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Assessment of regional cardiac sympathetic innervation by 123I-MIBG cardiac SPECT in evaluation of patients with cardiac resynchronization therapy.

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Aim: Cardiac resynchronization therapy (CRT) is increasingly being used in heart failure patients with the functional recovery as objective. Cardiac sympathetic innervation by 123I-MIBG could contribute to a better selection of candidate patients to CRT, avoiding cases of absence of a response. Usual evaluation of heart/mediastinum ratio is a well established assessment of global cardiac sympathetic innervation, but SPECT could provide additional information about regional uptake an location of denervated areas.

Material and methods: We have studied 22 patients (6 women, 57-77 y/o, 66±6), with dilated cardiomyopathy (7 ischemic, 15 non-ischemic) and CRT indication. We performed basal planar and SPECT cardiac 123I-MIBG (MEGP collimator) to obtain early and late heart/mediastinum ratio (EHM and LHM), washout rate (WR) and regional cardiac uptake (5-point visual score (0-4) and location of denervated areas. Myocardial GSPECT at rest with 99mTc-MIBI to assess left ventricular ejection fraction (LVEF), end-diastolic (EDV) and end-systolic (ESV) ventricular volumes. We evaluated clinical follow-up 12 months after CRT, with new assessment of cardiac 123I-MIBG and myocardial GSPECT, with a total of 84 performed explorations.

Results: Mean basal LVEF was 20.9±6.2% (10-33), with EDV: 235.2±71.8ml, ESV: 189.2±71.5ml, EHM: 2.25±0.54, LHM: 2.04±0.47, WR: 32.7±13.6%. Maximal regional score (MS) of 4 was present in 9/22 p (mean HMR: 1.89±0.29) vs MS 3-2 in 13/22 (mean HMR: 2.49±0.54) p<0.01. Denervation affected inferior and/or apical area in 21/22 p (95.4%), septal 17/22(77.2%), lateral 7/22 (31.8%) and anterior 3/22(13.6%). At 12 months after TRC, 15 patients showed clinical-functional improvement (responders patients-R), with improved LVEF and/or lower volumes, and 7 were non-responders (NR), with LVEF lower than basal or without changes. We found significant differences between R and NR patients in follow-up EHM: 2.49±0.41 vs 1.54±0.27 (p<0.001) and LHM: 2.36±0.47 vs 1.43±0.17(p<0.001) In R patients, basal EHM was higher than in NR patients (2.38±0.55 vs 1.95±0.47, p<0.05). There were 13/15(86%) R patients with EHM=1.9 vs 4/7(57%) NR patients with EHM<1.9 (p:0.04). 5/7 NR patients (71.4%) showed MS 4 vs 11/15 R patients (73.3%) with MS 3-2 (p<0.05). 13/15 R patients showed regional innervation improvement after TRC, located at septal area in 8/13, whereas there was innervation improvement in 3/7 NR patients (at septal area in 2/3).

Conclusion: Although it is necessary to study more patients, our results showed that SPECT can provide useful evaluation of regional uptake and location of denervated areas related with functional recovery after CRT, with good correlation with global HMR and could be useful to a better assessment of the appropriate CRT indication in these patients.