Coronary Artery Disease in Female Breast Cancer Patients Subjected to Radiotherapy

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Received: September 06, 2018; Published: October 15, 2018

When it comes to breast cancer patients, several questions may rise regarding their health status after radiation therapy [1-4]. One of the issues consists of the cardiac effect of radiation therapy in female patients treated for breast cancer. It is advocated that postponing of radiation therapy after mastectomy and chemotherapy in a patient with localized breast cancer may not increase the local recurrence rate or affect the prognosis [5]. In addition, delaying the irradiation in a patient with left breast cancer may also delay the possible cardiac toxicity [6,7].

In the paper by Takx RAP, et al. (2017), the authors studied the coronary arterial calcium deposition of irradiated breast cancer patients. The study was performed utilizing an automated algorithm on chest CT of 54 irradiated breast cancer patients compared with the CT of 279 breast cancer patients who had either CT prior to radiation therapy or no radiation therapy. The CT scans in the irradiated patients were performed more than 6 months after the start of radiation therapy with a median time between CT and radiation therapy of 2 years. The statistical analysis did not find any correlation between the radiotherapy and coronary calcification and the authors concluded that there was no evidence of irradiation-provoked coronary artery disease [6]. Similar conclusions reported in a single institutional observational study that found no association between left breast irradiation but rather hypertension and diabetes and subsequent cardiac events [8].

However, other well designed and executed studies have demonstrated definite cardiac injury after irradiation of the left breast. Taylor C., et al. (2018), undertook a detailed cross-sectional study in 456 women irradiated in the left breast that subsequently developed a major coronary event. After obtaining information on the radiotherapy regimen they received and on the exact site of their cardiac injury, they were able to determine that higher radiation doses were significantly linked to injury, but also that all cardiac segments (inferior, lateral, septal, anterior, and apex) were susceptible to irradiation [7].

Another method for screening the myocardial status in various diseases consists of myocardial perfusion imaging (MPI) with single-photon emission computed tomography (SPECT) [9-11]. MPI SPECT, has been reported to possess a sensitivity of 85%, specificity of 83%, positive predictive value of 66%, negative predictive value of 94%, and an accuracy of 84% for revealing coronary abnormalities, comparable with coronary artery angiography [12]. We have previously evaluated the existence of myocardial ischemia with MPI in breast cancer patients treated with radiotherapy. Twenty eight patients with left and 18 patients with right breast cancer were enrolled and evaluated. The existence of MPI abnormalities, were found in a rate of 54% and 44.4% respectively, revealing a significant statistical increase in left sided breast cancer patients when compared with right sided cancer [10]. Similarly, a prospective study in 35 irradiated patients with left breast cancer and 36 patients with right breast cancer revealed increased cardiac risk of irradiation in the left side. The authors recommended screening with MPI-SPECT, even if the patients are clinically asymptomatic, in order to diagnose and more effectively treat silent ischemia [13]. Most of the studies have shown perfusion defects after irradiation of the left breast involving the apical and anterolateral aspects of the left ventricle that correlates with the percent of the left ventricle inside the radiation field [14].
In conclusion, patients with radiation therapy for left breast cancer must be evaluated cardiologically even when cardiac events are not yet present and they are asymptomatic. MPI SPECT seems to play an important role for non-invasive evaluation of the myocardial status in this group of patients, even when the patients are asymptomatic. This evaluation may provide crucial information for early diagnosis of myocardial ischemia and thus, early treatment.

Bibliography


