《招待講演 VI》

A Practical Approach for the Clinical Use of Cardiac Phase Analysis

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As the clinical experience with cardiac phase analysis accumulates it becomes increasingly important to develop an organized approach for the evaluation of phase and amplitude images. This helps not only in deriving maximum information but above all avoids potential errors in interpretation. The first consideration should be to verify the appropriatness of the processing steps. The possibility of processing inadequacies is real and it thus seems inacceptable to interpret phase analysis results without a complete set of quality control images related to: 1) time activity curve correction for variable R-R intervals. 2) Ventricular regions of interest (ROI). The first one is technically an easy problem, and it is worth noting that calculating the first harmonic of the whole cardiac cycle (after tail drop correction) is still the only method proven usefull in clinical practice. The proper ROI delineation is still only a partially solved problem. The present solution involves not only rigorous criteria for drawing the ROI but also for refining it by an outlier suppression method applied on the phase distribution histogram. The clinical data fall into three main categories: regional wall motion abnormalities (RWMA), electrophysiologic disturbances, and tricuspid regurgitation. When motion abnormalities are truly regional a quantification can be easily performed. Clinical and experimental data available today indicate a good correlation with the size of abnormal areas along the free left ventricular border. The most notable limitation is related to diffuse left ventricular dysfunction, in which there is indeed no theoretical reason for phase changes within the ventricle. In such cases the amplitude image, previously submitted to a normalization procedure allows correct interpretation. If there is no evidence of RWMA the data can be analyzed qualitatively and quantitatively for detection of electrical disturbances (branch blocks, hemiblocks, WPW, nonspecific conduction defects, ventricular tachycardia, pacing sites). The precondition is a more drastic histogram clean-up before quantification. The amplitude image plays an important role in separating the effect of electrical abnormalities from that of RWMA on phase images. Even if RWMA is present, a qualitative evaluation of conduction abnormalities is still possible. Tricuspid insufficiency can be detected by a completely automated procedure based on the evaluation of the whole field of view including the hepatic phase image.

In conclusion, the availability of adequate quality control images and a sequential approach in processing and evaluation, generate reliable clinical data from the combination of phase and amplitude images.