Thesis Title Volume Determination of Myocardial Infarct by SPECT Using Tc-99m pyrophosphate
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ABSTRACT

Determination of myocardial infarction volume using Tc-99m pyrophosphate by SPECT was studied in both left ventricular myocardial phantom and patients. To appropriately define the infarct boundary, we studied the optimal threshold which was presented as percentage of maximum counts. It was found that the best threshold was 65% which gave correlation coefficient between calculated volume and true volume (r) and standard error of estimation ($S_{x,y}$) of 0.9923 and 0.7647 respectively.

We studied 2 factors which might influence the myocardial infarction volume calculation. The first factor was radioactivity concentration in the myocardial infarct site. The results showed that radioactivity concentration had only a small effect on volume calculation (%CV < 5). And the larger the myocardial infarction volume resulted in the more accurate results. However, among four volumes (1.8 cc, 2.6 cc, 6.0 cc and 12.0 cc.) included in the experiment, the 1.8 cc volume resulted in the least accuracy (66% accuracy).

Another factor, concentration of background activity (lung), was studied. The results showed a good linear relationship between the calculated volume and radioactivity concentration of background. Thus background concentration had a direct effect on myocardial infarct volume calculation. However, the calculated results did not depend on the reconstruction planes i.e. transaxial, coronal and sagittal.

Moreover, intra- and inter-operator's bias was also studied using the data of 12 myocardial infarction patients. The results showed that there was no such an operator's bias.

In conclusion, the myocardial infarction volume calculation method using Tc-99m pyrophosphate that we purposed, when taken into consideration of influencing effects, provided accurate results.