Hemodynamic Studies by the Use of Radiocardiogram in Combination with Thermodilution Technique in Essential Hypertension

Kikuhiko HIGUMA*, Hisaichiro TSUKIYAMA*, Keiko OTSUKA*, Minoru KIKUTA*, Shinichi TOOYAMA*, Kiminari KOBAYASHI*, Susumu UNEDA*, Yoshihiro KANEKO*, Morimichi UJIIE**, Takeo NOZAWA**, Kouichi ASAKURA**, Shigeru ONO**, Yooichi YAMAMOTO***, Toshihiko TANAKA***

**Second Department of Internal Medicine, Yokohama City University School of Medicine, Yokohama*

***Department of Radiology, Yokohama City University School of Medicine, Yokohama*

****Department of Radiology, Kanagawa Prefectural Center for Adults, Yokohama*

The relationship between cardiac index and cardiopulmonary volume has been extensively studied in recent years. Cardiopulmonary volume is determined as the product of cardiopulmonary transit time and blood flow per second. In this study, cardiac output was measured with thermodilution method using the Swanganz flow-directed catheter, and cardiopulmonary transit time (CPTT) was estimated as the interval for RISA to pass through from the right ventricle to the left heart in the precordial probe method. RISA was easily flushed as one bolus into the right atrium through the thermodilution catheter, and so, in the retardation of blood flow with iv propranolol, CPTT was easy to obtain as the catheter was positioned centrally.

In 20 patients with essential hypertension, the positive correlation ($r=0.797$, $p<0.001$) was observed between cardiac index and cardiopulmonary volume.

This suggests that differences in cardiac output were related in part to a central redistribution of blood volume as indicated by Tarazi. IV propranolol (0.2 mg/kg) induced an increase in cardiopulmonary blood volume but a decrease in cardiac index and cardiac index/cardiopulmonary blood volume as a whole, while, in some patients, propranolol produced a remarkable increase in cardiopulmonary blood volume and no decrease in cardiac output.

This method has proved useful in serial determination of cardiac function and easy to repeat.

Quantification of Right-to Left Shunting in Cyanotic Heart Disease

H. SETO, K. HISADA, M. MATSUDAIRA

Department of Nuclear Medicine, University of Kanazawa Hospital, Kanazawa

A method for the quantification of shunting is discussed experimentally and clinically.

Following quatitative injection of ^{99m}Tc-MAA to a patient in a supine position, whole body counting was obtained by summing up the counts of linear scanning with our Medical Universal Human Counter. For linear scanning, two detectors with a slit-field collimator are placed symmetrically above and two below the table. The table of the scanning bed was moved automatically along the longitudinal axis at the speed of 40 cm/min. Isoresponse curves of this system in air and chest fantom were made with a window of 140 KeV $\pm 2\%$.

Mean transmission rate (MTR) of ^{99m}Tc-MAA from the lung was calculated in healthy subjects. Good correlation was obtained between MTR and chest thickness of the subjects.

Right to left shunt rate was calculated as follows:

$$\text{R to L shunt rate} = \frac{No - Na/MTR}{No} \times 100$$

No: counts of the administered dose in air

Na: counts of the lung in the linear scan

MTR: Mean transmission rate of the patient

This method is safe and can be simply performed at rest and even though on exertion.