

The role of dopplerometry in differential diagnosis simple and proliferating uterine leiomyoma

Qolovko, T.S.¹, Abdullayev, R.Ya.¹, Dudnik, T.A.¹, Jukova, T.A.¹, Lisenko, T.P.¹

Department of Internal Medicine, Renal Unit, Faculty of Medicine, Menoufia University, Egypt¹



Keywords:

ultrasound diagnostics, three-dimensional echography, dopplerometry, simple leiomyoma, proliferating leiomyoma, uterine sarcoma.

ABSTRACT

The article analyzes modern literature data on the importance of studying the hemodynamics of uterine tumors with dopplerometry in two- and three-dimensional regimens of echography for differential diagnosis of simple proliferating leiomyomas and sarcomas of the uterus. It is shown that the differential diagnosis of benign and malignant tumors using the dopplerometry is based on various features of the blood supply of these tumors. On the basis of the analysis of literature data, it was concluded that in the dopplerometry evaluation of benign, borderline and malignant tumors of myometrium in the two-dimensional regime, there were differences in the localization of the detected vessels in the CDM regimen, in the rates of vascular blood flow and vascular resistance in pulse dopplerometry. For a simple leiomyoma, the absence of a central intra-node localization of blood vessels in the CDM regimen, a low rate of arterial and venous blood flow, as well as an average resistance of arterial blood flow in the regime of impulsive dopplerometry are most typical; in a leiomyoma with eating disorders, the absence of a central intra-node localization of blood vessels, a low rate of arterial and venous blood flow in combination with high arterial resistance were more often observed. For the proliferating leiomyoma, the central intra-node localization of the vessels and the average blood flow velocities with low and medium resistance are characteristic. For sarcoma of the uterus, there is abundant vascularization both around the periphery and in the center, high blood flow rates and low resistance. The authors emphasize that there is information about the low specificity of this gradation, since the detection of a central type of vascularization and low resistance values can be in simple myomatous nodes with edema, eating disorders and destruction, and leads to diagnostic errors and suspicion of malignancy. In the three-dimensional dopplerometry mode for simple leiomyomas, low indices of volume perfusion indices were characteristic, and for proliferating leiomyomas and sarcomas of the uterus – high indices of volume perfusion indices exceeding those in the uterus as a whole. Based on the review of the literature, the authors concluded that the presently available echographic and dopplerometric two- and three-dimensional markers are characterized by high sensitivity, but very low specificity. The low specificity of the known ultrasonic and dopplerometric criteria combined with the rarity of cases of sarcoma in the uterus against the background of a large number of similar echographically and dopplerometrically leiomyomas lead to low

diagnostic accuracy of ultrasound diagnostics. This situation requires a further continuation of the scientific search for differential diagnostic ultrasound criteria by leiomyomas and sarcomas of the uterus using modern technologies, including three-dimensional echography.



This work is licensed under a Creative Commons Attribution Non-Commercial 4.0 International License.

1. Introduction

Differential ultrasound diagnosis of benign, borderline and malignant tumors remains a problem that has not been fully solved to date, despite the fact that ultrasound has become a routine method over the past decade, its significance in the diagnosis of various oncological diseases has been proven and sufficiently covered in the literature [1], [2]. According to the comparison of the ultrasound and morphological pattern of macro preparations with the histology of distant tumors, experience is gradually accumulating, allowing the sonologist to assume the presence of oncopathology in the patient at the preclinical stage, analyzing only the echography data [3], [4]. However, despite this, the frequency of detection of early forms of malignant tumors using the ultrasound diagnosis method has been insufficient in clinical practice for many years [5]. At the present stage of the development of medicine, the diagnostic capabilities of echography have expanded significantly with the advent of methods such as color Doppler mapping (CDM), energy Doppler mapping (EDR), wavelet Doppler ultrasound (WDU), 3D energy Doppler ultrasonography [6], [7].

2. Results

Based on the review of the literature data on the importance of the study of hemodynamics of uterine tumors by the method of dopplerometry in the two-dimensional mode of echography for differential diagnosis of simple proliferating leiomyomas and sarcomas of the uterus, the specificity of known ultrasonic and dopplerometric indicators in the detection of oncopathology is clear. Three-dimensional echography, according to the literature, has become a new stage in the development of ultrasound diagnostics in the detection of uterine pathology. The study of perfusion of myometrium tumors using the 3D-energy dopplerometry method allows us to hope for a search for more reliable method, in comparison with the two-dimensional regime, and malignant tumors of myometrium. However, many questions of this problem remain unexplored, and the obtained data are contradictory. The number of published works is not numerous and is presented in a small number of observations. A single diagnostic algorithm for detecting this pathology using the methods of three-dimensional ultrasound is absent.

3. Conclusions

1. Analysis of the literature data showed that the place of three-dimensional ultrasound in the diagnosis of myometrium tumors is not definitively determined. In this connection, it is actual to search for new three-dimensional ultrasound and dopplerometry diagnostic differential diagnostic criteria that allow excluding or minimizing the subjective component of the study, which is characteristic of a two-dimensional echography. 2. Development and introduction of a new method for diagnosing simple, proliferating leiomyomas and sarcomas of the uterus using various techniques of three-dimensional echography with the development of quantitative parameters of 3D energy dopplerometry will significantly increase the level of ultrasonic diagnostics in oncogynecology

4. References

[1] Babkina, A. V., Krutova, V. A., Naumova, N. V. (2014). *Vozmognosti echografii v differencialnoy*

diagnostike prostoy i proliferiruyushey myomy matki subserosnoy lokalizacii [Possibilities of echography in differential diagnosis of simple and proliferating uterine fibroids of subserous localization]. Basic research, 2, 23.

[2] Devitskiy, A. A., Ozerskaya, I. A. (2014). Differentsial'naya ul'trazvukovaya diagnostika dobrokachestvennykh i zdokachestvennykh uzlov miometriya [Differential ultrasound diagnosis of benign and malignant myometrium nodes]. Ultrasound and functional diagnostics, 4, 96.

[3] Ozerskaya, I. A., Devitskiy, A. A. (2014). Ul'trazvukovaya differentsial'naya diagnostika uzlov miometriya v zavisimosti ot gistologicheskogo stroeniya opukholi [Ultrasound differential diagnosis of myometrium nodes depending on the histological structure of the tumor]. Medical imaging, 2, 110–121.

[4] Gu, Y., Zhu, L., Liu, A., Ma, J., Lang, J. (2014). Analysis of hysterectomies for patients with uterine leiomyomas in China in 2010. International Journal of Gynecology & Obstetrics, 129 (1), 71–74. doi: <http://doi.org/10.1016/j.ijgo.2014.10.031>

[5] Abdullayev, R. Ya., Sukhin, V. S., Semikoz, N. G., Sukhina, E. N., Pozdnyakov, S. A. (2013). Vozmozhnosti ul'trasonografii v diagnostike sarkomy matki [The possibilities of ultrasonography in the diagnosis of uterine sarcoma]. Women's health, 6, 161–164.

[6] Zaporozhchenko, M. B. (2015). Sostoyaniye regional'noy gemodinamiki v sosudakh matki u zhenshchin reproduktivnogo vozrasta s leyomiomoy matki [The state of regional hemodynamics in uterine vessels in women of reproductive age with uterine leiomyoma]. Arta Medica, 1 (54), 41–44.

[7] Abdullayev, R. Ya., Pozdnyakov, S. A., Mikhanovs'kyi, A. A. (2010). Rol' dopplerometriyi hilok matkovykh ven v dyferentsial'niy diahnostytsi pukhlyn tila matky ta endometriya [The role of dopplerometry of the branches of uterine veins in the differential diagnosis of tumors of the uterus and endometrium]. International Journal of Medicine, 1, 96–99.

[8] Kurjak, A., Zalud, I., Jurkovic, D., Alfirevic, Z., Miljan, M. (1989). Transvaginal Color Doppler for the Assessment of Pelvic Circulation. Acta Obstetrica et Gynecologica Scandinavica, 68 (2), 131–135. doi: <http://doi.org/10.3109/00016348909009900>

[9] Bourne, T., Campbell, S., Steer, C., Whitehead, M. I., Collins, W. P. (1989). Transvaginal colour flow imaging: a possible new screening technique for ovarian cancer. BMJ, 299 (6712), 1367–1370. doi: <http://doi.org/10.1136/bmj.299.6712.1367>

[10] Hata, K., Hata, T., Maruyama, R., Hirai, M. (1997). Uterine sarcoma: can it be differentiated from uterine leiomyoma with Doppler ultrasonography? A preliminary report. Ultrasound in Obstetrics and Gynecology, 9 (2), 101–104. doi: <http://doi.org/10.1046/j.1469-0705.1997.09020101.x>