

169

DETERMINING OF CARDIAC OUTPUT BY RADIO-NUCLIDE ANGIOCARDIOGRAPHY WITH COMPUTER PROCESSING. H.Hara,C.Yamanaka,S.Nara,M.Maki,K.Kusakabe and T.Yamasaki. Department of Radiology, Tokyo Women's Medical College., Tokyo.

Because conventional method of determining cardiac output with radionuclide tracer is time consuming, we made use of computer processing of radionuclide image in 56 patients and compared with the thermodilution method. With the scintillation camera angled 30° to 60° to the left, a bolus of 15 to 20 mCi Tc-99m HSA was injected. Image was obtained 2 frame per second for a minute followed by 1/60 frame per second for 9 minutes. The data were processed by the computer. The region of interest was set up manually over RV and LV. Cardiac output was calculated from activity of each ROI. Cardiac output of RV and LV correlated each other well ($r=0.83$). Cardiac output of RV correlated well with that from thermodilution method in most patients ($r=0.43$). Discrepancy in a small number of patients could be explained by poor positioning of the detector. We have proved with the artificial heart that superimposition of the great vessels upon ROI causes elevation of the saturation level resulting in apparent increase in cardiac output. Radionuclide angiocardio-graphy with computer processing was proved to be a simple and reliable method of measuring cardiac output with the detector properly positioned.

170

L-R SHUNT RATE EVALUATION METHOD WITH COMPARTMENT MODEL AND MULTI ROI. K.Nishimura,T.Miyamae and Y.Dohi. Saitama Medical School. Saitama.

There are many methods to determine quantitatively the L-R shunt caused by VSD, ASD or PDA. So far the gamma variate and the exponential function fitting methods were reported for the evaluation of the shunt rate. The use of these function fitting methods are limited to the cases of good bolus, no dilatation of right heart and no pulmonary hypertension. To improve these disadvantages we applied the 4-compartment model (corresponding to right heart, lung, left heart and surrounding organs) and tried to widen the applicable range. The method takes into account the information of the input bolus curve, so that a bad shaped bolus does not affect so much the applicability. Because the method uses the parameters such as staying times of radionuclide in the organs or delayed times between the organs, varieties of organ sizes and blood flows do not lead to errors. We tried to lessen the arbitrariness of the values of the parameters by setting ROI's on right heart as well as lung and innominate vein and by elaborating the time regions in which the values of the parameters are determined. As this procedure makes manual operations of computer complicated, we developed the program which finds out automatically the optimal parameters including the shunt rate. The good correlation with the oximetry method ($r=0.98$) is obtained.

171

EVALUATION FOR ACCURACY OF Qp/Qs RATIOS DETERMINED BY RADIONUCLIDE METHOD USING SIMULATED PULMONARY TIME-ACTIVITY CURVES H.Maeda,T.Nakagawa,N.Yamaguchi,M.Taguchi Department of Radiology, Mie University school of Medicine. Tsu.

This study was aimed to evaluate the accuracy of pulmonary-to-systemic flow ratios (Qp/Qs) in patients with left-to-right (L-to-R) shunts determined by radionuclide (RN) method using simulated pulmonary time-activity curve (simulated PTAC). It was assumed that each component due to initial passage, shunt flow and recirculation in a PTAC could be expressed as gamma functions respectively. Simulation was performed as follows; 1) separation of an original PTAC with L-to-R shunt into three components using a gamma function, 2) Variation of the Qp/Qs, appearance time of shunt flow and recirculation, 3) Summation of three components, 4) generation of noise for the summed curve.

Thus obtained various simulated PTACs were analyzed using the gamma function method (GFM) and the deconvolution analysis (DA). Linear regression analysis of the Qp/Qs determined by GFM with those given in 24 simulated PTACs was $r=0.89$ ($Y=0.84x + 0.28$) and DA showed higher correlation more than GFM ($r=0.97$, $Y=0.96x + 0.03$).

It is considered that the evaluation for the analytical accuracy which various RN methods have for detection of the Qp/Qs is possible without comparison with the Qp/Qs by other methods with errors of measurement.

174

DETECTION OF TRANSIENT ISCHEMIC ATTACK OF VARIANT ANGINA USING Tl-201 MYOCARDIAL PERFUSION IMAGING. K.Fujita,K.Abo,N.Horayama,T.Konishi,M.Hamada,T.Nakano,H.Takezawa,H.Maeda,T.Nakagawa and N.Yamaguchi. 1st Department of Internal Medicine and Department of Radiology, Mie University School of Medicine, Tsu.

Fifteen patients with variant angina undergoing coronary arteriography performed Tl-201 myocardial perfusion imaging (MPI). In 11 out of 15 patients, MPI showed perfusion defect transiently during attacks provoked by methacholine (6/8), ergonovine maleate (1/1) and treadmill or Master's two step exercise (4/6). In a 28 y/o case with old myocardial infarction, methacholine-induced defect of Tl-201 uptake suggested transient coronary arterial spasm as a cause of preceding myocardial infarction. The site of perfusion defect induced by provocative methods was fairly concordant with that of ST-segment elevation and coronary arterial spasm. Therefore, MPI had a clinical usefulness in detection of abnormal perfusion on attacks of variant angina.