Mammography and Ultrasonography in the Diagnosis of Breast Cancer

Soxibova Ziyoda Rahmonovna, Axmadova Maftuna Amin qizi
State Medical Institute of Bukhara, Uzbekistan

Abstract: The article examines 160 women with various forms of mastopathy. I was revealed that ultrasound is a highly effective method of diagnosing mastopathy. Ultrasound diagnostic criteria for breast cancer against the background of fibrocystic mastopathy have been established. The differential series is determined for these pathological conditions. The sensitivity of ultrasound in mastopathy was 90.0 ± 2.6%.

Keywords: breast cancer, mastopathy, diagnostics, ultrasonography, digital mammography.

Introduction

The problem of breast diseases (breast cancer)It remains relevant not only in Uzbekistan, but also throughout the world, since the prevalence of both benign and malignant lesions of the MJ is growing everywhere. Recently, many authors have noted that there is a rejuvenation of the contingent of breast cancer patients [1,11, 7]. In this regard, 30% of women with detected tumors are under the age of 40, when benign proliferative breast diseases are most often detected [4,6,9].A number of researchers believe that the greatest difficulties in diagnosing breast cancer are associated with the presence of pronounced forms of fibrocystic mastopathy[10,5,12]. Manual examination should be carried out by everyone; in the presence of risk factors for breast cancer, but in the absence of changes in the mammary glands, send for ultrasound. In the presence of palpatory changes, refer not only to ultrasound, but also to mammography [18,14,]. In the presence of changes in women characteristic of this nosology, there is a “masking” of volumetric pathological formations by a multitude of seals [15,17,18].X-ray mammography in this contingent of women does not allow visualizing up to 40% of tumors[45,30,45]. According to most researchers, the specificity of mammography in such situations is only 37.8% [19,20,28]. From the presented positions, it becomes obvious that it is necessary to search for more informative diagnostic methods that allow visualizing volumetric tumor formations against the background of pronounced proliferative changes in breast tissue [21,22,26].

It is known that tumor development is associated with impaired cell growth and differentiation and their malignant degeneration[33,37,46]. In many cases, such disorders are caused by mutations or a sharp increase in the activity of cellular oncogenes - normal genes that are involved in the regulation of the cell cycle, signal transmission and other processes of cell activity.

Objective: to compare the diagnostic effectiveness of digital mammography and ultrasound in the early detection of breast cancer that has developed against the background of diffuse and nodular benign proliferative formations.

Material and methods

The study included 160 women aged 35-60 years (average age - 43.0±0.21 years) with various benign proliferative breast diseases. The first group consisted of 85 women with nodular forms of mastopathy, the second - 75 patients with diffuse forms with a predominance of the cystic component. All patients underwent clinical examination, mammography, sonography, morphological examination of a biopsy of breast tissue. Ultrasound examination was performed on the 5th-8th day of the menstrual cycle (with its regularity) on the SonoScapeP50 device in real time with a linear sensor with a frequency of 11 MHz. Mammography was performed on the Phillips UC Mammodiagnost device in two projections. All three-dimensional formations were punctured under subsonic control with subsequent morphological confirmation. The sensitivity and specificity of radiation diagnostic methods were evaluated, and their comparative analysis was carried out. Statistical processing of the results was carried out using the licensed Statistica 6.0 software package. nonparametric criteria were used to compare qualitative features: 2 the exact Fisher criterion with the Yetz correction for two groups; for comparison of quantitative features – the Mann-Whitney criterion with the calculation of confidence intervals. The differences were considered statistically significant at the $p<0.05$ level. The sensitivity and specificity of X-ray mammography and ultrasonography in the diagnosis of breast cancer against the background of various forms of mastopathy were determined by the formula: A/(A+C) and D/(B+D), respectively, where A – true positive, B – false positive, C-false negative, D – true negative results. Results and discussion

In a comparative aspect, we studied the sensitivity of mammography and sonography in detecting fibro adenomas and mastopathy. When performing mammography, out of 85 examined women, fibro adenomas were diagnosed in 98, which was 73.0±3.8%. When performing ultrasound, benign tumors were found in 75 women (90.0± 2.6%), i.e. the sensitivity of sonography was 17% higher. All fibro adenomas detected on ultrasound did not exceed 20 mm in diameter. The cysts ranged in size from 10 to 35 mm, and in only one observation the cyst reached 120 mm. It should be noted that in addition to the typical signs, in 19% of cases fibro adenomas had indistinct contours, in 9.0± 2.6% of cases the contour of the formation was uneven. Due to anechoic zones, heterogeneity of the internal structure was observed in 4.0 ± 1.8% of cases, attenuation of the acoustic signal behind the formation - in 1.7 ± 1.1%. Such a variety of the ultrasound pattern of fibro adenomas was due to the peculiarities of the acoustic properties of the surrounding tissues. Traditionally, it is believed that in women under the age of 41, glandular tissue predominates in the structure of the breast, therefore, ultrasound is the preferred and more sensitive method of diagnosing any processes in patients of this age category. After 41 years, fat involution gradually begins to develop in the mammary glands and the X-ray diagnostic method becomes the most preferred. An analysis of the sensitivity of both methods in detecting benign tumors in different age groups showed that in women aged 30-40 years, the sensitivity of ultrasound and X-ray mammography significantly differ from each other and amount to 91±2.8% and 69±4.6%, respectively ($p=0.05$). In patients aged 40-50, this indicator did not differ significantly. In this regard, in the latter age group, the use of both mammography and ultrasound is equally justified for the diagnosis of pathological changes in breast tissues. Women aged 50-62 years also participated in our study. However, their number (n=6), from the point of view of evidence-based medicine, was insufficient for any conclusions, and a further set of data is required. Ultrasound examination in 20 observations showed signs suspicious of a malignant process, namely: uneven contours of formations, heterogeneous structure with the presence of anechoic zones, attenuation of the acoustic signal behind the tumor. Breast cancer was diagnosed in 18 of them during morphological examination. In two

cases, the presence of breast cancer has not been confirmed histologically. We conducted a retrospective assessment of signs indicating malignant tumor growth in a group of women with breast cancer, and concluded that the greatest differences in ultrasound signs found in benign tumors and breast cancer were determined by characterizing the contours of the formation. In 28.0±1.1% of breast cancer cases, the contour of the formations was indistinct, while in fibro adenomas this sign was found in 9.0± 2.6%. Another characteristic symptom was the heterogeneous internal structure of the tumor. With the established diagnosis of breast cancer, such changes were noted in 89 ± 7.6%. Apparently, this fact was due to the presence of hypo echoic sites in the tumor node, which were observed in more than half (52%) of patients. Of the secondary ultrasound phenomena in breast cancer, central acoustic attenuation was most common (17.0±9.1%). The level of these values was higher than in benign pathology (p=0.03).According to other ultrasound criteria, such as acoustic signal amplification and the absence of secondary phenomena, we did not notice significant differences in the frequency of occurrence in the studied groups of patients. It should be particularly noted that in 2 women (11.0±1.5%) with a histologically confirmed diagnosis of breast cancer, there were no displays of existing pathological formations either radio logically or by ultrasound. When analyzing these two observations, it turned out that the tumor nodes were located retroareolar, their size did not exceed 5 mm, there was infiltration of surrounding tissues, thanks to which the nodes were palpated, and a positive symptom of the "site" was determined. These areas were characterized by the presence of X-ray dense and hypo echoic structures, which may have been the reason for the absence of their diagnostic manifestations. Based on the data obtained, we calculated the main diagnostic indicators characterizing the level of capabilities of ultrasound and X-ray mammography in the detection of breast cancer against the background of nodular mastopathy (Table 1).

Table 1.Diagnostic capabilities of ultrasound and X-ray research methods in the diagnosis of breast cancer against the background of nodular mastopathy

Researchmethods	Sensitivity, %	Specificity, %
Ultrasonography(n=85)	61,0±11,8	92,3±2,3
Mammography(n=85)	61,0±11,8	84,6±3,1

Note: no statistically significant differences were found (p=0.48).Taking into account all the data obtained, it should be noted that in women 40-50 years of age, the diagnostic capabilities of the methods used turned out to be equal, therefore, the use of ultrasound is permissible in this contingent of women at the initial stages of diagnosis. To identify ultrasound criteria for breast cancer against the background of cystic mastopathy, we retrospectively studied the results of a survey of 75 women with various types of breast cysts. 15 out of 125 patients with cysts were diagnosed with breast cancer: 13 patients – in stage T1–2 N0–1 M0, 1 - in stage T4N2M0 and 1 - cancer in situ. When performing X-ray mammography, cysts were visualized in 60 out of 75 patients, which was 81.6± 3.5%. When performing an ultrasound examination, cystic formations were detected in all the examined patients. We have determined the features of the sonographic picture in this contingent of women. The cysts encountered had a rounded, oval or irregular shape, multiple and solitary structure. 95 (76%) patients had multiple cysts, and 30 women had solitary cysts. In a number of cases, cysts with the presence of septa were observed, which we regarded as multi-chamber, which occurred in 28 observations (22.4%).Breast cancer was found in 18 patients with ultrasound examination based on the presence of internal echo syndrome. In order to formulate diagnostic criteria characteristic of breast cancer, we conducted a comparative analysis of the symptoms that occurred in normal, uncomplicated cysts and malignant neoplasms. Statistically significant differences in the frequency of occurrence of ultrasound signs, first of all, were obtained when characterizing the internal structure of the formation. Thus, its heterogeneity occurred

in 87.0±8.9% of breast cancer cases against the background of a cystic form of mastopathy, while in the group of ordinary cysts this sign was found in 26.4± 4.2%, i.e. 3 times less often. Another characteristic feature of breast cancer was the central acoustic attenuation of the signal behind the formation. This symptom in malignant neoplasms was detected in 66.7± 12.6% of cases. In breast cancer, 87.0±8.9% of observations revealed the presence of a solid component. In the comparison group, this sign was 5 times less common (16.3±3.5%, p= 0.01). The remaining ultrasound symptoms were approximately the same in frequency in the studied groups of patients.

The results of the analysis of all cases of visualization of the internal echo syndrome allowed us to speak about the alleged causes that caused it. Mastitis with the formation of a suppurated cyst can mask the malignant process. When examining such patients, redness of the skin with the development of edema was noted. Ultrasound examination revealed a cyst with heterogeneous contents, with a weakening of the acoustic signal behind the formation, swelling of the surrounding tissues, thickening of the skin. anamnesis of the disease, as well as the effectiveness of conservative anti-inflammatory therapy, was of no small importance in making the correct diagnosis of a suppurated cyst with an acute inflammatory process. In case of incomplete evacuation when a certain amount of contents remains in the lumen, and air bubbles enter the cavity, which create a secondary acoustic dimming during ultrasound examination, the contour of the cyst deformed, the internal structure looked heterogeneous, and this formation could be mistaken for malignant. In breast cancer against the background of a cystic form of mastopathy, ultrasound has demonstrated great diagnostic capabilities (Table 2).

Table 2. Diagnostic capabilities of ultrasound and X-ray mammography in the diagnosis of breast cancer against the background of cystic mastopathy

Researchmethods	Sensitivity %	Specificity, %
Ultrasonography(n=125)	93,3±6,7	98±1,3
Mammography (n=125)	40±13	92,7±2,3
P	0,01	0,57

Conclusion

The results of the study indicate that the semiotics of breast cancer against the background of mastopathy and diagnostic algorithms are few and sometimes contradictory. As our studies have shown, the pronounced background pathology of the mammary glands not only significantly impairs the visualization of pathological processes and their interpretation, but also creates additional difficulties in obtaining informative material for morphological examination. The ultrasound method of examination is highly effective in the diagnosis of breast cancer that has developed from the epithelium of the cyst lining, and has high sensitivity and specificity. In our opinion, in all cases when mammography is performed first, in which the tal breast compaction is noted or volumetric formations are detected, ultrasound examination should be carried out as the second stage. Due to the ability of the method to perform layer-by-layer tissue scanning, differentiate cystic and solid formations, and detect internal echo syndrome, ultrasound should be considered as an important stage in the early diagnosis of breast cancer. In cases where it is not possible to obtain the contents of the cyst for morphological examination, as well as due to the insufficiently high sensitivity of radiation methods, for the differentiation of fibro adenomas and breast cancer, it is advisable to make wider use of interventional radiology techniques followed by morphological examination.

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