Although today’s breast cancer treatments are more effective than ever, that efficacy can come with short- and long-term toxicities. Cardiotoxicity, although rare, can be a serious side effect of cancer treatments such as anthracyclines, taxanes, radiation, hormonal therapy, tyrosine kinase–targeting drugs, and trastuzumab.

Trastuzumab can cause cardiotoxic effects—including left ventricular (LV) cardiac dysfunction, dysrhythmias, hypertension, cardiac failure, cardiomyopathy, and death—with reported incidence rates ranging from 2.6%–4.5% when the drug is used alone and as high as 27% when it is used in combination with anthracyclines. In their article in the November 2009 issue of the Oncology Nursing Forum, Moss, Starbuck, Mayer, Harwood, and Glotzer suggested that the actual incidence rates may be even higher, pointing out that the clinical trials the numbers are based on excluded women with a history of cardiac symptoms. Moss et al. explained monitoring and management strategies oncology nurses can use in patients exhibiting cardiac side effects from trastuzumab and described the patient education that nurses should provide.

Trastuzumab and the Heart

Because trastuzumab is an antibody to ErbB2, an epidermal growth factor, it can also affect the heart. Cardiomyocyte survival and growth require ErbB2; blocking ErbB2’s pathway influences heart function and makes the heart more susceptible to cardiotoxic stress. Trastuzumab-induced cardiotoxicity usually manifests as a decline in LV function, which often is reversible when the drug is discontinued.

Key Definitions

Left ventricular dysfunction: Occurs when the left ventricle of the heart decreases in function, leading to congestive heart failure, myocardial infarction, or other cardiovascular diseases. The condition is diagnosed by measuring left ventricular ejection fraction through echocardiography or multigated acquisition scanning.

Trastuzumab: A monoclonal antibody to ErbB2, a member of the growth factor family of tyrosine, that inhibits proliferation of tumor cells that overexpress HER2. Initially used for metastatic HER2-positive breast cancer, the drug is now approved for use in the adjuvant setting.
Cardiac Risk Assessment and Monitoring

Current cardiac monitoring recommendations are based on the use of trastuzumab in the metastatic setting. However, because the drug is now approved for adjuvant use as well, the authors suggest that more thorough monitoring is necessary because of better prognoses and higher life expectancies.

The manufacturer recommends the following monitoring protocol for patients receiving trastuzumab.

- Measure baseline LV ejection fraction (LVEF) prior to start of treatment.
- Monitor LVEF every three months during treatment and following completion.
- For two years after treatment, LVEF should be measured every six months.

The assessment is usually done with echocardiography or multigated acquisition scanning. Normal LVEF is 55%–70%.

Oncology nurses should ensure that a patient’s history and physical assessment include risk factors for LV dysfunction (see Figure 1). Nurses also should assess for clinical signs and symptoms of heart failure at patient appointments, including dyspnea, increased cough, paroxysmal nocturnal dyspnea, peripheral edema, and S3 gallop. If a patient has three or more risk factors and the benefits of using trastuzumab are determined to outweigh the risks, LVEF should be monitored more frequently than every three months.

For a prototype risk assessment tool, refer to the full article by Moss et al. (2009). The tool is currently being pilot tested for clinical practice and has been reviewed and verified by three medical oncologists, two nurse practitioners, and seven oncology nurses.

Treatment of Cardiotoxicity

Patients who were taking beta blockers or statins prior to treatment with trastuzumab should continue those medications. Angiotensin-converting enzyme inhibitors and beta blockers are also indicated as standard treatment for trastuzumab cardiotoxicity because they have been shown to reduce decline in LV function and possibly reverse further damage. However, further cardiotoxicity despite the use of these drugs may require trastuzumab to be discontinued.

Patient Education

The authors contended that current patient education materials for trastuzumab may downplay the risk of cardiotoxicity from the drug. A review of those materials found that most listed cardiotoxicity as an uncommon or rare event; however, the materials did not indicate that women with preexisting heart conditions were omitted from clinical trials and that women in the studies were younger than average. Also, women who developed mild cardiac symptoms were not included in the final statistics.

When educating patients about the side effects of trastuzumab, healthcare providers should be sure to explain the potential for cardiotoxicity as well as the signs and symptoms to watch for. They should emphasize that early detection of heart failure is important and to report those symptoms immediately. The authors also suggested that a recommended cardiac monitoring schedule be provided to patients at the start of treatment so they can be sure they are getting the testing they need at each appointment.

For more information on cardiotoxicity from trastuzumab, refer to the full article by Moss et al. (2009).


Figure 1. Evaluation for Left Ventricular Dysfunction

Patient History
- Myocardial infarction
- Angina
- Heart failure
- Valvular disease
- Pacemaker or intracardiac device
- Hypertension
- Hyperlipidemia
- Tobacco use
- Diabetes
- Family history of left ventricular dysfunction

Physical Examination
- Vital signs
- Pulses
- Bruits
- Jugular venous distension
- Lung and heart auscultation
- Edema in extremities

Other Assessment
- Functional assessment
- New York Heart Association classification status
- Activities of daily living (e.g., dressing, showering, doing housework, walking, climbing stairs)

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