

Evaluation of core-needle biopsy in Breast Imaging Reporting and Data System 3 breast mass

Khaled Diab^a, Mohamed F. Zaidan^a, Sameh Samir^a, Obaida A. Derballa^a, Mahmoud I. Aboelnor^b, Hany F. Habashy^a

Departments of ^aGeneral Surgery, ^bRadio Diagnosis, Faculty of Medicine, Fayoum University, Fayoum, Egypt

Correspondence to Khaled Diab, MD, Department of General Surgery, Faculty of Medicine, Fayoum University, Fayoum Governorate, 63614, Egypt. Tel: +20 110 066 1166; fax: +20842146324; e-mail: krd00@fayoum.edu.eg

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Background/aim

A crucial approach for finding breast cancer sooner is the triple examination of breast diseases. Our goal was to determine if ultrasound-guided core biopsies were required to investigate clinically ambiguous breast tumors that lacked imaging features suspicious for malignancy in Breast Imaging Reporting and Data System 3.

Patients and methods

A prospective study was performed on 50 patients fulfilling our eligibility criteria who presented with symptomatic indeterminate breast masses chosen according to our selection criteria and underwent an ultrasonography-guided core biopsy in the period from January 2021 to March 2022.

Results

A total of 50 clinically ambiguous breast masses were investigated, of which 47 (94%) were benign lesions, including 34 (68%) lesions were fibroadenomas, six (12%) lesions were fibrocystic disorder without ductal hyperplasia, one (2%) lesion was fibrocystic disease with ductal hyperplasia with no atypia, and six (12%) lesions showed periductal mastitis. Two (4%) lesions were proliferative breast lesions with focal atypia. One (2%) lesion was infiltrating duct carcinoma grade 2.

Conclusion

Ultrasound-guided core biopsy is necessary for investigating clinically indeterminate breast mass in symptomatic patients with Breast Imaging Reporting and Data System 3 finding on imaging, for early detection of malignancy and atypical hyperplastic changes.

Keywords:

core biopsy, indeterminate breast masses, malignancy, proliferative atypia

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Introduction

Breast cancer is one of the main reasons for deaths owing to cancer among women. It resulted in 2.3 million new instances of cancer in 2020, which represents 12.5% of all patients with cancer, and 685 000 cancer-related deaths, which accounts for 6.8% of all cancer-related fatalities [1].

Even though benign tumors make up the majority of visible lumps, they cannot be fully ruled out. Breast cancer is identified in approximately one-third of breast biopsies [2].

Mammography and clinical breast examination are frequently used to evaluate symptomatic breast lesions [3]. Clinical breast examination is a simple, noninvasive, and inexpensive way to discover breast cancers; however, further imaging should be utilized to increase its overall accuracy. Breast ultrasonography plus mammography may increase the incidence of breast cancer detection by 4.2 malignancies per 1000 screened women when compared with women who receive screening mammography alone. Breast lesions

undergoing mammography are categorized into six groups using the Breast Imaging Reporting and Data System (BI-RADS) technique.

The BI-RADS system can be summarized as follows: BI-RADS 0, assessment incomplete; BI-RADS 1, negative; BI-RADS 2, benign finding; BI-RADS 3, probably benign finding; BI-RADS 4, suspicious abnormality; BI-RADS 5, highly suspicious of malignancy; and BI-RADS 6, known biopsy-proven malignancy [4].

Our study was conducted to evaluate the importance of core biopsy in the detection of early atypia and malignancy in indeterminate breast lesions, with corresponding BI-RADS 3 score in mammographic findings and complementary breast ultrasonography.

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Patients and methods

Patients and study design

The study was conducted on a prospective basis on 50 patients fulfilling our eligibility criteria presented with symptomatic indeterminate breast lesions chosen according to our selection criteria and underwent an ultrasonography-guided core biopsy in the period from January 2021 to March 2022 in Fayoum University Hospital in Egypt.

Inclusion criteria

All female patients who had ambiguous breast lesions when they arrived, with BI-RADS 3 score in mammography and ultrasonography, were included.

Exclusion criteria

Female patients who presented with inflammatory breast lesions and different BI-RADS scores in mammography were excluded.

Ethical approval

The present study was conducted with the Code of Ethics of the World Medical Association, according to the principles expressed in the Declaration of Helsinki. This study has been approved by the local ethics committee of Fayoum University, Fayoum, Egypt, with approval number 80 on January 10, 2021. A written informed consent was provided by each participant before their inclusion in the study.

Methods

Breast lesions were sampled using a core-needle biopsy that was guided by ultrasonography.

In an ultrasonography examination room with perfect aseptic conditions, with the patient reclining and with the breasts exposed, a 10% antiseptic solution of povidone-iodine was used to prepare the breast. To maintain full asepsis, sterile curtains were folded. A 1 : 10 ratio of 1% lidocaine served as the local infiltrating anesthesia. Without epinephrine, lidocaine was administered to the skin and subcutaneous tissue (to avoid skin necrosis). The scalpel-made incision on the skin made it easier to implant the needles for a core needle biopsy. Disposal semiautomatic 18- and 16-G core needles were used to biopsy masses, with real-time ultrasound scanning of the breast mass (Figs 1 and 2).

The skin incision was left unsutured and covered with sterile gauze only. It closed spontaneously.

All our participants stayed in the hospital for 2 h for monitoring of vital signs and biopsy site expanding hematoma. The patient was directed during this period

Figure 1



Disposal semiautomatic 18-G core needle.

Figure 2



Needle in breast mass under ultrasonography.

about what to expect, clinic visit return dates, and how and where to get her results. The first outpatient clinic visit was within 1 week to check the biopsied breast for biopsy site infection or hematomas and discuss the pathology report and the plan for further management.

Statistical analysis

Data were gathered, coded to make data manipulation easier, and then double entered into Microsoft Access. Data analysis was done using SPSS software, version 18 running on Windows 7 (SPSS Inc., Chicago, IL, USA). Simple descriptive analysis was used to represent data, which were expressed as percentages and numbers for qualitative data and arithmetic means as a measure of central tendency and SDs as a measure of dispersion for parametric quantitative data.

Results

A total of 50 female patients were clinically examined and underwent bilateral breast ultrasound and mammography (mammography was done for patients above 35 years old). The average age of the 50 patients was 30 years, with a standard deviation of

10.8 years, and the mean age was 31.92 years. In contrast, 18 (36%) patients were beyond the age of 35 years, whereas 32 (64%) patients were under 35 years (Table 1).

All patients had breast masses categorized as BI-RADS 3 by the radiologist. One (2%) patient had first-degree family history of breast cancer. The 32 patients who were younger than 35 years had breast lesions ranged between 14 mm (the smallest) and 90 mm (the largest). The mean size in this age group was 31.8 mm. The 18 patients who were older than 35 years had breast lesions that ranged between 14 mm (the smallest) and 68 mm (the largest). The mean size in this age group was 32.2 mm (Table 2).

Every patient had a core biopsy that was guided by ultrasound. A total of 47 (94%) lesions were benign lesions, according to the histological analysis of clinical core biopsy. Proliferative breast lesions with localized atypia made up two (4%) of the lesions. Infiltrating duct carcinoma grade 2 was seen in one (2%) lesion, as shown in Table 3.

Of 47 benign lesions, 34 (68%) lesions were fibroadenomas, six (12%) lesions were fibrocystic disease without ductal hyperplasia, one (2%) lesion was fibrocystic disease with ductal hyperplasia with no atypia, and six (12%) lesions showed periductal mastitis (Table 4). The two patients with proliferative breast lesions with focal atypia were 53 and 31 years of age with breast lesion sizes of 15 and 25 mm, respectively.

Table 1 Age distribution in BIRADS3 cases

Age	N=50 [n (%)]
<35 years	32 cases (64)
35–49 years	14 cases (28)
≥50 years	4 cases (8)

Table 2 Size of the breast mass in different age groups

Mass size	n (N=50)	%	Largest	Smallest	Mean
<35 years	32 cases	64	90 mm	14 mm	31.8
>35 years	18 cases	28	68 mm	14 mm	32.2

Table 3 Histopathological types of masses after core biopsy

Lesions	N=50 [n (%)]
Benign	47 cases (94)
Hyperplastic with focal atypia	2 cases (4)
Malignant	1 case (2)

The one patient with infiltrating duct carcinoma was 28 years old with breast lesion size of 33 mm. Figure 3 shows her breast lesion shape and criteria under ultrasound. All three prementioned patients had a negative family history of breast malignancy.

Discussion

Breast cancer accounts for 32% of all newly diagnosed cancer cases in Egypt, or 157 cases per 100 000 individuals [5], more than any other kind of cancer. Breast cancer affects more women than any other type of cancer.

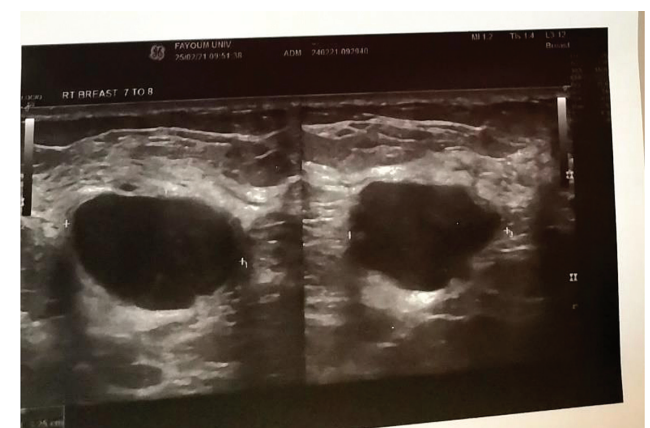
The incidence of cancer is estimated to rise by threefold in the Egypt between 2014 and 2050 [1]. Overall, 18.9% of patients with breast cancer presented with breast pain, whereas 71.3% of cases had a palpable breast lump. According to studies, patients who go to the breast clinic with a persistent lump in addition to other breast complaints frequently want a clinical breast examination [6].

Clinical breast examination is a rapid, noninvasive, and inexpensive way to detect breast cancer; however, auxiliary imaging should be employed to increase the ultimate accuracy. Combined ultrasound with

Table 4 Histopathological subtypes of benign masses

	N=50 [n (%)]
Fibroadenoma	34 cases (68)
Fibrocystic disease without ductal hyperplasia	6 cases (12)
Fibrocystic disease with ductal hyperplasia with no atypia	1 case (2)
Periductal mastitis	6 cases (12)

Figure 3



The breast mass of the patient with infiltrating duct carcinoma; showing hypoechoic solid mass that is almost well circumscribed with fine nodularity at posterior margin. No posterior acoustic shadows, no breakdown, or calcifications are present.

mammography is superior to mammography alone in detection of breast cancer with a rate of 4.2 malignancies per 1000 screened women [7]. Breast ultrasound has an accuracy rate of 89% in suspected malignant masses [18]. Accuracy increases up to 96% if mammography is added to breast ultrasound [8].

Each of the 50 patients in our trial who had breast lesions classified as BI-RADS 3 underwent an ultrasound-guided biopsy, which was carried out by the same radiologist. Mocian *et al.* [9] found that ultrasound-guided sampling increases the accuracy of the diagnosis. Okoli *et al.* [10] claimed that ultrasound-guided CNB showed sensitivity and specificity of 92.8 and 95.83%, respectively, with an overall diagnostic accuracy of 94.44%.

In our study, we found one (2%) case of malignancy and two (4%) cases of proliferative breast lesions with focal atypia through a total of 50 core biopsies obtained from indeterminate breast lesions equivalent to BI-RAD 3.

Pakdemirli *et al.* [11] investigated clinically palpable breast lesions with BI-RADS 1, BI-RADS 2, and BI-RADS 3 imaging in 72 individuals (who had had clinical core biopsy) using a retrospective observational review of their practice. They discovered two cancers. The first instance was determined to be invasive lobular carcinoma, whereas the second case was determined to be breast-metastatic colorectal cancer. 'Any ambiguous breast lesions with BI-RADs 3 should be clinically biopsied, preferably with a core biopsy,' they continued.

Park suggested short-term follow-up for BI-RAD 3 breast lesions. They biopsied 312 masses, of which 310 were benign lesions and two were cancers [12]. A research by Sickles also included 3184 lesions that were subjected to short-term follow-up mammography and were similar to BI-RADS category 3. A total of 17 (0.5%) lesions had cancer. These findings suggest that the majority of BI-RADS category 3 lesions are benign and that short-term follow-up mammography allows for the early detection of the rare category 3 lesions that are malignant [13].

If Sickles and Parker [14] were in favor of core biopsy for ambiguous, likely benign breast lesions, it would only be given to patients who, despite receiving the right information and counseling, nevertheless suffer excessive concern or who are unable to adhere to mammographic follow-up. In our study, the three

prementioned patients, whose biopsies were not benign, varied in age (from 28 to 53 years old), and we could not correlate the age of patients and the susceptibility of atypical proliferative lesions or malignancy in their biopsies from indeterminate breast lesions.

According to a study by Lee *et al.* [15], the cancer yield for women over the age of 60 years exceeded the 2% barrier and rose to 4.6% for those between the ages of 80 and 89 years.

However, Giess *et al.* [16] noted that all three of the patients with cancer in her series were over 40 years old, whereas the analysis by Harvey *et al.* [17] only included one cancer patient who was 59 years old and had a BI-RADS 3 finding.

Despite their modest size, these figures point to the possibility that our findings may not apply to older age groups, especially considering the study's predominance of young women (age mean=31.91). Future research should compare the malignancy rates in higher concentrations of BI-RADS 3 palpable lesions in women under the age of 40 years to those in women beyond the age of 40 years.

All three of the individuals in our research had no history of breast cancer in their families. However, this investigation was unable to conclusively link family history to incidence of cancer or atypical proliferative lesion, as the study was not designed to bypass recall bias, which is generated from absent medical records of patients' relatives and dependently created from patients' questionnaire answers (completely subjective). Limitations of our study included a small sample size and symptomatic patient presented to our clinic without screening patients.

Conclusion

For the investigation of clinically ambiguous breast lesions in symptomizing patients with BI-RADS 3 imaging changes, for the early diagnosis of malignancy, and for atypical hyperplastic alterations, ultrasound-guided core biopsy is required. The majority of studies in literature were based mainly on radiologic change upon follow-up of initial BI-RADS 3, but few studies discussed the incidence of atypia or malignancy with early core biopsy. We, in this study, tried to screen Egyptian females burdened with their fear of malignancy and our fear of continuous losing their follow-up based on imaging only.

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Nil.

Conflicts of interest

We declare that there is no conflicts of interest for this study.

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