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Effect of the Covid-19 pandemic on breast cancer presentation

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Abstract

Introduction

On 11th March 2020 the World Health organization officially declared the Novel Coronavirus-19 a global pandemic.[1] The resulting worldwide reconfiguration of national health systems posed a significant challenge to the diagnosis and treatment of many diseases, including that of Breast Cancer.[2]

Aims

Due to the closure of pre-existing diagnostic pathways and the cancellation of elective surgery, the presentation and management of Breast Cancer during the pandemic era changed.[3] The aim of this study was to conduct a retrospective analysis of breast cancers presentations during the Covid era in a busy tertiary referral Breast Cancer center in Ireland.

Methods

A retrospective observational study was performed of all patients presenting with breast cancer to Beaumont Hospital from January 2017 to December 2021. Variables collected included (i) total number of patients attending the service, (ii) Absolute number of breast cancers, (iii) TNM staging and (iv) Number of locally advanced breast cancers presenting every year. Descriptive statistics were calculated for all numerical variables and logistical regression was performed.

Results

The yearly number of new cancer diagnoses was higher in the pandemic era (378 vs 332 cases per year). Cases of Ductal Carcinoma in situ were unchanged (7% in the pandemic era vs 6% previously). The incidence of Stage I and Stage II increased by 10% in the pandemic era. The number of locally advanced breast cancer diagnoses more than doubled during the pandemic era (from 1.5% to 3.4% OR 2.25 95% CI: 1.18 to 4.3, p=0.014)

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The Covid-19 pandemic affected modes of presentation and diagnoses of new breast cancer cases. More diagnoses were made in a hospital setting with a higher incidence of stage I and II disease as well as significantly higher cases of locally advanced and fungating disease.

Introduction

Breast cancer remains the most frequently occurring non-cutaneous malignancy in women with an associated mortality rate of 2.6%.[4] Approximately 3700 new cases of breast cancer are diagnosed each year in Ireland resulting in nearly 760 mortalities[5]. The number of patients having undergone breast cancer treatment in Ireland continues to increase on a yearly basis with breast cancer now accounting for 23% of all cancer survivors (n=45,875). Overall survivorship from breast cancer surpasses all other cancer types in Ireland.[6] Due to improved access to diagnostics, breast cancer has continued to be diagnosed at an earlier stage over the last decade, resulting in improved survival outcomes. Today, the five-year survival rate of patients diagnosed with stage I breast cancer is 98%. In contrast, only 25% of those diagnosed with Stage IV disease will be alive after five years.[7]

The diagnosis of Breast cancer typically occurs through one of two pathways: (i) Patient presents with clinical manifestations (symptoms such as a lump, nipple discharge or skin changes), accounting for approximately 66% of new cases or (ii) through the National Breast Screening Programme, where the patient is diagnosed due to an abnormality found on screening mammography, accounting for the remaining 33% of cases.

The Covid-19 pandemic had detrimental effects on both of these diagnostic pathways. On March 11th 2020, The World Health Organization (WHO) declared the novel coronavirus (COVID-19) outbreak a global pandemic, [1] resulting in challenges to national health systems worldwide. The majority of hospitals were required to introduce unprecedented changes with significant re-allocation of resources required to deal with the influx of patients suffering from COVID-19. As a result, access to diagnostics and surgical procedures became a significant challenge. Patients were advised by authorities to stay home and to seek medical attention only in emergency situations. As a result, the pandemic had a negative impact on the screening, presentation, diagnosis, treatment and follow up of Breast Cancer.[2] Many elective procedures (including breast reconstruction) were deferred due to recommendations that non-urgent surgeries be postponed. In other cases, patients with early stage hormone receptor positive disease were commenced on primary endocrine therapy alone (instead of surgery) until such time that elective operative interventions were deemed safe to resume. [3] Significant changes and disruptions also occurred within breast imaging, such as the pausing of the National Breast Screening Programme, as well as how diagnostic breast imaging was triaged.

The aim of this study was to conduct a retrospective analysis of how these pandemic-related healthcare challenges affected the presentation and diagnosis of breast cancer. Specifically, the incidence of newly diagnosed fungating breast cancers presenting during the pre-Covid period compared to the pandemic period were analysed. We hypothesised that during the COVID-19 pandemic, the number of locally advanced breast cancer patients presenting in a delayed manner to the breast clinic increased, resulting in an increased burden being placed on the hospital healthcare system.

Methods

This single-centre study was a retrospective observational study which identified and compared the Tumour-Node-Metastases (TNM, 8th Edition - American Joint Committee on Cancer)[8] staging of all new breast cancers diagnoses presenting to Beaumont Hospital over a five-year period between January 2017 and December 2021. The pre-COVID cohort (patients presenting between 2017 – 2019) was compared with the COVID-19 cohort (2020 – 2021).

Data on TNM staging of all patients was collected retrospectively. Patients with missing data on staging were reviewed and clinical staging assigned to them. Data on the following variables was collected: (i) Total number of patients reviewed in Beaumont Breast Clinic per annum, (ii) Absolute number of breast cancers treated In Beaumont Hospital each year, (iii) Absolute number of patients with their TNM stage of Breast Cancer per year and (iv) Number of locally advanced breast cancers presenting each year. For the purpose of this study, the term “locally advanced breast cancer” is defined as per National Comprehensive Cancer Network (NCCN) guidelines[8].

Patients with incomplete histopathological or radiological data were excluded. Patients with breast cancer recurrence and patients with disease progression were also excluded. Data was compiled, anonymized and analysed using Microsoft Excel on an encrypted device. Descriptive statistics were calculated for all numerical variables. Data protection was performed as per national General Data Protection guidelines.

Results

27,102 new patients presented to the Beaumont Hospital Breast Clinic over the five-year study period. 15,763 patients presented during the pre-covid period (2017-2019) compared to 11,339 during the pandemic period (2020-2021). Over the five years, 1,952 breast cancers were diagnosed (table 1). The median number of new cancer diagnoses per year was 349 (Range: 314-386). The mean number of cancers diagnosed within the pre COVID era was 332 (Range: 314-349) compared to a higher mean of 378 cancers (Range: 370-386) in the COVID

era. 90% of all breast cancer diagnoses were new cases, with the remaining 10% of diagnoses being recurrences.

The number of breast cancers diagnosed in stage I and II increased during the pandemic era when compared to the pre-Covid era (table 2). There was an increase of 10% in both stage I & II cancers seen during the pandemic. This is likely explained by the closure of Breast Check services during the pandemic and the subsequent diversion of early tumours towards the hospital setting. The mean stage III and IV breast cancers remained comparable across both periods.

The number of locally advanced/fungating breast cancer cases increased significantly during the Covid-19 pandemic (table 3). In 2017, seven patients presented with locally advanced disease along with two patients in 2018 and six patients in 2019, accounting for 1.5 % (15/988) of all new cases during the pre-pandemic era. This is in comparison to 3.4% (25/744) of all new cases during the pandemic era (10/361 patients in 2020 and 15/383) in 2021. The incidence rate more than doubled during the Covid 19 pandemic (OR 2.25 95% CI: 1.18 to 4.3, p=0.014.

Table 1: Comparison of total number of patients seen in the symptomatic breast clinic, breast cancer diagnosis and new primary breast cancers

	2017	**2018**	**2019**	**2020**	**2021**
Patients reviewed	4688	5347	5728	5525	5814
Breast cancers diagnosed	348	396	381	403	424
New Primary Breast cancers	314 (6.6%)	349 (6.5%)	335 (5.8%)	370 (6.96%)	386 (6.4%)

Table 2: Stage distribution

	2017	2018	2019	2020	2021	Pre pandemic (Mean)	Pandemic
Stage 0 (DCIS)	28	26	17	22	26	71 (23.6)	48 (24)
Stage I	78	126	161	177	122	365 (123.6)	299 (149.5)
Stage II	129	106	86	101	157	321 (107)	258 (129)
Stage III	61	54	57	41	59	172 (57.3)	100 (50)
Stage IV (excl. fungating tumours)	12	24	23	20	19	59 (19.6)	39 (19.5)
Fungating Tumours	7	2	6	10	15	15	25
Total	308	342	344	361	383	988	644

Discussion

Numerous studies[9,10,11] have demonstrated a reduction in the total number of malignancies and in-situ breast cancer cases diagnosed during the pandemic period the. A study by (Skovlund et al) reported no change in the stage of breast cancer diagnosed during the pandemic.[12] Conversely, our findings demonstrate a slight increase in the number of confirmed cancer cases over this pandemic period. This difference is likely due to two factors. Firstly, the study performed in Denmark was primarily conducted during the early lockdown

period in 2020 and was therefore likely too early to account for any changes in the stage of disease at presentation.[12] Secondly, our institution made additional efforts to review an increasing volume of patients in the outpatient setting once lockdown restrictions had eased in order to clear any backlog. As such, a similar number of referrals were seen despite restrictions and temporary closures of outpatient clinics during the early pandemic period.

Despite the suspension of screening services, the incidence of carcinoma in-situ breast disease in this study was comparatively similar across both periods (accounting for 6% in the pandemic period compared to 7% during the pre-pandemic period). Stage I and II presentations did increase slightly, representing 75% of new diagnoses during the pandemic period compared to only 69.4% during the pre-pandemic period. There was a slight reduction in the incidence of stage III disease and almost identical incidence of stage IV disease across the two time periods. We noted that the proportion of total cancers presenting as fungating breast tumours more than doubled during the pandemic period, with 25 new locally advanced fungating tumours (accounting for 3.4% of all new diagnoses) identified during this period.

There are a number of factors accounting for the changes seen in breast cancer presentations in our institution during the pandemic period. The increase in Stage I and II breast malignancies is likely attributed to the number of patients presenting to the breast clinic who would otherwise have been diagnosed through the National Breast Screening Programme. This effect has previously been demonstrated in the UK where screen-detected cancers dropped from 43.8% during the pre-pandemic period to only 9.2% during the pandemic period[11].

A number of studies published in the last 3 years have used predictive mathematical models to assess the impact of COVID-19 on numbers and stage of newly diagnosed breast cancers.[13,14] Yong et al. used an OncoSim-Breast cancer microsimulation model to estimate the long-term impact of pausing the Canadian National Breast Screening Programme. The authors reported that a three-month suspension of services could increase the incidence of Stage III and Stage IV presentations as well as death from breast cancer between 2020-2029[13]. Similar studies have estimated that a delay in screening programmes will lead to an increase in (i) stage of breast cancer at presentation [15], (ii) delayed presentations by up to 2-3 months[16] and (iii) increased breast cancer mortality in the next 5 years[17] .

Pandemic-related delays in the referral of patients and fear of attending medical facilities likely accounted for the increased incidence of fungating tumour presentations during the pandemic period. Ordinarily, 2-5% of locally advanced breast cancers develop a fungating wound.[18] Patients presenting with such advanced tumours in Ireland have traditionally been low – however, this study demonstrates that this has increased two-fold during the pandemic years. This may result in a detrimental effect on recurrence rates as well as overall and disease-free survival rates over the next 5-10 years[9].

The increase in patients seen with fungating lesions mirrors the findings of an Italian study by Vanni et al, who found the incidence of patients presenting with "extremely advanced disease" increased significantly during the pandemic period (2.7%) compared to the pre-COVID group (0%); p=0.011[19]. The authors concluded that the suspension of breast cancer screening and the delay in breast cancer treatments were not the cause of these presentations. Anxiety and fear were reported to play a significant role with an increased rate of refusal to attend hospital services with a resulting impact on late diagnosis and cure.[20] Management of fungating lesions presents an increased pressure on patients and healthcare providers as previously documented by Lo et al[21].

As a retrospective observational analysis, this study has an inherent limitation in its design. The data collected in this analysis represents only one of eight Breast Cancer centres across Ireland and therefore does not necessarily reflect national trends. A multicentre study across the country would help apply these findings to the general population and understand the true nature of impact of pandemic across the nation. The unit in this study does not provide a screening service and so outcomes from a centre that includes screening patients may yield different outcomes. An additional limiting factor arises from the fact that numerous patients were staged clinically based on radiographic findings and not from histopathology. This limits the precise accuracy of staging as per UICC staging guidelines.

The findings of this study highlights the impact of the COVID-19 pandemic on breast cancer presentations in our institution. Further multicentre studies are required to assess the impact at a national and international level. In addition, future studies will also provide critical insight into the impact of such changes on longer-term outcomes such as survival and mortality[22] . The study highlights the need for robust strategies and pathways to overcome the backlog of delayed screening appointments as well as avoiding any further delay in reviewing patients with possible breast cancer, which may have an adverse effect on longer-term outcomes.

Covid-19 caused an increased volume of breast cancer patients presenting with locally advanced disease to our centre. There are many reasons to account for the increased presentation of fungating breast cancer patients. Over the coming year as we recover from the pandemic this number may continue to rise as more patients seek medical care and similarly more locally advanced presentations can be observed. Current research should be directed towards implementing pathways to overcome this backlog created during the pandemic in order to provide optimum care to the patients and negate long term negative effects.

Declarations of Conflicts of Interest:
None declared.

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