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A PROPOSITION OF THE CRITERIA FOR AN INDICATION OF AORTOCORONARY BYPASS GRAFT (ACBG) SURGERY TO THE REGION OF OLD MYOCARDIAL INFARCTION (MI).

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Twelve patients (Pts) with MI were studied to determine whether the ACBG to the coronary artery responsible for the region of the MI was effective by means of washout rate (W-R) on exercise Tℓ-201 single photon emission computed tomography (SPECT). These pts, were divided into the two groups (Gp); GpA consisted of 7 pts. with effective ACBG and GpB of 5 pts. with noneffective operation. SPECT was displayed to the short axis, vertical and horizontal long axis of the left ventricle on exercise (early image) and 4 hours later (delayed image). The circumferential W-R was measured for each of 3 slices (short axis) and one slice (vertical long axis), as follows; the W-R=(early uptake-delayed uptake)/early uptake × 100%.
The mean-2S.D. of the W-R in 8 normal controls was ranged from 36 to 40%. In GpA, the W-R in the region of MI before ACBG was 18±9% (mean±S.D.) and increased to 52±7%, while the preoperative W-R was 48±7% in GpB.
In conclusion, the criteria for the indication of ACBG to the region of MI may be selected in the pts, with less than about 40% of the W-R on SPECT.

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EFFECT OF ATTENUATION CORRECTION ON THE SPECT IMAGE OF THE HEART.

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Three dimensional imaging of the heart using a rotating gamma camera has been commonly performed by half(180°) rotation method without attenuation correction. In the present study, necessity and importance of attenuation correction was shown by phantom study especially in the case of quantitative study. Images of myocardial phantoms filled with Tl-201 chloride solution with and without cold spots were generated by full(360°) and half rotation of gamma camera with and without attenuation correction.Attenuation correction methods of radial post correction(RPC) by Tanaka and pre-correction by Sorenson were compared by the analysis of circumferencial profile of the long axial myocardial images. Decreased activity at the base of myocardium without attenuation correction was evident for both of half and full rotation. These phenomena of decreased activity were corrected by RPC method better than by Sorenson method. It is more important for half rotation image to correct attenuation effect comparing with full rotation image, although the half rotation image has better signal to noise ratio than full rotation images.

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MEASUREMENT OF THE LV WALL THICKNESS BY ECG-GATED TL-201 MYOCARDIAL EMISSION CT.

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We evaluated ECG-gated Tl-201 myocardial emission CT (ECT) for the measurement of the LV wall thickness. The system consists of rotating single head γ-camera and online computer system (HITACHI, HARP system). Initialy, we made 10,15,20,25mm tubular phantoms with wheat flour clay. By the phantom study, we recognized that ECT had an ability to distinguish the phantoms from each other. Clinicaly we evaluated 15 patients (8 HCM, 1 DCM, 5 HHD, 1 valvular disease). After i.v. injection of 3~5 mCi of Tl-201, ECG-gated ECT deta were collected from 180°, 24 steps, 100 ~ 130 beats/step for total sampling time of 40 ~50 minites by MUGA method for 20 frames/R-R interval. One and two frames were added for the reconstruction of the ED image. From the transaxial tomography, short axial and long axial ED images of the LV were reconstructed. We measured the LV septum and the free wall thickness with the obtained short axial ED image. LV wall thickness measured by ECT was correlated with that by UCG (septum : γ=0.66, p〈 0.01 free wall : γ=0.57, p〈 0.05). In summary, we obtained relatively good correlation between the measurement by ECT and that by UCG, but there were some difficalties in measurement of the LV wall thickness by ECT. For example, there were sometimes wide differences in a slice and anterior ~ lateral wall seems more thick than inferior ~ septal wall.

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ESTIMATION OF RIGHT AND LEFT VENTRICULAR VOLUMES BY GATED BLOOD-POOL TOMOGRAPHY.

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For the estimation of right and left ventricular(RV & LV) volumes by SPECT,we performed phantom and clinical studies. The RV phantoms containing Tc-99m(5mCi/l) were set in the body phantom with various background(BG). The SPECT system consisted of dual scintillation-camera heads and nuclear medicine miniconputer system.Thirtysix projection data were collected for 20 sec at every 10 degree in phantom study and for 1 min in clinical study. Ventricular volume was measured by addition of voxels above a threshold percentage of maximum counts within a volume of interest(VOI). BG-ROIs were set adjacent to RV and LV in 4-chamber -view image at endsystolic frame. When BG level(% of maximum counts in ventricular VOI) was constant, the optimal cut off level (OCL) was not changed in various ventricular volumes. The following relation was present between OCL and BG: OCL(%)=0.47×BG(%)+44.2 (%) (r=0.989). Using OCL determined by this equation,we could estimate the phantom volume correctly(cv=9.8%). In 10 patients without valvular diseases,the LV to RV stroke-volume ratio was 1.05+0.10. We concluded that ventricular volume can be reliably estimated using gated blood pool tomography.

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