Relation between the Infarcted Area and the Ischemic Area of the Mapping in Myocardial Infarction

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It is an important problem to prospect the infarcted area by the body surface isopotential mapping of the QRS wave (mapping) in old myocardial infarction. Yamada et al. reported the method to determine the infarcted area by the voltage difference between the normal mapping and the mapping in myocardial infarction.

Recently, we could take the mappings before and after the attack of anterior infarction. In those mappings at 20 msec from the beginning of the QRS wave, both mappings were compared and the positive area before infarction which changed to a negative area after infarction was picked up. That area was located at the left anterior region, and that location was coincident to the location of anterior infarction in that case (Fig. 1).

Consequently, in our study, the positive area in normal cases which was altered to a negative area in myocardial infarction was determined to be the infarcted area as shown in Fig. 2.

In the same method, the ischemic area was determined by using the mapping at T max (at the point of the maximal amplitude of the T wave in normal cases or at the minimal amplitude of the T wave in myocardial infarction (Fig. 3).

In the present study, the relation between the infarcted area and the ischemic area was studied, because it was theoretically considered that the infarcted area was located inside of the ischemic area.

However, it is a difficult problem to select the mapping of the QRS wave and T wave adequate to compare both areas. Initially, the infarcted area at 20 msec and the ischemic area at T max

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Fig. 2. a: The mapping at 20 msec of the mean value in normal cases.
b: The mapping at 20 msec in the case with anterolateral infarction.
c: The infarcted area in that case located at right lateral, anterior and left lateral regions.

Fig. 3. a: The mapping of the zero line at T max of the mean value in normal cases.
b: The mapping at T max in the case with anterolateral infarction.
c: The ischemic area in that case located at anterior, left lateral and partly posterior regions.

Fig. 4. a: The infarcted area at 20 msec and the ischemic area at T max in the case with anterolateral infarction.
b: The infarcted area at 25 msec and the ischemic area at T max in that case. Both areas are almost coincident.
c: The infarcted area at 25 msec and the ischemic area at T max in the case with anterior and inferior infarction. Both areas are partly coincident.
d: The infarcted area at 25 msec and the ischemic area at T max in the case with anterolateral infarction. Both areas are different.
were used. As shown in Fig. 4-a, the infarcted area and the ischemic area were plotted in the case with anterolateral infarction (the case of Figs. 2 and 3). The vertical lines indicated the overlapped area of both areas. But the infarcted area was located more rightward than the ischemic area. We reported at the 44th Annual Meeting of Japanese Circulation Society that the infarcted area at 20 msec at right lateral region was mainly due to the septal infarction. Therefore, instead of the infarcted area at 20 msec the infarcted area at 25 msec was used, because the mapping at 25 msec was less affected by the septal factor than the mapping at 20 msec.

When the infarcted area at 25 msec and the ischemic area at T max were compared in the same case, both areas were almost coincident as shown in Fig. 4-b.

As the result of comparing both areas in 40 cases with myocardial infarction, coincident cases were 25 cases and partly coincident cases were 7. Cases with the different location of both areas were only 3 (10%). Most cases of partly coincident cases were cases with combined infarction. In the remaining 5 cases, the ischemic area was almost absent, as the T wave became to be normal.

Accordingly, it was found that the infarcted area at 25 msec and the ischemic area at T max determined by our method were located at same region in most cases with myocardial infarction.