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Imaging Surveillance for Cardiovascular Complications of Cancer Therapy

We read with great interest the state-of-the-art paper by Yeh and Bickford (1) on the cardiovascular complications of cancer therapy. Although the review on monitoring for chemotherapy associated left ventricular (LV) dysfunction discussed the role of established noninvasive tools, such as radionuclide ventriculography and echocardiography, evidence on emerging tools such as cardiac magnetic resonance (CMR) was not provided. The potential influence of cancer therapy on the vascular system was also not addressed.

CMR, with its heightened spatial resolution compared with these established modalities, has become a valuable tool in the assessment of myocardial function, perfusion, and tissue characterization (2). In addition, CMR has low intra- and interobserver variability and high test-retest reproducibility for measurement of LV function (3,4), characteristics that are crucial in clinical situations requiring accurate serial monitoring of LV function that occurs in cancer patients receiving potentially cardiotoxic therapy for cancer. Also, CMR is considered by the American College of Cardiology Foundation and multiple professional societies as an appropriate tool for evaluation of LV function in patients with technically suboptimal echocardiograms and evaluation of specific cardiotoxic therapy associated with cardiomyopathy (5).

Tissue characterization by CMR is a robust technique of prognostic importance (6). In a pilot study, Wassmuth et al. (7) demonstrated the strength of CMR to detect subclinical cardiotoxic effects of anthracyclines. Increase of relative myocardial contrast enhancement of >5 on day 3 compared with baseline predicted a significant decline in LV ejection fraction at 28 days ($p < 0.05$).

An emerging concern for cancer survivors is the increasing prevalence of cardiovascular events (8). For survivors of breast cancer and hematologic malignancies, cardiovascular events are the second most common cause of mortality after cancer recurrence (8). At present, there are few studies that have been performed to identify subclinical markers of increased cardiovascular events in cancer survivors. Increased aortic stiffness is an independent predictor of cardiovascular events beyond the Framingham score (9,10). In a soon-to-be published prospective case-control study, Chaosuwannakit et al. (11), observed a significant increase in CMR measures of aortic stiffness among cancer patients within 4 months of exposure to anthracycline chemotherapy. As cancer survivors experience higher incidence of cardiovascular events, further studies will be necessary to identify subclinical markers of cardiovascular disease.

CMR holds great potential in the comprehensive cardiovascular evaluation of cancer patients on therapy and should therefore be included in discussions on contemporary cardiovascular imaging of this growing patient population.

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Reply

We thank Drs. Ntim and Hundley for their interest in our paper (1) and their comments regarding the role of cardiac magnetic resonance (CMR) in the evaluation of cardiac complications of cancer therapy. We agree that CMR has a well-defined and expanding role in the evaluation and management of cardiac disease in general, with specific value in cardiovascular structure, function, and physiology (2). The use of CMR in cardiotoxicity, however, has only been evaluated in a preliminary fashion. One study (3) with a limited number of patients and without biopsy correlation, suggested that CMR could be used as a prognosticator of future cardiomyopathy. A 10-patient case series evaluated the value of CMR in confirming the presence of left ventricular dysfunction and demonstrated late gadolinium enhancement in patients with cardiomyopathy. Delayed enhancement CMR was also used to demonstrate abnormalities in patients with late-onset cardiomyopathy in isolated case reports (4,5).

The ability of delayed gadolinium enhancement CMR to diagnose myocardial pathology makes it an attractive method to evaluate patients at risk for antineoplastic cardiotoxicity. However, as of yet there have been no studies correlating findings of CMR to endomyocardial biopsies, which is the gold standard. In addition, the total number of patients studied to this day remains very small. Because of this lack of data we do not routinely use CMR at M. D. Anderson Cancer Center for the purpose of screening or following patients with cardiotoxicity.

In conclusion, whereas we felt it would be premature to include CMR in a state-of-the-art paper, we feel strongly that this technology merits further investigation and certainly has the potential to benefit patients with cardiotoxicity related to cancer treatment.

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