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Type 2 Diabetes and Breast Cancer Survivorship: A Case Report

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Diabetes and Breast Cancer Survivorship: A Case Report

The breast cancer survivor community continues to expand with improved breast cancer screening and treatment. Female breast cancer survivors with a comorbid diagnosis of type 2 diabetes are at higher risk for morbidity, mortality and decreased quality of life than other breast cancer survivors. A 45-year-old Caucasian female, with significant past medical history of type 2 diabetes and hypertension, presented to the primary care clinic for evaluation regarding diabetic follow-up. She admitted to lack of follow-up regarding her diabetes, poor dietary choices and a sedentary lifestyle. A collaborative approach was taken in the care of this patient to assure improved outcomes and to reinforce necessary lifestyle changes. Survivorship care of diabetic breast cancer survivors should focus on effective diabetes management, identification of modifiable lifestyle factors, medication compliance and supporting positive health changes.

While additional research is required, future interventions must incorporate the entire treatment team, including primary care providers and oncology specialists, in a coordinated effort to improve breast cancer survivor quality of life and long-term outcomes. Lifestyle intervention programs may help improve health-related quality of life in diabetic breast cancer survivors.
Introduction

The continuous advancements in breast cancer screening and treatment coupled with an aging society has resulted in a persistent expansion of the breast cancer survivor community (Vissers, Falzon, van de Poll-Franse, Pouwer, & Thong, 2016). More than 3.5 million women in the United States have a history of breast cancer (American Cancer Society, 2017). The relative five-year survival rate for female breast cancer is near 90% with almost 100% 5-year relative survival rate for stage 1, localized, breast cancer (Howlander et al., 2017). The incidence of type 2 diabetes in cancer survivors is higher than that of the general population (Onitilo et al., 2013). Chronic conditions diagnosed in the cancer survivor are associated with increased health care use, medical costs and loss of productivity (Guy et al., 2017; Heins, Korevaar, Rijken & Schellevis, 2012). The purpose of this case report is to identify current evidence regarding best practices in the care diabetic breast cancer survivors (BCS). This paper will present necessary background information on the topic, a related case report, current literature review, synthesis and recommendations for future research.

Background

In general, survivors of cancer are more likely to suffer from chronic conditions than an individual without a history of cancer (Guy et al., 2017). Long-term cancer survivors are at increased risk for type 2 diabetes, cardiovascular disease, overweight and obesity, chronic pain, fatigue and poor health-related quality of life (Conlon et al., 2015). Unique considerations and management interventions are required to improve survivorship care, including physical and emotional health promotion, in the growing population of BCS. While survivorship should be much celebrated in the arena of breast cancer treatment, the long-term health, economic and psychosocial implications must not be overlooked. The known long-term effects of the breast
cancer diagnosis highlight the importance of improving survivorship care through intensified screening, surveillance and chronic disease management (Guy et al., 2017).

While the community of cancer survivors continues to grow, finding a universally accepted definition for the concept of “cancer survivorship” has proved difficult. For the purpose of this case report, the content is directed towards the individual in “permanent survivorship”; when cancer treatment is completed, recurrence is not likely and focus is on the long-term effects of cancer and its treatment (American Society of Clinical Oncology, 2016). In addition, this case report focuses on female BCS, recognizing these results may not be generalizable to male BCS.

While both cancer and diabetes share many similar risk factors including aging, obesity, diet and physical inactivity, the association between the two disease states has yet to be fully elucidated (Paxton, Taylor, Chang, Courneya, & Jones, 2013). Potential direct links between the diagnosis of diabetes and cancer include hyperinsulinemia, hyperglycemia and inflammation (Onitilo et al., 2013). The association may also be related to cancer treatment, age and/or unhealthy lifestyle choices (obesity and sedentary lifestyle) (Onitilo et al., 2013; Lipscombe et al., 2013; Weaver et al., 2013). Regardless, cancer survivors with diabetes represent a vulnerable population who may benefit from increased screening and treatment of comorbidities, as well as promoting a healthy lifestyle. A current review of the literature regarding the diagnosis of type 2 diabetes in BCS was conducted in order to identify best practices in providing survivorship care to this patient population.

Case Report

A 45-year-old Caucasian female, with significant past medical history of type 2 diabetes and hypertension, presented to the clinic for a chief complaint of “diabetes follow-up”. She reported she saw the diabetes educator last week and was encouraged to come in for follow-up.
She presented with concerns regarding a 20-pound weight gain over the course of a year and fatigue for the last six months. She stated a known diagnosis of type 2 diabetes, however admitted to being inconsistent in her follow-up for her diagnosis. She noted she was diagnosed “a few years ago,” and at that time, she was started on oral Metformin 500 mg twice daily. She reported taking this medication consistently. Family history was significant for a myocardial infarction in her father at age 50.

In regards to her weight gain, the patient felt this was appropriate given her recent poor dietary choices and inactivity. She denied any shortness of breath, edema or decreased urine output. Her additional symptom of fatigue was quite nonspecific. Discussion included sleep hygiene, limiting caffeine/alcohol intake as well as improving her glycemic control as interventions to help with her symptoms of fatigue.

The patient’s vital signs revealed moderate hypertension at 148/98, a normal pulse, respiratory rate and temperature. Her medications included Metformin 500 mg twice daily, aspirin 81 mg daily, Lisinopril 20 mg daily, Atorvastatin 20 mg daily and a multivitamin. Upon further questioning, she reported she stopped taking her Lisinopril “a while ago” due to the commonly experienced side effect of cough. Otherwise, the patient was medication compliant. Physical exam was benign, with the exception of some new onset of bilateral decreased sensation to her feet. She denied any pain, numbness or tingling with this new onset neuropathy. Laboratory tests performed included hemoglobin A1c, basic metabolic panel, thyroid stimulating hormone, free t4 and lipid panel. Hemoglobin A1c was elevated at 8.5, and other results were within expected limits.

These results were reviewed with the patient. This patient required improved blood pressure management, and thus was started on an angiotensin receptor blocker in hopes to avoid
the symptoms of cough she was experiencing. She also required intensified management of her diabetes. She was instructed to increase her Metformin from 500 mg twice per day to 1000 mg twice per day. She was instructed to continue her statin medication as well as a baby aspirin. She was in agreement with this plan.

The patient was also advised to follow-up with the diabetic educator and dietician. She has multiple areas for improvement in her lifestyle behaviors that could result in improved diabetes management and decrease in cardiovascular risk. The patient was educated generally on the importance of following a diabetic diet and incorporating activity into her daily routine. She has historically not followed through with routine diabetic follow-up appointments. She is educated on the need to be seen on a consistent basis in order to assure glycemic control, medication compliance and maintenance of healthy lifestyle changes.

**Literature Review**

Optimal long-term management of type 2 diabetes in BCS requires the identification of best practices, risk factors and interventions specific to this unique population. A literature review was completed in order to help guide survivorship care, as well as identify areas of opportunity for further study. A literature review was conducted using Cochrane Database of Systematic Reviews (CDSR), CINAHL and PubMed databases.

The Cochrane Database of Systematic Reviews (CDSR) was searched first as these reviews are considered to have a very strong level of evidence, with well-designed studies and rigorous research. The CDSR was searched with the terms *breast cancer* (27370) AND *survivor* (2862) AND *diabetes* (52707) resulting in 34 articles to review. Of the 34 results, 17 were Cochrane reviews, none of which discussed diabetes in breast cancer survivorship. The remaining 17 articles were trials; none of which were relevant for review on this topic.
A search using similar terms was conducted on the PubMed database. The three Mesh terms utilized in the search were survivor AND breast neoplasm AND diabetes mellitus resulting in 11 articles to review. The search was limited to articles within the last 5 years. Of the 11 results, 10 were applicable for review.

Lastly, a search of Cumulative Index to Nursing and Allied Health Literature (CINAHL) was completed. The search terms included were breast cancer AND diabetes AND survivor. Initial search resulted in 48 articles for review. The search was limited to publications within the last 5 years and peer-reviewed articles. This narrowed the search to 22 articles. Of the 22 articles, 4 were identified as duplicate results from the PubMed search. Of the remaining 18 articles, 7 were identified as pertinent to this literature review.

Research regarding the connection between cancer and diabetes has focused largely on cancer incidence and mortality (Vissers et al., 2016). Connor et al. (2016) found that diabetes was a prognostic indicator for all-cause and breast cancer specific mortality among BCS. While preexisting diabetes does have an association with increased morbidity and mortality in cancer, there is no evidence to suggest that the incidence of cancer has an adverse effect on the long-term outcomes of patients with diabetes (Griffiths et al., 2017). Much of the existing research regarding diabetes in BCS has been focused on various cardiovascular risk factors with diabetes as an included variable. Other research has focused on cancer survivors, in general, with BCS as a subgroup.

Weaver et al. (2013) found that cardiovascular risk factors (such as body mass index, physical inactivity, hypercholesterolemia, hypertension, and diabetes) were more common among cancer survivors than the general adult population. In another study, diabetes and obesity at age 30 were significantly associated with all-cause mortality in all female BCS (Connor et al.,
2016). Onitilo et al. (2013) provided additional evidence of increased rates of vascular risk factors such as kidney disease, heart disease and high blood pressure in BCS and patients with diabetes; suggesting the possibility of a “double-hit” in BCS with diabetes. In a study conducted regarding the effect of cardiovascular risk factors on long-term prognosis in BCS over the age of 65, cardiovascular risk factors such as very old age, smoking history, diabetes and hypertension were more predictive of CVD risk than breast cancer history alone (Haque et al., 2014). Additionally, Qin, Thompson and Silverman (2015) recommended the need for tight glycemic control and longer monitoring for cardiac toxicity in diabetic BCS who have received anthracycline chemotherapy (a commonly utilized agent in the treatment of breast cancer). The BCS with diabetes proved to be at increased risk for late onset anthracycline-induced heart failure than BCS without diabetes (Qin et al., 2015). Much improvement could be made to improve the overall cardiovascular risk in diabetic BCS with interventions targeting modifiable risk factors such as smoking, sedentary lifestyle and obesity.

A systemic review found patients with both cancer and diabetes diagnoses scored lower on general health-related quality of life, physical functioning and sexual functioning than those diagnosed with cancer or diabetes alone (Vissers et al., 2016). Tang et al. (2016) and Jarvandi, Perez, Schootman and Jeffe (2016) concluded that a comorbid diagnosis of diabetes specifically in BCS was associated with decreased quality of life in comparison to BCS without diabetes. Cumulatively, the literature demonstrates enhanced cardiovascular assessment, optimized diabetes management as well as interventions to promote positive lifestyle changes in the BCS population are necessary to improve long term patient outcomes and quality of life.

Some consideration has been taken to analyze possible ethnic differences among diabetic BCS. African-American and Hispanic/Latino cancer survivors are more than twice as likely to
have comorbidities related to obesity, such as cardiovascular disease and diabetes, than whites (Conlon et al., 2015). Ashing, Rosales, Lai & Hurria (2014) examined the occurrence of comorbidities among African-American and Latina BCS, with 19% of the sample size endorsing a diabetes diagnosis. Chronic conditions, such as diabetes, have been associated with increased risk of poor health outcomes among Latina BCS (Ashing et al., 2014). Appropriate and timely assessment and management of comorbid conditions in cancer survivors has important implications on survival and quality of life (Ashing et al., 2014).

Paxton et al. (2013) determined African American BCS have higher rates of comorbid conditions, such as diabetes, exacerbated by lack of physical activity and increased sedentary behavior. There is a need for intervention focused research to assist African American BCS in adopting and maintaining a physical active lifestyle after treatment (Paxton et al., 2013), as well as further investigate how this unique population can be best supported after treatment (Barsevick et al., 2016). In response to these findings, Black et al. (2018) completed a qualitative study in attempts to identify barriers to physical activity in African-American BCS. In order to achieve their physical activity goals after treatment, survivors require a multidisciplinary team to assist with their psychosocial needs in addition to their physical limitations.

A first of its kind, the Bronx Oncology Living Daily (BOLD) Health Living program was designed to help cancer survivors prevent and control diabetes. In areas of low socioeconomic status, there is limited information and access to cancer screening, treatment and treatment options. This intervention was directed towards an underserved community of cancer survivors with limited resources to reduce comorbid risk. This short-term lifestyle intervention program for cancer survivors was successful in improving health related quality of life and motivating participants to improve health behaviors (Conlon et al., 2015). These results are promising
evidence to support additional study into effective lifestyle intervention programs aimed at improving health status and reducing comorbidity in BCS.

Medication compliance in breast cancer survivorship remains a concerning topic. BCS have an increased use of long-term medications after the completion of cancer treatment (Loh, Ng, Lee, Ng & Chan, 2016). Unfortunately, Yang, Neugut, Wright, Accordin and Hershman (2016, p. e802) found that adherence to diabetes medication declined from 79% to 53.1% in the first year after breast cancer treatment. Additional research completed by Calip, Elmore and Boudreau (2017) found that 75% of BCS studied were nonadherent in taking prescribed diabetic medication. Nonadherence to medications prescribed for chronic conditions is associated with increased all-cause mortality, health care cost and hospitalizations (Calip et al., 2017).

Development of evidence-based interventions to enhance medication adherence, specifically in the diabetic BCS population, remains an area of opportunity for additional high-quality research (Calip et al., 2017; Loh et al., 2016).

Prior research on medication adherence suggests interventions such as collaboration with other healthcare providers, assistance with the cost of medications, promoting social support and using technology-based strategies may be successful (Yang et al., 2016). Close collaboration between oncology and primary care providers is necessary for effective medication management for BCS (Loh et al., 2016). In the future, the development of interventions to address noncancer medication adherence after breast cancer treatment should be aimed at mediating factors associated increased nonadherence such as older age, insurance type, polypharmacy, and more comorbid conditions (Yang et al., 2016). Additional research is required to determine what interventions would be the most beneficial for this population (Loh et al., 2016; Yang et al., 2016).
Throughout the literature there are some common themes regarding the increased incidence of cardiovascular risk factors in cancer survivors (Connor et al., 2016; Qin et al., 2015; Weaver et al., 2013), the importance intervention to reduce risk through modifiable lifestyle factors (Conlon et al., 2015, Paxton et al., 2013), identifying ethnic and socioeconomic variations in management (Ashing et al., 2014; Barsevick, 2016), and improving medication adherence of BCS with type 2 diabetes (Calip et al., 2017; Loh et al., 2016; Yang et al., 2016). While unique needs of BCS with diabetes have been identified, gaps remain in establishing evidence-based interventions targeted towards risk reduction and management in this patient population.

In a study examining how frequently health care providers were counseling cancer survivors with one or more cardiovascular risk factors, only a third of survivors reported having a discussion with their healthcare provider regarding health promotion topics such diet, exercise and lifestyle change (Weaver et al., 2013). Valid research continues to demonstrate the importance of managing preexisting conditions in BCS (Haque et al., 2014). As discussed previously, BCS with diabetes require intensified management of comorbid diagnoses. Many BCS have modifiable cardiovascular risk factors that need to be addressed. An intervention to increase the number of health promotion discussions occurring with diabetic BCS may be an important area of further study.

The BOLD Healthy Living program offered evidence to support lifestyle intervention programs to assist cancer survivors in prevention and control of diabetes (Conlon et al., 2015). Implementation of a program with a similar curriculum in diabetic BCS may have similar positive results. Development of interventions that coordinate the entire patient care team in the management of comorbidities (Ashing et al., 2014) as well as research regarding mental health issues, patient empowerment and improving patient self-management of chronic illness may be
areas for further study to improve survivorship care in diabetic BCS (Vissers et al., 2016).

**Learning Points**

- Survivorship care of diabetic BCS should focus on effective diabetes management (Hauge et al., 2014), identification of modifiable problems (i.e. obesity, inactivity) (Barsevick, 2016; Paxton et al., 2013) and supporting positive health changes (Onitilo et al., 2013; Weaver et al., 2012).
- Interventions must incorporate a multidisciplinary treatment team, including primary care physicians and oncology specialists, in a coordinated effort to improve management of comorbidities in cancer survivors (Ashing et al., 2014).
- Special consideration for high-risk populations, such as ethnic minorities and low socioeconomic classes, could aid in identifying barriers to healthy behaviors and individualize health promotion recommendations (Ashing et al., 2014; Barsevick, 2016; Conlon et al., 2015; Black et al., 2018; Paxton et al., 2013).
- Lifestyle intervention programs may help improve health-related quality of life in diabetic BCS (Conlon et al., 2015).
- Interventions to improve medication compliance in diabetic BCS could improve overall outcomes (Loh et al., 2016; Yang et al., 2016).

**Conclusion**

Improvement in screening, diagnosis and treatment of breast cancer in women has lead to an increase in the BCS population. BCS with diabetes are more likely to suffer from increased morbidity, mortality, and decreased health-related quality of life than BCS without diabetes (Barsevick et al., 2016; Jarvancdi et al., 2016; Tang et al., 2016; Vissers et al., 2016). Diabetic BCS face unique physical and emotional difficulties in their survivorship journey. BCS with
diabetes require individualized support and early risk-factor identification, screening and disease management. Further research into interventions specifically regarding emotional and multidisciplinary support for sustaining healthy lifestyle change and medication adherence in BCS with diabetes, not only could improve morbidity, mortality and quality of life, but also stands to enhance survivorship care for this growing population.
References


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