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Short Notes on Breast Cancer Toxicity to the Heart and Vessels

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Introduction

Cardiovascular diseases are common in cancer patients and appear to be significant side effects of cancer treatment, negatively impacting quality of life and leading to premature morbidity and death among cancer survivors. Treatments for breast cancer, in particular, have been shown to have serious negative effects on cardiovascular health. This review will look at the available literature on breast cancer therapy-induced side effects on the heart and vessels, illustrating the molecular mechanisms of cardiotoxicity that have been identified thus far. Furthermore, the principles of cardiovascular risk [1-3] assessment and cardiotoxicity management in clinical practise will be clarified.

Adverse effects of chemotherapy (anthracycline, taxanes, cyclophosphamide, and 5-fluorouracil), hormonal therapy (oestrogen receptor modulator and gonadotropin or luteinizing releasing hormone agonists), and targeted therapy (epidermal growth factor receptor 2 and Cyclin-dependent kinases 4 and 6 inhibitors) include arterial and pulmonary hypertension, supraventricular and ventricular arrhythmias, systolic and As a result, cardiovascular prevention programmes and cardiotoxicity treatment appear to be critical for improving cancer survivors' morbidity and mortality.

About the Study

Breast cancer is the most common cancer in women and one of the leading causes of death, posing a significant public health problem. Breast cancer, the most common cancer in the world, was diagnosed in 7.8 million women between 2015 and 2020. It affects women at any age after puberty in every country around the world, with rates increasing with age. Breast cancer death rates have recently been declining due to early detection programmes and advances in treatment, but this cancer remains a leading cause of death in 119 countries. Survivor women lose more disability-adjusted life years (DALYs) than any other type of cancer in the world, owing to increased morbidity and adverse effects.

A chemotherapy regimen is a set number of cycles of drugs administered over a specific time period. Many different types of chemotherapy have been shown to be effective in treating breast cancer, depending on its grading, staging, and patient comorbidities. Anthracyclines, such as doxorubicin, epirubicin, and pegylated liposomal doxorubicin; taxanes, such as docetaxel and paclitaxel; cyclophosphamide; and 5-fluorouracil (5-FU) are commonly used regimens.

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Future Perspective

Hormonal therapy is an effective treatment for neoplasms that express oestrogen (ER positive) and/or progesterone (PR positive) receptors and use hormones to fuel their growth (79 percent of all breast cancer). Cancer recurrence and death can be reduced by blocking receptors. Hormonal therapy can be used alone or in conjunction with chemotherapy. Estrogen receptor modulators, such as tamoxifen, aromatase inhibitors (AI) and gonadotropin, and luteinizing releasing hormone (GnRH or LHRH) agonists, such as goserelin and leuprolide, are examples of hormonal therapy.

A treatment that specifically targets cancer genes, proteins, or the tissue environment that contributes to cancer growth and survival is known as targeted therapy. One of the most important targets in breast cancer [4,5] treatment is the HER2 receptor, which is overexpressed in 15-18% of all breast cancers. Trastuzumab, Pertuzumab, Ado-trastuzumab emtansine (T-DM1), and Lapatinib are examples of HER2 receptor-targeting therapies that can be used in conjunction with chemotherapy. Cyclin-dependent kinases 4 and 6 (CDK4/6) are also important pharmacological targets. Abemaciclib, palbociclib, and ribociclib are examples of these medications.

Anthracyclines are cytostatic antibiotics derived from the bacteria Streptomyces. Anthracycline-based chemotherapy is used in about one-third of breast cancer patients over the age of 66, and in half of patients over the age of 65. Doxorubicin, daunorubicin, epirubicin, and idarubicin are the most commonly used anthracyclines. These compounds could also be used to treat other cancers, such as leukemias, lymphomas, stomach cancer, uterine cancer, ovarian cancer, bladder cancer, and lung cancer. Anthracyclines act on cancer cells through a variety of mechanisms, including free radical formation, lipid peroxidation, direct membrane effects, and enzyme interactions. The interaction with topoisomerase II, a complex that promotes chromosome disentanglement, appears to be the most important mechanism. Anthracyclines promote growth arrest and apoptotic cancer cell death by inhibiting this complex.

Conclusion

Liposomal doxorubicin formulations (liposomal doxorubicin and pegylated liposomal doxorubicin) are phospholipid membrane drugs that are encapsulated. These drugs are as effective as traditional anthracyclines, but they appear to be safer. When compared to conventional doxorubicin, this formulation results in lower levels of free drugs in the blood and fewer nonspecific bindings. Indeed, the large size of the liposome vesicles reduces doxorubicin exposure to cardiac tissues, and the larger size of the liposomes may be recognized more easily by mononuclear phagocytes, improving drug clearance.

Conflict of Interest

None.

Acknowledgement

None.

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