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ARAŞTIRMA / RESEARCH

The impact of the COVID-19 pandemic on the breast cancer diagnosis process

COVID-19 pandemisinin meme kanser teşhis sürecine etkisi

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Abstract

Purpose: The primary aim of thşis study was to evaluate difference in the number of patients with tru-cut biopsies to diagnose breast lesions between non-pandemic and pandemic periods.
Materials and Methods: In this study, the nonpandemic period and the pandemic period were compared, the periods for the pandemic times, between March 1, 2018, and 29 February 2020, and for the nonpandemic period, 1 March 2020 to 12 March 2022 to 12 March 2022. In each period, we have included all the tru-cut biopsies for suspected breast cancer. During the pandemic and non-pandemic period, the number of tru-cut biopsies BI-RADS and histopathological findings of the patients who experienced tru-cut biopsies were compared.
Results: The number of tru-cut biopsies performed during the nonpandemic and pandemic period was similar (1596, 1599). In the pandemic period, tru-cut biopsy histopathologic reports revealed that benign and high-risk cases decreased statistically, while invasive carcinoma cases increased by 1.9 (95% CI 1.6-2.2) times. During the pandemic period, US-guided BI-RADS 3 and BI-RADS 4a cases decreased statistically significantly, BBI-RADS 4b cases increased 1.4 (95% CI 1.1-2.2) times, BI-RADS 4c cases 1.7 (95% CI 1.2-2.2), BI-RADS 5 cases increased 2.1 (95% CI 1.4-3.1) times
Conclusion: There was no significant change in tru-cut biopsy numbers compared to the period of the pandemic and the non-pandemic period. However, the stage of the cancers captured during the period of the pandemic was higher.
Keywords:. Breast cancer, covid-19, histopathology, BI-RADS

Öz

Amaç: Bu çalışmada amaç pandemi ve pandemi öncesi döneminde meme lezyonlarının teşhisinde tru-cut biyopsi sayılarının karşılaştırılmasıdır.
Gereç ve Yöntem: Bu çalışmada pandemi ve pandemi öncesi donem karşılaştırıldı. Pandemi öncesi dönem, 1 Mart 2018 ve 29 Şubat 2020 arası ve pandemi dönemi ise, 12 Mart 2022 ile 12 Mart 2022 arasında idi. Her dönemde çalışmaya meme kanseri şüphesi lezyonları nedeniyle tru-cut biyopsi yapılan hastalar dahil edildi. Pandemi dönemi ve pandemi öncesi dönemde tru-cut biyopsi yapılan hastaların tru-cut biyopsi sonucunda histopatolojik bulguları ve BI-RADS sonuçları karşılaştırıldı.
Bulgular: Pandemi öncesi ve pandemi döneminde yapılan tru-cut biyopsi sayısı benzer idi (1596, 1599). Pandemi döneminde tru-cut biyopsi sonucu histopatolojik raporlar, benign ve yüksek riskli vakaların istatistiksel olarak azaldığını, invaziv karsinom vakalarının ise 1,9 (%95 CI 1,6-2.2) kat arttığını ortaya koydu. Pandemi döneminde ultrasonografi kılavuzluğunda BI-RADS 3 ve BI-RADS 4a vakaları istatistiksel olarak önemli ölçüde azaldı, BI-RADS 4b vakaları 1,4 (%95 GA 1,1-2,2) kat, BI-RADS 4c vakaları 1,7 (%95 CI 1,2 -2,2), BI-RADS 5 vaka 2.1 (%95 CI 1,4-3,1) kat arttı.
Sonuç: Pandemi ve pandemi öncesi döneme göre tru-cut biyopsi sayılarında önemli bir değişiklik olmadı. Ancak pandemi döneminde tespit edilen kanserlerin evresi daha yüksekti.

Anahtar kelimeler: Breast cancer, covid-19, histopatoloji, BI-RADS

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INTRODUCTION

The SARS-COV-2 virus, which is a new variety of RNA Coronavirus, was first detected in China in the Wuhan region in China[1]. By April 5, 2022, 493.924.905 million cases and 6.171.092 million deaths due to coronavirus disease 2019 had been globally confirmed. In the Republic of Turkey, the first case of Covid-19 was recorded on March 11, 2020, and by April 5, 2022, there were 14.907.378 total cases and 98.197 total deaths[2]. To prevent the spread of the Covid-19 Virus, applications such as hygiene, plugging the mask, social distance, and lockdown measures were performed throughout the country. From 12 March 2020, the first restriction decisions have been activated and the scope of these restrictions that gradually passed to life was expanded over time. During this time, breast imaging, mammography scan, and diagnostic breast imaging significantly interrupted changes in breast cancer algorithms[4].

US-guided tru-cut biopsy (TBC) has been increased as a tool for the diagnosis of breast lesions[5-9]. A large number of works showed many several benefits of the TCB over stereotactic or surgical biopsy.

The TCB is superior to fine-needle aspiration cytology(FNAC) because it ensures a greater amount of tissue samples, the pathologists make more accurate diagnoses and oncologists manage better the treatment of the patients[10]. Breast cancer is, globally the most common malignancy in women[11]. The absence of adequate follow-up procedures besides the lack of diagnostic interventions concerning Covid-19 oncologic features has caused both delay and upward stage migration in the diagnosis of breast cancer [3]. Multidisciplinary care algorithms have not only forced patients to delay nursing during the pandemia, but cases have also made their own choices to delay care. The long-time physical and social consequences of these postponements have yet to be decided.

The primary endpoint was the difference in the number of patients with tru-cut biopsies to diagnose breast lesions between comparable periods; in non-pandemic periods between March 2018, February 2020, and during covid-19 periods between 2020 March and 2022 March [3]. The secondary endpoint was BI-RADS (Breast Imaging Reporting and Data Systems) and histopathologic records diagnosed in tru-cut biopsies during these periods. This study may contribute to an algorithm to be developed to improve breast cancer screening and diagnosis during the pandemic period.

MATERIALS AND METHODS

The present cohort was approved by the Cukurova University Clinical Ethical Board with reference number 121, 8 April 2022. All features of the study were held concerning the principles of the declaration of Helsinki (64th, 2013). This cohort was retrospective in natüre. The study was held in Adana City Hospital and Adana Private Ortadogu Hospital. Population

In this study, the nonpandemic period and the pandemic period were compared, the periods for the pandemic times, between March 1, 2018, and 29 February 2020, and for the nonpandemic period, 1 March 2020 to 12 March 2022 to 12 March 2022. Each period consisted of 24 months.

In each period, we have included all the TCBs for the suspected breast cancer. Proven malignancies determined as BI-RADS category 6 lesions(n=26) and lesions with non-diagnostic pathologic results(n=146) were excluded from this study. All TCBs were carried out by experienced two interventional radiologists and investigating the presence of breast cancer was accomplished by pathologists.

Biopsy procedure

Biopsy practice US-guided 14-gauge TCB was carried out applying the freehand technique and a high-resolution US system with 9–16 MHz linear transducers (GE Voluson 730 Pro, GE Medical Systems, USA). Each biopsy was carried out with local anesthesia and the patients were in a supine position. A 14-gauge automated TCB needle biopsy gun was applied. At least four or five samples were taken routinely from each lesion. The pathological and radiological findings of patients of Tru-Cut biopsy were obtained from the electronic medical data system.

Each variant is classified as specified: BI-RADS system on ultrasonography; pathological findings of TCB as benign, high risk (lobular neoplasia, sclerosing lesions phyllodes tumors, atypia, and atypical ductal hyperplasia), or malignant. In the pandemic and non-pandemic periods, BI-RADS and histopathological findings of the patients who experienced TCB were compared. We also have

achieved demographic characteristics, containing gender and age.

Statistical analysis

The SPSS 25.0 software package was applied in the statistical analysis of the data. Categorical variables were expressed in numbers and percentages and continuous measurements were indicated in mean and Standard deviation (median and minimum-maximum, where necessary) values. The Chi-square test or Fisher's test was applied to compare categorical measurements. The odds ratio is measured by dividing the odds of the first group by the odds in the second group. $p<.05$ was assessed as statistically important in all of the tests.

RESULTS

During the nonpandemic comparison period from March 2018 to February 2020, 1596 US-guided tru-cut biopsies were applied versus 1599 throughout the pandemic period from March 2020 to March 2022, representing approximately the same number of TCBs applied for diagnosis of breast carcinoma. The distribution of the number of Tru-cut biopsies by years and periods was shown in graphic 1.

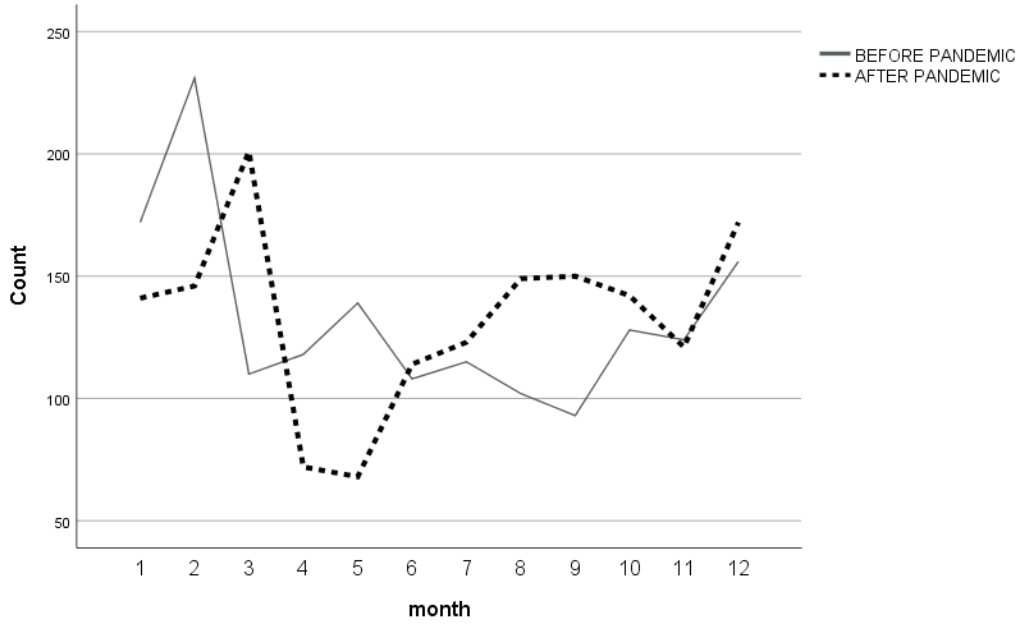

Figure 1. Number of tru-cut biopsies in non-pandemic and pandemic periods.

Table 1 explains the demographic variables for the non-pandemic and pandemic periods. The mean age of patients was 48.7±14.3 years in the nonpandemic versus 46.0±14.2 years in the pandemic period.

In the pandemic period, tru-cut biopsy histopathologic reports revealed that benign and high-risk cases decreased statistically, while invasive carcinoma cases increased by 1.9 (95% CI 1.6-2.2) times (Table 2).

During the pandemic period, US-guided BI-RADS 3 and BI-RADS 4a cases decreased statistically significantly, BBI-RADS 4b cases increased 1.4 (95% CI 1.1-2.2) times, BI-RADS 4c cases 1.7 (95% CI 1.2-2.2), BI-RADS 5 cases increased 2.1 (95% CI 1.4-3.1) times (Figure 2, Table 3).

Table 1. Patients' sociodemographic characteristics

	n	%
Age years		
Nonpandemia		48.7±14.3*
Pandemia		46.0±14.2*
Sex		
Nonpandemia		
Female	1584	%99.2
Male	12	0.8
Pandemia		
Female	1581	98.9
Male	18	1.1
Diagnosis		
Benign	2095	65.6
DCIS**	22	0.7
Invasive carcinoma	1070	33.5
High risk	8	0.3
BI-RADS categories		
BI-RADS 3***	420	13.1
BI-RADS 4a***	2130	66.7
BI-RADS 4b***	312	9.8
BI-RADS 4c***	224	7.0

*: mean ± standard deviation, **: Ductal carcinoma in situ, ***: Breast Imaging Reporting and Data Systems, ductal carcinoma in situ

Table 2. Histopathologic results in non-pandemic and pandemic periods.

	Non pandemia (n=1596)		Pandemia (n=1599)		p
	n	%	n	%	
Benign	1152	72.2	943	59.0	0.0001
Invasive carcinoma	422	26.4	648	40.5	0.0001
DCIS*	15	0.9	7	0.4	0.092
High Risk	7	0.4	1	0.1	0.032

*: Ductal carcinoma in situ

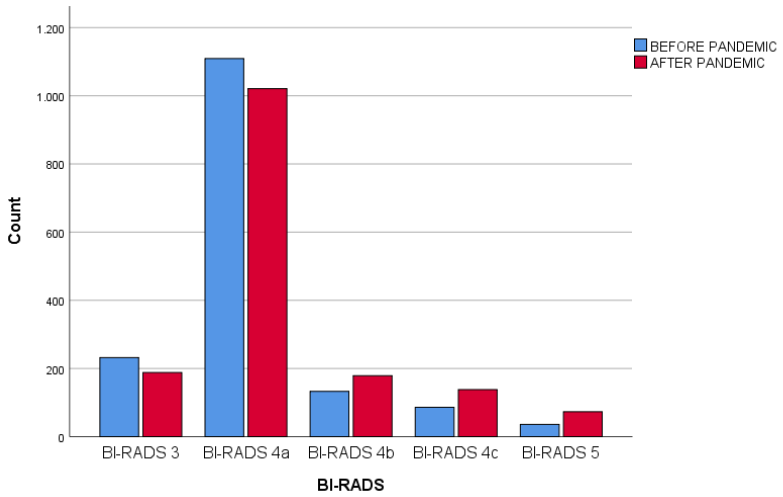

Figure 2. BI-RADS categories in non-pandemic and pandemic periods.

Table 3. BI-RADS categories in non-pandemic and pandemic periods

	Non pandemia (n=1596)		Pandemia (n=1599)		p
	n	%	n	%	
BI-RADS 3**	232	14.5	188	11.8	0.021
BI-RADS 4a**	1109	69.5	1021	63.9	0.001
BI-RADS 4b**	133	8.3	179	11.2	0.007
BI-RADS 4c**	86	5.4	138	8.6	0.0001
BI-RADS 5**	36	2.3	73	4.6	0.0001

**: Breast Imaging Reporting and Data Systems

DISCUSSION

During the early periods of the pandemia, the decrease in the newly detected cancer has been determined[12,13]. This decrease is not a real drop in incidence, probably due to the decrease in receiving health care of patients during the pandemia. Therefore, these cancers will be captured in the higher stage and greater in the size according to the period in which the early is diagnosed. As a result, the patients require more extensive surgical procedures or more requirements for chemotherapy due to delays in the diagnosis of the disease[4].

In the study of Koca B et al., they compared the findings of breast cancer surgery performed in non-pandemic times and the first year of the pandemic times. They found that tumor sizes were larger and axillary involvement was greater during the pandemic period[14]. In the present cohort, there was quite a similarity between the numbers of tru-cut biopsies in the non-pandemic vs. pandemic period. However, invasive carcinoma and high-risk patients were statistically significantly increased in the pandemic times compared to the non-pandemic times.

The present study reported that BI-RADS classification 3 lesions dropped importantly in the pandemic period assessed to the non-pandemic period in terms of both the total number and percentage of 232 (14.5 %) and 188 (11.8%) respectively. The present study revealed that BI-RADS category 4a, 4b, 4c, and BI-RADS 5 masses, increased significantly in the pandemic times assessed to the non-pandemic times in terms of both the total number and percentage 1109 (69.5 %), 1021 (63.9%); 133(8.3%), 179(11.2%); 86(5.4%),138(8.6%); 36(2.3%), 73(4.6%) respectively.

The TCB has become one of the best methods in terms of reliability, accuracy, and reproducibility in the diagnosis of breast lesions. Pinto D. et al. in their study, claimed that FNABs could be an accurate and valuable method in symptomatic breast lesions in the period of COVID-19 in terms of both being fast and requiring less personnel and less invasive[15].

Breast imaging has been affected in a highly negative direction from delayed situations. One of the largest health systems in New York showed that the usage of mammography by 94%, MRI by 74%, and ultrasonography % by 64 has been decreased by[16].

Between January 2019 and September 2020, 17,728 tru-cut biopsies were performed and 6,009 cancers were diagnosed. From March 2020, March, and September, fewer breast biopsy recommendations with subsequent cancers diagnoses compared to 2019, owing to decreasing in cancer detected by the scanning method ($p<0.001$)[17]. But in our study, the number of biopsies performed during non-pandemic and pandemic periods were similar. It may be because we take the pandemic process as 2 years.

It is uncertain what effect these COVID-19-induced changes in cancer screening and diagnosis will have on long-term cancer results. Breast imaging was disproportionately affected by postponed patients. The greatest healthcare unit in New York concluded an 88% decrease influencing all modality types; the usage of mammography dropped by 94%, MR breast imaging by 74%, and ultrasonography by 64%[18].

The limitation of the present cohort was that we assessed data from only two centers, but the number of TCBs was high enough because our hospital was a referral center for breast lesions. More multicenter studies are needed to apply our results to general clinical situations.

The number of TCBs performed in the pandemic and non-pandemic periods was similar. However, in the pandemic times compared to the non-pandemic times, high risk and invasive carcinoma were significantly higher according to the histopathological

results of the tru-cut biopsy. Similarly, the rates of ultrasonography-based BI-RADS 4a, 4b, 4c, and 5 were higher during the pandemic period. However, BI-RADS 3 cases were significantly reduced in the pandemic times matched to the non-pandemic times. These findings show that the pandemic period has led to the diagnosis of patients at a more advanced stage.

We hope this study will help clinicians provide the highest level of care for their patients during this evolving pandemic and may contribute to an algorithm to be developed to improve breast cancer screening and diagnosis during the pandemic period.

Yazar Katkıları: Çalışma konsepti/Tasarımı: SA, MB; Veri toplama: SA, MB; Veri analizi ve yorumlama: SA, MB; Yazı taslağı: SA, MB; İçeriğin eleştirel incelenmesi: SA, MB; Son onay ve sorumluluk: SA, MB; Teknik ve malzeme desteği: SA, MB; Süpervizyon: SA, MB; Fon sağlama (mevcut ise): yok.
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