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Covid - 19 Pandemisi Birinci Dalgasinin Meme Görüntüleme Uygulamasi Üzerindeki Etkisi - Üçüncü Basamak Onkoloji Hastanesi Deneyimi

Impact Of The Fırst Wave Of The Covıd - 19 Pandemıc On Breast Imagıng Practıce – A Tertıary Cancer Care Hospıtal Experıence

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ÖZET

AMAÇ: COVID-19 pandemisinin ilk dalgası sırasında Türkiye'de bir üçüncü basamak onkoloji hastanesinin meme görüntüleme ünitesindeki hasta sayısı, yapılan işlemler ve görüntüleme prosedürlerinin sonuçlarındaki değişiklikleri değerlendirmeyi amaçladık.

GEREÇ VE YÖNTEM: Çalışmada, pandemi öncesi (n=2010) ve pandeminin ilk dalgası sırasında (n=740) birimimize başvuran hastalar retrospektif olarak değerlendirildi. Hasta cinsiyeti ve yaşı, neoadjuvan kemoterapi öyküsü, kullanılan görüntüleme yöntemleri, BI-RADS sınıflandırması ve biyopsi ve/veya tel lokalizasyon prosedürleri dönemler arasında karşılaştırıldı.

BULGULAR: Pandemi döneminde birimimize başvuran hasta sayısında anlamlı azalma oldu (p<0,001). Pandemi dışı döneme göre nispi azalmalar mamografide %59,1, ultrasonografide %66,8, manyetik rezonans görüntülemede %70,4, biyopside %52,3, tel lokalizasyonunda %82,6 ve kanser teşhisinde %57,2 olarak gerçekleşti. Pandemi döneminde tarama mamografi oranı önemli ölçüde azaldı (p<0,001) ve BI-RADS 1 tanı oranlarında pandemi dışı döneme göre istatistiksel olarak anlamlı bir azalma oldu (p=0,044).

SONUÇ: Meme görüntüleme ünitemize biyopsi, tel lokalizasyonu ve tarama mamografisi başta olmak üzere tüm görüntüleme yöntemleri için başvuran hasta sayısı pandemi döneminde önemli ölçüde azalmıştır. Bu düşüş, gelecekte meme kanseri teşhis sayısında artışa neden olabilir. Ancak hastanemizin pandemi dışı bir hastane olması neoadjuvan kemoterapi alan hastalar için güvenli bir ortam oluşturmuş görünmektedir. Gelecekteki pandemi veya benzeri durumlarda, çalışmamızın sonuçları, meme görüntüleme ünitesi operasyonlarının yönetilmesinde yol gösterici olacaktır.

Anahtar kelimeler: COVID-19, meme görüntüleme, meme kanseri, tarama mamografisi

ABSTRACT

AIM: We aimed to evaluate changes in patient numbers, procedures performed, and the results of imaging procedures in the breast imaging unit of a tertiary cancer care hospital in Turkiye during the fırst wave of the COVID-19 pandemic.

MATERIAL AND METHOD: The study retrospectively evaluated patients who presented to our unit before the pandemic (n=2010) and during the first wave of the pandemic (n=740). Patient sex and age, neoadjuvant chemotherapy history, imaging modalities used, final BI-RADS classification, and biopsy and/or wire localization procedures were compared between the periods.

RESULTS: There was a significant decrease in the number of patients presenting to our unit during the pandemic (p<0.001). Relative decreases compared to the non-pandemic period was 59.1% for mammography, 66.8% for ultrasonography, 70.4% for magnetic resonance imaging, 52.3% for biopsy, 82.6% for wire localization, and 57.2% for cancer diagnosis. The screening mammography rate also decreased significantly during the pandemic period (p<0.001), and there was a statistically significant decrease in the rate of BI-RADS 1 diagnoses during the pandemic period compared to the non-pandemic period (p=0.044).

CONCLUSION: The number of patients presenting to our breast imaging unit for biopsy, wire localization, and all imaging modalities, especially screening mammography, decreased significantly during the pandemic period. Decline in the procedures may lead an increase in breast carcinoma diagnosis in the future. However, the fact that our hospital is a non-pandemic hospital seems to have created a safe environment for patients receiving neoadjuvant chemotherapy. In case of future pandemics or similar situations, the results of our study will provide guidance for managing the operations of the breast imaging unit.

Keywords: COVID-19, breast imaging, breast cancer, screening mammography

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INTRODUCTION

In December 2019, a highly contagious virus that caused severe pneumonia appeared in Wuhan, China and began spreading rapidly[1-3]. The World Health Organization (WHO) called the disease novel coronavirus disease 2019 (COVID-19) and the viral agent was later named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)[3,4]. WHO declared COVID-19 a pandemic on March 11, 2020, the same day the first case was reported in Turkiye[5,6]. The Turkish Ministry of Health established a COVID-19 Scientific Committee and based on its recommendations, promptly implemented many precautionary measures to prevent the spread of COVID-19. One of these measures was to designate selected hospitals as pandemic hospitals that would be organized for the diagnosis and treatment of COVID-19 patients only. The other hospitals, or non-pandemic hospitals, were reserved for the diagnosis and treatment of emergency and oncological patients other than COVID-19 patients. Our hospital, one of the oncology hospitals in Ankara, Turkiye, was declared a non-pandemic hospital. To protect patients and staff, certain precautions were taken in the radiology department as recommended by our hospital's infection control department. Healthcare workers were encouraged to wear personal protective equipment, and patient appointments were reorganized to prevent crowding. Patients were encouraged to wear masks, questioned about symptoms, and checked for fever upon presentation to the radiology department.

Breast cancer is the most common malignancy in women[7]. The breast imaging unit of our hospital serves a high volume of patients. Therefore, in addition to the COVID-19 preventive measures stated above, attempts were made to schedule patients with Breast Imaging Reporting and Data System (BI-RADS) category 4 and 5 lesions for biopsy on the same day as imaging to reduce the number of hospital visits.

We hypothesize that the COVID-19 pandemic has affected patient presentations to the breast imaging unit. This study aimed to investigate changes in the number of patients presenting to the breast imaging unit, the examinations performed, the number and modalities of biopsies performed, and the results of examinations and biopsies during the first wave of the pandemic.

MATERIAL AND METHOD

This study was approved by the medical ethics committee of Dr Abdurrahman Yurtaslan Oncology Training and Research Hospital (approval number: 2020-09-818, 23.09.2020) and the Republic of Turkiye Ministry of Health, COVID-19 Scientific Research Committee, and adhered to the principles of the Declaration of Helsinki. All patients provided informed consent. We defined the first wave of the pandemic period as March 11, 2020 to May 11, 2020 (41 workdays) and compared with data from March 11 to May 11, 2019 (43 workdays) as the non-pandemic period for consistency in season and population mobility. All patients who visited the breast imaging unit of the radiology clinic of our non-pandemic hospital during the first wave of the pandemic and non-pandemic periods were retrospectively identified. During the non-pandemic and pandemic periods, 2010 and 740 patients presented to our unit, respectively. The gender, age, imaging modality used, final BI-RADS classification, and biopsy and/or wire localization procedures performed were recorded for each patient from records in the unit archive. Patients who received neoadjuvant chemotherapy treatment were also noted. Imaging modalities consisted of mammography, ultrasound, and magnetic resonance imaging (MRI). Mammograms were classified as screening (annual examinations for women over the age of 40 with no symptoms), diagnostic (for new symptoms), or postoperative follow-up, while ultrasound and MRI were classified as postoperative follow-up or diagnostic. BI-RADS category (0–6) was assigned after all imaging findings were examined for each patient. If a patient underwent biopsy and/or wire localization, the guiding imaging modality used was noted. The pathology reports of these patients were reviewed, and the results were recorded as benign or malignant. The data were compared between the two time periods.

Statistical Analysis

IBM SPSS Statistics version 20.0 for Windows was used for statistical analysis. As descriptive statistics, numbers and percentages are presented for categorical variables, mean and standard deviation for numerical variables. Student's t-test was used for between-group comparisons of normally distributed variables and Mann–Whitney U test for non-normally distributed variables. Categorical variables were compared using chi-square test and Fisher's exact test. Statistical significance was accepted at $p<0.05$.

RESULTS

Of the 2750 patients included in the study, 2010 presented to our breast imaging unit during the non-pandemic period and 740 during the pandemic period. The demographic characteristics of the patients in both groups are summarized in Table 1. There was no statistical difference between the groups in terms of age or gender

Table 1

	Period		P value
	Non-pandemic (n=2010)	Pandemic (n=740)	
Age (years), mean ± SD	50.0 ± 12.2	49.6 ± 11.4	0.505
Gender, n (%)			
Female	2000 (99.5%)	735 (99.3%)	0.565
Male	10 (0.5%)	5 (0.7%)	
Received neoadjuvant chemotherapy (n)	11	7	0.346

n: Number of patients, SD: Standard deviation

There was no statistical difference in the number of patients who received neoadjuvant chemotherapy (p=0.346) (Table 1). However, the number of patients presenting to our unit and numbers of mammography, ultrasound, MRI, biopsy, and wire localization procedures performed and cancer diagnoses decreased significantly in the pandemic period compared to the non-pandemic period ($p<0.001$)

Table 2, Table 3

	Period		P value
	Non-pandemic n (%)	Pandemic n (%)	
Mammography	1153 (100%)	471 (100%)	
Screening	640 (55.5%)	183 (38.9%)	<0.001
Postoperative follow-up	287 (24.9%)	124 (26.3%)	
Diagnostic	226 (19.6%)	164 (34.8%)	
Ultrasonography	1807 (100%)	599 (100%)	
Postoperative follow-up	369 (20.4%)	135 (22.5%)	0.270
Diagnostic	1438 (79.6%)	464 (77.5%)	
Magnetic Resonance Imaging	321 (100%)	95 (100%)	
Postoperative follow-up	43 (13.4%)	16 (16.8%)	0.398
Diagnostic	278 (86.6%)	79 (83.2%)	

n: Number of patients

Table3

	Period		P value
	Non-pandemic n (%)	Pandemic n (%)	
Biopsy	216 (100%)	103 (100%)	
Ultrasound-guided	214 (99.1%)	103 (100%)	1.000
MRI-guided	2 (0.9%)	0 (0%)	
Wire localization	75 (100%)	13 (100%)	
Mammography-guided	32 (42.7%)	9 (69.2%)	
Ultrasound-guided	34 (45.3%)	3 (23.1%)	0.194
MRI-guided	9 (12%)	1 (7.7%)	
BI-RADS classification			
BI-RADS 0	13 (0.6%)	3 (0.4%)	
BI-RADS 1	210 (10.4%)	53 (7.2%)	
BI-RADS 2	803 (40%)	287 (38.8%)	
BI-RADS 3	651 (32.4%)	249 (33.6%)	0.044
BI-RADS 4	259 (12.9%)	108 (14.6%)	
BI-RADS 5	50 (2.5%)	24 (3.2%)	
BI-RADS 6	24 (1.2%)	16 (2.2%)	
Pathology result			
Benign	185 (65.8%)	72 (63.7%)	0.690
Malignant	96 (34.2%)	41 (36.3%)	

n: Number of patients, MRI: Magnetic resonance imaging,
BI-RADS: Breast imaging reporting and data systems

In the first two months of the pandemic, the relative decrease compared to the same two months of the previous year was 59.1% for mammography, 66.8% for ultrasonography, 70.4% for MRI, 52.3% for biopsy, 82.6% for wire localization, and 57.2% for cancer diagnosis.

The distribution of mammography, ultrasound, and MRI subgroups and imaging modalities used during biopsy and wire localization in both periods are shown in Table 2 and Table 3. Comparison of mammography subgroup ratios for both periods revealed a significant reduction in the ratio of screening mammography during the pandemic period ($p<0.001$). The distributions of other modalities were similar for both groups.

BI-RADS classifications and biopsy pathology results for both periods are shown in Table 3. More than half of the patients in both periods consisted of patients with BI-RADS 2 and BI-RADS 3 findings. Compared to the non-pandemic period, there was a statistically significant decrease in the ratio of BI-RADS 1 findings and a slight increase in the proportions of patients with BI-RADS 4, BI-RADS 5, and BI-RADS 6 in the pandemic period. The results of pathological examination after biopsy showed an increase in the ratio of malignant to benign lesions during the pandemic period, but the difference in biopsy results between the periods was not statistically significant.

DISCUSSION

This retrospective study demonstrated the impact of the first wave of the COVID-19 pandemic on the operations of the breast imaging unit of a cancer care hospital in Turkiye. During the pandemic period, there was a significant decrease in the number of patients presenting to our breast imaging unit compared to the non-pandemic period, in line with the literature[8-11]. Following the official letter from the Ministry of Health, a flexible work arrangement was implemented in our hospital, as in many other institutions in the country, to prevent cross-contamination among health care workers[12]. Therefore, the appointments of patients other than those with clinical suspicion of breast cancer and those presenting for biopsy/wire localization were postponed in our clinic. In addition, there was a general decrease in the number of referrals to our clinic from the clinical and surgical departments/units of our hospital. These factors played an important role in this decline. The effect of national lockdown and societal restrictions due to COVID-19 may be added as a reason for the overall decrease in the number of patients[11]. Proportional decreases were also observed in the numbers of mammography, ultrasound, and MRI examinations, biopsies, and wire localization procedures performed and in the number of cancer diagnoses made in our unit during the pandemic. The rates of decline were similar to results obtained in a large-scale study by Grimm et al.[13]. In line with the recommendations of the European Society of Breast Imaging (EUSOBI), we performed biopsies of patients with BI-RADS 4 and 5 lesions as soon as possible[14,15]. For this reason, although the overall number of biopsies during the pandemic period decreased in proportion to the number of patients, there was an increase in ratio when compared with the non-pandemic period.

There was a minimal decrease in the number of patients receiving neoadjuvant chemotherapy during the pandemic period, with no significant difference between the periods. The reason for this may be that our hospital is a non-pandemic hospital, and therefore emergency and oncological patients felt more comfortable presenting to our hospital during the pandemic period. In addition, these patients may have been encouraged by clinicians or surgeons to have follow-up breast imaging tests, because the response of breast malignancy to neoadjuvant chemotherapy is important in deciding whether surgery is urgent and whether the treatment method should be changed[16,17]. During the pandemic period, it was necessary to avoid elective surgeries in order to keep the occupancy rates of intensive care units under control. This increased the importance of the decision between emergency and oncological emergency surgery, thus making it essential to follow these patients closely with breast imaging.

The comparison of mammography numbers in both periods showed that although there was a decrease in the number of screening, diagnostic, and follow-up mammograms during the pandemic period, the only significant decrease was in the ratio of screening mammography, consistent with the literature[9,10,13]. This suggests that most patients wanted to postpone their screening mammograms until after the pandemic due to the risk of COVID-19 transmission. This ratio was lower among patients who were symptomatic or under follow-up after previous breast cancer surgery. However, COVID-19 morbidity and mortality ratios are known to be higher in patients who have previously undergone chemotherapy and surgery and patients with comorbidities such as cancer[18-21]. In the literature, it has been reported that the COVID-19 mortality rate is approximately 10 times higher in patients with cancer compared to the general population[8]. For this reason, we expected that there might be a significant decrease in follow-up imaging examinations during the pandemic period, but this was not the case. The relative decrease in the number of follow-up mammography procedures was less than that of screening mammography during the pandemic period compared to the non-pandemic period. The reason for this may be that our hospital provides health services to patients with cancer who are not diagnosed with COVID-19, which ensures that patients with cancer can safely undergo follow-up imaging without worrying about COVID-19 transmission.

During the pandemic period, significantly fewer examinations resulted in BI-RADS 1 diagnoses compared to the non-pandemic period. According to the literature, BI-RADS category 1 lesions are detected most frequently in screening and diagnostic mammography (70% and 50%, respectively)[22]. Therefore, the significant decrease in the ratio of BI-RADS 1 lesions detected during the pandemic period in our study may be attributed to the significant decrease in the ratio of screening mammography. For the same reason, there was also a minimal increase in the ratios of BI-RADS 4, 5, and 6 diagnoses during the pandemic period.

Breast cancer detection ratios of 0.6% and 8.6% were reported for screening and diagnostic mammography, respectively, in the literature[22]. In light of this information, we believe that the significant decrease in the number of screening mammograms in our study during the pandemic period had little effect on the number of breast cancers detected. Regardless, we did not detect a significant difference in the pathology results of the biopsies performed in both periods. The reason for the minimal increase in the ratio of biopsy results reported as malignancy during the pandemic period may have been that we perform biopsy in BI-RADS 4 and 5 patients as soon as possible. The Canadian Society of Breast Imaging (CSBI) has already described screening mammographies as nonurgent and stated that these can be delayed for up to 60 days[23-25]. In addition, EUSOBI stated that a short delay in screening will not adversely affect the overall results of breast cancer[14,24]. CSBI considered diagnostic imaging modalities as semi-urgent and allowed a maximum delay of 30 days[23,24]. EUSOBI emphasized that short-term delay in diagnostic tests would not significantly affect the treatment results of breast cancer but could negatively affect patients' psychology[14,24].

As expected, there was a marked decrease in breast cancer diagnoses during the pandemic period, as mammography screenings were postponed during the pandemic. This result was similar to the study of Grimm et al.[13]. The literature indicates that mammography screening provides a 40% reduction in breast cancer mortality in women aged 50-69 years and a 30% reduction in

T2-T4 cancer incidence at all ages[26]. Therefore, clinicians predict with concern that we are likely to encounter more advanced breast cancers in the near future[7,13,27].

A limitation of our study was that we chose a narrow two-month window of the first wave as the pandemic period. However, in reality the pandemic is still ongoing, and its implications will be far-reaching. Later studies should evaluate a longer period and investigate the effects of COVID-19 on patients presenting to the breast imaging unit in the later and post-pandemic periods.

CONCLUSION

The number of patients who presented to our breast imaging unit decreased significantly during the COVID-19 pandemic period. The fact that patients who received neoadjuvant chemotherapy continued their imaging follow-up safely during the pandemic demonstrates the importance of non-pandemic hospitals. Non-pandemic hospitals also played a major role in performing biopsies of breast cancer patients without delay during the pandemic. In the unfortunate case of future pandemics or similar situations, the results of our study will provide guidance for managing the operations of breast imaging units.

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