognized as adequate. The closer the values are to 1, the more clinically significant they are [13]. Some studies have shown that during the first week after delivery, the length of the uterus is shortened by an average of 27% from the initial value, while the width and anterior-posterior size are only 17 and 6%, respectively. The most pronounced and stable dynamics was found in determining the uterine volume, which decreased by an average of 43.8% from the initial value during the first seven days of puerperia [14]. When conducting a three-dimensional ultrasound examination, it was revealed that in puerperal women after spontaneous labor with a complicated puerperium course, a significant increase in uterine volume was noted compared to similar indicators of healthy puerperal women. The most pronounced increase in volume was found in subinvolution (by 42%), less pronounced in hematometria (by 25%) and endometritis (by 29.5%). Complications after cesarean section were also associated with a 54% increase in uterine body volume in subinvolution, 16% in hematometria, and 25.5% in endometritis. Both after spontaneous labor and after cesarean section, in all subgroups of puerperium patients, a decrease in the volume of the cervix was also noted, which was less pronounced in subinvolution (by 12%), the most significant decrease occurred in hematometria (by 16-20%) and endometritis (by 21-24%). In puerperas with subinvolution of the uterus, the values of the uterine cavity volume did not significantly differ from those of healthy puerperas, while in hematometria and postpartum endometritis, this indicator was higher than the standard values by 3.3 and 5.5% times, and after cesarean section by 2.3 and 2.4 times. Thus, the analysis of three-dimensional echography indicators revealed the greatest increase in uterine body volume in puerperas with subinvolution, the maximum increase in uterine cavity volume in hematometria and endometritis. The lowest volume of the cervix was observed in postpartum endometritis, which was associated with its delayed formation in the presence of an inflammatory process. In women who give birth after cesarean section, the volume of the body, cervix and uterine cavity change depending on puerperium complications, similar to the data after spontaneous labor. The highest values of myometrial volume in the area of the uterine suture in postpartum endometritis were associated with more pronounced edema of this area in the presence of an inflammatory process [15]. According to various data, the ultrasound picture in endometritis is characterized by an expansion of the uterine cavity of more than 15 mm due to structures of heterogeneous echo density, with a parietal echonegative zone and the morphological substrate of this echonegative zone is an inflammatory infiltrate with perifocal edema [16]. However, the ultrasound picture of endometritis is not always informative. Often, with severe clinical symptoms, the echographic picture does not have specific signs. In some cases, it is possible to identify a subtle weakly echogenic endometrium and slightly (only 2-4 mm) expanded cavity. In

addition, fibrin plaque is detected, which has increased echogenicity, thin hyperechoic strips along the walls of the uterus. There is a decrease in the tone of the uterus, liquid contents are detected in the cavity, gas in the form of hyperechoic inclusions, blood clots of more than 5 mm. Fluid in the small pelvis on the 6th-8th day is also a sign of endometritis. Hypoechogenicity of the uterine walls is caused by edema of the myometrial layers adjacent to the endometrium миометрия[17]. According to some authors, the development of puerperal endometritis in 54-67% of cases is accompanied by a decrease in uterine tone, which is supported by an increase in the ratio between the length and anterior-posterior size, as well as the length and width of the uterus [18]. The most reliable indicator of uterine involution is its length and the length of the cavity. However, data on the informative value of echographic determination of linear parameters of the uterus for assessing the severity of the postpartum period are quite contradictory [19]. Currently, the leading non-invasive method for assessing the state of the uterus after cesarean section is ultrasound scanning, the use of which allows not only to diagnose deviations in the structure of the median MEHO, but also to assess the state of the suture on the uterus, the suture on the anterior abdominal wall and adjacent tissues [20]. The rate of uterine reduction after cesarean section is significantly reduced and between the 3rd and 9th days of the postoperative period is only 17%. In this regard, to assess the involution of the uterus after cesarean section, the most informative is to determine its estimated volume. As modern studies have shown, from the 3rd to the 7th day after spontaneous labor, the volume of the uterus decreases on average from 574 to 363 cm³, which is 38%. The decrease in uterine volume between 3 and 7 days after cesarean section is an average of 33% (from 696 to 469 cm³). It should be noted that the size of the uterus after abdominal delivery significantly exceeds those after spontaneous labor. Uterine volume reduction родоразрешенных in surgically delivered patients lags behind by an average of 2 days, reaching values (379 cm³) corresponding to the 7th day after self-delivery, only by the 9th day of the postoperative period [8]. After cesarean section, the size of the uterine cavity is almost the same as the size of the uterine cavity in women who gave birth through the natural birth canal. The main difference is the presence of edema and thickening of the stitched tissues of the anterior wall of the lower segment. When suturing a wound on the uterus with two rows of stitches, a deformity of the anterior wall of the uterus is formed, including from the side of the cavity, which reduces its lumen. During the first 9 days of the postpartum period, the anterior-posterior size of the uterine cavity at the suture level remains within 5-6 mm. After cesarean section, the release of the uterus from blood clots occurs more slowly than after spontaneous labor, which is associated with a violation of the contractility of the uterus, as well as a narrowing of the lumen of its cavity at the suture level. In connection with the above, the hematolochiometer is more common in patients after cesarean section than after spontaneous labor [10, 19]. Studies have shown that reducing the length of the uterus after cesarean section it occurs much more slowly than after delivery through the natural birth canal, which is due to a violation of the contractility of muscle fibers crossed in the lower segment. It was revealed that after cesarean section, the processes of formation of the anterior uterine wall are disrupted, and the formation of the posterior uterine wall is slowed down. A significant increase in the thickness of the myometrium of the anterior uterine wall in its lower third is

associated with deformity and edema of tissues in the area of the postoperative suture. Violation of the contractility of the uterus and narrowing of the lumen of its cavity at the suture level determine the difficulty of outflow of lochia and predispose to the development of endometritis [21]. According to some data, hematomas in the area of the uterine suture that reach 2 cm in diameter or more pose a high risk of purulent-inflammatory complications, since even with a clinically uncomplicated course of the postoperative period, such hematomas do not undergo complete regression for a long time, which requires clinical and ultrasound monitoring [14]. Echographic assessment of the uterine suture reveals small hematomas under the vesico-uterine fold in a third of women with endometritis, while 42% of women have myometrium in the suture area involved in the inflammatory process. In the fifth part of patients, echographic signs of the inflammatory process in the myometrium are combined with the manifestation of its anatomical failure, which is expressed in the formation of a wall defect from the uterine cavity in BIOMEDICINE No. 3/2017 in the form of an irregular triangular niche and pronounced thinning of its distal part. According to I, this echographic pattern is a sign of partial divergence of the suture on the uterus [22]. Characteristic ultrasound signs of inflammation of the uterine muscle layer: increased vascular pattern — the appearance of sharply dilated vessels, mainly in the posterior uterine wall; the presence of structures with reduced echo density in the projection of the suture after cesarean section; the absence of positive dynamics in the presence of hematomas in the projection of the postoperative suture and the symptom of a niche in the lower uterine segment [23]. In puerperal women with purulent complications after cesarean section, a set of echographic signs was established that allow predicting the course of the disease [22]. Recent studies have shown that the echographic picture of the uterus in the postpartum period of endometritis is characterized by a large polymorphism and does not always clearly differentiate the nature of intrauterine pathology, as well as determine the presence of an inflammatory process in the uterus. Therefore, the use of Doppler examination of intrauterine blood flow should be a necessary component in the complex of diagnostic measures in patients with puerperal complications. The most significant changes are detected in the hemodynamics of the uterine arch arteries. Echography using Doppler imaging can detect early signs of blood flow disorders. In puerperal women with an uncomplicated course of the postpartum period, the systolodiastolic ratio (5/0) in arcuate uterine arteries is on average 2.45 and the IR (resistance index) is 0.58 [24]. Studies of uterine blood flow have shown an increase in the final diastolic blood flow rate in the arc. arteries of the uterine body with the development of endometritis after cesarean section. The accuracy of diagnosis of endometritis after Cesarean section based on Doppler data was 45-75%. With adequate endometritis therapy, partial normalization of blood flow occurred, and, according to the authors, Dopplerometry can serve as a method for monitoring the effectiveness of the treatment. It is interesting to note that the Doppler parameters obtained in patients who gave birth by Caesarean section coincided with the values characteristic of the inflammatory process in the uterus after spontaneous labor, and this may be due to tissue injury as a result of surgical interventions [25]. Blood flow analysis for a more accurate assessment of uterine hemodynamics should be performed not only in the arcuate, but also in other uterine arteries. Ultrasound scanning with Doppler is the most

informative diagnostic method, which has no contraindications even if the patient has a generalized infection. Blood flow indicators in the branches of the uterine artery in the area of the anterior uterine wall, in the bottom and in the area of the posterior uterine wall were obtained and the following data were obtained. In patients with purulent complications after cesarean section, who managed to perform conservative surgical (endoscopic) treatment, local circulatory disorder in the scar area was expressed in a decrease in blood volume flow and an increase in vascular resistance indices: an increase in the S/D index to 3.5-4.0; IR to 0.7-0.85 (signs of local ischemia); with indicators of S/D 2.2-2.8; IR 0.34-0.44 in the upper half of the anterior and posterior walls of the uterus. Local panmetritis revealed signs of a local circulatory disorder: the absence of a diastolic component of blood flow in the area of the uterine scar, which indicated a sharp violation of blood supply to the tissue, leading to its focal necrosis. With total panmetritis, a sharp decrease in blood supply to the anterior uterine wall and an increase in blood flow in the posterior wall were detected: S/D() are characteristic of the clinically neoc-BIOMEDICINE No. ложненного3/2017 complicated course of the postoperative period, since Doppler studies from the first days after cesarean доплерометрическиесection allow us to identify reliable criteria for the possibility of purulent-septic complications and, Accordingly, they can serve as a method for early prediction of the development of the inflammatory process [26]. The conducted studies revealed a significant decrease in 1P in the uterine arteries in puerperal women with a pronounced inflammatory process in the area of the incision on the uterus. The presence of an inflammatory process was confirmed by researchers using ultrasound examination of the uterus and its sutures, cytological examination, and the protein coefficient of uterine lochia aspirate [27]. The dynamics of S/D, PI, and IR parameters in the uterine and internal iliac arteries turned out to be more statistically significant compared to other uterine vessels [19]. The use of three-dimensional energy Doppler imaging made it possible to assess the uterine vasculature, including the arc, radial, basal, and spiral arteries. In puerperas with subinvolution of the uterus after spontaneous labor, an increase in the vascularization index by 43% was noted, with a hematolochiometer by 64% relative to the standard values. In postpartum endometritis, the vascularization index decreased васкуляризацииby 54%. In post-cesarean delivery women, the vascularization субинволюцииindex васкуляризацииwas increased by 27% with subinvolution of the uterus, and by 61% with hematolochiometer. In postpartum endometritis, the vascularization index was reduced by 44-47%. Increased васкуляризация myometrial vascularization in puerperal women with субинволюциейuterine subinvolution may indicate incomplete spiral artery thrombosis after placental separation and is a risk of developing hematometry as a result of insufficient контрактильности contractility of the myometrium [15]. A marked decrease васкуляризации in myometrial vascularization in puerperal women with postpartum endometritis and hematolochiometra may be a consequence of an exudative inflammatory process in the uterus, in which compression of the vascular bed occurred due to edema of the surrounding tissue. For the early diagnosis of postpartum endometritis in puerperal women with gestosis, dynamic Doppler blood vessels of the uterus on the 2nd, 4th and 8th days of the postpartum period are proposed. A predisposing factor for the development of endometritis in puerperal

women with gestosis is an increase in IR in the arcuate arteries to 0.69-0.73, in the radial arteries to 0.66-0.72 on the 2nd day of the postpartum period. An early diagnostic criterion for the development of endometritis in puerperal women with gestosis is a decrease in IR and S/D (in uterine arteries, IR is lower than 0.58 and S/D is lower than 2.45, in arcuate arteries, IR is 0.49, S/D is 1.91, and in radial arteries, IR is 0.44, S/D is 1.61) [28]. According to some studies conducted on Doppler images of puerperal women with an uncomplicated course, a positive final diastolic blood flow rate is always noted. A decrease in the final diastolic blood flow rate in the dynamics of the postpartum period is noted due to good uterine involution, a decrease in blood supply to myometrial tissues, and an increase in peripheral resistance in the uterine arterioles. Quantitative indicators of vascular resistance indices in puerperal women with a physiological course of puerperia, according to the author, approach the values corresponding to 18-20 weeks of normal pregnancy. At the same time, in women with postpartum purulent-septic diseases, vascular resistance indices were lower than in puerperal women with a normal course of puerperium, they were registered before the appearance of clinical manifestations of the disease and were persistent. The severity of the disease is proportional to changes in hemodynamic parameters, which means that Doppler blood flow in the uterine vessels allows for preclinical diagnosis of the inflammatory process, serves as a criterion for the effectiveness of treatment, and makes it possible to predict the recurrence of the disease [29]. Thus, ultrasound is an informative, non-invasive method for diagnosing puerperium complications, including endometritis. However, the problem of diagnosing postpartum complications using ultrasound and Doppler imaging it remains far from resolved. Erased forms of endometritis are often characterized by a conditionally "clean" uterine cavity during ultrasound examination, which makes it difficult to diagnose this pathology with a hidden clinical picture. In this regard, it is necessary to further study the possibilities of ultrasound diagnostics of postpartum complications.

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