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THE CLINICAL USEFULNESS OF PHASE IMAGES ANALYSIS FOR EVALUATION OF VENTRICULAR ACTIVATION.

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The clinical usefulness of phase image analysis in evaluating the ventricular activation sequence was investigated in 12 patients with the Wolff-Parkinson-White syndrome and 8 patients with right ventricular endocardial pacemaker. The phase image was performed on multiple gated blood pool scintigrams acquired in left anterior oblique and left lateral projection.

The phase image identified the site of the bypass tract as determined by the electrophysiological study or the location of the pacing electrode. The mean phase angle in the ventricle with the bypass tract or the pacing electrode was significantly earlier than in the other ($p<0.01$). In 10 patients studied with endocardial mapping, the phase difference between posterior LV and anterior RV regions correlated significantly with the time difference between anterior RV and posterior LV activation in endocardial maps ($r=0.89$, $p<0.001$).

In conclusion, the sequence of mechanical contraction assessed by phase image reflected well that of ventricular activation.

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PHASE ANALYSIS IN WOLF-PERKINSON-WHITE SYNDROME. NEW APPROACH FOR DETECTION OF ACCESSORY PATHWAYS.

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Using Tc-99m-PYP, phase images were obteined by multi-gated method in 18 cases of WPW syndrome. 4 cases indicated type A ECG and 14 cases, type B. One case with Mahaim fiber was included. Preemptying segments in phase images were compared with the preexciting sites in intracardiac mappings. At a position of MLAO-30°, preemptying segments were no good agreement with the sites detected by other methods. So, we took phase images from multi-directions. From these images, preemptying segments were dicided in 15 cases, and they coincided well in 11/13 cases with mappings. Phase images after injection of Amisalin in 3 cases demonstrated the presence of RBBB. Subtraction images before and after Amisalin administration expressed more clear preemptying sites in many cases, and were useful to wipe out other abnormal phases. Administrations of Verapamil showed the preemptying segments more clear or made it visible in many cases. There were no changes on preemptying segments in a case with Mahaim fiber after its administration.
We could justify the preemptying segments in all cases of WPW syndrome using above menthioned methods, and the sites in phase images were agreed with intracardiac mappings in 13/13 cases.

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APPLICATION OF FOURIER ANALYSIS TO GATED BLOOD POOL TOMOGRAPHY: DETECTION OF THE SITE OF ACCESSORY CONDUCTION PATHWAY.

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Phase analysis of gated blood pool study has been performed in Wolff-Parkinson-White syndrome (WPW) to detect the site of accessory conduction pathway (ACP). We have reported that the side of pre-excitation was correctly identified; however, there were limitations to detect the more precise site of the ACP especially in the left cardiac type. In this study, we applied Fourier analysis to gated tomography. Study group consisted of 19 patients with WPW and 11 control patients without asynergy or conduction anomaly. In 14 patients, ACPs were determined by epicardial mapping and the result of surgery. Using 20 mCi of Tc-99m RBC, gated blood pool study were performed in multiple projections (LAO, RAO or L.lat.) seven pinhole tomography (7PT, n=20) and emission computed tomography (GECT, n=10). In 7PT, the site of ACP grossly agreed to the phase image. In GECT, phase images were generated in rotated transverse, sagittal and coronal sections. Although further study is required on this method, GECT was useful to avoid the overlap of blood pool and to understand the three-dimensional progression of contraction.

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EVALUATION OF VENTRICULAR ACTIVATION BY PLANAR, TOMOGRAPHIC AND SURFACE PHASE IMAGE.

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ECG-gated equilibrium cardiac blood pool scintigraphy in LAO and RAO projection and seven-pinhole tomography were performed in 7 normal subjects (N) and 29 patients with abnormal ventricular activation. Planar, tomographic and surface phase images were constructed using the first-harmonic Fourier analysis in order to presume ventricular activation sequence.

Each phase image well demonstrates ventricular activation sequence estimated by ECG and body surface maps in the case of WPW syndrome and ventricular pacing. However, the site of the earliest phase angle did not correspond to the site of onset of ventricular activation in the cases of N, CRBBB and CLBBB. This discrepancy may be caused by paradoxical motion of the upper septum and overlap between both atrium and ventricule.

Tomographic and surface phase images showed the phase angle distributions in the right and left ventricule spatially.

In conclusion, tomographic and surface phase images using a seven-pinhole collimator were clinically more useful to evaluate ventricular activation sequence than planar phase images.