Assessment of Myocardial Viability in Patients with Left Ventricular Dysfunction: Correlation between CT-Based Attenuation Correction and Uncorrected Quantification Analysis in Thallium201(201Tl) Rest-Redistribution SPECT Study

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Abstract:

Objectives: Previous studies have demonstrated that Quantitative Rest-Redistribution Thallium Imaging is one of the most accurate protocols for the assessment of myocardial viability. This study was conducted to evaluate the alteration of the relative segmental activity of quantification analysis in patients undergoing the Rest-Redistribution Thallium-201 Study via the Single Photon Emission Computed Tomography (SPECT) method for the assessment of viability before (NC) and after introducing CT-based attenuation correction (CTAC).

Materials and Methods: Forty-two patients with left ventricular dysfunction who were referred for viability assessment with Thallium-201 Rest-Redistribution protocol were included. A series of two acquisitions, comprising twenty-minute rest and four-hour redistribution acquisitions, were performed for all the patients. CT acquisition of the same region of the SPECT acquisition was performed for attenuation correction, immediately after the completion of each SPECT study. All the images were analyzed quantitatively to obtain normalized segmental activity on the basis of seventeen-segment model.

Results: Forty-two patients (9 women and 33 men) at a mean age of 64 ± 12.2 years and a mean ejection fraction (EF) of 24.4 ± 10.1% were recruited in the study. There was a significant agreement between the NC and CTAC images in the apex, apical anterior, apical septum, apical lateral, mid anterior, mid inferoseptal, mid anterolateral, basal anterior, basal anteroseptal, basal inferoseptal, basal inferolateral, and basal anterolateral segments between the two methods (p value < 0.05) for predicting viability. However, no significant agreement was noted in the apical inferior, mid anteroseptal, mid inferior, mid inferolateral, and basal inferior segments.

Conclusions: The results of the present study suggest that CT-based attenuation correction can
play a role in minimizing the patient's body-related attenuation artifact, resulting in a different quantification result in a Rest-Redistribution Thallium-201 Viability study, particularly in the territory of the right coronary artery. (Iranian Heart Journal 2013; 13(4):15-20).

Keyword: Nuclear medicine, Viability, Thallium 201, redistribution, Myocardial infarction, Attenuation correction