THE DETERMINATION OF THE VOLUME, EJECTION FRACTION AND OUTPUT VOLUME OF THE LEFT VENTRICLE BASED ON THREEDIMENSIONAL IMAGE AND ITS BIOLOGICAL AND PATHOLOGICAL SIGNIFICANCE. A. Asahara, Y. Homma, Y. Oana, S. Tachibana and H. Ueda
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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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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 devided 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, peak rate of LV ejection and filling of the LV devided 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 (2.17 ± 0.52). The data suggest that max D dv/dt/EDV is useful in detecting in early deterioration of LV performance.

DETERMINATION OF LEFT VENTRICULAR VOLUME BY IN VIVO TC-99m RBC POOL SCAN. K. Hayashida, T. Mishimura, T. Uehara, H. Ohmine, T. Kozuka
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Left ventricular volume was estimated by the count method. In the basic experiment, the counter 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 ESB had good correlation (R=0.96) with the EDV and ESV estimated by dye dilution method. Subsequently, with the equaion of y=40.89x+0.08 (y=EDV (EDV) 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=0.86) with those by contrast angio­graphy in various heart diseases excluding shunt and regurgitant cases.