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Cancer Therapy and Osteoporosis: Identifying Patients at High Risk for Skeletal Fractures

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Osteoporosis Related to Breast Cancer Therapy

Shapiro, C.L., Manola, J., & Leboff, M. (2001). Ovarian failure after adjuvant chemotherapy is associated with rapid bone loss in women with early-stage breast cancer. *Journal of Clinical Oncology, 14,* 3306–3311.

Study Summary

The purpose of this prospective, longitudinal study was to evaluate the effects of chemotherapy-induced ovarian failure on bone loss. The study sample included 64 premenopausal women diagnosed with stage I or II breast cancer receiving chemotherapy. Bone mineral density and biochemical indices of skeletal turnover were performed before chemotherapy and at six and 12 months post-chemotherapy. Of the 64 women, 61 completed the six-month evaluation and 49 completed the 12-month evaluation. Data analysis was based on the 49 women who completed the evaluations at baseline, six, and 12 months. Chemotherapy regimens included cyclophosphamide, methotrexate, and fluorouracil (69%) and cyclophosphamide and doxorubicin with or without fluorouracil or paclitaxel (31%). Twenty-two percent of the women received tamoxifen after chemotherapy. At the 12-month evaluation, 71% of the women experienced ovarian failure and 29% experienced menstrual function. The women who developed ovarian failure were significantly older than the women who maintained ovarian function (44 years versus 38 years). A family history of osteoporosis was identified by 31% of the women with ovarian failure and 14% of the women who had menstrual function. The women with ovarian failure had a highly significant bone-density loss of –4.0 in the lumbar spine at six months and a further decrease of –3.7 at 12 months. No significant decreases in bone density were found in the 14 women who maintained menstrual function. Serum osteocalcin and alkaline phosphatase increased significantly at six and 12 months in the women with ovarian failure. In the women who had menstrual function, these markers increased at six months and then declined by the 12-month evaluation.

Applications to Patient Care

- **Study findings indicated that patients experienced rapid bone loss by the six-month evaluation after chemotherapy.**

Oncology nurses can play a key role in the education of younger women with breast cancer by discussing bone health and the possible consequences of chemotherapy, such as ovarian failure and the increased risk of osteoporosis. Nurses should advise women at risk to discuss bone-density testing with their physicians before beginning chemotherapy to establish a baseline evaluation. Nurses also should encourage patients to adhere to follow-up bone-density testing schedules while undergoing treatment. Women who develop ovarian failure upon completion of chemotherapy should have a repeat bone-density test to evaluate for significant bone loss and for initiation of treatment for osteoporosis.

- **Study findings indicated that 31% of the women with ovarian failure had a family history of osteoporosis in comparison to only 14% of the women who maintained menstrual function.**

In addition to educating women about osteoporosis and its treatment, oncology nurses also should be familiar with risk factors for osteoporosis and review patients' medical and family histories. Risk factors for osteoporosis include early menopause (before age 45); a small, thin body frame; Caucasian or Asian descent; family history of osteoporosis; a history of taking high doses of thyroid hormones or steroid-type medications; poor calcium intake; sedentary lifestyle; and excessive cigarette or alcohol use. Many of these risk factors can be reduced by a change in diet or lifestyle. Nurses can encourage patients to begin weight-bearing exercises, such as weight lifting, and decrease or eliminate the use of tobacco and alcohol. Nurses also should instruct patients with ovarian failure to consume 1,500 mg of calcium each day and give them a list of foods high in calcium, along with suggestions for supplementing calcium in the diet (e.g., taking calcium carbonate antacids).

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Digital Object Identifier: 10.1188/02.CJON.111