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IMPROVED FACTOR ANALYSIS ALGORITHMS AS AN AID IN THE INTERPRETATION OF FIRST-PASS AND EQUILIBRIUM CARDIAC STUDIES. +Leger FA., ++Lumbroso J., ++Aurengo A., ++Bazin JP., ++DI Paola R. +Service Central de Medecine Nucleaire, Hopital de la Pitie, 75013 Paris. ++Unite de Radiobiologie Clinique (U66 INSERM). Institut Gustave Roussy, 94800 Villejuif France.

Factor analysis of dynamic studies (FADS) was applied to the automatic interpretation of cardiac dynamic studies. Two new algorithms were used and compared to classical FADS:

- The optimal stochastic segmentation (OSS) of the images sequence.
- The determination of "Physiological Components" by RMLEC Algorithm.

1) Twenty cardiac left-to-right shunt first pass studies were analyzed. Three scintigraphic data processing were compared: ROI processing conventional FADS and improved FADS (OSS+RMLEC). In each case the activity curves provided a shunt diagnosis and quantification after a kalman deconvolution algorithm. Among these three methods, improved FADS provided the better correlation with the owymetric data.
2) 18 equilibrium cardiac studies were analized. The regional wall motion was investigated in 10 cases. The diagnosis was assessed by ventricular X-Ray angiogram and/or echography. Improved FADS was qualitatively compared to the temporal fourier transform and results were found to be comparable as reported previously.
The left ventricular ejection fraction was tentively quantified in 8 cases and compared to the classical radionuclide ROI method. An entirely automatic method of LVEF quantification is under investigation.

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FACTOR ANALYSIS IF ABNORMAL WALL MOTION OF A HEART.
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M.Di.Paola and Barber applied factor analysis for dynamic investigation carried out with scintillation camera. We analised the data of radionuclide angiocardiography with a way based on the technique of factor analysis presented by M.Di.Paola.
Eighteen patients were studied, including 6 ventricular aneurysm , 6 myocardial infarction and 6 hypertension.
RESULT: All patients suffering from ventricular aneurysm was detected their abnormal region by means of factor analysis. In two cases out of six patients suffered from myocardial infarction, we failed to detect the location of abnormality. One out of these patients was suffered from subendocardial infarction.
To detect wall motion abnormalities, we conclude factor analysis was superior to phase analysis.

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IMPROVEMENT OF QUANTIFICATION IN LV WALL MOTION ANALYSIS USING A NEW 3-DIMENSIONAL CONTRACTION PARAMETERS.:BASIC STUDY USING A CARDIAC DYNAMIC PHANTOM.
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Clinical nuclear medicine has been widely accepted. At present time, wall motion assessment is not completely satisfactory in nuclear medicine because of poor quality of image using the same method with contrast ventriculography. Regional functional images such as regional EF and phase images obtained from the regional time-activity curve are of clinical value. However the regional time-activity curves are significantly affected by change of LV volume and relationship between the pixel and LV position. Therefore regional wall motion assessment in fixed coordinate system has problem on quantification.

We reported a new image recontruction method for regional wall motion in moving coordinate system, however some regional information is lost in this method. At this time, we developed a new analytical method to measure the distance between regional wall points and LV centroid through cardiac cycles in 3-dimensional basis.

In this study, we assessed basic performance of this method using a original cardiac dynamic phantom and improvement of quantification in LV wall motion analysis was performed.

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IMPROVEMENT OF QUANTIFICATION IN LV WALL MOTION ANALYSIS USING A NEW 3-DIMENSIONAL CONTRACTION PARAMETERS.:CLINICAL STUDY IN ISCHEMIC HEART DISEASE.
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Various functional images have been used for LV regional wall motion analysis. However,the reliability of nuclear method is not so heigh because of poor quality of nuclear image and incordination between image matrices and LV volume changes through cardiac cycles.

We reported a new image reconstruction method using a moving coordinate system, however some of regional information is lost in this method. At this time, we developed a new analytical method to mesure the distance between regional wall points and LV centroid through cardiac cycles in 3 dimensional basis. Using this method ,regional information is reserved and quantitative functional images can be generated. Objective circumferential profile analysis is applicable to each functional images.

To assess clinical reliability of this new 3-dimensional analytical method, we studied 42 patients with IHD and 39 normal controls. In comparison with conventional fixed matrix functional images, this new method has improved reliability for LV wall motion analysis.