ORIGINAL ARTICLE

Annals of Nuclear Medicine Vol. 19, No. 6, 485–489, 2005

Initial experience with X-ray CT based attenuation correction in myocardial perfusion SPECT imaging using a combined SPECT/CT system

Daisuke UTSUNOMIYA,*,** Seiji TOMIGUCHI,** Shinya SHIRAISHI,** Koichiro YAMADA,* Tsuyoshi HONDA,*** Koichi KAWANAKA,** Akihiro KOJIMA,**** Kazuo AWAI** and Yasuyuki YAMASHITA**

**Diagnostic Imaging Center, Saiseikai Kumamoto Hospital*
*Departments of **Diagnostic Radiology and ***Cardiovascular Medicine, Graduate School of Medical Sciences, Kumamoto University*
*****Institute of Resource Development and Analysis, Kumamoto University*

Objective: Attenuation artifacts adversely affect the diagnostic accuracy of myocardial perfusion imaging. We assessed the clinical usefulness of X-ray CT based attenuation correction (AC) in patients undergoing myocardial perfusion imaging by comparing their myocardial AC- and non-corrected (NC) SPECT images with the coronary angiography (CAG). ***Methods:*** We retrospectively reviewed the myocardial SPECT images of 30 patients (18 men, 12 women; mean age 68 years). Thirteen of 30 patients with coronary artery disease (CAD) and 17 without CAD were confirmed by CAG. They underwent sequential CT and myocardial SPECT imaging with thallium-201 (111 MBq) under an exercise or pharmacological stress protocol using our combined SPECT/CT system. Two readers reviewed the myocardial SPECT images for the presence of CAD on a 4-point scale where 1 = normal, 2 = probably normal, 3 = probably abnormal, and 4 = abnormal. Two reading sessions were held. First, non-corrected (NC)-SPECT and second, AC-SPECT images using X-ray CT images were interpreted. Interobserver variability was assessed with kappa statistics. Diagnostic performance (accuracy) of coronary arterial stenosis was compared between AC- and NC-images. ***Results:*** Interobserver agreement for visual assessment was substantial or almost perfect. For AC-images, the observer consensus for analysis was 0.84 for the LAD-, 0.87 for the LCX-, and 0.71 for the RCA-territory. For NC-images, it was 0.91, 0.71, and 0.78. AC resulted in statistically significant improvements in overall diagnostic accuracy (sensitivity/specificity/accuracy = 76%/93%/89%, 67%/86%/81%, respectively, for AC- and NC-images). ***Conclusions:*** Because of an increase in the specificity, diagnostic accuracy was significantly increased on AC-images. These preliminary data suggest that X-ray CT based AC in myocardial SPECT imaging has the potential to develop into a reliable clinical technique.

Key words: coronary artery disease, myocardial perfusion SPECT, Tl-201, attenuation correction, CT