

Evaluation of right and left ventricular function by quantitative blood-pool SPECT (QBS): Comparison with conventional methods and quantitative gated SPECT (QGS)

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Though quantitative ECG-gated blood-pool SPECT (QBS) has become a popular tool in research settings, more verification is necessary for its utilization in clinical medicine. To evaluate the reliability of the measurements of left and right ventricular functions with QBS, we performed QBS, as well as first-pass pool (FPP) and ECG-gated blood-pool (GBP) studies on planar images in 41 patients and 8 healthy volunteers. Quantitative ECG-gated myocardial perfusion SPECT (QGS) was also performed in 30 of 49 subjects. First, we assessed the reproducibility of the measurements of left and right ventricular ejection fraction (LVEF, RVEF) and left and right ventricular end-diastolic volume (LVEDV, RVEDV) with QBS. Second, LVEF and RVEF obtained from QBS were compared with those from FPP and GBP, respectively. Third, LVEF and LVEDV obtained from QBS were compared with those from QGS, respectively. The intra- and inter-observer reproducibilities were excellent for LVEF, LVEDV, RVEF and RVEDV measured with QBS ($r = 0.88$ to 0.96 , $p < 0.01$), while the biases in the measurements of RVEF and RVEDV were relatively large. LVEF obtained from QBS correlated significantly with those from FPP and GBP, while RVEF from QBS did not. LVEF and LVEDV obtained from QBS were significantly correlated with those from QGS, but the regression lines were not close to the lines of identity. In conclusion, the measurements of LVEF and LVEDV with QBS have good reproducibility and are useful clinically, while those of RVEF and RVEDV are less useful compared with LVEF and LVEDV. The algorithm of QBS for the measurements of RVEF and RVEDV remains to be improved.

Key words: quantitative gated blood-pool SPECT (QBS), quantitative gated SPECT (QGS), ^{99m}Tc -human serum albumin-DTPA, left ventricular ejection fraction, reproducibility