

Introduction

Survival rates of Hodgkin's lymphoma have been increasing with the use of radiotherapy however they have been linked to various side effects. We report a case of radiation induced aortic regurgitation and myocardial fibrosis in a patient who was given involved field modified mantle radiotherapy for Hodgkin's lymphoma.

Case

A 57 year old lady was followed up with her aortic regurgitation. She had nodular sclerosing Hodgkin's lymphoma in 2000 treated with chemotherapy doxorubicin, bleomycin, vinblastine and dacarbazine (ABVD) initially. She then received modified mantle radiotherapy to her cervical/mediastinal lymph nodes.

As part of her chemotherapy she had some serial echocardiograms. Initial echocardiogram in 2012 showed good bi-ventricular function with mild-moderate aortic regurgitation. Repeat echocardiogram after 2 years showed mild left ventricular (LV) impairment with moderate aortic regurgitation. A Cardiac Magnetic Resonance (CMR) scan of the heart was performed which showed moderate AR with poor opening of the trileaflet aortic valve, the regurgitation fraction is 24%. Her LV function is preserved. There is also some patchy mid wall delayed enhancement suggestive of myocardial fibrosis. She was subsequently followed up with serial echocardiograms. The patient's computer tomography (CT) scan also showed calcification within the coronary arteries.

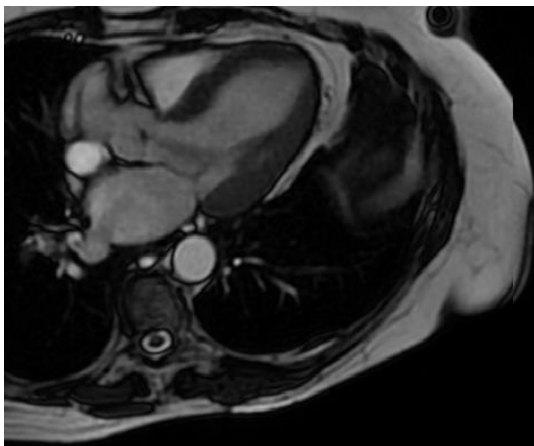


Figure 1 Chamber view of aortic regurgitation

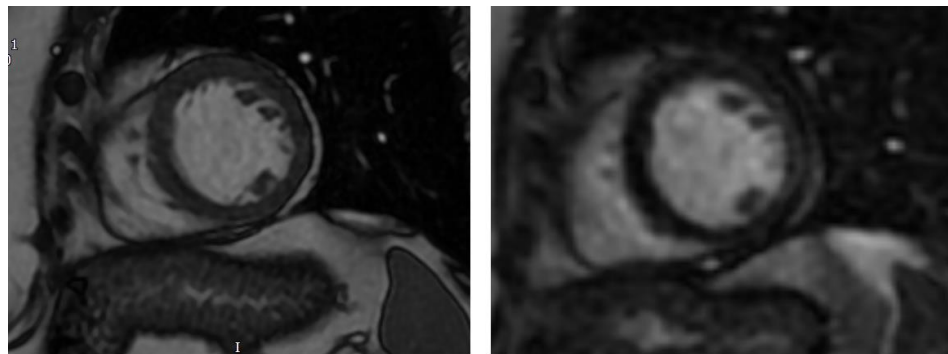


Figure 2 Comparison between early and late gadolinium showing diffuse free wall fibrosis.



Figure 3 CT scan showing calcification in the right coronary artery

Discussion

Radiation causes focal valvular dystrophic calcification. It is difficult to assess the time period for conversion from asymptomatic and symptomatic valvular heart disease as radiation induced valvular heart disease represents a continuum progressing from asymptomatic valvular thickening to symptomatic valvular dysfunction. (1)

The American Society of Echocardiography suggests yearly history and examination on individuals who have had chest radiation exposure. The asymptomatic group would need an echocardiogram every 5 years. While echocardiogram is ideal for looking at valvular lesions, some other pathologies may be better characterised on CMR, such as myocardial fibrosis as in this case. Early identification of myocardial fibrosis may help to guide further treatments/plan further radiotherapies. (2)

Radiation typically cause diffuse wall fibrosis which follows a diffuse and non-ischaemic pattern, there is typically patchy involvement with small intramural or subepicardial enhancing spots. (3) CMR can also detect subendocardial enhancing typical in post myocardial infarctions as the incidence of coronary artery diseases is also higher in patients who have undergone mediastinal radiotherapy. (4)

Estimation of extracellular volume (ECV) can also be estimated with post-contrast T1 mapping. ECV can be used to assess myocardial fibrosis. It has been shown that that it ECV correlates well fibrosis as confirmed on endocardial biopsy in patients with dilated cardiomyopathy. (5)

References:

1. Yusuf SW, Sami S, Daher IN. Radiation-induced heart disease: a clinical update. *Cardiol Res Pract.* 2011;2011:317659.
2. Lancellotti P, Nkomo VT, Badano LP, et al. Expert consensus for multi-modality imaging evaluation of cardiovascular complications of radiotherapy in adults: a report from the European Association of Cardiovascular Imaging and the American Society of Echocardiography. *Eur Heart J Cardiovasc Imaging.* 2013;14(8):721-40.
3. Taunk NK, Haffty BG, Kostis JB, Goyal S. Radiation-induced heart disease: pathologic abnormalities and putative mechanisms. *Front Oncol.* 2015;5:39.
4. Machann W, Beer M, Breunig M, et al. Cardiac magnetic resonance imaging findings in 20-year survivors of mediastinal radiotherapy for Hodgkin's disease. *Int J Radiat Oncol Biol Phys.* 2011;79(4):1117-23
5. aus dem Siepen F, Buss SJ, Messroghli D, et al. T1 mapping in dilated cardiomyopathy with cardiac magnetic resonance: quantification of diffuse myocardial fibrosis and comparison with endomyocardial biopsy. *Eur Heart J Cardiovasc Imaging.* 2015;16(2):210-6.