A dynamic heart phantom has been developed for the evaluation of multigate method as measuring cardiac ejection fraction (EF). The phantom consists of two diaphragms moulded with silicon rubber and of two ball valves. Air pressure is applied between the diaphragms to get the periodical inner volume change. The pulsed flow is obtained by ball valves placed between the phantom and water bath. The pulse width, rate, and amplitude can be changed to get various volume curve. Using the voltage pulse for driving a electromagnetic three-way stopcock valve as a gate timing signal, we obtained multigate images and calculated the EF in various pulse conditions. When the background activity is negligible, EF obtained by the multigate method has a good correlation with that obtained by the electromagnetic flowmeter, and moreover pulse rate and amplitude can be changed to get various volume curve. Using the voltage pulse for driving a electromagnetic three-way stopcock valve as a gate timing signal, we obtained multigate images and calculated the EF in various pulse conditions. When the background activity is negligible, EF obtained by the multigate method has a good correlation with that obtained by the electromagnetic flowmeter, and moreover pulse rate and amplitude can be changed to get various volume curve.

To obtain left ventricular enddiastolic volume (EDV) by RI, a new method was developed by using individual attenuation factor (IAF). In 36 healthy subjects, EDV determined by UCG was compared with that by RI to confirm the accuracy of determination of volume by RI. Five ml of saline with Tc-99m, given count of Tc-99m (Co), was filled in a balloon mounted on the tip of catheter ( Foley 12 F). The catheter was inserted through esophagus to the level of the 3rd, intercostal space to Tc-99m in the balloon was counted. (C1) Then the catheter was pulled out. After this, multigated acquisition during which venous blood of 10 ml was sampled and Tc-99m in the blood was counted. EDV by multigated acquisition was computed in the LAO 45° projection by following formula:

EDV = LV count/sec - IAF × Co

There was a good correlation between EDV by RI and that by UCG (r=0.86).

Thus this new method by esophageal balloon is useful for the clinical determination of EDV.