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Case Report

CASE REPORT

Radiation-induced breast cancer: the question of early breast cancer screening in Hodgkin's lymphoma survivors

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Abstract

Chest irradiation is associated with numerous early and late complications that arise from ionizing radiation-induced damage to cellular structures within the field of therapy. In patients exposed to chest irradiation at an early age as part of the treatment of childhood cancer, specifically Hodgkin's lymphoma, the increased risk of breast cancer in the long run should be considered. A case of a 35-year-old woman who exposed to chest irradiation as part of the treatment of Hodgkin's lymphoma at the age of 20 years is presented here and serves as a reminder of this somewhat overlooked complication. The article presents the evidence available for and against breast cancer screening in this particular patient population.

INTRODUCTION

It has long been established that young women treated for childhood cancer, specifically Hodgkin's lymphoma, with chest irradiation have an elevated risk of breast cancer [1–4]. On the basis of this, guidelines have been put in place regarding breast imaging for early detection of cancer in patients exposed to chest irradiation. Awareness of these guidelines and strength of evidence are essential in the primary care setting to guide appropriate management. We report a case of radiation-induced breast cancer in a young woman and summarize the available evidence that pertains to screening in this patient population.

CASE REPORT

A 35-year-old woman presented to the primary care clinic to establish care after relocating to a new city. She reported intermittent, unilateral, bloody nipple discharge over the preceding 2 months, and the presence of a breast mass. She denied overlying skin changes or abnormalities in the contralateral breast. Her past history was significant for Hodgkin lymphoma (HL) diagnosed when she was 20 years old, and treated with combination chemotherapy (ABVD; doxorubicin, bleomycin, vinblastine and dacarbazine) and chest radiation therapy (RT). There was no evidence of disease recurrence over the 15-year period of follow-up, and the patient was deemed cured. She denied tobacco or illicit drug use. Her family history was negative for malignancy, and she was not taking any prescription or over-the-counter medications.

Clinical breast examination revealed a small palpable mass in the right breast at the 10 o'clock position. There was no nipple retraction or skin discoloration. Examination of the left breast and axillary lymph nodes was unremarkable. The patient underwent bilateral mammography and an ultrasound of the right breast which confirmed the presence of a suspicious mass measuring 0.8 × 0.7 cm at the same position ~2 cm from the nipple. Image-guided core biopsy revealed moderately differentiated invasive ductal adenocarcinoma. Estrogen receptor was strongly positive

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in 90% of tumor cells, progesterone receptor was positive in 50% of tumor cells and HER2 was scored as 0 by immunohistochemistry (IHC). The patient underwent a modified radical mastectomy after sentinel lymph node sampling was negative for malignancy. Her clinical stage was IA, and she was started on adjuvant hormonal therapy with tamoxifen for a planned 5-year period. Genetic testing for BRCA 1 and BRCA 2 mutations was negative.

DISCUSSION

Being aware of the guidelines pertaining to long-term healthcare of cancer survivors is essential when dealing with patients in the primary care setting. Evidence-based guidelines on routine breast imaging for early detection of treatment-related breast cancer is one such area that tends to be missed by patients and primary care physicians due to their unfamiliarity with the recommendation. A survey of women in Canada and the USA treated with chest RT in the pediatric age revealed that only 49% were aware of the increased risk of breast cancer [5].

The risk is highest in younger patients (<30 years) exposed to extended-field RT that targeted the axillae, infraclavicular, hilar and mediastinal nodes (i.e. mantle). The Late Effects Study Group trial reported a 56.7-fold increase in the overall risk of breast cancer associated with prior mantle RT at a young age compared with the general population. In that study, the relative risk according to the follow-up interval was 0 at 5–9 years, 71.3 at 10–14 years and 90.8 at 15–19 years [4]. Since then, mantle RT has been replaced by involved-site and involved-field RT which is associated with a significant decrease in the risk of direct breast irradiation [6].

Despite the current use of targeted RT, there are still survivors who received outdated RT and who will require screening for decades to come. The Society of Breast Imaging, American College of Radiology (ACR) [7] and the National Comprehensive Cancer Network (NCCN) [8] recommend annual mammogram screening together with breast MRI for women who underwent chest RT between the ages of 10 and 30 years beginning 8–10 years after exposure. However, breast mammogram is not recommended for women <25 years of age. The addition of breast MRI is also recommended by the American Cancer Society (ACS) due to the improved sensitivity seen with combining the two modalities [9]. A prospective study in HL survivors showed equal sensitivity of both methods (68% for mammography and 63% for MRI), but reported a remarkable improvement in sensitivity with the combination (95%), which allowed for detection of early-stage breast cancer [10].

Our patient was not aware of her need for breast cancer screening starting at age 28–30, and the diagnosis came as a surprise to her. Given her negative family history for breast cancer and lack of high-risk genetic mutations, it would be reasonable to conclude that this was radiation-induced breast cancer. Lumpectomy followed by RT was not an option due to her previous history of chest RT. Furthermore, had it not been an early-stage tumor, she would have required systemic chemotherapy that included a second round of anthracycline-based treatments putting her at greater risk of cardiomyopathy.

It is important to recognize that all these recommendations are based on expert consensus opinion and are supported by neither nonrandomized observational studies nor prospective randomized trials. These guidelines have been put in place because of the evidence for increased lifetime risk of breast cancer in this patient population. Unfortunately, strong evidence in support of screening is likely unachievable due to the limited population size. The risks associated with screening, such as the high rate of false-positive results leading to unnecessary interventions and psychological distress, should be considered in counseling patients in the primary care setting. It remains a matter of opinion whether early detection in this group outweighs the risks and whether it leads to improvement in survival.

CONFLICT OF INTEREST STATEMENT

All authors had access to the data and a role in writing the manuscript.

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ETHICAL APPROVAL

No ethical approval is required.

CONSENT

No consent is obtained.

GUARANTOR

T.H. is a guarantor of the study.

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