APPLICATION OF RADIONUCLIDE STUDIES IN DIAGNOSIS OF ACUTE MYOCARDIAL INFARCT : EVALUATION OF THE LEFT VENTRICULAR FUNCTION BY MYOCARDIAL SCANNING AND RADIONUCLIDE ANGIOCARDIOGRAPHY WITH TECHNETIUM-99m PYROPHOSPHATE

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Pump failure, the primary cause of the in-hospital death in patients with acute myocardial infarct(AMI), reflects the extent of cellular necrosis. Recently, a scanning technique has been developed using radiopharmaceuticals which sequester in acutely damaged myocardium. The size of the anterior AMI has been acurrately estimated by myocardial scanning with Tc-99m pyrophosphate(PYP) in animal experiments. The first purpose of this paper is the comparison of the size of the AMI and the clinical data representing left ventricular(LV) function. In 12 patients(Pt) with anterior wall AMI, the size of the AMI estimated from the scanning with Tc-99m PYP was compared with the pulmonary capillary wedge pressure(PCWP). In the 6 Pt with PCWP below 10mmHg, the size of the AMI was less than $30cm^2$ except one. In the 6 Pt with PCWP beyond 10mmHg, 3 AMIs were larger than $40cm^2$ and other 3 AMIs were smaller than $30cm^2$, but in these 3 cases AMIs were extended to septum and/or lateral wall. In comparison with chest X-ray findings, the following results were obtained. The average size of the AMIs among the patients with alveolar and/or interstitial edema on chest X-ray was $44cm^2$ and on the other hand that of among the patients without pulmonary edema was $24cm^2$. The size of the AMI estimated from myocardial scanning with Tc-99m PYP appears to represent the LV function of Pt with anterior AMI quite well, but this method has several problems as following; the AMI in the inferior wall and posterior wall will be underestimated by this method, on the other hand the subendocardial AMI might be overestimated, and with this method any information about old MI can not be expected.

The ejection fraction(EF) is well accepted measure of LV function. The second purpose of this paper is comparison of left ventricular ejection fraction(LVEF) obtained from radionuclide angiocardiography and other clinical data representing LV function. First pass radionuclide angiocardiography(FPRACG) with Tc-99m PYP was obtained with the multicrystal gamma camera before myocardial scanning. The LVEF was calculated from LV time-activity curve at 0.05 sec intervals. In 12 Pt LVEF and PCWP was compared. The LVEF in 7 Pt with PCWP below 10mmHg was 0.49 ± 0.08 and that of in 5 Pt with PCWP beyond 10mmHg was 0.33 ± 0.07. The LVEF was also compared with the chest X-ray findings of pulmonary congestion in 16 Pt. The LVEF in 5 Pt with pulmonary edema was 0.38 ± 0.1 and that of 11 Pt without pulmonary edema was 0.44 ± 0.09. This difference was, however, statistically not significant. This discrepancy might be explained by the time lag between increased PCWP and chest X-ray findings. Therefore, LVEF calculated from FPRACG appears to be reflected LV function more precisely than chest X-ray.

In conclusion both myocardial scanning and FPRACG with Tc-99m PYP are simple and safe in technique. Each study gives us different information about LV function in patients with AMI. If we combine these methods, we can expect quite useful informations about present and future LV function in the patients with AMI.