# Ultrasonic diagnosis of infertility

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**Abstract:** This article describes current views on the sonographic diagnosis of infertility. Generalized data on modernity techniques. Pressing questions about the most common causes of infertility.

**Keywords:** 3D, 4D, ultrasound, anovulation, persistence, luteinization, hysterosonography.

The frequency of infertile marriages, according to the data of foreign and domestic authors, is 9-18% and does not tend to decrease. Every year, 1.8-2.2 million new cases of male and female infertility are registered in the world. Infertile marriage, significantly influencing demographic indicators, acquires not only biomedical, but also social significance. The nature of the change in demographic indicators puts the problem of infertile marriage among the most important in modern medicine in almost the entire territory of the Uzbekistan. There are primary infertility, when there has never been a pregnancy from the very beginning of sexual activity, and secondary infertility, when, after the previous one or several pregnancies (childbirth, abortion, ectopic pregnancy), a subsequent pregnancy does not occur. It is also customary to single out absolute female infertility associated with irreversible pathological changes in the genital organs, excluding any possibility of conception, and relative, when the cause that caused it can be eliminated. Infertility can also be a sign of a number of common diseases and diseases of the genital organs. Ultrasound is mandatory in diagnosing the causes of female infertility. At present, the possibilities of the method have been significantly expanded, which is associated with the introduction into clinical practice of the 3D ultrasound technique, which provides a multifaceted three-dimensional image of the object under study and its layer-by-layer study. Anovulation is one of the most common causes of infertility. The use of 3D ultrasound makes it possible to identify the ovarian follicular apparatus, to accurately monitor the growth and maturation of the dominant follicle in a stimulated cycle in patients with infertility. The lack of growth and formation of the dominant follicle during dynamic observation indicates the insufficiency of the follicular phase of the menstrual cycle. Follicle persistence is characterized by anovulation with prolonged functioning of the dominant follicle and its transformation into a follicular cyst. The syndrome of luteinization of a non-ovulating follicle occurs in 13-32% of cases with infertility. When monitoring

folliculogenesis in the second phase of the cycle, a gradual decrease in the size of the dominant follicle without its rupture is noted; secretory transformation occurs in the endometrium, i.e. there is an imitation of a two-phase cycle in the absence of ovulation. Luteal phase insufficiency is an ovarian dysfunction characterized by hypofunction of the corpus luteum of the ovary. The incidence of luteal phase deficiency is 4-26%. Ovulation occurs and the corpus luteum is formed.

In case of insufficiency of the luteal phase, the peripheral vascular rim is not expressed or is weakly expressed, which makes it possible to fix 3D angiography. This situation leads to incomplete secretory transformation of the endometrium, changes in the function of the fallopian tubes, impaired implantation of a fertilized egg, which is clinically manifested by infertility or spontaneous miscarriage in the first trimester of pregnancy. For the onset of pregnancy, in addition to successful fertilization, it is necessary to create conditions on the part of the endometrium for the purpose of further implantation. It is known that one of the factors of infertility can be a violation of nidation and implantation of the blastocyst. 3D ultrasound makes it possible to more accurately assess the state of the endometrium in various phases of the menstrual cycle, identify characteristic signs of incomplete secretory transformation, and determine pathological changes in its structure. In the secretion phase in women with a complete secretory transformation and the absence of focal disorders, the endometrium is homogeneous, hyperechoic. Additional echostructures in the uterine cavity are not detected. Inadequate secretory transformation of the endometrium is noted in women with endocrine infertility. The structure of the endometrium is significantly different from the norm. Insufficient echogen is detect ness of the endometrium and the severity of the hypoechoic rim surrounding the endometrium. Also, the characteristic features include the discrepancy between the volume of the endometrium and the phase of the menstrual cycle, the heterogeneity of the echogenicity of the endometrium, and the lack of smoothing of the contour of the tubal angles of the uterine cavity. Adequate blood supply to the myometrium is required to ensure complete secretory transformation of the endometrium and its proliferation. Violations of uterine vascularization lead to various structural and functional changes in the endometrium. 3D ultrasound angiography can provide an assessment of myometrial and endometrial vascularity in general. Anovulatory cycles are characterized by a constant increase in peripheral resistance indices in the uterine arteries, which leads to a decrease in uterine perfusion due to vasoconstriction. The volume of the endometrium is an important predictor of conception and is normally 2 $cm^3$ or more. The calculation of the volume of the endometrium is carried out in patients in the middle of the menstrual cycle, on the days when the embryo is transferred to the uterus using ART. In the structure of female infertility, the tubalperitoneal factor is 65-75%. Organic lesions of the fallopian tubes include: obstruction, adhesions, torsion. Their causes can be:

inflammatory diseases, pelvic or general peritonitis, operations on the internal genital organs, postpartum complications, polyps and endometriosis of the fallopian tubes, as well as other factors of external endometriosis. Hysterosonography (HSG) is one of the main diagnostic methods for suspected obstruction of the fallopian tubes. With its help, you can also get information about the adhesive process in the pelvis. However, the frequency of false-negative HSG results is 14-18%. A conventional transvaginal ultrasound is preliminarily performed. Then the cervix is exposed with the help of mirrors and, after treating the vagina with an antiseptic solution, a catheter is inserted into the cervical canal through the internal os. A balloon intrauterine catheter is used for HSG. Expansion of the cervical canal is not required. When the catheter is in place, the speculum is carefully removed and the transducer is inserted into the vagina according to the position of the uterus in the anterior or posterior fornix. Then, physiological saline is injected through the catheter, achieving adequate expansion of the uterine cavity (5-35 ml). The entry of air bubbles into the uterine cavity significantly complicates the study due to the appearance of artifacts. With HSG, information about the passage of fluid through the fallopian tube can be obtained from power Doppler imaging of the fallopian tube. The 3D mode avoids the disadvantages of conventional 2D tubal ultrasound when one segment of the fallopian tube is in the scanning plane or only one fallopian tube, allowing simultaneous imaging of the uterine cavity and fallopian tubes while collecting the entire amount of data. In terms of sensitivity and specificity, transvaginal echohysterosalpingography is not inferior to hysterography, and in some cases even surpasses it. 4D hysterosonography is one of the modern methods of diagnostics and allows real-time imaging of the uterine cavity in a three-dimensional spatial structure to identify foci of endometriosis, assess the condition of existing myometrial scars, and also study the bases of subserous and submucosal uterine nodes using a contrast agent. According to the sonometric parameters, the volume of the uterine cavity is calculated and the required amount of contrast agent for injection into the cavity is calculated; subsequently, after the bolus injection of the calculated volume of hydrogen peroxide, the absence of a reverse expiration of the contrast is ensured, and the rate of appearance and the nature of the spread of the sonocontrast are estimated in real time. substances in the area of myometrial scars, in the myometrium, along the parietal and visceral peritoneum. Unlike routine methods of visualization of the uterine cavity using radiopaque agents, this method is not allergenic, does not cause anaphylactic reactions, in addition, radiopaque agents do not have an antiseptic effect, and at the time of the study, the patient is exposed to radiation exposure. Unlike other substances used to visualize the uterine cavity during sonographic studies, the contrast agent used provides greater information content due to interaction with biological fluids (contents of endometriotic passages), stability of the connection, which determines a long time

interval for the study. Among the known methods of ultrasound diagnosis of endometriosis, endometrial scars, subserous and submucosal nodes, the proposed method is distinguished by high diagnostic reliability, increased accuracy of the ultrasound examination. One of the new and promising techniques is 3D-contrast magnetic resonance hysterosalpingography, which allows visualizing the uterine cavity, obtaining direct visualization of the fallopian tubes, assessing their patency, and examining the extratubal factor of infertility. With obstruction of the fallopian tubes, the effect of sactosalpinx occurs - the accumulation of a contrast agent in the lumen of the sealed fallopian tube, which allows you to accurately diagnose the level and degree of obstruction. With the help of ultrasound, it is possible to identify adhesions in the presence of fluid or encysted cavities in the small pelvis. Signs of the adhesive process are There are: shortening of the vaginal vaults, incorrect position of the fallopian tubes, a change in the position of the uterus in the small pelvis, displacement of the uterus, uneven distribution of free fluid in the postovulatory phase of the cycle. The presence of free fluid in the retrouterine space facilitates the visualization of adhesions and deformities of the contours of the posterior fornix. In the presence of adhesions and adhesions, the contours of the posterior fornix are deformed, there is asymmetry, retractions and irregularities with the formation of asymmetric cavities. Free fluid around the ovaries in the lateral fornix in the postovulatory phase contributes to detection of adhesions around the ampulla of the fallopian tubes.

## Conclusion

A full ultrasound picture of cyclic transformations is obtained by a dynamic study, but a single ultrasound during the patient's first visit to the ultrasound room for infertility gives a fairly detailed picture of the anatomical and morphofunctional state of the reproductive sphere, sufficient for clinicians to develop a further plan for a full examination and the first steps in organizing treatment.

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