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VOLUME CURVE PROCESSING OF THE PHASE IMAGE AND AMPLITUDE IMAGE USING FOURIER ANALYSIS.

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Evaluation of the cardiac function can be made using the ejection fraction or the cardiac function using the phase image and amplitude image that have been processed using the Fourier analysis. Data was gathered by obtaining multi-gated images at intervals of 10 msec or 50 msec. The volume curve obtained during the R-R wave interval were gathered on a single matrix. Using the 1th Fourier progression,the volume curve was divided into 3 components;a direct, a Cos, and Sin component. By summing up these 3 component,on approximation curve was obtained. The approximated volume curve function $F(x)$ is $F(x)=a_0+\sum_{m=1}^{n}(a_m \cos mx + b_m \sin mx)$ $a_0=\frac{1}{2\pi}\int_0^{\pi}F(x)dx$, $a_m=\frac{1}{\pi}\int_0^{\pi}F(x)\cos mx\,dx$, $b_m=\frac{1}{\pi}\int_0^{\pi}F(x)\sin mx\,dx$, were a_0 is the direct component,the amplitude is $\sqrt{a_m^2+b_m^2}$ and the phase is $\tan^{-1}(b_m/a_m)$. In the present study,a comparision of the volume curve and image with and without smoothing processes was made. In addition various matrix size were compared. Using the 1th Fourier progression the effect of changing these factors on the phase and amplitude image was investigated. We feel that the results reported here may be importance with regards to clinical application of map(matrix) smoothing on multi-gated images.

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QUANTITATIVE PHASE ANALYSIS OF MYOCARDIAL INFARCTION.

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We performed phase analysis in RAO projection by first pass method and LAO by equilibrium method. Quantitative phase analysis was performed in 24 cases with myocardial infarction(MI:anterior 14,inferior 10) and 10 normal cases by using Histogram. Segmental phase values at anterior,septal, lateral and infero-posterior infarctions were compared with segmental phases of control group in RAO and LAO images. Negative correlation was observed between phase value and R-R interval. Therefore,segmental phase values were corrected by R-R interval. Control and MI group were clearly separated by corrected phases. Phase difference between RV and LV was calculated. Control group showed delay in RV phase(mean 13msec). Almost all of anterior MI cases showed delay in LV phase. On the other hand,several inferior MI cases showed more delay in RV phase than control group. In such cases, RV infarction was suspected. Phase difference between infarcted areas and normal areas were compared with global LVEF. In the cases without severe CHF,negative correlation was observed between phase difference and global LVEF.

Quantitative phase analysis was thought to be useful in the detection of location and contraction abnormality of infarcted areas.

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EVALUATION OF LV FUNCTIONAL RESERVE BY INTERVENTION RADIONUCLIDE VENTRICULOGRAPHY.

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In order to detect the CAD patients and LV functional reserve, intervention radionuclide cardioangiography were performed in 80 patients who underwent coronary angiography.

1) Detection of CAD ; For detection of CAD, sensitivity and specificity of exercise radionuclide ventriculography and stress ECG were (83, 90%), (69, 60%) respectively. Exercise radionuclide ventriculography were superior than stress ECG.

2) Evaluation of LV functional reserve ; In AP and MI cases, LVEF decreased by 5%, after exercise in many cases, while increased by 10% in normal cases,moreover, regional wall motion were reduced in ishemic area after exercise, especially, in multivessel diseases LVEF decreased significantly in comparison with single vessel diseases and by combination with NTG, reduced motion were improved in ishemic area.

3) Application of phase, amplitude image ; Quantification of regional wall motion were evaluated in applying functional image. In ishemic area, phase angle was delayed and amplitude was decreased in comparison with normal area respectively.