Impact of radiotherapy on myocardial function and paravalvular leaks after transcatheter aortic valve implantation (TAVI)

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Introduction: Thanks to the anticancer therapies, the life expectancy of the oncologic patients has noticeably increased, but several cardiac diseases can be observed in these patients as the result of the cardiotoxic effects.

Purpose: To investigate the impact of radiotherapy on the clinical and echocardiographic outcomes, in patients with severe aortic stenosis (AS) and preserved left ventricle ejection fraction (LVEF) treated with transcatheter aortic valve implantation (TAVI).

Methods: We recruited patients with severe AS and left ventricular ejection fraction (LVEF) =50‰ treated with TAVI and who received prior radiotherapy. Patients with LVEF <50‰, treated with valve in valve, with inadequate acoustic windows or the absence of echocardiographic images pre-TAVI and after 3-6 months were excluded. Demographic, clinical and echocardiographic data were recorded.

Results: 102 patients were included in the present analysis. They were divided in two groups: 19 (18‰) with an oncologic history treated with previous left thoracic/mediastinal radiotherapy and 83 (82‰) patients without an oncologic history. The two groups were homogeneous in terms of demographic and clinical data, brain natriuretic peptide (BNP), echocardiographic data pre-TAVI. They only differed for a greater prevalence of mitral stenosis and calcifications in the oncologic patients versus the non-oncologics (respectively 36‰ vs. 12‰ p= 0,016; 73‰ vs. 29‰ p= 0,001). No differences in terms of in-hospital clinical outcomes were observed. The echocardiographic evaluation in both groups showed a significant decrease of the peak velocities and of the transprosthetic gradients. There was a higher incidence of at least moderate degree paraprosthetic leaks in the oncologic group vs. the non-oncologic one: 6 (31‰ total leaks, 37‰ leaks >2+) vs. 7 (8‰ total leaks, 12‰ leaks >2+); p= 0.029. After 3-6 months, there was not a statistically significant improvement of ejection fraction (EF) in neither of the two groups but there was a statistically significant improvement of transmural, subepicardial and subendocardial longitudinal strain values in the non-oncologic group compared to pre-TAVI values, respectively -19 ± 4 vs. -17 ± 4 (p < 0.001); -17 ± 3 vs. -15 ± 3 (p < 0.001); -22 ± 4 vs. -19.8 ± 4 (p < 0.001). Any statistically significant improvement was detected in the group with history of anticancer treatments between the longitudinal strain values post and pre-TAVI (-18 ± 3‰ vs. -16 ± 3‰; -14 ± 3‰ vs. -20 ± 5‰; -20 ± 5‰ vs. -19 ± 4‰).

Conclusions: Patients affected by severe AS treated with TAVI and who received received prior radiotherapy, showed the absence of statistically significant improvement of multilayer strain values, at 3-6 months after TAVI. Oncologic patients also had a higher incidence of haemodynamically relevant paravalvular leaks after the intervention, compared to the non-oncologic patients.