

심자도를 이용한 심방세동 부정맥의 진단

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DETECTION OF ATRIAL ARRHYTHMIA IN SQUID MAGNETOCARDIOGRAPHY (MCG); PRELIMINARY RESULT OF A TOTALLY NONINVASIVE LOCALIZATION METHOD FOR ATRIAL CURRENT MAPPING

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1. Introduction

Map-guided surgery is the best method for treatment of atrial fibrillation, because it minimizes unnecessary incisions or procedures. Electrophysiologic(EP) study for mapping is useful, but still time-consuming, difficult to do, unstable and unreliable. Intra-operative mapping with epicardial patch electrode is useful only during the operation, therefore it is very invasive and useless for follow-up. We propose a totally noninvasive method to detect atrial arrhythmia with a SQUID (superconducting quantum interference device) Magnetocardiography system.

2. Methods

To detect weak atrial excitation, we utilized a high sensitive low-Tc 64-channel SQUID MCG system measuring tangential magnetic field components, which is known to be more sensitive to a deeper current source. We measured the MCG signals from three patients with chronic atrial fibrillation. Then, we separated the f wave from the other components by using independent component

analysis. The extracted f wave was three-dimensionally localized on the mesh model of a human heart by a sophisticated inverse solution.

3. Results

It is detected that atrial f wave MCG signals from chronic Atrial fibrillation patients. We localized the abnormal stimulation source of an atrial arrhythmia non-invasively and visualized the current source distribution corresponding to the atrial excitation successfully on the three-dimensional atrial surface, which was separated from the ventricular excitation.

4. Conclusion

MCG is a totally noninvasive and non-contact method for mapping to detect atrial arrhythmia. The visualization of the atrial current distribution would be a great help for planning the Af surgery and for follow-up. However, more technical advances in sensitivity of MCG system and image processing solution are required for more accurate source localization.

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