Comparison of two software in gated myocardial perfusion single photon emission tomography, for the measurement of left ventricular volumes and ejection fraction, in patients with and without perfusion defects

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Source: HELLENIC JOURNAL OF NUCLEAR MEDICINE **Volume:** ١٠ **Issue:** ١ **Pages:** ١٩-٢٣ **Published:** JAN-APR ٢٠٠٧

Abstract: Emory cardiac toolbox (ECTb) and quantitative gated single photon emission tomography - SPET (QGS) software are the two most often used techniques for automatic calculation of left ventricular volumes (LVV) and ejection fraction (LVEF). Few studies have shown that these software are not interchangeable, however the effect of perfusion defects on performance of these software has not been widely studied. The aim of this study was to compare the performance of QGS and ECTb for the calculation of LVEF, end-systolic volume (ESV) and end-diastolic volume (EDV) in patients with normal and abnormal myocardial perfusion. One hundred and forty-four consecutive patients with suspected coronary artery disease underwent a two-day protocol with dipyridamole stress/rest gated technetium-٩٩m-methoxy isobutyl isonitrile (Tc-٩٩m-sestamibi) myocardial perfusion SPET (GSPET) (٨ gates/cardiac cycles). Rest GSPET scintiscan findings were analyzed using QGS and ECTb. Correlation between the results of QGS and ECTb was greater than ٩٠٪. In patients with no perfusion defects, EDV and LVEF using ECTb, were significantly higher than using QGS (P<٠,٠٠١), whereas no significant difference was noticed in ESV (P=٠,٧٤١). In patients with perfusion defects, also ECTb yielded significantly higher values for EDV, ESV and LVEF than QGS (P<٠,٠٠١). In tomograms of patients with perfusion defects, mean differences of EDV and ESV between the two software, were significantly higher than in tomograms of patients without defects (P<٠,٠٠١), while for LVEF this difference was not significant (P=٠,٠٩٣). Patients were classified into three subgroups based on the summed rest score (SRS); G١: patients with SRS:٥٣ (n=١٠٩), G٢: patients with ٤ <= SRS <= ٨ (n=١٣) and G٣: patients with SRS >= ٩ (n=٢٢). One-way ANOVA showed that the mean differences of EDV and ESV values between ECTb and QGS between the subgroups were significant (P<٠,٠٠١ for both parameters), while no significant difference was noticed between the subgroups, as for the mean difference of LVEF, calculated by the two software (P=٠,٠٧). By increasing SRS, the EDV and ESV values were overestimated to a higher level by the ECTb as compared to the QGS software. Linear regression analysis showed that the difference in LVV values, between the two software increased, when SRS also increased (P<٠,٠٠١). In conclusion, correlation between QGS and ECTb, software was very good both in patients with and without perfusion defects. In patients with perfusion defects, calculated LVEF, ESV and EDV values are higher using ECTb compared to the QGS software. However, the more extensive the perfusion defect was, the greater the difference of LVV between these two software. For the follow up of patients, we suggest the use of a single software either QGS or ECTb, for serial measurements of LV function.

Accession Number: WOS:٠٠٠٢٥٣٩٤١٨٠٠٠٠٥

Document Type: Article

Language: English

Author Keywords: gated SPET; left ventricular volume; ejection fraction; perfusion defects; summed rest score

KeyWords Plus: TC-٩٩M SESTAMIBI; AUTOMATIC QUANTIFICATION; COMPUTED-TOMOGRAPHY; WIDE-RANGE; SPECT; QGS; VALIDATION; TETROFOSMIN; INFARCTION; ٤D-MSPECT

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