

Summary

Assessment of Biventricular Function Using Gated Blood Pool SPECT with QBS Software: Comparison with Planar Radionuclide Ventriculography

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Quantitative blood pool SPECT (QBS) is a new application for the quantitative assessment of biventricular function from gated blood pool SPECT (TMUGA). In this study, we compared biventricular function between planar radionuclide ventriculography and TMUGA. The reproducibility of measuring biventricular ejection fraction with QBS was also evaluated. **[Materials and Methods]** Thirty-five patients with cardiac disease were enrolled. Following intravenous bolus injection of 740 MBq of ^{99m}Tc human serum albumin-DTPA, first-pass radionuclide angiography (FP) and 25-gated interval planar multi-gated blood pool scintigraphy (PMUGA) were performed for the measurement of right ventricular ejection fraction (RVEF; %) and left ventricular ejection fraction (LVEF; %), respectively. Subsequently TMUGA data set was acquired with a dual-head gamma camera (16 gated intervals). Then, alternative LVEF and RVEF were measured using TMUGA with QBS. Regional left ventricular wall motion for both PMUGA and TMUGA were assessed with a 4-point scoring system respectively. **[Results]** Automatic biventricular border detection using QBS was feasible in 27 of 35 patients (70.7%). Measurements of

TMUGA LVEF and RVEF were well reproducible, with interobserver correlation coefficient of 0.98 and 0.97, respectively. TMUGA LVEF showed excellent correlation with PMUGA LVEF ($r = 0.98$, $SEE = 3.92\%$). The agreement of LV wall motion score between TMUGA and PMUGA was 88.1% (214 of 243 segments), with a kappa value of 0.82. On the other hand, RVEF determined by QBS had a 12.4% average overestimate compared to the same value obtained by FP. Moreover 95% confidential interval of TMUGA RVEF (- 28.8 to + 4.0%) was wider than that of TMUGA LVEF (- 10.7 to + 10.7%). **[Conclusion]** TMUGA with QBS analysis provided accurate and reproducible data for global and regional left ventricular function. However, the results of RVEF with TMUGA were not satisfying as a replacement for those with FP and modifying the algorithm were needed to improve accuracy of quantification.

Key words: ^{99m}Tc -human serum albumin-DTPA, ventricular function, Quantitative gated blood pool SPECT (QBS), Multigated equilibrium radionuclide ventriculography, First-pass radionuclide angiography.