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Evaluation of cardiac function by peak to peak time (PPT). H.Adachi, H.Miyanaga, H. Katsume, H.Ijichi, Y.Torii, T.Watanabe, M. Ochiai, T.Ohtomo, K.Takagi, and H.Kunishige. Kyoto Prefectural University of Medicine, Kyoto Prefectural Rakuto Hospital and Matsushita Hospital. Kyoto and Osaka.

PPT, the time interval between right and left ventricular count peaks in time activity curve of radionuclide angiogram, was evaluated as an index of cardiac function. PPTs in 45 cases with normal cardiac function were well negatively correlated with heart rate (HR). The regression relating PPT and HR was $PPT = 12.85 - 0.085HR$. This relationship was approved by the change of HR by atropine iv. injection or artificial pacing. Therefore, corrected PPT (CPPT) = $PPT + 0.085HR - 5.8$ was derived by transposition of the above equation. There was no significant correlation between CPPT and age or body surface area. Classifying by NYHA criteria, CPPT was prolonged proportionately to the degree. The correlation coefficients between CPPT and other cardiac function indices were -0.779 for left ventricular ejection fraction, -0.518 for right ventricular ejection fraction and -0.457 for cardiac output index.

These results suggest that CPPT could be an index of cardiac function.

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MEASUREMENT OF LEFT VENTRICULAR VOLUME AND CARDIAC OUTPUT BY GATED EQUILIBRIUM RADIONUCLIDE ANGIOCARDIOGRAPHY. H.Adachi, H.Miyanaga, H.Katsume, H.Ijichi, K.Okamoto, Y.Torii, T.Ishizu, O.Shimamura, and M.Ochiai. Kyoto Prefectural University of Medicine and Kyoto Prefectural Rakuto Hospital.

A new method to estimate left ventricular volume was developed using equilibrium angiography, based on the count changes within the left ventricle. Venous blood (10ml), withdrawn during multi-gated acquisition, was replaced in a cubic container and counted the radioactivity with the approximate distance from a gamma camera. Left ventricular volume (ml) was calculated with the following formula ;

$$X = \frac{\frac{\text{Ventricular activity} \times \text{Number of frame}}{\text{Acquired heart beat} \times \text{Cardiac cycle time}}}{\frac{\text{Blood volume}}{\text{Blood activity} \times \text{Attenuation factor (AF)}}}$$

To get AF, stroke volumes (SV) obtained with first-pass method were compared with non-corrected SVs with this method. AF in 29 subjects was 0.278 ± 0.047 (mean $\pm$ SD). There were good correlations between scintigraphic and M-mode ultrasonic cardiac volumes of 16 subjects; $r = 0.777$ for EDV, 0.761 for SV and 0.787 for cardiac output.

Thus, this technique is useful for the quantitation of left ventricular volumes and of cardiac output, and independent on geometric assumptions and easily repeatable.

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CARDIAC MEASUREMENTS BY RADIOISOTOPE IMAGES A COMPARISON WITH ECHOCARDIOGRAPHY. Hisao Tomiya, Masahiko Shimizu, Masaki Shukuya, Yoshiaki Masuda, Yoshiaki Inagaki, Koichi Uno, Gyo Uchiyama, Noboru Arimizu and Sakuzo Kaneko. The Third Dept. of Internal Medicine and Dept. of Radiology, Chiba Univ. School of Medicine, Chiba Emergency Medical Care Center, Chiba.

The validity of quantitative measurements by radioisotope (RI) for diagnoses of cardiac dilatation and myocardial hypertrophy was studied by comparing RI data with echocardiographic measurements.

In 50 patients with or without cardiovascular diseases, ^{201}Tl myocardial scanning was obtained, and the 45° LAO images were analyzed for the external and the internal diameters, and the interventricular septal and the posterior wall thickness at the level of the largest diameter. The echocardiographic measurements were compared with the profile curves of the RI studies.

The external and the internal diameters by RI studies correlated well with the echocardiographic studies with the "r" values of greater than 0.6 and 0.7 respectively. However myocardial thickness by RI had a tendency to show higher values than by UCG and the "r" values were somewhat lower. The septal and the posterior wall thickness measured by UCG at end-diastole corresponded to the thickness measured on the profile curve at the level of 89% and 91% of the peak respectively. These data correlated well to the results of an experiment using a heart phantom.

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APPLICATION OF ECG-GATED EQUILIBRIUM CARDIAC BLOOD POOL SCINTIGRAPHY TO EVALUATION OF SEVERITY OF VALVULAR REGURGITATION AND ATRIAL SHUNT. T.Kondo, K.Kaneko, M.Shigemura, F.Funakawa, K.Douniwa, Y.Sakai, H.Teshigawara, S.Ohashi, M.Wada, Y.Miyagi, M.Nomura, S.Okajima, H.Hishida, Y.Mizuno, K.Ejiri, Y.Kawai, F.Sasaki, A.Takeuchi, S.Koga, H.Isaji and I.Fukukei. Dept. of Internal Medicine, Radiology and Surgery, Fujita Gakuen Univ., Toyoake, Aichi 470-11, Japan.

To evaluate the validity of ECG-gated equilibrium cardiac blood pool scintigraphy (SCINTI) in assessment of severity of valvular regurgitation and atrial shunt, eight normal subjects (N) as control, 20 patients (pts) with aortic regurgitation (AR), 16 pts with mitral regurgitation (MR), seven pts with both AR and MR, 10 pts with atrial septal defect (ASD) and three pts with other valvular and congenital heart diseases were studied. SCINTI were performed in LAO projection using $Tc-99m$ -albumin (15mCi) IV. The ratio of the maximum change in count of LV region to that of RV region was calculated (stroke index ratio = SIR). SIR was 1.27 ± 0.05 (mean $\pm$ SD) in N, 2.26 ± 1.00 in AR ($P < 0.001$), 2.04 ± 0.93 in MR (N.S.), 3.05 ± 0.62 in AR+MR ($P < 0.001$) and 0.73 ± 0.14 in ASD ($P < 0.001$). There was a good agreement between the SIR and the angiographic grading by Sellers in nine pts with valvular regurgitation. SIR in post-operative ASD were near the values in N. In conclusion, these results suggest that SIR may become a useful noninvasive parameter for assessment of severity of valvular regurgitation and atrial shunt.