ORIGINAL ARTICLE

INCIDENTAL BREAST CANCERS IDENTIFIED ON SCREENING MAMMOGRAMS

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ABSTRACT

OBJECTIVE: Breast carcinoma may display no symptoms in its initial stages; therefore, screening programs are crucial for the early identification of breast malignancies. Moreover, in patients who exhibit breast-related symptoms, breast carcinomas may be located distally from the symptomatic area. The objective of this study was to evaluate the prevalence, anatomical location, and imaging techniques employed in the detection of these incidental malignancies within the symptomatic one-stop breast clinic. **METHODS:** All individuals who presented at department of Radiology at DHQ hospital exhibiting breast-related symptoms during a two-year timeframe were incorporated into the research. We conducted a correlation analysis between the initial symptoms of patients subsequently diagnosed with breast cancer and the results obtained from imaging modalities (mammography and ultrasound). Incidental malignancies were delineated as histologically verified breast carcinomas that were non-palpable, distant from the symptomatic region, and solely detected through imaging techniques. **RESULTS:** During the investigative timeframe, a total of 281 female patients were ascertained to have breast cancer from 440 individuals evaluated. A subset of thirty-six patients (12.8%) who received a diagnosis of breast cancer presented with incidental malignancies that were exclusively detected through imaging modalities. The predominant instances of contralateral incidental cancers were discerned utilizing both mammography and ultrasound (US), with all patients being over the age of 35 years. **CONCLUSION:** We suggest mammography of both breasts and US of the symptomatic breast in order to identify incidental cancers.

Key Words: Breast, Cancer, Mammography, Ultrasonography

Introduction

The screening has exerted a significant influence on the evaluation of women presenting with potential breast cancer. Within the clinic, patients engage in a comprehensive triple assessment that encompasses ultrasound (US), mammography, and tissue sampling as deemed necessary.[1] Patients obtain the outcomes of their radiological evaluations on the same day and are subsequently informed of the results of their tissue sampling in a timely manner. Since the inception of the integrated breast mammogram within our department, we have qualitatively observed that numerous breast neoplasms were detected through imaging

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modalities at locations that did not align with the patient s reported symptoms. A comprehensive rise in the utilization of ultrasound (US) and computed tomography (CT) within the realm of diagnostic radiology has resulted in an augmented identification of additional incidental malignancies, encompassing renal and thyroid carcinomas.[2,3] It has been documented that the detection of breast cancers occurs incidentally during thoracic computed tomography, with an incidence rate ranging from 0.30% to 1.85%.[4,5] It is established that previously unrecognized breast cancers are identified through mammographic imaging and ultrasound examinations.[6,7] Within the breast screening demographic, a total of 7.2 cancers were identified via mammography per 1,000 (0.72%) women screened in England during the years 2007-2008.[6] The incidence of mammographically and clinically occult malignancies that were solely detected through screening ultrasound is reported to be 1.69%.[7] Furthermore, in females exhibiting dense breast tissue, the prevalence of mammographically and clinically undetectable breast malignancies, discerned solely through ultrasound imaging, ranged from 0.23% to 0.32%.[8-10] The objective of our investigation was to evaluate the occurrence of incidental breast cancers within our integrated timeframe.

Methods

Over a two-year period (January 2021 to December 2023), all patients diagnosed with breast cancer at radiology department underwent evaluation. Imaging (US and mammography) results were associated with the patient s presenting symptoms. Every patient over 35 years old who came radiology gets a bilateral mammogram. Additionally, the symptomatic breast undergoes full breast US; however, if the patient s clinical symptoms, examination or mammography are suggestive of malignancy, then bilateral, whole breast US is performed.[11] Histopathologically confirmed breast cancers which entirely correlated to the patient's symptoms" was how we classified symptomatic malignancies. "Historically confirmed breast cancers which were detected only by imaging in a completely separate location to the site of presenting symptom and were not palpable by the clinician" is how we classified incidental malignancies. Because these incidental tumours were always histologically distinct from any symptomatic cancer that may have been present, the pathologist mistook them for distinct cancers. After collecting the radiological analysis, results were correlated with information on presenting symptoms as well as clinical, and histological outcomes, is how the accidental malignancies were first discovered. The hospital case notes for these patients were then also reviewed by us.

Results

Total 281 (6.4%) of the 4000 patients evaluated in the radiology department during the course of the two-year trial were found to have breast cancer. The study was approved by institutional review committee. Of them, 245 (5.6%) had breast cancers that were symptomatic and linked with radiological abnormalities, and 36 (0.8%) had incidental breast cancers that were discovered only by imaging and were unrelated to the symptoms. In the one-stop breast clinic, 87.2% of patients received cancer diagnoses that were symptomatic, while 12.8% of patients had an incidental malignancy discovered (with or without a comorbid condition). Out of the 36 patients who received an incidental cancer diagnosis, 23 (63.9%) had the cancer found in the breast opposite their presenting symptom, and 13 (36.1%) had the cancer found in the breast opposite their symptom (Tab.1, Fig.1). Of the 23 ipsilateral incidental malignancies, five were in patients with normal or benign change and 18 were in patients who also had a symptomatic disease (Tab.2). Of the 13 accidental contralateral malignancies, 4 patients had normal or benign change at presentation, and 9 patients additionally had a symptomatic malignancy

Site of incidental cancers compared to presenting symptoms	Total No.	Percentage
Ipsilateral, different quadrant	15	41.7%
Ipsilateral, same quadrant	6	16.7%
Ipsilateral, axillary lymph node presentation	2	5.6 %
Contralateral breast	13	36.1%
Total	36	100%

Table 1: Site of incidental breast cancers compared to the site of the patients presenting symptom

(Tab.2). Out of the 36 incidental cancers, nine (25%) were single incidental cancers and 27 (75%) were second malignancies that were evidently distinct from the symptomatic malignancy on both imaging and histology.

	Lump	Nipple inversion	Nipple discharge	Pain Nipple	eczema
Ipsilateral (n=23) Presenting symptoms	21	1	1		
Histological outcome Malignant	18				
Benign	1				
Normal	2	1	1		
Contralateral (n=13) Presenting symptoms	11			2	
Histological outcome Malignant	9				
Benign	2				
Normal				1	1

Table 2: Presenting symptom and histological outcome of presenting symptom of patients diagnosed with incidental cancers

As a result, 0.2% (9 out of 4,400 patients) of all solitary accidental breast malignancies. In contrast to incidental cancers, which had a mean age range of 63 years (36-90 years), individuals with symptomatic malignancies had a mean age range of 64 years (24-100 years). Patients with incidental breast cancers in the ipsilateral breast prior to presenting symptoms ranged in age from 38 to 79 years, whereas those with contralateral incidental breast cancers ranged in age from 36 to 90 years. Fifteen individuals were over the age range (50-70 years) for the national breast screening program, while seven patients had incident malignancies below that age range. When comparing patients with symptomatic breast cancer to those with incident breast cancer, the Nottingham Prognostic Index (NPI) for symptomatic patients was 4.4, whereas for incident patients it was 4.5. Atypical methods were used to identify some of the accidental malignancies (Tab.2). After imaging revealed incidental breast tumours in two patients who had axillary node metastases. After undergoing imaging, a patient who initially had a straightforward breast abscess was discovered to have incidental breast cancer on her contralateral breast. A patient with persistent nipple inversion and another with non-blood stained green nipple discharge were among the other patients with incidenceal tumours; these patients were not deemed clinically suspicious for malignancy. The imaging modalities used to identify incident oral malignancies is shown in (Tab.3). Both modalities detected most of

Imaging modality	Ipsilateral No. (%)	Contralateral No. (%)
Both mammogram and US	15 (65.2)	10 (76.9)
Mammogram only		2 (15.4)
US only	7 (30.4)	
Mammogram not performed	1 (4.3)	
US not performed		1 (7.7)
Total	23 (100)	13 (100)

Table 3: Imaging modality by which incidental cancers were identified the site of the incidental breast cancer is indicated in relation to the site of the presenting symptom

the accidental cancer cases. The incidence of incidental breast cancers discovered by mammography was 0.61% in the one-stop clinic since 27 incidenceal breast cancers were found by mammography (some of which were also found by US). In the same way, 32 incidental breast cancers were found by US (some of which were also found by mammography). As a result, the incidence of incidental breast cancers found by US in the one-stop clinic was 0.73%. Seven incidental breast cancers were only discovered by US (mammographically occult), while two incidenceal breast cancers were only found by mammography (ultrasonographically occult). Consequently, the incidence of incidental breast cancers found alone by mammography in the one-stop breast clinic was 0.05%, while the incidence of mammographically occult breast cancers found solely by US was 0.16%. One patient did not have a mammography because she had just had a normal surveillance mammography of her residual breast and had a chest wall recurrence after a previous mastectomy on the same side as her presenting symptom. Due to pain, a different patient who was found to have incidental cancer on the breast opposite her presenting symptom and an evident breast cancer on the same breast did not get a US examination.

Discussion

In this study, a sizable fraction of patients-12.8%-who received a breast cancer diagnosis by accident (i.e.,

without any symptoms) and were only detected by imaging. This was greater than what we had anticipated before starting this investigation. As far as we know, clinician has never looked at incidental malignancies. About one-third of patients with accidental cancer diagnoses had the cancer on the breast opposite the site of the preceding symptom. While most contralateral incidental tumours were detected by both mammography and US, two cancers (ultrasonographically occult) were detected by mammography alone. On her mammography, one of these two patients had microcalcification that was ultrasonographically occult. The age of the youngest patient whose contralateral breast cancer was only discovered by imaging was thirty six. In order to detect incidental malignancies, these results would be in favour of a comprehensive evaluation of both breasts using mammography in patients older than 35. Most patients with contralateral incidental cancer have another malignancy as the cause of their current illness. Patients who have had a unilateral breast cancer are known to be 5-15% more likely to get a contralateral breast cancer in the future.[12,13] In light of this, radiographic evaluation of the contralateral breast is especially crucial in cases when a probable cancer has already been found in the symptomatic breast. This is in accordance with previous studies, which demonstrate that mammography is the follow-up imaging modality of choice to detect contralateral breast cancers in patients with a unilateral breast cancer.[14,15] Both imaging modalities detected most incidental malignancies in the ipsilateral breast related to the patient's presenting symptom; however, US examination was only used to detect one-third of instances. This supports the idea that the symptomatic breast should undergo both imaging modalities. Most cases where there was an accidental cancer on the same side as the presenting ailment later had the presenting symptom diagnosed as a different cancer. Because of this, US evaluation of the symptomatic breast is crucial anytime a suspected cancer is discovered. Additionally, prior research has shown that US is more accurate than mammography at determining the degree of cancer spread, and it should be utilised in particular whenever breast-conserving surgery is being considered.[16,17] Although the most prevalent presenting symptom for individuals in this analysis was a lump that was later proved to be a distinct malignancy, all forms of presenting symptoms were associated with incidental cancer. The aetiology of the presenting symptom itself was consistently linked to normal breast tissue in individuals exhibiting symptoms that were not thought to be suggestive of breast cancer, such as non-blood stained nipple discharge and breast pain. It's probable that the incidental cancer in the two individuals who had long-standing nipple inversion and green nipple discharge developed microscopically along the ductal system, causing these symptoms.

Since many patients have several pathologies, it is crucial to thoroughly assess the entire breast using both imaging modalities, even if the clinical history is unremarkable and benign pathology or normal breast tissue has been found to match to the patient's symptoms. This has also been emphasised in other research showing that incidental cancers are discovered on bilateral mammography in a small but significant percentage of women with a non-suspicious clinical history.[18-20] The overall mammography detection rate for breast cancer was 0.61%, which is comparable to the Breast Screening Programme's detection rate of 0.72%.[6] The US detection rate for breast cancer was 0.73%; this is higher than studies where patients with dense breasts who were asymptomatic but had US screening[8-10] but lower than that reported by Simpson et al.[7] Even though the one-stop clinic is successfully screening its patients, the discovery of an unintentional cancer could have a significant effect on how well the patient is managed. Patients may have breast conservation surgery if they only have one symptomatic malignancy. However, patients who have a symptomless cancer in one breast and an incidental cancer in another will eventually have a mastectomy. Furthermore, individuals who have an accidental cancer in the breast opposite a symptomatic malignancy will have bilateral breast surgery, either a mastectomy or a large local excision. Moreover, the discovery of two distinct cancers can call for a modification of the chemotherapy schedule. A sizable fraction of breast cancers found at radiology department, symptomatic breast clinic are incidental breast tumours, which can only be found by imaging. To detect incidental breast malignancies, we suggest whole breast US of the symptomatic breast and suggest mammography of both breasts. The radiology department is successfully using US and mammography to screen patients, but the discovery of inci-

dental breast cancers has important ramifications for patient care.

Conflict of Interest: Declared none.

References

1. SEER Cancer Stat Facts: female breast cancer. National Cancer Institute. Published 2023. Accessed July 31, 2023. https://seer.cancer.gov/statfacts/html/breast.html

2. Cancer Statistics Explorer Network. Breast cancer: SEER 5-year age-adjusted incidence rates, 2015-2019. National Cancer Institute. Published 2022. Accessed February 16, 2023. https://seer.cancer.gov/statistics-network/explorer/application.html

3. American Association for Cancer Research. AACR cancer disparities progress report 2020. Published 2020. Accessed September 23, 2020. https://cancerprogressreport.aacr.org/disparities/

4. Trentham-Dietz A, Chapman CH, Jayasekera J, et al. Collaborative modeling to compare different breast cancer screening strategies: a decision analysis for the US Preventive Services Task Force. JAMA. Published April 30, 2024. doi:10.1001/jama.2023.24766

5. US Preventive Services Task Force. Screening for breast cancer: US Preventive Services Task Force recommendation statement. JAMA. Published April 30, 2024. doi:10.1001/jama.2024.5534

6. Henderson JT, Webber EM, Weyrich M, Miller M, Melnikow J. Screening for Breast Cancer: A Comparative Effectiveness Review for the US Preventive Services Task Force. Evidence Synthesis No. 231. Agency for Healthcare Research and Quality; 2024. AHRQ publication 23-05303-EF-1.

7. Wang S, Sultana F, Kavanagh A, et al. Benefits and harms of breast cancer screening: cohort study of breast cancer mortality and overdiagnosis. Cancer Med. 2023; **12(17):** 18120-32.

8. Richman IB, Long JB, Soulos PR, Wang SY, Gross CP. Estimating breast cancer overdiagnosis after screening mammography among older women in the United States. Ann Intern Med. 2023; **176(9):** 1172-80.

9. National Comprehensive Cancer Network. NCCN Guidelines: breast cancer screening and diagnosis. Published 2022. Accessed March 10, 2023. http://www.nccn.org/guidelines/guidelines-detail?category=2&id=1421

10. Canelo-Aybar C, Carrera L, BeltrÆn J, et al. Digital breast tomosynthesis compared to diagnostic mammographic projections (including magnification) among women recalled at screening mammography: a systematic review for the European Commission Initiative on Breast Cancer (ECIBC). Cancer Med. 2021; **10(7):** 2191-204.

11. Ryser MD, Lange J, Inoue LYT, et al. Estimation of breast cancer overdiagnosis in a U.S. breast screening cohort. Ann Intern Med. 2022; **175(4):** 471-8.

12. Dunn BK, Woloshin S, Xie H, Kramer BS. Cancer overdiagnosis: a challenge in the era of screening. J Natl Cancer Cent. 2022; **2(4):** 235-42.

13. Berkman ND, Lohr KN, Ansari M, et al. AHRQ Methods for Effective Health Care: grading the strength of a body of evidence when assessing health care interventions for the effective health care program of the Agency for Healthcare Research and Quality: an update. In: Methods Guide for Effectiveness and Comparative Effectiveness Reviews. Agency for Healthcare Research and Quality. Published 2008. Accessed March 18, 2024. https://www.ncbi.nlm.nih.gov/books/NBK174881/

14. Armaroli P, Frigerio A, Correale L, et al. A randomised controlled trial of digital breast tomosynthesis vs digital mammography as primary screening tests: screening results over subsequent episodes of the Proteus Donna study. Int J Cancer. 2022; **151(10):** 1778-90.

15. Ganguli I, Keating NL, Thakore N, Lii J, Raza S, Pace LE. Downstream mammary and extramammary cascade services and spending following screening breast magnetic resonance imaging vs mammography among commercially insured women. JAMA Netw Open. 2022; **5(4):** e227234.

16. Heindel W, Weigel S, Ger J, et al; TOSYMA Screening Trial Study Group. Digital breast tomosynthesis plus synthesised mammography versus digital screening mammography for the detection of invasive breast cancer (TOSYMA): a multicentre, open-label, randomised, controlled, superiority trial. Lancet Oncol. 2022; **23(5):** 601-11.

17. Ho TH, Bissell MCS, Kerlikowske K, et al. Cumulative probability of false-positive results after 10 years of screening with digital breast tomosynthesis vs digital mammography. JAMA Netw Open. 2022; **5(3):** e222440.

18. Sprague BL, Coley RY, Lowry KP, et al. Digital breast tomosynthesis versus digital mammography screening performance on successive screening rounds from the Breast Cancer Surveillance Consortium. Radiology. 2023; **307(5):** e223142.

19. Cancer Statistics Explorer Network. Breast cancer: US mortality rates by age at death, 2016-2020, by race/ethnicity (based on us mortality data 1969-2020). National Cancer Institute. Published 2022. Accessed February 16, 2023. https://seer.cancer.gov/statistics-network/explorer/application.html

20. Chen T, Kharazmi E, Fallah M. Race and ethnicity-adjusted age recommendation for initiating breast cancer screening. JAMA Netw Open. 2023; **6(4):** e238893.

21. Feng X, Zahed H, Onwuka J, et al. Cancer stage compared with mortality as end points in randomized clinical trials of cancer screening: a systematic review and meta-analysis. JAMA. Published April 7, 2024. doi:10.1001/jama.2024.5814

22. Women Informed to Screen Depending on Measures of Risk (Wisdom Study) [NCT02620852]. Updated December 8, 2022. Accessed August 7, 2023. https://www.clinicaltrials.gov/study/NCT02620852

23. My Personalized Breast Screening (MyPeBS) [NCT03672331]. Updated June 15, 2023. Accessed August 7, 2023. https://clinicaltrials.gov/study/NCT03672331