ETHIOPIAN INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

eISSN: 2349-5715 pISSN: 2349-5707

Volume: 11, Issue 01, Jan-2024 SJIF 2019: 4.702 2020: 4.737 2021: 5.071 2022: 4.919 2023: 6.980

# COMPLEX RADIOLOGIC IMAGING OF EARLY BREAST CANCER

**Rashidova M.B.**

Department of Medical Radiology
Andijan State Medical Institute

**Abstract:**Clinicoradiological diagnosis of early breast cancer – BC (non-invasive or invasive small-sized cancers) is difficult due to the absence of any characteristic clinical symptoms and pathognomonic radiological signs of the malignant process. Screening of BC has shown to be one of the most successful projects for early diagnosis of malignancies, but the probability to receive false negative results using screening mammography reaches 12%, and, on the one hand, this is due to interval cancers, and on the other hand – to defects in the primary screening. Among the factors associated with the likelihood of ineffective screening of BC, the most authors highlight such as high breast density, preceding the breast biopsy for a benign process, young age, as well as the use of hormone replacement therapy. The main methods of instrumental BC diagnostics are mammography, ultrasound (US), magnetic resonance imaging (MRI) and positron emission tomography (PET). Mammography is the "gold standard" for both screening and best diagnostics, but is characterized by a high proportion of both false positive and false negative results, and this can be partially solved by the use of digital mammography with tomosynthesis (performing a series of mammography images obtained at different angles and producing the focused 3-D images).. Contrast enhanced mammography allows to identify angiogenesis in the area of the predicted malignancy, but is characterized by a high radiation exposure. Breast ultrasound is characterized by low specificity of the method and the high dependence of the result of data interpretation depending on physician qualifications. MRI of the breast for screening is characterized by high sensitivity, but also high cost and high proportion of false positive results. The role of PET/computer tomography in the diagnosis of early BC remains unclear, and the informative value of research in patients with nonpalpable tumors is extremely low. The radiological picture of early BC is widely variable; characteristic features include the presence of clustered calcifications, lumps with jagged edges, rough multinodular lumps. However, in a significant proportion of women the only manifestation of early BC is the presence of microcalcinates. Careful analysis of the localization and the shape of microcalcinates and basic characteristics allows correctly interpret the roentgenological diagnosis and helps to choose the optimal diagnostic and treatment algorithm.

**Key words:**Breast cancer screening, microcalcinates, mammography, breast ultrasound, magnetic resonance imaging, positron emission tomography.

Breast cancer (BC) is the leading oncopathology in the structure of cancer morbidity and mortality in the world. According to the International Agency for Research on Cancer and GLOBOCAN, more than 2 million new cases of the disease were detected in 2018, 71 thousand Russian women were diagnosed with the disease in our country
[1]. Despite the success of early diagnosis and improvement of treatment methods, breast cancer mortality also remains the leading one in the structure of oncoletality in
women [1, 2].Breast cancer screening is one of the most successful in oncological practice, its appearance in the economic In developed countries, it has reduced mortality from breast cancer by 15-25% [3-5]. On the other hand, the results of screening mammography turn out to be false negative in 6.5–12% of women, and the proportion of false positive results reaches 0.9–15% [6-9]. The true proportion of false negative examination results may be higher, depending on the interpretation of the

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definition of interval breast cancer. It is assumed that only in 65% of cases the cancer detected between screening sessions is truly interval (occurred between screening
rounds), while in 35% of cases there is an error
The primary diagnosis is the omission of microcarcinomas by radiologists [5]. Incorrect interpretation of the preventive examination data may cause additional unnecessary examinations or even operations, which causes physical and psychological injuries to healthy women and increases the cost of screening itself. If mammography is performed regularly for 10 years, every 4th woman will have at least one false positive result, and only in 1/3 of the cases according to the results of biopsies are indeed confirmed by breast cancer [1]. Thus, the search for ways to optimize the early diagnosis and interpretation of the results of breast examination in women is one of the priorities in the development of modern oncology. The main methods of instrumental diagnostics Breast cancer includes mammography, ultrasound (ultrasound), magnetic resonance imaging (MRI) and positron emission tomography (PET). Each of these methods has its advantages and disadvantages (see the table). As already discussed, the main problem of mammography is the high proportion of both false positive and false negative results. And if the probability of failure of a single study is relatively low, then, subject to regular screening, every 4th
a woman risks getting an unreliable examination result at least once . The widespread introduction of digital mammography has significantly changed the format of diagnostic services, but the degree of objective differences in the quality of examinations remains controversial . The evolution of digital mammography is mammography with tomosynthesis. The essence of the method consists in performing a series of mammographic images with a mobile device at different angles. The received data is converted by the computer into a three-dimensional image. From the technical The features that potentially affect the informativeness of the method are a significant decrease in the necessarycompression of the mammary glands, which reduces the possibility of tissue overlap and reduces the likelihood of overlapping tumors in the images with neighboring tissues. The TOMMY multicenter retrospective study compared the effectiveness of standard digital mammography and mammography with tomosynthesis in 7,060 patients. The use of tomosynthesis did not significantly affect the sensitivity of the study (87% vs 89%, respectively, >0.05), but the specificity increased from 58 to 69% ($p<0.001$). It should be noted that in patients with a breast density of 50% or higher, the sensitivity of the combination
of mammography with tomosynthesis was significantly higher than the standard study: 93% vs 86%, respectively ($p=0.03$) [28]. In the Italian prospective cohort study STORM with a study group of 7,292 patients aged 48 years, the use of mammography with tomosynthesis increased the detection rate of breast cancer from 4.8 to
7.4 per 100 thousand women who underwent screening [10].A new direction in the diagnosis of early breast cancer is contrast-enhanced mammography. Iodine-containing contrast agents are used. Diagnosis is fundamentally different from conventional mammography – angiogenesis in the area of the suspected tumor site becomes the key parameter to be evaluated. In the analysis of U. Lalji et al. 10 specialists with different levels of experience in both conventional mammography and
contrast-enhanced mammography independently reviewed 199 mammograms from the Dutch screening program. The use of contrast enhancement significantly increased
sensitivity and specificity of research, and regardless of the experience of specialists. The average sensitivity increased from 93 to 96.9%, and the specificity increased from 35.9 to 69.7%. Sensitivity for the group of researchers increased only due to improved interpretation of mammograms by radiologists-residents – an increase in sensitivity was 6.8% (1.6–12%; $p=0.011$), and specificity increased regardless of

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doctor's experience [10].

Ultrasound is routinely used in addition to mammography only in high-risk patients, as well as in an independent version if there are contraindications to mammography [4]. It should also be taken into account, that the main disadvantage of ultrasound is the low specificity of the method and the high dependence of the result of data interpretation on the qualification of the doctor. In addition, most of the detected tumors are benign, and their differential diagnosis is often impossible using this method alone. Ultrasound elastography has been developed as a complementary diagnostic method that increases the informativeness of standard ultrasound. Its independent use has no advantages over conventional ultrasound. Elastography evaluates the degree of change in the size and shape of tissues after external compression under the influence of an elastographic sensor, and the obtained data are graphically displayed and superimposed on the ultrasound image [5-7]. There are several standardized systems for the qualitative assessment of elastography data: a 5-point Itoh score (based on color image data before and during compression) and a 4-point Fleury score (additionally taking into account color characteristics of tissues after decompression) [9]. The effectiveness of elastography largely depends on the chosen scale of evaluation of the results: if in the first studies its sensitivity did not exceed 79%, in recent studies using more advanced data interpretation systems, this indicator reaches 93% . One of the key problems of the method is the difficulty of standardizing the degree of compression, which can lead to non-reproducibility of the results obtained in various clinics [2].Breast MRI for screening purposes in addition to mammography has been studied only in high-risk groups of hereditary breast cancer [3]. The use of MRI significantly increased the sensitivity of the study, however, due to the high cost, similar work was not carried out in groups with moderate and low risk of developing the disease[4]. In addition, despite the high sensitivity, a large proportion of false positive results are present during MRI. In a retrospective study of 650 high–risk patients, MRI showed sensitivity of 92.3% compared to 30.8% for mammography, but specificity was only 85.9% compared to 96.8% for mammography. Nevertheless, in this study, out of 13 identified cases of breast cancer, 9 patients were diagnosed only on the basis of MRI data [45]. In a Canadian study the effectiveness of various methods for diagnosing breast cancer in patients with BRCA1 and BRCA2 mutations was studied. The study included 236 women who revealed 16 cases of invasive breast cancer and 6 – ductal carcinoma
in situ. In 17 (77%) patients, the disease was detected on MRI, 8 (26%) – on mammography, 7 (33%) – on ultrasound, 2 (9.1%) – on clinical examination [6]. These results show that in patients at high risk of developing breast cancer, it is breast MRI that has the maximum effectiveness.

The role of PET/computed tomography (CT) has also been studied in the diagnosis of early breast cancer [5]. So, in the study of N. Peng et al. PET/CT was performed in 54 patients with positive mammography results for differential diagnosis. Subsequently, all patients underwent biopsy. PET/CT results were positive only in 9 (81.8%) of 11 patients with established invasive breast cancer and in 3 (20%) out of 15 – with non-invasive. There were no false positive results [7]. The key problem of using this method for the diagnosis of early breast cancer is the different absorption of the radiopharmaceutical by different histological types of breast cancer. In most studies, 18F-fluorodeoxyglucose was used, the degree of its absorption in ductal cancer
maximum. Such carcinomas are detected in 95% of cases on PET/CT. At the same time, the frequency of detection of fractional breast cancer is significantly lower due to the characteristically lower metabolic activity. In general, the sensitivity of PET/CT
for all neoplasms, less than 1 cm remains low [8,9]. PET/CT is most informative in the edematous infiltrative form of breast cancer and in triple negative breast cancer

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(due to the characteristic high glycolysis), in which the SUV coefficient correlates with the index of proliferative activity [10]Despite these findings,
the role of PET/CT in the diagnosis of early breast cancer remains unclear,
and the informative value of studies in patients with non–palpable neoplasms is extremely low.

**REFERENCES:**

1. GLOBOCAN 2018; IACR, WHO, 2018. http://gco.iarc.fr/today
2. Злокачественные новообразования в России в 2017 году (заболеваемость и смертность). Под ред. А.Д.Каприна, В.В.Старинского, Г.В.Петровой. М.: МНИОИ им. П.А. Герцена – филиал ФГБУ «НМИЦ радиологии» Минздрава России, 2018. [Malignant neoplasms in Russia in 2017 (morbidity and mortality). Ed. A.D.Kaprin, V.V.Stalinskii, G.V.Petrov. Moscow, Herzen MNIOI – branch of NMHC, 2018 (in Russian).]
3. Gotzsche PC, Jorgensen KJ. Screening for breast cancer with mammography. Cochrane Database Syst Rev 2013; 6: CD001877.
4. Humphrey LL, Helfand M, Chan BK et al. Breast cancer screening: a summary of the evidence for the U.S. Preventive Services Task Force. Ann Intern Med 2002; 137 (5 Part 1): 347–60.
5. Slawson DC, Coates ML. Efficacy of screening mammography. J Fam Pract 1995; 40 (6): 602–3. 6. Nelson HD, O'Meara ES, Kerlikowske K et al. Factors Associated With Rates of False-Positive and False-Negative Results From Digital Mammography Screening: An Analysis of Registry Data. Ann Intern Med 2016; 164 (4): 226–35.
6. Chan CH, Coopey SB, Freer PE et al. False-negative rate of combined mammography and ultrasound for women with palpable breast masses. Breast Cancer Res Treat 2015; 153 (3): 699–702.
7. Christiansen CL, Wang F, Barton MB et al. Predicting the cumulative risk of false-positive mammograms. J Natl Cancer Ins 2000; 92 (20): 1657–66.
8. LMng K, NergMrden M, Andersson I et al. False positives in breast cancer screening with one-view breast tomosynthesis: An analysis of findings leading to recall, work-up and biopsy rates in the MalmЪ Breast Tomosynthesis Screening Trial. Eur Radiol 2016; 26 (11): 3899–907.
9. Hofvind S, Skaane P, Vitak B et al. Influence of review design on percentages of missed interval breast cancers: retrospective study of interval cancers in a population-based screening program. Radiology 2005; 237 (2): 437–43.