Myocardial perfusion SPECT/CT according to body mass index: a non-attenuation and attenuation correction comparison study between overweight and extremely obese patients

Authors:
A Marques1, L Vieira2, S Figueiredo2, E Carolino2, C Pereira2, A Ventosa1, J Calqueiro1, F Abreu1, C Gaspar1, S Pintao1, 1Centro Hospitalar de Lisboa Ocidental - Lisboa - Portugal, 2Lisbon Polytechnic Institute - Lisbon - Portugal,

Topic(s):
Single Photon Emission Computed Tomography (SPECT)

Citation:
Background / Introduction

Single Photon Emission Computed Tomography/Computed Tomography (SPECT/CT) is a well-established non-invasive modality widely used as a clinical tool for the myocardial perfusion assessment. However, the diagnostic accuracy of this conventional technique has remained suboptimal in patients with excess weight due to Compton diffusion and attenuation artifacts, limiting the quantification reliability in myocardial perfusion imaging (MPI).

Purpose

To evaluate the influence of different imaging reconstruction methods in MPI, with and without attenuation correction, based on the defect extent quantitation for overweight and extremely obese patients.

Methods

Retrospective study of forty consecutive patients, who were referred for MPI-SPECT/CT underwent a one-day stress/rest 99mTc-Tetrofosmin imaging protocol. The patients were divided in two groups, each with 20 patients. The group A, with a body mass index (BMI) between 25 and 29.9 (overweight) and group B, with a BMI=35 (extremely obese). A dual detector gamma-camera model was used to acquire the SPECT/CT data. The Quantitative Gated SPECT/Quantitative Perfusion SPECT software was used to calculate, in each study, the total left ventricular (LV) lesion extension. The data were reconstructed using ordered subset expectation maximization, iterative reconstruction with attenuation correction (IRAC) and without attenuation (IRNC). Descriptive statistics, t-test for two paired samples and t-test for two independent samples were applied. The results were considered statistically significant for p<0.05.

Results

In group A, patients had a BMI of 28.35 (±0.89) and 70% (N=14) were male. In group B, patients had a BMI of 38.59 (±3.43), and 30% (N=7) were male.
Both in stress as in rest, the total LV lesion extension was larger in group A than in group B, both for IRNC and IRAC methods.
No statistically significant differences were found in the quantification of the total LV lesion extension between the groups, both in stress as in rest, when using both methods: with IRNC (stress, p=0.678; rest, p=0.212); with IRAC (stress, p=0.602; rest, p=0.656).
When comparing for each group the total LV lesion extension obtained with the IRNC and the IRAC methods, for group A statistically significant differences were found in rest (p=0.004) but not in stress (p=0.055), and for group B in stress (p=0.037) but not in rest (p=0.844).
Conclusion

In overweight and extremely obese patients, the total left ventricular lesion extension quantification at stress and rest, applying the IRNC and IRAC reconstructions methods, seems to demonstrate that for the overweight patients the accuracy was improved with attenuation correction in rest, and that for the extremely obese it was improved in stress. A further study including a larger sample will be performed to confirm these results.