A new Method of Assessing BV/CO Ratio in RCG

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BV/CO (circulating blood volume/cardiac output) ratio in RCG (radiocardiogram) is calculated from values determined by Stewart-Hamilton's dilution method.

Since this procedure is complicated and time consuming, an attempt was made to establish a simpler formula by which BV/CO ratio can be easily calculated.

BV/CO ratio is expressed as transit time. Therefore, in the RCG curve, an interval ($T_{CF\,1.5}$), between the time when the ratio activity rose to 1.5 times as high as concentration in the steady state and the time when it reduced to 1.5 times the concentration was measured.

Correlation between BV/CO ratio and $T_{CF\,1.5}$ was studied. In 367 cases of nonvalvular diseases, regression coefficient was 0.973,

$$\text{BV/CO ratio} = 0.058\ T_{CF\,1.5} - 0.016 \cdots\cdots (1)$$

In 243 cases of valvular diseases, regression coefficient was 0.982. Consequently,

$$\text{BV/CO ratio} = 0.067\ T_{CF\,1.5} - 0.184 \cdots\cdots (2)$$

And two regression lines crossed each other at the point of 20 seconds of $T_{CF\,1.5}$. Thus, by measuring $T_{CF\,1.5}$, BV/CO ratio was easily estimated using formula (1), when $T_{CF\,1.5}$ was less than 20 seconds, of formula (2), when $T_{CF\,1.5}$ was more than 20 seconds.

Correlations between BV/CO ratio and peak to peak interval as well as full width of half maximum value were also analyzed. However, they were not so close as that between BV/CO ratio and $T_{CF\,1.5}$.

Our analysis indicates $T_{CF\,1.5}$ measurement was very feasible for the calculation of BV/CO ratio in RCG.

An Automated Detection of Abnormal Left Ventricular Wall Motion from RI-angiocardiograms

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ECG-gated RI-angiocardiography can be noninvasively performed to obtain a left ventricular volume and wall motion In general RI-images are obscure because of the statistical fluctuation of radioisotope and the poor resolution of RI-imaging devices. Computer-based methods for detecting left ventricular edge are proposed.

ECG-gated images of left ventricle were digitized by a image processing system consisting of a flying-spot-scanner and a mini-computer system. A nonlinear filter was designed for smoothing and enhancing the digitized RI-angiocardiographic image. Four rectangular filters were set up around the point of observation and means and variances of the density of the image were calculated. Among the nighbors one which has the smallest variance can be considered as the region in which a boundary is not contained, because the existence of boundary makes the variance of the image in this region increase. An edge was obtained from the left ventricular image which was extracted by nonlinear filter smoothing method. The edge for enddiastolic images was superimposed on the one for endsystolic image with two reference points outside the cardiac images. In order to quantify regional shortening the method employed a radial