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THE DETERMINATION OF THE VOLUME, EJECTION FRACTION AND OUTPUT VOLUME OF THE LEFT VENTRICLE BASED ON THREE-DIMENSIONAL ANALYSIS AND ITS BIOLOGICAL AND PATHOLOGICAL SIGNIFICANCE. A. Asahara, Y. Honma, Y. Oasa, S. Tachibana and H. Ueda. Department of radiology, Central Hospital of J.N.R.

We recorded a three-dimensional image of the left ventricle based on the dual camera method and at the same time calculated the volume of the ventricle and by studying various factors that could be induced from this we studied the significance of the three-dimensional analysis method in regard to ventricular function.

Based on the results of 22 normal subjects we investigated the relationship between ventricular volume, various indexes and age, physical types. Furthermore, by comparing the results of heart diseases patients with these results we attempted an analysis of pathology. Under biological conditions the ventricular volume of adults exhibited a direct correlation with body surface area. In similar body type the cardiac minute output showed the best correlation. The cardiac output volume reduction agreed well with the clinical findings.

Thus, the three-dimensional analysis method makes possible the calculation of the absolute amount of the ventricular volume and better observe the biological and pathological conditions of cardiac function we believe the clinical application of this method to be quite important.

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ASSESSMENT OF THE LEFT VENTRICULAR FUNCTION BY THE RATE OF CHANGE OF LEFT VENTRICULAR VOLUME (DV/DT) USING ECG GATED RADIOCARDIOGRAPHY. T. Ikezono, M. Ozaki, T. Yamagishi, T. Fujii, K. Katayama, F. Yoshino, H. Ogawa, Y. Matsuda, T. Kumada and R. Kusukawa. The Second Division, Department of Internal Medicine, Yamaguchi University School of Medicine. Ube

Radiocardiogram has been widely used as a non-invasive method to evaluate the cardiac function. This study examined the rate of change of left ventricular (LV) volume (dv/dt) during systole and diastole in 18 normal controls (N) and 71 patients [18 hypertension (HT), 27 ischemic heart disease (IHD) and 30 old myocardial infarction (OMI)]. In all cases, the peak rate of the LV systolic ejection divided by end diastolic count (max S dv/dt/EDV) were correlated well with ejection fraction (r=0.85) and mean Vcf (r=0.90). These data indicate that max S dv/dt/EDV reflects the LV systolic function.

Compared with N (3.24 ± 0.50), max S dv/dt/EDV was significantly lower in OMI (2.18 ± 0.27), but not significant in HT (3.25 ± 0.57) and IHD (3.07 ± 0.49). On the one hand, the peak rate of diastolic filling of the LV divided by end diastolic count (max D dv/dt/EDV) were significantly lower in HT (2.40 ± 0.52), IHD (2.20 ± 0.40) and OMI (1.71 ± 0.72) than N (3.26 ± 0.52). These data suggest that max D dv/dt/EDV is useful in detecting in early deterioration of LV performance.

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EVALUATION OF THE ATRIAL CONTRIBUTION USING TWO BEAT LEFT VENTRICULAR VOLUME CURVE OBTAINED BY ECG-GATED RADIONUCLIDE ANGIOGRAPHY. K. Ejiri, K. Kawai, F. Sasaki, T. Takeuchi, S. Koga, T. Kondo, K. Kaneko, Y. Kato, Y. Kogame, H. Hishida and Y. Mizuno. Dept. of Radiology and Internal Medicine, Fujita Gakuen Univ. Toyoake, Aichi, Japan, 470-11.

The late diastolic phase of left ventricular (LV) volume curve (LVVC, =time-activity curve) obtained by conventional list mode ECG-gated equilibrium radionuclide angiocardiology is distorted and unreliable, even if a minimal variation of R-R interval is present. We developed a new compiling method, in which each cardiac cycle was divided every 20 msec interval in two different ways, i.e., backward and forward from R wave, and two LVVC's were constructed and connected to make a "two-beat LVVC". The two-beat LVVC enabled the study of late diastolic phase. To estimate atrial contribution, an increment of counts after the beginning of P wave divided by counts corresponding to stroke volume (A(P)/SV) was calculated. This value correlated well with A/SV by contrast cineventriculography (N=11, r=0.76, p<0.01). Determination of ROI (55% or 70% ROI) did not influence the A(P)/SV value (N=14, r=0.99, p<0.001). However, the standard LAO projection tended to underestimate the value compared with the craniocaudal LAO projection. The A(P)/SV discriminated atrial contributions in myocardial infarction or congestive cardiomyopathy from normal. There was a correlation (N=19, r=-0.76, p<0.01) between EF and A(P)/SV in patients with EF less than 50%.

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DETERMINATION OF LEFT VENTRICULAR VOLUME BY IN VIVO Tc-99m RBC POOL SCAN. K. Hayashida, T. Nishimura, T. Uehara, H. Ohmine, T. Kozuka. Department of Radiology, National Cardiovascular center

Left ventricular volume was estimated by the count method. In the basic experiment, the counts rate of balloon had good correlation (R=0.996) with the measured volume of the balloon from 50ml to 350ml. The left ventricular counts were corrected by counts of 0.1ml blood sampling in order to standardize administered dose of Tc-99m and total blood volume. The corrected LV counts of EDC and ESC had good correlation (R=0.962) with the EDV and ESV estimated by dye dilution method. Subsequently, with the equation of $y=40.89x+0.08$ (y=EDV (ESV) by dye dilution method, x=EDV (ESV) by counts method), left ventricular volumes were determined by counts method in our laboratory. Left ventricular volumes estimated by counts method had good correlation (R=0.88) with those by contrast angiography in various heart diseases excluding shunt and regurgitant cases.