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USEFULNESS OF MYOCARDIAL IMAGING FOR THE ESTIMATION OF MYOCARDIAL INFARCT SIZE.

A.Suzuki, H.Miyakoda, Y.Koike, T.Watanabe, H.Itazu, O.Ueda, and K.Sakurai. National Nagoya Hospital. Nagoya. N. Kawai and I.Sotobata, Nagoya University School of Medicine. Nagoya.

A correlative study was performed between the infarct size estimated by either Tc-99m PYP (Tc-99m infarct area:TcIA) or Tl-201 (mean uptake ratio: MUR) myocardial imaging, and the total CPK activity (ΣCPK) or left ventricular ejection fraction (LV EF) in 43 patients with acute myocardial infarction. LVEF was evaluated by the first-pass method using Tc-99m PYP in the acute phase of myocardial infarction.

In 23 patients with anterior myocardial infarction, a significant correlation was shown between either of TcIA or anterior wall MUR and ΣCPK ($r=0.91$, $p<0.01$ and -0.71, $p<0.01$, respectively), and also between either of TcIA or anterior wall MUR and LVEF ($r=-0.69$, $p<0.02$ and 0.68, $p<0.02$, respectively). In 20 patients with inferior myocardial infarction, neither TcIA nor inferior wall MUR correlated significantly with ΣCPK, while a significant correlation was shown between inferior wall MUR and LVEF ($r=0.85$, $p<0.01$).

In conclusion, the infarct size estimated with Tc-99m PYP or Tl-201 myocardial imaging can be a useful clinical indicator of the severity of acute myocardial infarction.

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THE CLINICAL VALUE OF TL-201 MPI FOR EVALUATION OF LEFT VENTRICULAR SEGMENTAL WALL MOTIONS IN OLD MYOCARDIAL INFARCTION.

M.Okada,N.Kawai,T.Abe,H.Miyakoda,K.Shiki and I.Sotobata. Nagoya University School of Medicine. Nagoya.

The relationship between regional myocardial perfusion assessed by Tl-201 MPI and the LV segmental wall motion on LVG was studied in 100 patients with OMI. Regional Tl myocardial uptake ratios(RMURs) of 28 LV myocardial segments were obtained in 5 projections. A statistically significant mean difference in RMURs was shown between left ventriculographically documented akinetic and normokinetic segments in the 22 ROIs; 7 ROIs for the anterior, 2 for the apical, 3 for the inferior, 4 for the septal, 3 for the lateral portion. The MURs(or minimum MURs) for the above described five LV portions was defined as the average(or minimum) of those of the respective LV portion. Both of the mean and the minimum MURs in each wall showed a significant difference between akinetic and normokinetic wall portions. However, neither of the mean nor minimum MURs showed a significant difference between hypokinetic and normokinetic portions. Diagnostic accuracy to detect akinetic wall portions was 73% for the anterior, 67% for the apical, 75% for the inferior, 65% for the septal and 94% for the lateral portions.

In conclusion, the sites of Tl-201 perfusion defects correlated with akinetic wall portions, and Tl MPI was considered to be useful to detect akinetic wall portions.

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A FUNDAMENTAL EVALUATION OF FOURIER ANALYSIS.

H.Toyama, H.Tabuchi, H.Murata & H.Yamada. Dept. Nuclear Medicine & radiological sciences, Tokyo Metropolitan Geriatric Hospital, Tokyo.

In order to evaluate the reliability of Fourier analysis, a root mean square (rms) of Fourier approximation and a standard deviation (SD) of calculated phase value were estimated for a regional volume curve of the ventricles with various statistics and time resolution. Using a global volume curve which is less affected by statistics, linearity of phase value was tested and the relationship with the other time parameters such as ejection time (ET), times to peak ejection rate and peak filling rate were investigated. Considering statistics error and time resolution of phase value, the most adequate data sampling interval was 40 ms for ten min. data acquisition in the equibrium study after 20 mCi Tc-99m injection. The linearity of phase value and the other time parameters was good and correlation coefficients and proportional coefficients were almost unit. By using higher order (2 or 3) Fourier function, rms became less value and more reliable time parameters were estimated. In the case of asynergy, however, the third order of Fourier function could not give a good result because of the lack of smoothing effect by function approximation.

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A SIMULATION STUDY ON FOURIER ANALYSIS OF VOLUME CURVE.

K.Nakajima, H.Bunko, K. Hisada and K.Kojima. Kanazawa University, School of Medicine and School of Paramedicine. Kanazawa.

A simulation study was performed to assess the accuracy of Fourier analysis in gated blood pool scintigraphy. Volume curves were simulated using sinusoidal function and the statistical variations added to them. Phase and amplitude were calculated in each volume curve and compared with the theoretical value. The number of frames per cardiac cycle did not affect the value of phase largely, while data acquisition time did. Sixteen frames per cardiac cycle were sufficient. Low ejection fraction or small amlitude caused large statistical variation. Temporal smoothing was inadequate to reduce the statistical variation. In simulation of arrhythmia, phase was over- or under-estimated according to the patterns of volume curve. It is important to take into consideration that abovementioned factors affect the phase and amplitude.