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Chest Computed Tomography Findings and Clinicopathological Features among Breast Cancer Patients Treated with Radiation at Ocean Road Cancer Institute

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Abstract

Background: Radiation-induced lung changes are major health concerns among patients with breast cancer treated with radiation. The increasing rate of this kind of complication could partly be attributed to the inappropriate irradiation dosage and the recent widespread use of mastectomy plus radiation therapy as the first treatment for women with breast cancer. Even though few studies in Tanzania describe clinicopathological features and treatment of breast cancer, there is a lack of research studies addressing chest Computed Tomography (CT) findings in relationship to clinicopathological features among breast cancer patients treated with radiation at Ocean Road Cancer Institute (ORCI), Tanzania's national cancer centre.

Objective: The study was conducted to determine chest CT findings and clinicopathological features among post-irradiated breast cancer patients treated at ORCI.

Methodology: A retrospective cross-sectional study was conducted at ORCI's Department of Radiology and Medical Imaging, utilizing patient records and diagnostic imaging data. The study comprised breast cancer patients who had completed radiation therapy and underwent chest High-Resolution Computed Tomography (HRCT) scans between March 2021 and September 2022. Data analysis involved SPSS version 23, including descriptive analysis for categorical and continuous data. A significance level of p-value <0.05 was set to identify statistically significant results.

Results: The study included 75 breast cancer patients treated with radiations referred for chest CT. The mean age was 58.37 years. Most participants were female (97.3%), aged between 50 and 79 (73.3%), and presented with a dry cough (52.0%). Ground-glass opacity (GGO) was observed in 54.7% of the cases, making it the most common HRCT finding. The use of Cyclophosphamide in combination with other chemotherapy drugs as part of neoadjuvant or adjuvant chemotherapy was significantly associated with 0.22 times lower odds of developing GGO (p-value = 0.01).

Conclusion: Overall, this study highlights post-radiotherapy pulmonary complications among breast cancer patients and the potential influence of Cyclophosphamide on the development of ground-glass opacities.

Recommendation: It is advisable to conduct further prospective research to explore radiation-induced pneumonitis and the potential synergistic effects of specific chemotherapy regimens.

Keywords: *Breast cancer, Organizing pneumonia, Radiotherapy, Radiation pneumonitis.*

Introduction

Breast cancer significantly burdens the human community worldwide (1). According to GLOBOCAN 2020 estimates, breast cancer is among the most frequently diagnosed malignancies and the fifth cause of cancer-related fatalities, with an estimated 2.3 million new cases globally (1). It accounts for 14.8% of all cancer cases in the United States, with 281,550 new claims. In 2021, 43,600 cancer deaths were expected, accounting for 7.2 % of all cancer fatalities. The survival percentage after five years of diagnosis is 90.3% (2). In 2018, Africa experienced an estimated 168,690 cases and 74,072 breast cancer-related deaths. Incidence rates varied from 6.9 to 69.6 per 100,000, with Nigeria having the highest burden and a mortality-to-incidence ratio between 0.24 and 0.68 (3). In Tanzania, there are 3,028 new breast cancer cases among women, with a fatality rate of 7.9% (4).

More patients receive mastectomy and radiation therapy as initial breast cancer treatment (5,6). Standard radiation portals cover the breast, axilla, and supraclavicular region, treating the entire breast at doses ranging from 1.8 to 2.0 Gray per fraction (5). Newer regimens have been created, tested, and implemented to varying degrees, including hypo-fractionated whole-breast irradiation, partial-breast irradiation, brachytherapy, and intra-operative radiation treatment (5). Advancements in radiation technology do not entirely spare surrounding tissues, leading to common side effects and structural changes in nearby organs like the lungs, pleura, chest wall, and mediastinal structures (6). Radiation-induced lung damage consists of radiation pneumonitis and organizing pneumonia, wherein the latter encompasses radiation pneumonitis within its definition(5–7). Organizing pneumonia is a clinicopathological condition, part of the spectrum of pulmonary fibrosis, marked by migratory lung infiltrates outside the radiation field, differing from radiation pneumonitis (5–7). The onset of radiation pneumonitis is typically 6–8 weeks post-treatment, peaking at 3–4 months, evolving into radiation fibrosis within 9–12 months and stabilizing after that (6,7). Post-stabilization alterations might signal recurrent tumours or secondary infections, requiring careful consideration and monitoring for potential complications or disease recurrence post-radiation therapy (6,7).

For accurate differential diagnosis, computed tomography (CT) scans help identify lung parenchyma illnesses and other chest ailments compared to chest plain radiography (8). High-resolution computed tomography (HRCT) scans exhibit superior sensitivity (more than 84%) and specificity (more than 94%) for diagnosing radiation pneumonitis while also offering improved capabilities in identifying and staging this condition, as well as other chest diseases due to their enhanced precision in locating and characterizing lesions (8). Although radiation therapy plays a significant role in the palliative treatment of ulcerating/ fungating breast lesions and also control of the local disease (9), radiation-induced lung changes are major health concerns among breast cancer patients treated with radiation (10). The increasing rate of this kind of complication could partly be attributed to the inappropriate irradiation dosage and the recent widespread use of mastectomy plus radiation therapy as the first treatment for

women with localized breast cancer (5). The current study addresses CT findings in relationship to clinicopathological features and treatment offered among breast cancer patients treated with radiation at Ocean Road Cancer Institute (ORCI), Tanzania's national cancer centre.

Methodology

Study design

A hospital-based retrospective cross-section study was conducted at ORCI. This study used patient medical records extracted from the institutional database and diagnostic imaging data stored within the picture archiving and communication system.

Study population and study area

This study involved medical records and images of breast cancer patients who had undergone post-radiotherapy chest CT scans between March 2021 and September 2022 at the Ocean Road Cancer Institute (ORCI). The ORCI is located in the heart of the Dar es Salaam central business district. It is Tanzania's oldest and most prominent cancer institute, renowned for delivering state-of-the-art radiotherapy and advanced medical imaging services, including cutting-edge CT scans. It proudly serves as a teaching hospital affiliated with the esteemed Muhimbili University of Health and Allied Sciences (MUHAS).

Sampling strategy

The study enrolled a consecutive series of all eligible breast cancer patients who had undergone post-radiotherapy chest CT scans between March 2021 and September 2022 at the Ocean Road Cancer Institute (ORCI). Biases were minimized by choosing all essential medical records of all eligible patients within the requisite period, consecutively.

Sample size estimation

The research enrolled all eligible breast cancer patients treated with radiation referred to ORCI between March 2021 and September 2022. A total of 75 patients who met the research criteria were assessed.

Inclusion criteria

The inclusion criteria encompassed breast cancer patients who had undergone radiation therapy and were subsequently referred for a chest CT scan at the ORCI, with the stipulation that this imaging study occurred no earlier than six weeks post-completion of their therapeutic regimen, within the timeframe spanning from March 2021 to September 2022.

Exclusion criteria

Patient without retrievable chest HRCT, and Patient under the age of 18 years.

Independent variables

Sociodemographic characteristics: Age (years), sex, body mass index (kg/m^2; categories as per World Health Organization), occupation, and tobacco use (any history of using any form of tobacco).

Clinicopathological factors: Clinical presentation, histopathological classification, and comorbidities.

Treatment received: Radiotherapy with chemotherapy, radiotherapy with mastectomy and chemotherapy, chemotherapy type, and radiation dose.

Dependent variables

Post-irradiation chest HRCT findings of radiation pneumonitis

Radiation pneumonitis is associated with distinct radiological findings on computed tomography

(CT) scans, reflecting pulmonary inflammation and injury. These CT findings encompass:

Ground-Glass Opacities: Areas of increased lung density, rendering lung tissue hazy due to inflammation-induced changes.

Consolidation: Radiographic evidence of airspace filling with inflammatory exudate, cellular infiltrates, and debris, leading to increased lung density and air bronchograms

Septal wall thickening: An abnormal thickening of the walls or septa within the lungs

Pulmonary fibrosis: Reticular patterns that do not follow the anatomical lung architecture indicate fibrosis or scarring consequent to the inflammatory process.

Data Collection Methods

Data from breast cancer patients treated with radiation who have had chest HRCT were obtained from patients' databases and registries using a structured data collection form. The PI acquired HRCT images from ORCI's picture archiving and communication system (PACS). The primary investigator (PI) re-interpreted all pictures previously reviewed by radiologists and weighed all the data against the study's objectives.

The patient's saved information at the time of hospitalization was listed on the checklist. The checklist was divided into three sections in the following order: Part 1 gathered the patient's demographic data, such as age, sex, body mass index, occupation, and tobacco use. We also collected information regarding the clinical diagnosis and every other pertinent clinical observation made throughout the investigation at the time of hospitalization in part 2 of the checklist. Information about the CT-Scan results noted during CT-Scan imaging at hospitalization is concluded in part 3 of the checklist. This checklist was integrated into the web-based Kobo Collect program, enabling data collection using portable electronic devices. Kobo Collect facilitated the synchronization, extraction, and transfer of collected data to the SPSS analysis software.

Imaging platform

The Somatom CT using Somaris/7 syngo CT VB20, (produced by Siemens Healthcare GmBH in Germany), was used in chest HRCT imaging at ORCI. Competent radiographers were responsible for overseeing the operation of the equipment.

Validity and reliability

The principal investigator (PI) and research assistants included only trustworthy and comprehensive medical records in the study to maintain consistency and reliability. The PI carefully reviewed all previously recorded chest HRCT images, consulting an independent radiologist when uncertainties arose to ensure accurate documentation using pre-installed software on mobile devices streamlined data collection, reducing the chances of incorrect data entry and coding errors.

Pretesting and pilot data tools

The principal investigator conducted a preliminary study to improve the data collection instruments used in this research. This pilot study analyzed eight cases, representing ten per cent of the required medical records. The findings from the pilot study, specifically regarding data integrity, were thoroughly evaluated, and the investigators revised the checklist accordingly. We integrated the valuable insights from the pilot study into the

primary research to enhance the effectiveness and accuracy of the data collection tools.

Data Analysis

For data analysis, the investigators utilized SPSS software version 23. Continuous data were summarized using central tendency measurements and the dispersion measures that go with them. To describe categorical data, frequencies and percentages were employed. Descriptive analysis was used for both continuous and categorical data. The Pearson Chi-square tests were used to compare proportions and binary logistic regression tests to asses associations. Statistical significance was determined when the p-value was less than 0.05.

Ethical Issues

The research proposal underwent a thorough evaluation and received ethical approval from the MUHAS Institutional Review Board (MUHAS-REC-01-2023-1504). As the study had a retrospective design, the investigators sought a waiver for informed consent. Additionally, We obtained permission to collect the data from the director of ORCI to collect the necessary data. The study maintained strict confidentiality protocols, ensuring that patient identities were neither collected nor used, and the researcher included no identifying information in the data analysis—moreover, the PI limited access to the data exclusively to the investigators involved in the study.

Results

Sociodemographic characteristics among breast cancer patients treated with radiation referred for the chest CT scan at ORCI

The study involved 75 breast cancer patients treated with radiation. The mean age was 58.37 years. The majority were aged between 60 and 69 years, 28.0%, females 97.3%, and had an average BMI, 73.3% (Table 1).

The clinicopathological characteristics among breast cancer patients treated with radiation referred for the chest CT scan at ORCI

Most breast cancer patients in our study presented with dry cough and chest pain, accounting for 52.0% and 50.7% of all patients, respectively. Most patients had invasive ductal carcinoma 92.0%, poorly differentiated tumours 48.0%, and T4 primary tumours 61.3%. Regional lymph node involvement, N1, was the most common 46.7%. Distant metastasis was present in 18.7% of patients. Most patients were in stage IV, 64.0% (Table 2).

The CT chest findings among breast cancer patients treated with radiation referred for the chest CT scan at ORCI

Ground-glass opacity was observed in 54.7% of the cases, making it the most common chest HRCT finding. On the other hand, emphysematous changes were the least frequent chest HRCT finding, occurring in only 1.3% of the patients (Figure 1).

The treatments received among breast cancer patients treated with radiation referred for the chest CT scan at ORCI

The majority of patients, 89.3%, underwent both mastectomy and chemotherapy, with 68.0% receiving adjuvant chemotherapy (Table 3).

Association between CT chest findings and treatment offered among breast cancer patients treated with radiation, referred for the chest CT scan at ORCI

GGO was significantly less prevalent in breast cancer patients treated with radiation who were

administered a combination of Cyclophosphamide and other chemotherapy drugs (39.3% vs 63.8%, p = 0.039). Septal thickenings were significantly less prevalent among those who received adjuvant (31.4% vs 62.5%, p = 0.011) and Cyclophosphamide (25.0% vs 51.1%, p = 0.027). Fibrosis was significantly less prevalent among those who received Cyclophosphamide (7.1% vs 38.3%, p = 0.003) (Table 4).

Cyclophosphamide and other chemotherapy drugs are significantly associated with a reduced risk of GGO. Patients who received Cyclophosphamide and other chemotherapy drugs had 0.37 times lower odds of developing GGO (p = 0.041). Moreover, after considering other variables, this association became more pronounced and statistically significant, with those receiving Cyclophosphamide having 0.22 times lower odds of GGO (p = 0.01) (Table 5).

Discussion

This cross-sectional study using secondary data from a tertiary hospital examined the medical records of 75 breast cancer patients treated with radiation and referred for chest CT scans. The mean age was 58.37 years, with most patients between 50 and 79 years old. These findings are consistent with a previous study conducted in Nigeria, which indicates that breast cancer is more prevalent among elderly patients (10). Most patients in this study were females, which aligns with findings from a previous study conducted in Pakistan by Khokher et al. (12). The noted similarities highlight the significance of age-specific screening and gender-targeted strategies in the management of breast cancer, emphasizing the need for comprehensive healthcare tailored to the specific requirements of women. However, the BMI distribution observed in this study indicated that most patients had a normal BMI, which contrasts with the findings of a study conducted by Allen et al. in the United States, in which 64% of patients were overweight (13). The difference could be due to the previous research having a more significant number of participants, variations in BMI, or differences in the sociodemographic makeup across the studies.

A small portion of the patients in this study reported tobacco use, which contrasts with findings from a previous study by Johansson et al. conducted in Sweden, in which 33% of post-irradiation breast cancer patients were former tobacco users (14). The variation might be attributable to a previous study having a larger sample size, distinct inclusion criteria such as breast cancer staging, or broader population-level factors, including varying sociodemographic characteristics and the higher prevalence of tobacco use often observed in high-income countries like Sweden. In the current study, a small number of patients had diabetes mellitus, contrasting with the results from a survey conducted in South Korea by Kong et al, which showed a 29.3% prevalence of diabetes mellitus (15). The observed difference could be attributed to the prior Korean study having more participants than the current study; however, it could also reflect underlying differences in the population prevalence of diabetes between South Korea and Tanzania, where the burden of non-communicable diseases, such as diabetes is comparatively lower in Tanzania.

Table 1: Sociodemographic characteristics among breast cancer patients treated with radiation referred for the chest CT scan at ORCI (n = 75)

Variables	Frequency	Percentage
Age (years)		
18-39	5	6.7
40-49	14	18.7
50-59	18	24.0
60-69	21	28.0
70-79	16	21.3
80+	1	1.3
Sex		
Female	73	97.3
Male	2	2.7
BMI category		
Normal	55	73.3
Overweight	20	26.7
Occupation		
Hospital worker	2	2.67
Farm worker	14	18.67
Others	59	78.66
Consumption of;		
Tobacco	1	1.3

Table 2: Clinicopathological characteristics among breast cancer patients treated with radiation referred for the chest CT scan at ORCI (n = 75)

Variable	Frequency	Percentage
Clinical presentation		
Dry cough	39	52.0
Chest pain	38	50.7
Dyspnea	23	30.7
fever	1	1.3
Histology		
Invasive ductal carcinoma	69	92.0
Invasive lobular carcinoma	1	1.3
Others	5	6.5
Grades		
Well-differentiated	12	16.0
Moderate differentiated	27	36.0
Poorly differentiated	36	48.0
Primary tumour (T)		
T1	1	1.3
T2	12	16.0
T3	13	17.3
T4	46	61.3
This: In situ	1	1.3

Tx: Inability to assess	2	2.7
Regional lymph node (N)		
N0	17	22.7
N1	35	46.7
N2	16	21.3
N3	1	1.3
Nx: Inability to assess	6	8.0
Distance metastasis		
M0	47	62.7
M1	14	18.7
Mx; Inability to assess	14	18.7
Overall stage		
0	1	1.3
I	2	2.7
II	14	18.7
III	10	13.3
IV	48	64.0
Comorbidities		
Hypertension	26	34.7
COPD	4	5.4
DM	12	16.0

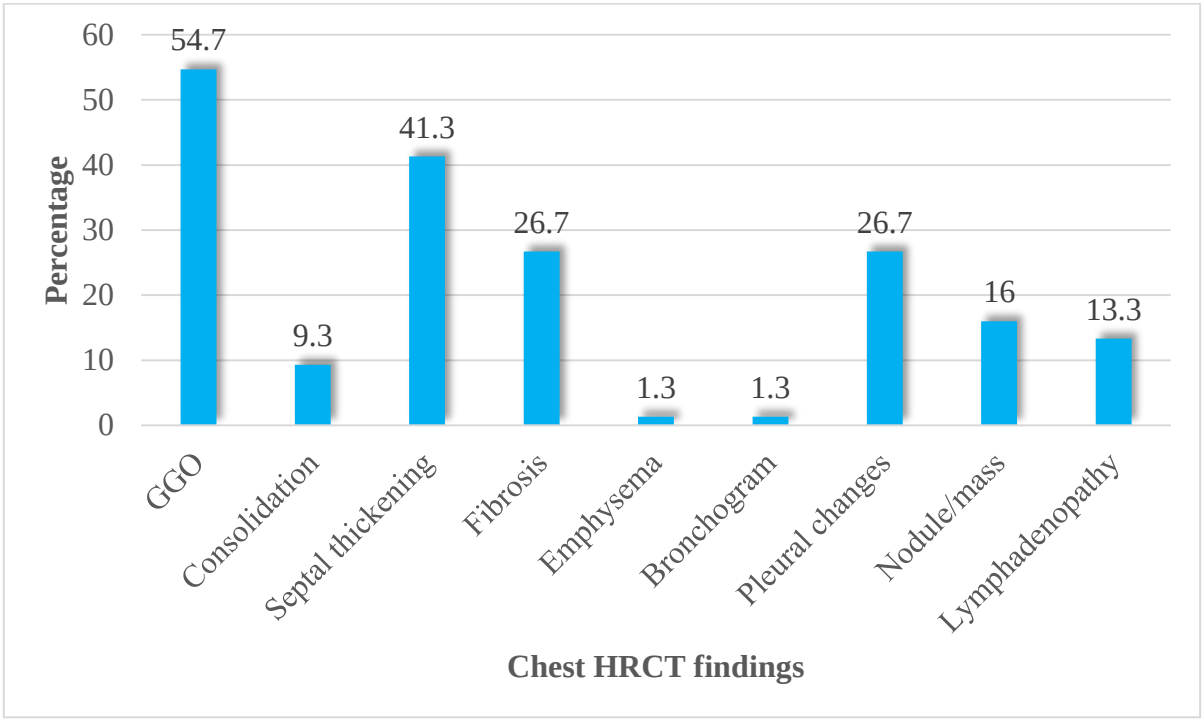

Figure 1. Chest HRCT findings among breast cancer patients treated with radiation referred for the chest CT scan at ORCI

Table 3: Treatment received among breast cancer patients treated with radiation referred for chest CT scan at ORCI (n = 75)

Treatment	Frequency	Percentage
Radiotherapy (EBRT) with		
Chemotherapy	8	10.7
Mastectomy and Chemotherapy	67	89.3
Chemotherapy used		
Neoadjuvant	11	14.7
Adjuvant	51	68.0
Sandwich	11	14.7
Unknown	2	7
Chemotherapy drugs		
Cyclophosphamide	28	37.3
Doxorubicin	17	22.7
Paclitaxel	28	37.3

Table 4: Chest HRCT findings by treatment offered among breast cancer patients treated with radiation referred for the chest CT scan at ORCI (n = 75)

Variables		Ground-glass opacities	Consolidations	Septal thickenings	Fibrosis
		Frq (%)	Frq (%)	Frq (%)	Frq (%)
Rad. with chemo.	Yes	5 (62.5)	0 (0.00)	1 (14.3)	3 (42.9)
	No	36 (53.7)	7 (10.3)	30 (44.1)	17 (25.0)
	p-value	0.638	0.373	0.127	0.309
Rad. with chemo. and mastectomy	Yes	36 (53.7)	6 (9.10)	29 (43.9)	17 (25.8)
	No	5 (62.5)	1 (11.1)	2 (22.2)	3 (33.3)
	p-value	0.638	0.845	0.215	0.630
Neoadjuvant	Yes	8 (72.7)	0 (0.00)	7 (63.7)	5 (45.5)
	No	33 (51.6)	7 (10.9)	24 (37.5)	15 (23.4)
	p-value	0.193	0.249	0.104	0.127
Adjuvant	Yes	24 (47.1)	5 (9.80)	16 (31.4)	13 (25.5)
	No	17 (70.8)	2 (8.30)	15 (62.5)	7 (29.2)
	p-value	0.054	0.838	0.011	0.737
Sandwich	Yes	8 (72.7)	1 (9.1)	7 (63.7)	2 (28.2)
	No	33 (51.6)	6 (9.40)	24 (37.5)	18 (28.1)
	p-value	1.193	0.976	0.104	0.491
Cyclophosphamide	Yes	11 (39.3)	2 (7.10)	7 (25.0)	2 (7.10)
	No	30 (63.8)	5 (10.6)	24 (51.1)	18 (38.3)

	p-value	0.039	0.615	0.027	0.003
Doxorubicin	Yes	8 (47.1)	1 (5.90)	5 (29.5)	2 (11.8)
	No	33 (56.9)	6 (10.3)	26 (44.8)	18 (31.0)
	p-value	0.474	0.578	0.256	0.114
Paclitaxel	Yes	16 (57.1)	1 (3.6)	10 (35.7)	4 (14.3)
	No	25 (53.2)	6 (12.8)	21 (44.7)	16 (34.0)
	p-value	0.740	0.186	0.448	0.061
Rad dose ≥ 50	Yes	33 (51.6)	6 (9.40)	26 (40.6)	18 (28.1)
	No	8 (72.7)	1 (9.10)	5 (45.5)	2 (18.2)
	p-value	0.193	0.976	0.764	0.491

Frq = Frequency, Rad. = Radiotherapy, Chemo. = chemotherapy

Table 5: Logistic regression of Chest HRCT finding by treatment offered among breast cancer patients treated with radiation referred for the chest CT scan at ORCI

		Crude					**Adjusted**				
		Coefficient (B)	**OR**	**95% CI**		**p-value**	**Coefficient (B)**	**OR**	**95% CI**		**p-value**
				Lower limit	**Upper limit**				**Lower limit**	**Upper limit**	
GGO	Cyclophosphamide										
	No	Reference									
	Yes	1.00	0.37	0.14	0.96	0.041	-1.53	0.22	0.05	0.94	0.01
Septal thickenings	Cyclophosphamide										
	No	Reference									
	Yes	-1.141	0.319	0.114	0.894	0.03	-1.617	0.199	0.038	1.034	0.055
	Adjuvant										
	No	Reference									
	Yes	-1.294	0.274	0.099	0.758	0.013	-0.783	0.457	0.027	7.7779	0.588
Fibrosis	Cyclophosphamide										
	No	Reference									
	Yes	-2.088	0.124	0.026	0.586	0.008	-20.927	0.00	0.00	-	0.99

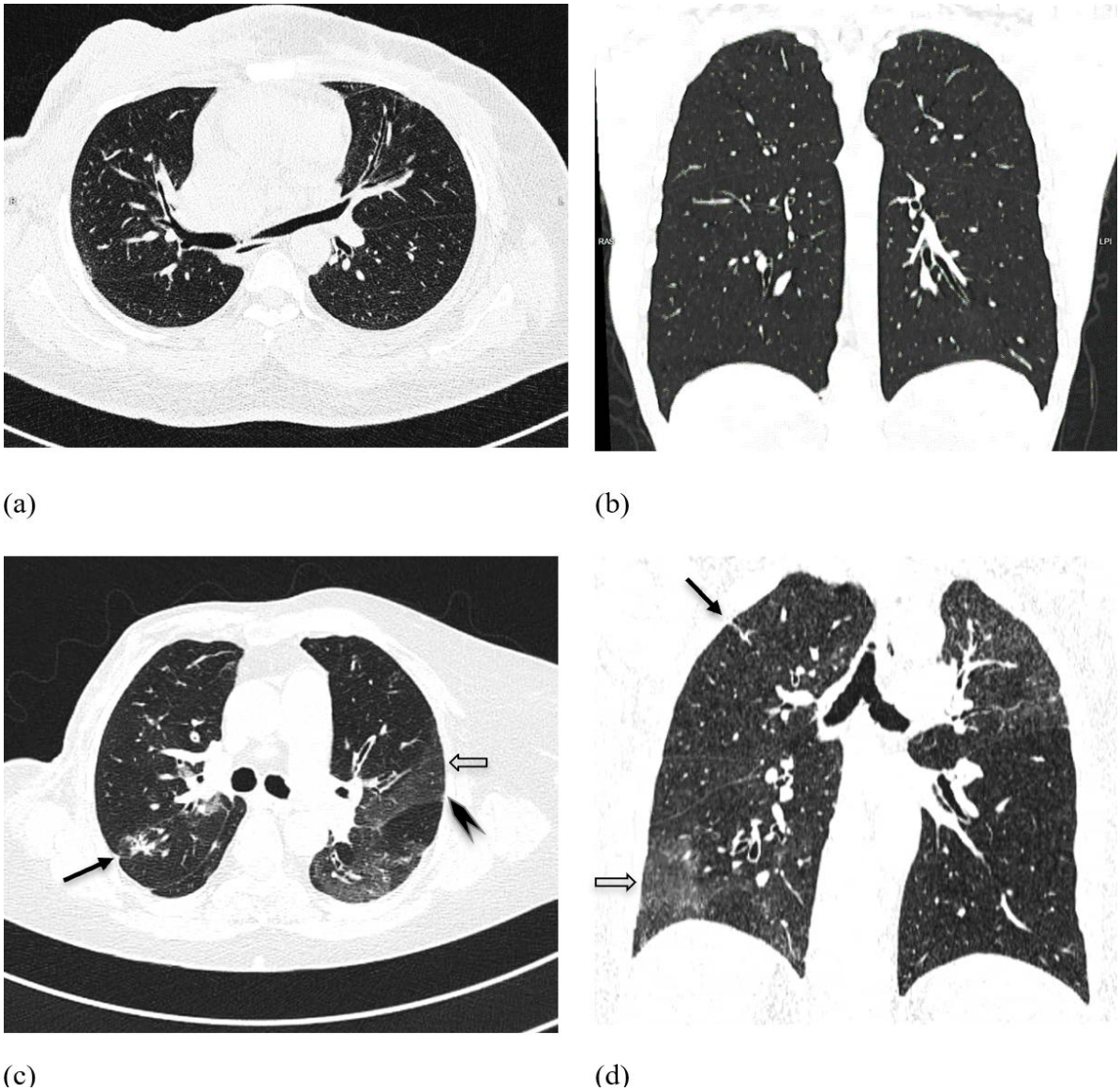

Figure 2. Representative Chest HRCT images of breast cancer patients treated with radiation referred for the chest CT scan at ORCI. Images (a) and (b) are axial and coronal planes depicting normal lung findings. While images (c) and (d) are axial view and coronal reconstruction, showing features of radiation pneumonitis; that is, ground-glass opacities (block arrows) and septal thickening (arrowhead), and fibrotic changes (arrows).

About half of the patients in this study presented with a dry cough, which is slightly lower than the findings of a previous study conducted in Germany by Werner et al., in which all patients presented with a dry cough (11) and twice higher than the findings of a study done in Korea by Chung et al., where 26% of patients presented with dry cough (16). These discrepancies may be attributed to differences in clinical staging at diagnosis, as most patients in the current cohort presented at an advanced stage, and potentially to variations in radiation dose across studies, since higher doses can exacerbate pulmonary inflammation, thereby increasing the likelihood of

radiation-induced cough. Most of the histological results were invasive ductal carcinoma, which aligns with a previous study in Pakistan and Tanzania (4,12). Furthermore, most patients had poorly differentiated tumours with grade four, which is consistent with the findings from a study done in Tanzania (4). The parallel findings emphasize the significance of consistent patterns in tumour histology across different regions and the need for standardized diagnostic and therapeutic approaches, especially concerning aggressive tumour types. However, the findings contrast with a study in China by Zhao et al., which demonstrated that the majority had moderately differentiated tumours (17). This disparity may be attributed not only to the larger, population-based design of the Chinese study but also to differences in breast cancer screening practices, as earlier detection in settings with well-established screening programs often leads to diagnosis at a less advanced histologic grade.

In the current study, GGO was the most commonly observed chest HRCT finding, followed by septal thickening and lung consolidation, in that particular order. The findings align with previous research done in China by Wall et al., which demonstrated a similar order of HRCT findings (18). The observed similarity in the order of HRCT findings underscores the reliability and universality of these observations in chest imaging. However, a study conducted in South Korea by Wen et al. reported consolidations as the second prevalent finding (19). In our study, chest CT scans were performed no earlier than six weeks post-completion of radiotherapy, which is within the typical window for detecting early radiation-induced changes. The inclusion of cases with pneumonitis and organizing pneumonia within this timeframe further suggests a progression of post-radiation lung injury that may influence HRCT findings. However, the lack of precise staging, due to variability in the timing of scans relative to the disease process, remains a limitation in fully understanding the evolution of these imaging features.

In this study, a significant proportion of patients underwent a combination of radiotherapy, mastectomy, and chemotherapy, with the majority also receiving adjuvant chemotherapy involving medications such as Cyclophosphamide or paclitaxel, consistent with findings from an earlier study conducted in China (17). This congruence could support the development of globally applicable treatment guidelines, facilitating more uniform and potentially optimized care for breast cancer patients across various healthcare settings. Cyclophosphamide, along with other chemotherapy drugs, is significantly associated with a reduced risk of GGO as part of either neoadjuvant or adjuvant chemotherapy. In our study, patients who received Cyclophosphamide and other chemotherapy drugs as part of either neoadjuvant or adjuvant chemotherapy had lower odds of developing GGO. Moreover, after considering other variables, this association became more pronounced. This association contradicts a study done in the United States by Taghian et al., which showed a significant association between receiving paclitaxel along with any other chemotherapy drugs as part of either neoadjuvant or adjuvant chemotherapy and the decreased chance of developing GGO (p-value <0.0001)(20). The variation can be

partially ascribed to dissimilarities in chemotherapy protocols across the studies, as 51.2% of participants in the study done in United States received sandwich chemotherapy, in contrast to 14.7% in the current study.

Conclusion

The findings of this study illuminate the impact of radiation therapy on the chest in breast cancer patients and underscore the potential role of chemotherapy in mitigating the development of radiation pneumonitis. Specifically, incorporating Cyclophosphamide alongside other chemotherapy agents in neoadjuvant or adjuvant settings was significantly associated with a decreased risk of ground-glass opacities.

Recommendations

The current study is expected to provide enlightenment among oncologists, radiologists, and pulmonologists on how to monitor and manage potential pulmonary complications in breast cancer patients receiving radiation therapy. However, further prospective research is needed to explore radiation-induced pneumonitis and the potential synergistic effects of specific chemotherapy regimens. A more comprehensive study would provide more robust evidence for clinical decision-making.

Study Limitations

When interpreting the results of this study, it is essential to acknowledge that the study deployed a cross-sectional design, which cannot inherently track longitudinal changes or discern temporal patterns in chest CT findings, precluding the establishment of causal relationships. This study was conducted amidst the COVID-19 pandemic, a viral affliction notorious for its propensity to induce pulmonary inflammation. Nevertheless, documenting participants' COVID-19 status was regrettably inadequate, introducing it as a potential confounding factor.

Abbreviations

BMI: Body Mass Index

COPD: Chronic Obstructive Pulmonary Diseases

CT: Computed Tomography

GGO: Ground Glass Opacifications

HU: Hounsfield Unit

HRCT: High-Resolution Computed Tomography

MNH: Muhimbili National Hospital

MRI: Magnetic Resonance Imaging

MUHAS: Muhimbili University of Health and Allied Sciences

ORCI: Ocean Road Cancer Institute

RP: Radiation Pneumonitis

SPSS: Statistical Package for Social Sciences

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Authors' Contributions

MMM, contributed to the conception and design of the study, acquired, analyzed and interpreted the data, and drafted and revised the manuscript. CVM, contributed to the design of the study, data interpretation and critically revised the manuscript, RI, contributed to the design of the study, data interpretation and critically revised the manuscript, TM, contributed to the design of the study, data interpretation and critically revised the manuscript, all authors read and approved the final manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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