FOURIER ANALYSIS OF MULTI-GATED BLOOD-POOL DATA IN PATIENTS WITH COMPLEX CARDIAC ANOMALIES

The clinical usefulness of Fourier analysis of multi-gated blood-pool data was evaluated in 18 non-cardiac subjects and 23 patients with complex cardiac anomalies (CCA) [Tetralogy of Fallot (TOF):18, Ebstein’s anomaly (EA):2, tricuspid atresia (TA):2, double outlet right ventricle (DORV):1 etc].

Quantitative analysis was done by using interventricular phase difference [D(Phase)] and amplitude ratio of right ventricle (RV) to left ventricle [R(Amp)] and qualitative analysis was undertaken by functional images constructed with parameters of each pixel’s phase angle and amplitude.

In patients with TOF, mean values of D (phase) and R(Amp) were 25.3±10.4 degrees and 1.35±0.49 respectively and significantly larger than those of non-cardiac subjects. Values of D(Phase) seemed to increase in proportion to the severity of cyanosis.

The size and dynamics of cardiac chambers could be easily estimated by visual interpretation of functional images in cases with CCA as TA and DORV etc. It was interesting that in patients with EA, the atrialized RV was shown as the hypokinetic area with atrial phase.

This method is highly valuable for pathophysiological investigation and differential diagnosis in cases with CCA.

VENTRICULAR CONTRACTION MAPPING IN WPW SYNDROME USING PHASE ANALYSIS WITH GATED POOL STUDY

Gated blood pool scan with Tc-99m was performed in 20 normal subjects and 14 patients with WPW syndrome. Ventricular contraction mapping using regional phase angle cine rotation was evaluated in left anterior, right anterior and left lateral view. In normals, earlier contraction site was located on anterior apical wall in right ventricle. Left ventricle usually had multiple earlier contraction sites. Above findings were closely correlated with reported epicardial breakthroughs in epicardial mapping study. In WPW syndrome, abnormal earlier contraction site was located in ventricular base just below the atrium, which subsided after abolished ECG delta wave with procaïne amide injection. In epicardial mapped case, Kent fiber was located in abnormal earlier contraction site.

We conclude that phase mapping was useful method to evaluate ventricular contraction-conduction relationship in normal subjects and patients with WPW syndrome, especially to detect Kent fiber portion noninvasively.

DETECTION OF ACCESSORY CONDUCTION PATHWAYS IN WOLFPARKINSON-WHITE SYNDROME: ASSESSMENT BASED ON FOURIER ANALYSIS OF GATED BLOOD POOL STUDY

Twenty-seven patients with WPW syndrome were assessed by phase analysis of gated blood pool study and twenty-one had surgical correction of WPW syndrome by directly incising the portion of an accessory conduction pathway (ACP). Gated blood pool studies were performed by Tc-99m RBC (in vivo labeling) and equilibrium data were obtained in modified left anterior oblique and right anterior oblique projection. The localization of ACP was determined by electrophysiological study using catheter, epicardial mapping and surgery. Out of twenty patients whose ACPs were confirmed by surgery, 16 patients were correctly diagnosed by abnormal initial phase at the side of pre-excitation. Four left cardiac type could not be detected by phase analysis alone. Phase analysis provided interesting informations before and after surgery and can be useful for the evaluation of WPW syndrome.