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OPPORTUNITIES AND CHALLENGES OF THE DIGITAL WORLD OF MULTIMODAL INTERVENTIONAL BREAST RADIOLOGY (REVIEW)

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ANNOTATION

The article presents the evolution of the introduction of digital technologies into the system of oncological screening, multimodal technologies of interventional radiology, statistical data on the growth of malignant neoplasms of the breast in the world and Russia, shows the advantages of digitalization of radiation diagnostics, interdisciplinary integration with systems biology "omics" technologies, contributing to the development of a new direction " radiogenomics", and also pointed out the existing problems of introducing the latest technologies of interventional radiology, the need to train a multimodal specialist.

KEYWORDS. *multimodal approach , diagnosis, breast cancer , ultrasound*

Relevance. Breast cancer (BC) is the most common oncological pathology in women both in Russia and throughout the world. In 2018, more than 70 thousand new cases of breast cancer were diagnosed in Russia and, despite modern treatment methods, 22.3 thousand Russian women died from the progression of the disease [6, 1 2]. The introduction of mammography screening programs in a number of European countries and the USA played an important role in reducing mortality from breast cancer. Screening, due to the detection of the disease at an early, potentially curable stage, has reduced mortality from breast cancer in countries with a developed screening system by 15-25% [10, 13, 14]. Tumors detected as part of mammographic screening for breast cancer are the most difficult in terms of preoperative differential diagnosis, since they do not have clinical manifestations and are most often represented by early forms of the disease (non-invasive cancer and invasive carcinomas up to 1.0 cm in size) [13].

Mammography (MMG) is the only method for correct screening of breast cancer and the leading method for diagnosing early forms of breast cancer, including the detection of carcinomas in situ and invasive tumors of minimal size. Digital mammography uniquely combines the diagnostic value of analog predecessors and the capabilities of digital technologies, and the use of the BIRADS formalized image assessment system makes it possible to standardize the analysis of the data obtained and provide the radiologist with the correct further tactics for treating patients [1, 9, 1 0].

An undeniable advantage of MMG is the ability to detect microcalcifications, which are often the only radiological sign of early breast cancer. The detection of intermediate and malignant microcalcifications even in the absence of a tumor node suggests the presence of early breast cancer [8, 9]. Unlike MMG, ultrasound diagnostics (US) does not have sufficient resolution for tumors less than 1.0 cm; Ultrasound diagnostic capabilities do not allow visualization of early forms of breast cancer, manifested in the form of accumulation of microcalcifications, local stringy restructuring of the structure, as well as damage to the ducts of the mammary gland [4, 9].

At the end of the 90s, with the advent of the ultrasound elastography method, which is based on the high sensitivity of the shear acoustic properties of tissues to their pathophysiological state, qualitative and quantitative criteria for sonoelastography were developed to diagnose non-palpable formations [4, 7].

Magnetic resonance imaging (MRI) has entered the practice of examination for breast cancer relatively recently. The advantage of this method is the high resolution and contrast of displaying soft tissue elements, non-invasiveness, and the ability to obtain images in any arbitrary plane without mechanical movements. In order to increase the information content of the MRI method, contrast enhancement is used, with which the sensitivity in diagnosing breast cancer is 94%, specificity is 96.7% [7, 8].

Despite the presence in the arsenal of oncologists of such modern methods for diagnosing the disease as MMG, ultrasound and MRI of the mammary glands, the sensitivity of these methods for different biological subtypes of breast cancer has not been sufficiently studied, precise differential diagnostic criteria for preoperative assessment of the invasiveness of the tumor process have not been

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established, which is very relevant and timely for the development of a modern personalized approach [10, 11, 12]. In addition, the greatest diagnostic difficulties arise when identifying early forms of breast cancer, when the diagnosis is established on the basis of minimal signs of the disease, such as the presence of microcalcifications, changes in the structure of breast tissue and changes inside the ducts. Isolation and systematization of radiological signs characteristic of microcarcinomas will increase the frequency of detection of early forms of the disease at the preclinical stage, achieve maximum treatment efficiency with minimal financial investments,

which seems to be a very important task for practical healthcare [8, 9]. Thus, the study of radiological characteristics of early forms of breast cancer, their relationship with clinical and biological characteristics is an urgent problem and requires research on sufficient clinical material.

PURPOSE OF THE STUDY

To show the capabilities of modern digital radiation non-invasive and invasive technologies, as well as the need for interdisciplinary integration and training of multimodal specialists for early detection and determination of the breast cancer phenotype, which increases the efficiency of choosing adequate treatment tactics aimed at increasing the duration and quality of life of patients

MATERIALS AND METHODS

Literary data on the development of digital radiation methods for diagnosing breast diseases, including interventional radiology technologies, are presented. New data is also presented on the direction of “radiogenomics”, which was born through the interdisciplinary integration of radiological digital systems, interventional technologies and high-tech systems biology.

RESULTS

The review presents the development of equipment and radiation methods for the early detection of breast diseases, based on technical progress, including the active introduction of digitalization and informatization in medicine. New artificial intelligence models act as a doctor's assistant during screening. The advantages of various options for interventional radiology technologies in cancer screening to improve the accuracy of pathomorphological diagnosis and determine the phenotype of tumors are shown. The latest data are presented on the feasibility of interdisciplinary integration of “computer vision” based on medical imaging features with the capabilities of systems biology in determining the tumor phenotype with a correlation reliability of 71%.

CONCLUSION

The undoubted advantages of digitalization and new opportunities of interventional radiology in identifying the earliest forms of diseases in an interdisciplinary format open up the prospect of highly accurate diagnostics and an adequate choice of organ-saving treatment tactics. The training of a multimodal specialist - radiation diagnostician - diagnostic radiologist and interventional radiologist, proficient in a wide range of radiation diagnostic methods, including invasive interventions, requires correction of organizational forms of work, new educational programs not only in the specialty, but also in the basics of digitalization, which will ensure rational and effective use of modern achievements of science and technology.

BIBLIOGRAPHY

1. *Borisova, M.S. X-ray mammography in the diagnosis of breast cancer / M.S. Borisova, N. Martynova, S. Bogdanov // Bulletin of the Russian Scientific Center of Radiology of the Ministry of Health of Russia. - 2013. - T. 3, No. 13. http://vestnik.rncrr.ru/v13/papers/borisova1_v13.htm.*
2. *Bukharin, D. Features of mammographic visualization of “small” forms of breast cancer that developed against the background of fibrocystic disease / D. Bukharin, S. Velichko, E. Slonimskaya, etc. // Questions of Oncology. - 2011. - T. 57, No. 5. - P. 664-667.*
3. *Bukharin, D.G. Possibilities of X-ray mammography of “small” forms of breast cancer against the background of fibrocystic disease / D.G. Bukharin, I.G. Frolova // Bulletin of Siberian Medicine. - 2014. - T. 13, No. 1. - P. 2730.*
4. *Vysotskaya, I. Modern possibilities for diagnosing pathology of the mammary glands / I. Vysotskaya, N. Zabolotskaya, V. Letyagin, etc. // Tumors of the female reproductive system. - 2015. - No. 1. - P. 18-26.*
5. *Zakharova, N.A. The role of the ultrasound method of examining the mammary glands in the implementation of breast cancer screening / N.A. Zakharova, E.V. Kotlyarov, J. Maskey // Bulletin of Tyumen State University. - 2011. - No. 3. - P. 134-139.*
6. *6 . Korzhenkova, G.P. Complex X-ray sonographic diagnosis of breast diseases / G.P. Korzhenkova; edited by N.V. Kochergina. - M.: Firma Strom, 2004. - 123 a*
7. *7 . Korzhenkova, G.P. Improving the diagnosis of breast cancer in the conditions of mass mammographic examination of the female population: Abstract of thesis. diss. Doctor of Medical Sciences / Galina Petrovna Korzhenkova. - Obninsk, 2013. - 26 a*
8. *8 . Korzhenkova, G.P. Standardization of mammographic image interpretation / G.P. Korzhenkova // Kuban Scientific Medical Bulletin. - 2013. - No. 1. - P. 108-112.*
9. *9 . Oksanchuk, E.A. Breast calcifications: differential diagnosis and prognostic significance / E.A. Oksanchuk, E.V. Meskikh, A.Yu. Kolesnik et a1. // Medical visualization. - 2017. - No. 5. - P. 120-127.*

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10. *10 . Carkaci, S. Retrospective study of 18F-FDG PET/CT in the diagnosis of inflammatory breast cancer: preliminary data / S. Carkaci, H. A. Macapinlac, M. Cristofanilli et al. // J Nucl Med. - 2009. - Vol. 50, N 2. - P. 231-238.*
11. *eleven . Chan, CH False-negative rate of combined mammography and ultrasound for women with palpable breast masses / CH Chan, SB Coopey, PE Freer et al. // Breast Cancer Res Treat. — 2015. — Vol. 153, N 3. - P. 699-702.*
12. *12 . Chiou, SY Sonographic features of nonpalpable breast cancer: a study based on ultrasound-guided wire-localized surgical biopsies / SY Chiou, YH Chou, HJ Chiou et al. // Ultrasound Med Biol. - 2006. - Vol. 32, N 9. - P. 1299-306.*
13. *12 . Christiansen, C. L. Predicting the cumulative risk of false-positive mammograms / C. L. Christiansen, F. Wang, M. B. Barton et al. // J Natl Cancer Inst. - 2000. - Vol. 92, N 20. - P. 1657-66.*
14. *13 . Ciatto, S. Integration of 3D digital mammography with tomosynthesis for population breast-cancer screening (STORM): a prospective comparison study / S. Ciatto, N. Houssami, D. Bernardi et al. // Lancet Oncol. - 2013. - Vol. 14, N 7. - P. 583-9.*