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Evaluation of the Reliability of Preoperative Ultrasonography and Ultrasonography-guided Fine Needle Aspiration Biopsy in Axillary Staging in Patients With Breast Cancer

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ABSTRACT

Objective: Our study aimed to evaluate the accuracy of axillary ultrasonography (AUS) and ultrasonography-guided fine-needle aspiration biopsy (US-FNAB) methods in patients diagnosed with breast cancer. In addition, to investigate the group that does not need sentinel lymph node biopsy (SLNB) and/or axillary lymph node dissection among the clinically negative axilla patients.

Methods: The patients diagnosed with breast cancer and an AUS scan with US-FNAB to the suspected lymph node between January 2013 and April 2020 were included, and the patients whose treatment started with neoadjuvant chemotherapy were excluded. Sensitivity, specificity, positive predictive value (PPD), negative predictive value (NPD), and accuracy of AUS and US-FNAB were calculated, and the factors affecting were evaluated.

Results: The mean age of the patients in the study was 51.1±10.76 years. The mean tumor size was 18.84±9.87 mm. While 14 of 95 patients (14.74%) considered benign with AUS had macrometastases in the final evaluation. In addition, 8 (40%) of 20 patients with suspicious or malignant image features had macrometastases. Twenty-five patients evaluated with US-FNAB but did not detect metastasis were included. However, 8 (32%) of these patients who were not initially considered for metastasis by FNAB had macrometastases in the final pathology. While US sensitivity was 36.36%, specificity: 87.10%, PPD: 40%, NPV: 85.26%, and accuracy: 77.39%, specificity for US-FNAB was 100%, NPV: 68.00%, and accuracy: 68%. The presence of palpable lymph nodes was observed as a factor in false positivity ($p<0.05$).

Conclusion: AUS and US-FNAB applied by experienced staff are valuable methods in excluding axillary disease. However, SLNB remains the standard method to evaluate the axilla nowadays.

Keywords: Breast cancer, axillary ultrasonography, ultrasonography-guided fine-needle aspiration biopsy

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INTRODUCTION

Breast cancer affects millions of women worldwide. Studies have reported 2.3 million new breast cancer cases in 2020 (1). Although treatment is started with surgery in early-stage tumors depending on the molecular subtype, neoadjuvant chemotherapy (NAC) is the initial treatment in locally advanced tumors or if axillary lymph node involvement is present (2). The most effective factors in determining the treatment decision are tumor size, axillary lymph node involvement and molecular subtype. Axillary lymph node involvement is still one of the most important prognostic factors in addition to its role in treatment (3).

Although axillary lymph node dissection (ALND) has been used for a very long time in the treatment of breast cancer in the traditional approach, the current approach in patients with early stage and clinically negative axillary breast cancer is sentinel lymph node biopsy (SLNB) (2,4). It has been reported that unnecessary dissection was performed in 70% of patients with palpable lymph nodes and in 90% of early-stage patients without palpable lymph nodes (5).

In addition, morbidities of ALND such as lymphedema, nerve damage and shoulder dysfunction can be avoided in patients who are found to have no nodal involvement with SLNB, which is a less invasive method to evaluate axillary nodal involvement (6).

On the one hand, although the sensitivity of imaging techniques in detecting axillary metastases is thought to be insufficient, on the other hand, the necessity of SLNB has begun to be evaluated in some studies conducted in recent years when axillary ultrasonography (AUS) is negative (7). In a study published in 2017, patients with early stage ($T_{1-2}N_0$) breast cancer were randomized to SLNB and non-SLNB in the group not considered to involve AUS and lymph node involvement, and it was observed that there was no clinically significant axillary recurrence with a mean follow-up of 17 months (8). Similarly, in the SOUND study, which was designed prospectively and is still ongoing, patients with ≤ 2 cm, clinically negative axilla and planned breast-conserving surgery were randomized as SLNB or non-SLNB, and it was thought that preoperative imaging could determine axillary nodal burden (9).

In studies, sensitivity, and specificity in determining preoperative axillary nodal load were reported to be between 56.6-92% and 81-100% for AUS, and between 39.5-71% and 95.7-100% for ultrasonography-guided fine-needle aspiration biopsy (US-FNAB) (10-12).

In addition, false negative (FN) rates for AUS and US-FNAB show similar results with SLNB (13).

Existing studies have led us to question the reliability of AUS and US-FNAB again to avoid unnecessary interventions. For this purpose, we aimed to calculate the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of these methods by comparing the patients who were evaluated with AUS and US-FNAB after being diagnosed with early breast cancer in our hospital and then underwent SLNB and/

or ALND at surgery. We also aimed to investigate whether there is a group in which SLNB can be neglected in the patient group with clinically negative axilla.

METHODS

Patient Group

In this retrospective study, ethics committee approval, (approval number: 267 and date: 05/05/2021), was obtained from the Gaziosmanpaşa Training and Research Hospital Ethics Committee, to which our hospital is affiliated. Patient informed consent was not required due to the retrospective use of anonymous administrative data. Between January 2013 and April 2020, 115 patients who were diagnosed with breast cancer and evaluated with AUS before surgical treatment and US-FNAB to the suspected lymph node in the axilla were included in the study. Patients who did not accept surgical treatment and were diagnosed with locally advanced breast cancer and started treatment with NAC were excluded from the study.

Patients' age, physical examination (evaluation by specialist breast surgeons), medical history, breast US findings, breast and axilla biopsy, and final pathology results were retrospectively gathered from medical records.

Study Design

The patients were evaluated based on preoperative US findings, US-FNAB findings and final pathology results. Evaluation of axillary lymph nodes in terms of metastasis with both US and US-FNAB was compared with the final pathology, sensitivity, specificity, PPV, NPV, FR, false positive (FP) and accuracy were calculated separately, and the two methods were compared in terms of these values. Since patients who were thought to be malignant by US-FNAB were referred for NAC, only patients with a cytopathological diagnosis of benign were included in the study.

Imaging Method and Image Analysis

Ultrasound examinations were performed by two experienced radiologists (N.U. and Y.K.) with 10 years of experience in breast imaging using an ultrasound device with a 5-14 MHz linear array probe and Toshiba Aplio 500 software version 6.0 (Toshiba Corporation, Tokyo, Japan).

In the ultrasonographic evaluation, diffuse, thin hypoechoic cortex (<3 mm) and hyperechoic lymph nodes with central fatty hilum are evaluated as benign, while those with asymmetric focal or diffuse cortical thickness (>3 mm), lobulated contours, hypoechoic/anechoic cortex according to the subcutaneous tissue or lymph nodes that were obliterated, also had distorted fatty hilum and could not be seen clearly were evaluated as suspicious-malignant (14).

Biopsy Method

US-FNAB was performed by the same radiologists (N.U. and Y.K.) on lymph nodes suspicious for metastasis or malignant in the evaluation performed with AUS. US-guided FNAB was

performed several times with a 21 G syringe from the thickest or focally thickened part of the cortex. Cytopathological results were grouped as negative for metastasis, atypical cytology, positive and insufficient. While atypical cytology was included in the positive group, the sample evaluated as insufficient was included in the negative group in the statistical evaluation.

Sentinel Lymph Node Biopsy

The first lymph node from which the tumor drained was called the sentinel node. Preoperative SLNB evaluation was performed for patients without metastasis in AUS findings and patients whose US-FNAB results were evaluated as benign-unsatisfactory, and the decision for axillary dissection was determined according to the SLNB result. In the SLNB technique, imaging with the blue dye method (isosulfan blue dye) was preferred for all patients. In the method, after anesthesia induction, 5 cc 1% isosulfan blue is injected into the subareolar tissue, then the breast is massaged for five minutes, followed by an axillary incision in patients who underwent breast-conserving surgery, and through an upper flap incision in patients who underwent mastectomy, and the axilla was entered to reveal blue stained lymph nodes and, if any, suspiciously palpated lymph nodes were removed and evaluated histopathologically. In the peroperative evaluation, ALND was performed in order not to miss axillary metastasis in patients who were thought to have axillary metastases as a result of SLNB and in patients who could not find blue stained lymph nodes in the axilla after isosulfan blue injection.

Histopathological Evaluation

Histopathological evaluation was performed on the final pathology result. In the examination, all sentinel lymph nodes were fixed in formalin, divided into two and embedded in paraffin. A minimum of 6 levels were cut at 50-150 μ m intervals. Pathological evaluation was done by hematoxylin-eosin and immunohistochemical staining. The histopathological evaluation of breast resection materials was evaluated in terms of largest tumor diameter, histopathological diagnosis, histological grade, estrogen, progesterone, Ki-67 and human epidermal growth factor receptor-2 (HER-2) receptor status. The Nottingham modification of the Bloom-Richardson system was used for histological grade determination. Tumor stage was evaluated according to the 2017 AJCC cancer staging guidelines 8th Edition and 2019 CAP guidelines (15,16).

In the evaluation for the axilla, the presence of macrometastases was considered positive, while the presence of benign histopathological lymph nodes, cases without macrometastases, micrometastases and isolated tumor cells were evaluated as negative. However, the presence of micrometastases was also specified in the case that was considered negative. The size and diameter of the metastatic lymph node were included in the evaluation.

Statistical Analysis

Normality control of continuous variables was evaluated by Shapiro-Wilk. One-Way ANOVA and Kruskal-Wallis tests were

applied depending on the normality of the data for age and tumor size, according to the true positive (TP), true negative (TN), YP and FN decisions obtained according to the final pathology result of the US. According to the TN and FN decisions of US-FNAB based on the final pathology result, Student's t-test and Mann-Whitney U test were used depending on the normality of the data for age and tumor size. In the analysis of categorical variables, chi-square test (Pearson chi-square) and Fisher's exact test were used. Sensitivity, specificity, PPD, NPD and accuracy values were calculated in the examination of diagnostic values of US and US-FNAB according to the final pathology result.

RESULTS

The study was conducted on 115 breast cancer patients who met the inclusion criteria. All patients were evaluated with AUS and US-FNAB was performed on 25 patients. The mean age of the patients was calculated as 51.1 ± 10.76 years. The mean tumor size was 18.84 ± 9.87 mm. Fifteen (13.04%) of the patients included in the study had palpable lymph nodes in the axilla. Demographic data and tumor characteristics of the patients are shown in Table 1.

Evaluation Results with AUS and US-FNAB

In the evaluation performed with AUS, axillary lymph nodes were evaluated as benign (negative) in 95 (82.60%) of the patients, and suspicious and malignant lymph nodes were observed in 20 patients (17.40%). Final pathology was also negative in 81 (85.26%) of 95 patients whose axillary lymph nodes were evaluated as benign by US. There were benign histopathological findings in 72 (75.79%) and micrometastases in 9 (9.47%) patients. Axillary metastases were detected in 14 (14.74%) of 95 patients whose axillary lymph nodes were evaluated as benign by US. Eight (40%) of 20 patients with suspicious or malignant image features on US had macrometastases in the final pathology, and 12 of them were negative in the final pathology [2 (10%) micrometastases and 10 (50%) benign histopathological findings]. Sampling was performed with US-FNAB in 25 (21.73%) patients who were evaluated as suspicious by US and additionally magnetic resonance imaging. Patients who were evaluated as malignant by US-FNAB were referred to NAC, and when the final pathology evaluation of 25 patients who were biopsied and thought to be benign by preoperative histopathological evaluation, macrometastasis was detected in 8 (32%) and 17 (68%) patients were evaluated as negative in the final pathology [benign histopathological findings in 14 (56%) patients and micrometastasis in 3 (12%) patients]. No complications were observed in any of the patients after US-FNAB. The sensitivity, specificity, PPD, NPD and accuracy rates for US and US-FNAB are shown in Table 2.

If we evaluate the results in terms of the effect on the treatment, metastasis was detected in 14.74% of the patients who were not suspected of metastasis by US, and the final pathology was evaluated as malignant in 32% of the patients diagnosed as benign by US-FNAB.

Table 1. Demographic data and tumor characteristics of the patients

Patient characteristics	Mean $\pm$ SD (min-max)
Age (years)	51.1 $\pm$ 10.76 (25-80)
Tumor size (mm)	18.84 $\pm$ 9.87 (5-60)
ALN size (mm)	13.17 $\pm$ 7.18 (0-34)
Features of the tumor	n (%)
Tumor localization	
Upper outer quadrant breast	59 (51.3)
Lower outer quadrant breast	16 (13.9)
Upper inner quadrant	19 (16.5)
Lower inner quadrant	14 (12.2)
Central	0 (0)
Multicentric	7 (6.1)
Type of tumor	
Invasive ductal cancer	79 (68.7)
Invasive lobular cancer	12 (10.4)
Others	24 (20.9)
Molecular subtype	
Luminal A	55 (47.8)
Luminal B	46 (40)
HER-2 enriched	6 (5.2)
Triple negative	8 (7)
T-stage	
T _{is}	0 (0)
T ₁	68 (59.6)
T ₂	43 (37.7)
T ₃	3 (2.6)
T ₄	0 (0)
Tumor grade	
G1	14 (12.6)
G2	74 (66.7)
G3	23 (20.7)
Axillary US	
Benign	95 (82.6)
Malign	20 (17.4)
US-FNAB	
Malign	25 (21.7)
Final pathology	
Benign	82 (71.3)
Micrometastases	11 (9.6)
Macrometastases	22 (19.1)

SD: standard deviation, US: ultrasonography, US-FNAB: ultrasonography-guided fine needle aspiration biopsy, HER-2: human epidermal growth factor receptor 2, min: minimum, max: maximum

When we look at the factors affecting accuracy between final pathology and US and between final pathology and US-FNAB; In the presence of palpable lymph node, both TP and FP lymph node were found at a higher rate than in non-palpable patients, and TN was found at a lower rate ($p < 0.05$). Tumor sizes were observed to be higher in TP patients compared to those with FP and TN ($p < 0.05$). Tumor size and the presence of a palpable lymph node in the axilla were the factors affecting FN. The results are shown in Table 3, 4.

DISCUSSION

After ALND performance, the introduction of SLNB by Giuliano et al. (17) in 1991 was interpreted as a major improvement, and over time, SLNB N₀ became the standard for regional lymphatic evaluation in patients with breast cancer (18).

When we look at the studies, it has been reported that postoperative side effects such as axillary hematoma, lymphedema, limitation of shoulder motion and paresthesia are less common in the SLNB group compared to the ALND group (19,20). Still, SLNB is not an entirely innocent method. In this method, which is reported to have a FN rate of less than 10% in general, the patient requires a second surgery (21,22). In addition, hospitalization is required, and infection, lymphedema, seroma, nerve damage and shoulder movement limitation can be seen in the postoperative period, albeit less frequently than ALND (23).

In a study evaluating the accuracy of SLNB after axillary dissection, it was found that the accuracy was 96.9%, the sensitivity 91.2%, the specificity 100%, and the FN 8.8% (19).

The introduction of less invasive methods suggests the consideration of US-FNAB as an alternative for SLNB. AUS and US-FNAB are inexpensive and low morbidity methods that do not require hospitalization, but their accuracy is highly dependent on the experience of the person performing the procedure.

When we examined the current literature to evaluate the reliability of AUS and US-FNAB in breast cancer; Chowdhury et al. (13) found the FN rate of AUS as 10.7% in a study conducted on patients aged >50 years, with a primary breast lesion <1.5 cm, estrogen receptor positive and HER-2 negative, and stated that this was like SLNB. In the study, the sensitivity of AUS in excluding axillary disease was found to be 89.3% (13).

However, contrary to this study, in another study evaluating the accuracy of AUS and US-FNAB in patients who were operated on with the diagnosis of breast cancer, FN for US and US-FNAB was found to be 42.4%, and in the final pathology, this rate was found to be 57.6% in patients with only one lymph node metastasis in the axilla. According to the results of the same study, FN was found to be higher in estrogen receptor positive patients (24).

In the study where Park et al. (10) evaluated 382 patients, the sensitivity of AUS in predicting axillary metastasis was 56.6%, the specificity 81.0%, PPV 60.3%, NPV 78.5% and accuracy 72.8%. For US-FNAB, the sensitivity, specificity, PPD, NPV and accuracy rates were found to be 39.5%, 95.7%, 82.3%, 75.6% and 76.7%,

Table 2. Sensitivity, specificity, PPV, NPV and accuracy rates for US and US-FNAB

Statistics	Diagnostic power for US	Diagnostic power for US-FNAB
Sensitivity	36.36 (17.20-59.34)	0.00 (0.00-36.94)
Specificity	87.10 (78.5-93.15)	100.00 (80.49-100.00)
Positive predictive value	40.00 (23.69-58.88)	-
Negative predictive value	85.26 (80.69-88.90)	68.00 (68.00-68.00)
Accuracy	77.39 (68.65-84.67)	68.00 (46.50-85.05)

US: ultrasonography, US-FNAB: ultrasonography-guided fine needle aspiration biopsy, PPD: positive predictive value, NPD: negative predictive value

Table 3. Factors affecting the accuracy of the final pathology in imaging with US

	US & final pathology								Total		
	TP		FP		FN		TN				
	n	%	n	%	n	%	n	%	n	%	p1
ER											
No	0	0.0	2	13.3	0	0.0	13	86.7	15	13.0	0.253
Yes	8	8.0	10	10.0	14	14.0	68	68.0	100	87.0	
PR											
No	2	7.7	5	19.2	0	0.0	19	73.1	26	22.6	0.084
Yes	6	6.7	7	7.9	14	15.7	62	69.7	89	77.4	
HER-2											
No	7	6.7	11	10.6	12	11.5	74	71.2	104	90.4	0.91
Yes	1	9.1	1	9.1	2	18.2	7	63.6	11	9.6	
Molecular subtype											
Luminal A	4	7.3	5	9.1	7	12.7	39	70.9	55	47.8	0.893
Luminal B	4	8.7	5	10.9	7	15.2	30	65.2	46	40.0	
HER-2 enriched	0	0.0	1	16.7	0	0.0	5	83.3	6	5.2	
Triple negative	0	0.0	1	12.5	0	0.0	7	87.5	8	7.0	
PLN											
No	1	1.1	5	5.3	14	14.7	75	78.9	95	82.6	<0.001
Yes	7	35.0	7	35.0	0	0.0	6	30.0	20	17.4	
Tumor grade											
Low	0	0.0	1	7.1	3	21.4	10	71.4	14	12.6	0.783
Intermediate	7	9.5	7	9.5	8	10.8	52	70.3	74	66.7	
High	1	4.3	3	13.0	3	13.0	16	69.6	23	20.7	
Tumor localization											
Upper outer	4	6.8	7	11.9	8	13.6	40	67.8	59	51.3	0.777
Lower outer	0	0.0	0	0.0	3	18.8	13	81.3	16	13.9	
Upper inner	1	5.3	3	15.8	1	5.3	14	73.7	19	16.5	
Lower inner	2	14.3	1	7.1	2	14.3	9	64.3	14	12.2	
Multicentric	1	14.3	1	14.3	0	0.0	5	71.4	7	6.1	
	Mean ± SD		Mean ± SD		Mean ± SD		Mean ± SD		Mean ± SD		p2
Age (years)	51.63±8.38		48.67±9.44		50.43±9.73		51.53±11.4		51.1±10.76		0.849
Tumor size (mm)	32.13±10.6		20±17.94		22.36±7.15		18.84±9.87		20.31±11.14		0.011*

The evaluation was performed on line percentages. p1: chi-square test, p2: One-Way ANOVA (*Kruskal-Wallis test), US: ultrasonography, ER: estrogen receptor, PR: progesterone receptor, HER-2: human epidermal growth factor receptor-2, PLN: palpable lymph nodes, TP: true positive, TN: true negative, FP: false positive, FN: false negative, SD: standard deviation

Table 4. Factors affecting the accuracy of the final pathology in the evaluation with US-IIAB

	US-FNAB & final pathology				Total		
	FN		TN				
	n	%	n	%	n	%	p1
ER							
No	0	0.0	3	100.0	3	12.0	0.527*
Yes	8	36.4	14	63.6	22	88.0	
PR							
No	2	25.0	6	75.0	8	32.0	1.00*
Yes	6	35.3	11	64.7	17	68.0	
HER-2							
No	7	30.4	16	69.6	23	92.0	1.00*
Yes	1	50.0	1	50.0	2	8.0	
Moleküler subtip							
Luminal A	4	33.3	8	66.7	12	48.0	0.633
Luminal B	4	40.0	6	60.0	10	40.0	
HER-2 enriched	0	0.0	1	100.0	1	4.0	
Triple negative	0	0.0	2	100.0	2	8.0	
PLN							
No	1	14.3	6	85.7	7	28.0	0.362*
Yes	7	38.9	11	61.1	18	72.0	
Tumor grade							
Low	0	0.0	1	100.0	1	4.2	0.563*
Intermediate	7	38.9	11	61.1	18	75.0	
High	1	20.0	4	80.0	5	20.8	
Tumor localization							
Upper outer	4	28.6	10	71.4	14	56.0	0.858
Upper inner	1	25.0	3	75.0	4	16.0	
Lower inner	2	50.0	2	50.0	4	16.0	
Multicentric	1	33.3	2	66.7	3	12.0	
	Mean ± SD		Mean ± SD		Mean ± SD		p2
Age (years)	51.63±8.38		50.18±11.25		51.1±10.76		0.75
Tumor size (mm)	32.13±10.6		19.82±14.93		20.31±11.14		0.002*

The evaluation was performed on line percentages. p1: chi-square test (Fisher's exact test), p2: Student's t-test (*Mann-Whitney U test), US-FNAB: ultrasound-guided fine needle aspiration biopsy, SD: standard deviation, ER: estrogen receptor, PR: progesterone receptor, HER-2: human epidermal growth factor receptor-2, PLN: palpable lymph nodes, TN: true negative, FN: false negative

respectively. Contrary to expectations, the reason for the low sensitivity of US-FNAB was stated as the detection of metastasis in the final pathology in the group evaluated as inadequate cytology. When the patients with metastasis detected by US-FNAB were evaluated in the study, it was emphasized that unnecessary SLNB for preoperative staging could be avoided in 16.2% of the patients. By comparing patients with palpable and non-palpable tumors in the study, it was shown that although the sensitivity was higher in the group with palpable tumors, there was no statistical difference in sensitivity and specificity between the two groups (10).

In the study of Baruah et al. (25), it was reported that preoperative diagnosis was made with US-FNAB in 28.5% of patients with metastasis in the axillary lymph node in the final pathology and in 7.8% of all patients, and SLNB was avoided in these patients. In the study, the sensitivity, specificity, PPD, NPD, and accuracy rates of US-FNAB were found to be 28.5%, 100%, 100%, 78.8%, and 80.5%, respectively (25).

In a similar study, Van Rijk et al. (26) evaluated the results of preoperative AUS and US-FNAB performed on suspicious lymph nodes and found the sensitivity of AUS and US-FNAB to be 35% and 62%, and the specificity as 82% and 99%. As a result of the

study, they argued that metastasis can be diagnosed in 8% of patients without preoperative SLNB and patients can be referred to NAC (26). However, this practice is not preferred in our hospital in accordance with current guidelines, and SLNB is not performed before NAC, but NAC is planned according to the results of US-FNAB (27).

In their meta-analysis, Houssami et al. (28) calculated the sensitivity of US-FNAB to predict axillary disease as 79.6%, specificity as 98.3% and PPV as 97.1% and stated that the accuracy of US-FNAB in the evaluation of axillary lymph node was very good.

In the results of the prospective study conducted by Singh et al. (5) to evaluate the accuracy of AUS and US-FNAB; the sensitivity, specificity, PPV, NPV and accuracy rates for AUS and US-FNAB were calculated as 61.5-83%, 75.6-100%, 69.5-100%, 68.5-72.6% and 69-88.1%, respectively. In their study, they showed that if metastasis was proven in 24% of the patients with US-FNAB, direct ALND could be performed without SLNB (5).

In the study of Gurleyik et al. (29), in which they evaluated patients with clinically negative axilla, direct ALND was applied to patients with axillary lymph node metastasis detected by US-FNAB, and FN was found to be 23.7% for US and 31.8% for US-FNAB.

Most studies have aimed to evaluate how much of the patients with lymph node metastasis detected by US-FNAB have unnecessary SLNB for preoperative staging and how much can be avoided. However, in the current situation, since most of the patients diagnosed with axillary metastases by US-FNAB start treatment with NAC, what we should focus on is the question of how much of the patients without metastasis detected by US-FNAB, preoperative surgical intervention to the axilla (SLNB/ALND) can be avoided, in other words, sensitivity of FNAB to exclude axillary disease.

As in our study, Fayyaz and Niazi (30) found the sensitivity, specificity, PPV, NPV, and accuracy rates for US-FNAB as 77.22%, 92.59%, 91.04%, 80.65%, and 85.0%, respectively, in their study without including patients who received NAC. In our study, sensitivity, specificity, PPV, NPV, and accuracy were found to be 36.36%, 87.10%, 40.00%, 85.26%, and 77.39% for AUS, respectively. For US-FNAB, the specificity was calculated as 100%, NPV and accuracy as 68.00%. Metastasis was not detected in the final pathology in 85.26% of the patients who were thought to have no metastasis by preoperative US and 68% of the patients who were not found to have metastasis by US-FNAB. However, metastasis was found in the final pathology in 14.74% of patients who were not suspected of metastasis by US and 32% of patients without metastasis by US-FNAB. The presence of palpable lymph nodes was effective on FP.

Study Limitations

The limitation of our study is that it was single-centered and included a limited number of participants. In addition, since the treatment was started with NAC in patients with axillary metastases considered in the preoperative evaluation, the evaluation was

carried out mostly on patients without metastasis. Since the involvement of axillary lymph nodes may change depending on the chemotherapy response after treatment in patients receiving NAC, they were not included in the evaluation. In addition, physical examination of the breast and axilla is a subjective method.

CONCLUSION

AUS and US-FNAB performed by experienced people are valuable methods in excluding axillary disease, preoperative evaluation of breast cancer and making a treatment plan. However, negative AUS and US-FNAB did not reach the accuracy to avoid SLNB. However, AUS and US-FNAB evaluation may eliminate surgical intervention in the axilla, especially in certain patient groups for whom breast-conserving surgery will be performed and radiotherapy will be planned in near future.

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Ethics Committee Approval: In this retrospective study, ethics committee approval, was obtained from the Gaziosmanpaşa Training and Research Hospital Ethics Committee, to which our hospital is affiliated (approval number: 267 and date: 05/05/2021).

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