284

COMPARISON OF 2-DIMENSIONAL POLAR AND SPREAD REPRESENTATION OF TL-201 MYOCARDIAL SPECT IMAGINGS.

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Tl-201 myocardial SPECT is 2-dimensional tomograms of relative 3-dimensional distribution of Tl-201 in the myocardium. A 2-dimensional polar representation was made by arranging short-axial SPECT imagings in polar and spread representation. The differences and characteristics of these two representations were compared in myocardial phantom and clinical cases. In the polar representation, the nearer to the myocardial base was the perfusion defect situated, the larger than real size was it observed. In the spread representation, the perfusion defect in any location of myocardium was observed in real size and figure. Therefore, the spread representation was considered to be superior to the polar representation in the detection of the size and location of perfusion defect. A perfusion defect of 3 cm diameter and 0.5 cm thick was shown to be a same size with that of 2 cm diameter and 1 cm thick, and the degree of the perfusion defect was seemed to depend upon the volume of perfusion defect. In the spread representation, the change of cutting point was very useful to observe the location and extension of the perfusion defect, when it was divided into two parts by cutting line.

285

QUANTIFICATION OF MYOCARDIAL INFARCT SIZE BY MYOCARDIAL SURFACE MAP.

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To estimate the infarct size, we devised the myocardial surface map using Tl-201 SPECT. The maximum-count circumferential profile curves(CPs) are generated and the distances between the center of the left ventricule(LV) and the maximum-count points are measured in each short axis sections. The circumferential length of the circle with the longest distance as radius are determined as the circumferential length of LV. Pixel line with the circumferential length is divided equally by division number of CP and then the CP values are put into the pixel line. The myocardial surface map are generated by placing these pixel lines in order from apex to base of LV. Infarct sizes are calculated in 6 patients with anterior MI and in myocardial phantom using the myocardial surface map. In conclusion, infarct size can be accurately and easily estimated by this method.

286

A NEW QUANTITATIVE REPRESENTATION OF EXERCISE Tl-201 MYOCARDIAL SPECT AND ITS CLINICAL UTILITY IN ISCHEMIC HEART DISEASE.

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To quantify myocardial ischemia, we have devised a new two-dimensional representation of Tl-201 myocardial SPECT(The unfolded map) and performed a basic study for the clinical utility of this method. The unfolded maps were obtained immediately(EX) and 4 hours after submaximal exercise stress(RD) in 15 patients(angina pectoris(AP):5,myocardial infarction (MI):5, no coronary artery disease(Cont.):5). The lower limits of %Max.count for detecting the perfusion defect were as follows,

	EX	RD
Cont.	67.27 ± 3.20	65.98 ± 1.72
AP	49.53 ± 8.32	56.39 ± 4.45
MI	39.84 ± 9.33	47.68 ± 10.31

(%Max.count)

These data suggests that two standard values were necessary for detecting the transient ischemic area (65 %Max.count on EX image) and the infarcted area (55 %Max.count on RD image). For the diagnosis of coronary artery disease,sensitivity and specificity of the unfolded map using two standard values were 80% and 83%,respectively. The unfolded map method provided quantitative assessment of the myocardial ischemia, and made us possible to grasp the extent of the perfusion defect more directly and easily. Thus, it seemed that this method is useful for the diagnosis and evaluation of patients with ischemic heart disease.

287

MYOCARDIUM UNFOLD CHART (MUC) OF LOCAL BLOOD FLOW DISTRIBUTION BY USING TL-201 HEART EXECERSISE SPECT IMAGE.

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A myocardium local blood flow distribution unfold chart was contructed from a Tl-201 myocardium load SPECT image to evaluate the Tl-201 myocardium distribution quantity , washout rate, redistribution index, and an area of ischemia or infarction. Short axis tomographs were taken immediately after exercise load, and again 4 hours later, and these were used for the SPECT image. Every slices from the apical area to the basis area were utilized and measured the distance between the center and the maximum counts in each slice radius and its circumferential profile in 6° segment (36 segments) were computed. A 2-dimensional myocardium blood flow distribution of unfold chart was then constructed by using the unfolded circumference of each slice as the abscissa axis, and the heart long axis as the ordinate axis. The quantitative analysis of this study was confirmed by simulation using a phantom. The area such as ischemic or infarction and myocardial surface were clinically judged with accuracy. This method measurements culd be utilized to evaluate the seriousness of a patient's ischemia. The entire procedure to make the computation required 8-10 minutes.