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CARDIAC REST-STRESS GATED SPECT ACQUISITION PROTOCOL: 8 VS 16 FRAMES/CYCLE QUANTITATIVE EVALUATION.

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BACKGROUND-AIM

The aim of the present study was to compare 8 vs 16 frames/cycle REST-STRESS gated SPECT acquisition protocols in order to analyze the percentage differences in left ventricle (LV) ejection fraction.

METHODS

28 patients underwent gated REST-STRESS SPECT examinations. Tc99m-Techne-MIBI 555 MBq radiopharmaceutical dose was injected to all patients. Quality control according European GMP was performed for each radiopharmaceutical dose. The acquisition protocol was LEHR collimator, 60 views, 180° rotation, 3° rotation step, 25 sec/view, 64 x 64 matrix size by the use of Skylight gamma camera (Philips Medical System, Netherlands). Two-day study protocol was used (45 min after STRESS injection, 1 h after REST injection). The acquisition was done in 8 and 16 frames/cycle simultaneously. Filtered-back-projection reconstruction algorithm with cut-off 0.4 (8 frames), 0.25 (16 frames), Butterworth filter and motion correction were used. Quantitative analysis was performed by the use of AutoQuant software (Philips Medical System, ver. 2012.2). LV end diastolic volume (EDV), LV end systolic volume (ESV) and LV ejection fraction (EF) were recorded. Kolmogorov-Smirnoff (K-S) test was performed in order to find the normality of distributions. Mean and standard deviation (SD) values of the distributions were calculated. Statistically significant differences ($p < 0.05$) of EF were analyzed by the use of paired T-test (MedCal sw, ver. 5.00). A linear correlation was studied between 8 and 16 frames/cycle acquisitions.

RESULTS

All the EDV, ESV, EF distributions were analyzed with K-S test. The data were normally distributed: EDV (8 vs 16 frames) $p = 0.99$; ESV (8 vs 16 frames) $p = 0.92$; EF (8 vs 16 frames) $p = 0.10$. The mean and SD of EDV was 95 ± 30 ml (8 frames), 98 ± 31 ml (16 frames). ESV analysis showed 43 ± 22 ml (8 frames), 40 ± 21 ml (16 frames). The EF% was 57.1 ± 10.2 (8 frames) and 61.6 ± 10.1 (16 frames) and paired T-test showed statistically significant difference ($p < 0.05$). One to one linear correlation was found between 8 and 16 frames acquisition ($R^2 = 0.96$). The percentage difference in EF was 6%.

CONCLUSION

This study showed the underestimation of EDV and overestimation of ESV by the use of 8 frames/cycle. Therefore, an underestimation of LV EF. These results were agree with European cardiac GSPECT guideline. No additional acquisition time was needed to execute the examination by the use of 16 frames. In our department, gated cardiac SPECT 16 frames/cycle acquisition protocol was implemented.