Cardiotoxicity in Cancer Treatment: New Frontiers in the Multimodality Diagnostic Approach

Keywords

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Mailing Address: José de Arimateia Batista Araujo-Filho

E-mail: ariaraujocg@hotmail.com

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functional parameters, especially when more reliable and accurate LVEF measurements were necessary to justify discontinuation of chemotherapy. In the age of targeted therapy, myocarditis became the most feared cardiac complication of cancer treatment (especially associated with a class of overwhelmingly successful immunotherapy known as immune checkpoint inhibitors) and CMRI was then raised to a new level due to its high sensitivity and specificity in this diagnosis through a combination of delayed enhancement techniques, and T1 and T2 mapping. Advanced CMRI techniques (Figure 1) are still extremely valuable in the evaluation of fibrosis classically related to radiotherapy and some anthracyclines, as well as in the detection of myocardial deposits of amyloid material (causing increased extracellular volume on T1 mapping) or iron (with T2* time reduction) potentially associated with the use of some chemotherapeutic agents. In addition, CMRI plays a central role in the diagnosis of intracavitary thrombi, assessment of vascular complications (MR angiography) and may be an alternative in the evaluation of ischemia (stress CMRI) in patients receiving therapies potentially associated with vasospasm or accelerated atherosclerosis. More recently, CMRI myocardial strain analysis in chemotherapy patients has demonstrated the ability of the method to detect important subclinical abnormalities.

Although recent studies have shown a potential use of PET-CT in the early detection of cardiotoxicity, the role of nuclear medicine in cardiotoxicity screening is limited by the high cost and limited availability of these methods. Scintigraphy techniques are currently in disuse in this context; however, the high precision in PET/SPECT myocardial perfusion analysis plays a role in the risk stratification of CAD in some patients. Recent evidence suggests that cardiac MRI may have an incremental value in the evaluation of myocarditis compared to PET-CT or CMRI alone. In the future, the role of imaging in cardio-oncology will depend on how we will be able to better and earlier predict subclinical cardiac involvement in an attempt to prevent or interfere in the progression of this process. New tools with artificial intelligence are promising, especially in the identification and understanding of new parameters beyond conventional visual analysis. It is known that the population of patients at risk for cardiotoxicity differs in many respects from those with primary cardiovascular risk, corroborating the need for collaboration among all members of the multidisciplinary team involved in developing individualized workup strategies and therapies. The correct indication and interpretation of the different diagnostic methods available - with their specific advantages and limitations (Chart 1), in a cost-efficient multimodality approach - is central in this process.

Conflict of interest

The authors declare that there is no conflict of interest regarding this manuscript.
References


