(3) The increase in stroke index was well correlated with the change in peak flow velocity in rapid filling phase ($r = 0.77$, $p < 0.01$). However, it had no correlation with the change in peak flow velocity in atrial contraction phase ($r = 0.20$, ns).

Conclusion:

DBcAMP improves the relaxation of the left ventricle in failing heart, and the improvement may influence on the mitral flow velocity pattern, especially in the rapid filling phase.

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REAL-TIME OPTICAL MAPPING OF PROPAGATION OF ELECTRICAL ACTIVITY IN THE BULLFROG ATRIUM

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A complete understanding of the conduction pattern of excitation in the atrium is necessary to answer major questions in cardiac physiology. With reference to the spread of excitation in the atrium, the question "Is the spread of excitation waves radial or nonradial?" has arisen. However, investigations into such a problem have been hampered, because of a technical limitation in the use of microelectrodes for simultaneous recording of action potentials from many sites of the preparation. In the present work, we investigated electrical propagation in the bullfrog atrium, using a voltage-sensitive merocyanine-rhodanine dye together with a multiple-site optical recording system to monitor action potentials simultaneously from 100 different contiguous areas. Isochrone curves of conduction obtained by timing the initiation of the action potential-related optical signals, and we constructed maps of the spread. Hence it is concluded (i) that basically, electrical excitation is generated in a narrow pace-making area where lies close to the sinus venosus, and conducts radially over the atrium, (ii) that the conduction velocity in the left atrium exceeds that in the right atrium, and (iii) that the location of the pacemaking area somewhat varies with every preparation.

Limitation and future development: In the present method, each element would detect signals from many cells. To analyse the conduction pattern of excitation in more detail, an apparatus with a photodiode array constructed of many more smaller elements and a higher magnification would be required. We are now attempting to increase the number of simultaneously monitored portions. The ability to record electrical activity simultaneously in more areas should enhance understanding the basis of the cardiac function under the normal or pathological conditions.

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EXPERIMENTAL STUDY ON DETERMINATION OF VENTRICULAR EXCITATION SEQUENCE USING EPICARDIAL AND BODY SURFACE QRS DEFLECTION AREA

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It is theoretically expected that the time integral of QRS deflection (QRS area) from the monopolar lead has a correlation with the ventricular activation time (VAT) determined by the intrinsic deflection. To ascertain this hypothesis we recorded monopolar lead potentials from 43 epicardial and 87 body surface points and compared QRS area maps and VAT maps during sinus rhythm and ventricular pacing. Epicardial study: The minima and isoarea lines of QRS area map were similar to VAT maps during both the sinus rhythm and ventricular pacing, although the anterior interventricular region tended to show large QRS areas. Body surface study: During sinus rhythm the minimum and the initial half of isoarea lines of the QRS area map resembled those of the VAT map. During ventricular pacing the minima of QRS area maps could be easily identified and indicated pacing sites well, while the earliest VAT point was very difficult to determine with the result of difficulty in diagnosing pacing sites by the VAT map.

Reproducibility of measurement of QRS area and that of VAT were examined. The former was better than the latter.

In conclusion, epicardial QRS area maps can represent epicardial activation sequences. Body surface QRS area maps are useful and superior to VAT maps in terms of diagnosing pacing sites and, therefore, foci of ectopic impulse formation.

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A NEW SYSTEM OF EPICARDIAL MAPPING AND ITS CLINICAL UTILIZATION

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To shorten the time taken in intraoperative epicardial mapping, we developed a new computer assisted mapping system. The system consists of simultaneous recording from 15 electrodes and computer assisted data acquisition and analysis. 9 patients of non-ischemic ventricular tachycardia underwent surgical therapy under the guide of intraoperative epicardial mapping using this system. Electric activation potential was recorded sequentially from each site with multiple bipolar electrodes during ventricular tachycardia with uniform morphology similar to that which had occurred spontaneously or preoperative electrophysiological study. The sites of the origin of ventricular tachycardia confirmed with this method agreed well with that presumed by preoperative ECG and catheter endocardial mapping. Conclusion: we successfully recorded epicardial activation potential with this mapping system and were able to identify the site of the origin in real-time. In case of no inducible tachycardia, we could localize the site of the origin analyzing only one beat of PVC.

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LEFT VENTRICULAR ENDOCARDIAL MAPPING STUDIES OF EXPERIMENTAL "TORSADE DE POINTES"

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