

Summary

Multi-center Study for the Evaluation of Clinical Usefulness of Attenuation and Scatter Correction on ^{201}Tl Myocardial SPECT

Seiji TOMIGUCHI*¹, Shin-ichiro KUMITA*², Jun HASHIMOTO*³, Tomio INOUE*⁴, Yoshiyuki NOMURA*⁵, Junichi EMOTO*⁶, Kenichi NAKAJIMA*⁷ and Tunekiko NISHIMURA*⁸

*¹ Department of Radiology, Kumamoto University Hospital

*² Department of Radiology, Nippon Medical School

*³ Department of Radiology, School of Medicine, Keio University

*⁴ Department of Nuclear Medicine, Gunma University School of Medicine

*⁵ Department of Radiology, Mie University School of Medicine

*⁶ Department of Radiology, Handa Municipal Hospital

*⁷ Department of Nuclear Medicine, Kanazawa University School of Medicine

*⁸ Department of Radiology, Kyoto Prefectural University of Medicine

The aim of this study was to evaluate the clinical usefulness of attenuation and scatter correction (AC, SC) on a ^{201}Tl myocardial single-photon emission computed tomography (^{201}Tl SPECT) as a multi-center trial.

With a dual-detector and a triple-detector SPECT systems with a $^{99\text{m}}\text{Tc}$ transmission source, simultaneous transmission/emission tomography (TCT/ECT) was performed on 38 patients with angiographically coronary heart disease (CHD) and 26 patients without evidence of CHD. Stress and delayed attenuation and scatter corrected images (SAC) and uncorrected images (NC) were reconstructed.

On NC images of normal cases, influence of attenuation was greater in male than female. In comparison of ^{201}Tl distribution between male and female, significant decrease in ^{201}Tl activity was observed in the inferoposterior wall in male and that was observed in the anterobasal wall of the left myocardium in female. Such a difference in ^{201}Tl distribution between male and female disappeared on SAC images. On the diagnostic performance for the identification of CHD, SAC images demonstrated improved specificity and

accuracy values in the right coronary arterial territory (RCA) with visual analysis statistically. Sensitivity value in the RCA was also improved, but it was not statistically significant. Sensitivity value in the left circumflex arterial territory (LCX) increased without decrease in specificity value on SAC images. In the left anterior descending arterial territory (LAD), sensitivity value increased on SAC images. Although specificity value decreased on SAC images in LAD territory, it was not statistically significant.

The difference in ^{201}Tl distribution between male and female is improved in normal cases by attenuation and scatter correction on ^{201}Tl myocardial SPECT. Diagnostic performance of CHD is also improved by attenuation and scatter correction, especially in territories of which specificity in assessing the absence of disease have been suboptimal. In conclusion, attenuation and scatter correction on ^{201}Tl myocardial SPECT is considered to be clinically useful.

Key words: ^{201}Tl myocardial SPECT, TCT, Scatter correction, Attenuation correction, Multi-center trial.