Breast cancer imaging: Mammography among women of up to 45 years

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Summary

Background: Among women under the age of 40, screening mammography examinations are not performed routinely. An ultrasonography scan is considered to be a basic breast imaging examination among younger women. The purpose of this study was to analyze mammography images, as well as to evaluate the usefulness and role of mammography in breast cancer diagnostic processes in women of up to 45 years, based on own experience.

Material/Methods: A retrospective analysis of mammography images, including 144 cases of breast cancer diagnosed in the group of 140 women of 45 years of age. All the patients underwent pre-treatment mammography and surgery procedure. The images were evaluated in accordance to BIRADS criteria. Lesions detectable in mammography were grouped as follows: • spiculated mass; • non-microcalcified oval/round mass; • microcalcified mass (regardless of shape); • microcalcifications; • architectural distortion; • breast tissue asymmetry.

Results: The most common mammographic symptom was solid tumor (41%), followed by microcalcified tumors (20.8%). Clusters of microcalcifications constituted 17.4% of mammography findings. In 4.9% of mammography scans, examination did not reveal any pathological lesions.

Conclusions: Breast cancer mammograms of women aged up to 45 years do not differ from diagnostic pictures of breast cancer in older women.

The diagnostic appearance of breast cancer in 1/3 of the patients involved microcalcifications detectable only on mammograms.

All the women with suspicion of breast cancer should have their mammography examinations performed, irrespective of ultrasonography scans.

Key words: breast cancer • mammography • young women • microcalcifications

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Background

One of the major achievements in the fight against breast cancer was the introduction of mammography and the wide acceptance of mammography screening. In most of the countries, screening includes women aged over 50 years. American College of Radiology recommends to carry out mammography at the age of minimum 40 years. Women under 40 are not subjected to screening mammographic examinations, due to the relatively low incidence of breast cancer in that age group – approx. 12% of breast cancer cases. The risk of developing breast cancer before the age of 40 years is less than 1%. Thus, it is believed that economic costs of population screening are too high with regard to the number of the diagnosed cases [1,2].

In young women, mammography is not a routine procedure, even with clinical symptoms. Ultrasonography is considered to be a basic imaging procedure in breast examination in women aged up to 35 years. It allows for the diagnosis of a simple cyst and for avoidance of unnecessary biopsies in case of palpable lesions. However, it is not fully reliable in differentiating benign mass lesions from the malignant ones [3]. Moreover, ultrasonography
does not detect microcalcifications – a symptom present in approx. 40% of all infiltrating ductal carcinomas. As much as 75–83% of the intraductal carcinomas are detected on the basis of microcalcifications found in mammograms [4].

The aim of the work was to analyze mammograms of breast cancer in women aged up to 45 years and to evaluate the usefulness and the role played by mammography in breast cancer diagnostics in women in the age of up to 45 years – based on own experiences.

Material and Methods

The study material included 140 women in the age range of 28–45 years, treated for breast cancer at the Center of Oncology in Cracow in the years 2000–2002. All the patients underwent mammography and surgical procedure, followed by histopathological examination of the lesion.

In the study group, there were 7 patients with bilateral breast cancer. Three of them underwent mammography of one breast cancer only. Thus, the mammographic analysis included 144 examinations.

Most of the patients presented to the doctor, being alarmed with the experienced symptoms. Only a few patients presented because of their results of prophylactic imaging examinations that revealed breast lesions. The TNM stage of the cancers found in the study material was advanced in most of the cases. Table 1 presents clinical TNM classification of the analysed cases.

Table 1. TNM classification of analysed cases.

|       | Tis | T1  | T2  | T3  | T4  | M   |
|-------|-----|-----|-----|-----|-----|-----|
| TNM  | N0  | a   | b   | c   | a   | b   |
|       | N0  | N1  | N0  | N1  | N2  | N0  |
| Number of tumors % | 1.4 | 0.7 | 9.0 | 15.3 | 1.4 | 32.6 |
| Number of cases | 2 | 1 | 13 | 22 | 47 | 24 |

Table 2. Implemented treatment in the investigated group.

| Treatment | Tumorectomy | BCT | Mastectomy simplex | Patey's operation | Chth + op. m. | Operation m. | Halsted | Adjuvant treatment |
|-----------|-------------|-----|--------------------|-------------------|---------------|--------------|---------|-------------------|
| Number of cases | 1 | 28 | 1 | 93 | 15 | 6 | 116 | 41 | 40 |

Table 3. Mammography images of the analysed cases.

| Mammography image | Number of cases | %  |
|-------------------|----------------|----|
| Spiculated mass    | 32             | 22.2 |
| Oval mass          | 27             | 18.8 |
| Mass + microcalcifications | 30   | 20.8 |
| Microcalcifications| 25             | 17.4 |
| Architectural distortion | 5   | 3.5 |
| Breast tissue asymmetry | 18  | 12.5 |
| No lesions         | 7              | 4.9 |

Lesions found in mammograms were grouped as follows:
• spiculated mass – with irregular margin, not containing any microcalcifications;
• non-microcalcified oval/round mass;
• microcalcified mass (regardless of shape);
• microcalcifications: linear, branching; polymorphic, coarse-granulated; fine-granulated;
• architectural distortion;
• breast tissue asymmetry.

Results

Table 3 contains lesions detected in mammography and their incidence rate.

The most frequent symptom was the spiculated mass (Figure 1) – with irregular, stellate margins. This lesion accounted for 22.2% of all symptoms. The second most frequent symptom was the microcalcified mass, regardless of its shape (Figure 2), and present in 20.8% of the cases. Round or oval masses, with regular outline (Figure 3) was seen in 18.8% of the cases. Ductal, irregular, branching microcalcifications – forming continuous (Figure 4), as well as fine-granulated and coarse-granulated, clusters of microcalcifications (Figures 5,6) accounted for 17.4% of all mammographic lesions. In 12.5% of the cases, the lesions included breast tissue asymmetry (Figure 7). Architectural distortion of breast tissue stroma (Figure 8) was classified as a separate group only when being the only symptom found in mammography – it was present in 3.5% of the cases. In 7 patients (4.9%), mammography did not reveal
any suspicious lesions. The sensitivity of the mammographic examination reached 95% in the studied material.

The predominant radiological feature was the spiculated or the oval mass, without microcalcifications (41% in total). Further 20.8% of the lesions revealed microcalcifications.
In total, 38.2% of breast cancer cases showed microcalcifications – within the mass lesion or as a separate symptom.

Microcalcifications were the only mammographic feature in all cases of ‘in situ’ carcinoma, as well as in 36.8% of infiltrating carcinomas with the intraductal component.

Ductal cancers accounted for 114 cases (i.e. 79% of the material), 48 out of which revealed microcalcifications. Other histological types included 30 cases, with microcalcifications in 7 cases. The analysis showed a statistically significant correlation between the presence of microcalcifications and ductal cancers – P-value from the chi-square test for independence amounted to 0.053.

Discussion

Many studies have been trying to explain the interrelation between the young age of patients at the moment of diagnosis and a worse prognosis of their breast cancer. Authors of the studies underscore that factors connected with the worse prognosis are often seen in younger individuals. These factors include: larger tumor, higher histological grading, involvement of the vessels or lymph nodes, no hormonal receptors, tumors with a high S-phase fraction[5–12]. Some studies suggest that age is an independent prognostic factor of local and distal recurrences [8]. According to a common knowledge, approx. 15–30% of breast cancer cases among women aged under 35, are connected with BRCA1 or BRCA2 gene mutation. These lesions are characterized by: more frequent incidence of high histological grading, low expression of estrogen receptors and high rate of proliferation [5].
The aggressive course of the disease provokes continuous discussions on the usefulness of diagnostic modalities in young women. Many countries that introduced screening mammography campaigns, reserved them initially for women over 50 years old. Swedish studies revealed lower mortality due to screening in the age group of 40–49 years. Nowadays, the American College of Radiology recommends covering with screening women from the age of 40. However, there are no uniform recommendations on the diagnostic procedures for younger patients. Ultrasonography, treated as a basic diagnostic method at that age, enables us to terminate the diagnostic process after finding a simple cyst (in patients with a palpable tumor) but it is not sufficient to evaluate the extent of suspicious lesions.

I analyzed mammographic findings of breast cancer in women aged up to 45 years, focusing on the incidence of microcalcifications – symptoms of cancer which are detectable by mammography only. The age limit was set at 45 years – after having assumed that all women at that age are prior to menopause. This limit was also applied by N. Houssami in his studies, due to the hormonal status of women [13].

Mammographic findings in breast cancer in young women are the same as in the group of older individuals. The most commonly revealed lesion is the mass. Masses with irregular spikulated margins are typical for cancers with predominant fibrosis and desmoplastic reaction of the connective tissue. Such tumors always suggest the presence of malignancy. In my material, spiculated mass was found in 22.2% of the cases. E. Show de Paredes et al. revealed it in 27% of cases from the group of 89 cancers in women aged up to 35 years [14].

Round or oval masses, with smooth or polycyclic (lobulated) outline, sometimes resembling a conglomerate of a few clustered tumors, may be hard to diagnose, especially in a dense, glandular structure, when the outline becomes invisible. Such tumors, especially the small ones, may be mistaken for benign lesions.

In the cases analysed by me, this kind of lesions could be seen in 18.8%. Similar results were obtained by E. Show de Paredes et al. – 19% [14]. It is worth underscoring that even in young patients, lesion of such kind should not be arbitrarily graded as benign. If the mass seen in mammography is not properly delineated, it is not surrounded by a 'halo', and it is hypoechoogenic in USG, it should be referred for biopsy.

As much as 70.1% of patients from the study group presented to the doctor because of a palpable tumor. It is not always possible to evaluate the type of lesion in a physical examination. Imaging studies in young women with palpable tumors aim at visualizing and assessing the type of tumor, as well as referring suspicious lesions for immediate biopsy [14].

In the studied material, microcalcifications were the only symptom of cancer in 17.4% of the evaluated cases. In further 20.8% of the cases, they could be seen within a visible tumor. Thus, in 38.2% of the cases, microcalcifications indicated to breast malignancy. In the studies by E. Show de Paredes et al., microcalcifications within (or not within) the tumor were present in 38% of cases [14], in the material analysed by D.O. Jeffries et al. - in 31% [15], and in the paper by M. Muttarak et al. – in 28.7% of all cases [16].

C. Ferranti et al. studied interrelations between the age, mammographic findings and histopathologic characteristics of the tumor in nonpalpable breast cancers [17]. The analysis of 982 cases revealed microcalcifications as an independent symptom in 51% of the cases and microcalcifications connected with tumor or with abnormal tissue structure in the next 15% of the cases – 66% of the cases in total. Moreover, they found a connection between microcalcifications and non-invasive tumors in 93.6% of the cases – irrespective of the patients' age. In case of invasive tumors, the incidence of microcalcifications was decreasing with age: starting from 67.9% in women before 40 years of age and with 21.7% in patients over 70. They explained this interrelation with the fact that in breasts of younger women – having a dense and inhomogeneous structure – nodular shadows may be invisible, while microcalcifications are always detected. The second explanation was that microcalcifications are more often connected with non-invasive lesions and with tumors including the intraductal component – i.e. the lesions which are more common in younger women.

Breast tissue asymmetry and architectural distortion belong to indirect symptoms of breast cancer and are rarely seen independently. Breast tissue asymmetry without a
visible mass was found in 7–27% of the cases of infiltrating lobular carcinoma. Tumor tissue saturation equal to 85% is comparable to the surrounding normal breast tissue. Similar lesions are found in approx. 4% of infiltrating ductal carcinomas. Tissue densification may be accompanied by ‘architectural distortion’ – i.e. the distortion of the normal breast tissue structure with a thickening and distortion of the structure of fibrous septa.

In a dense, glandular structure, any densification may be hard to distinguish from the surrounding tissue and the only discernible symptom would be then the architectural distortion, sometimes very discreet. Such lesions are hard to detect on mammograms, and they are mostly found in 1/3, in one projection only. In women with palpable lesions, the comparison of the results of the physical examination and of mammography increases the chances of a correct diagnosis [18]. In the study material, architectural distortion was found in 3.5% of the cases, and breast tissue asymmetry in 12.5%. The studies by E. Show de Paredes and by D.O. Jeffries, compared by me, revealed 5% and 8% of cases of breast tissue asymmetry, respectively [14,15].

Dense, glandular breast tissue may be the reason for mammography being unable to detect any lesions, despite the ongoing neoplastic processes. My material included 7 such cases, which accounted for 4.9% of all cases. In the study by E. Show Paredes et al., 11% of mammographies of patients aged up to 35 years showed no lesions – despite lesions found on physical examination. However, authors of that study underscore that among 34 patients (52%) with a very dense structure of their breast tissue, there were 14 cases of microcalcifications, 12 cases of masses without calcifications, and 8 cases of no discernible lesions [14]. Similar data, in the age group of up to 35 years, were obtained by D. Jeffries et al. – 86% [15] and JE. Meyer et al. – 90% [19], as well as M. Muttarak et al, but in the group aged up to 40 years – 93% [16].

Conclusions

1. Radiological image of breast cancer in women of up to 45 years does not differ from the radiological findings in case of breast cancer in older women.

2. The symptom of breast cancer in 1/3 of all patients is microcalcifications, visible only on mammography.

3. All women suspected with breast cancer require not only usg, but also mammography.

References:

1. Johnson ET: Breast cancer racial differences before age 40 – implications for screening. J Natl Med Assoc, 2002; 94(3): 149–56
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