123I-MIBG myocardial scintigraphy in diabetic patients: Relationship with 201TI uptake and cardiac autonomic function

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Purpose: To investigate the influence of diabetic myocardial damage (suspected myocardial damage; SMD) diagnosed by 201TI-SPECT and diabetic cardiac autonomic neuropathy (AN) on myocardial MIBG uptake in patients with non-insulin-dependent diabetes mellitus (NIDDM).

Subjects and Methods: Eighty-seven diabetic patients divided into four subgroups: 23 with SMD (+) AN (+); 19 with SMD (+) AN (−); 27 with SMD (−) AN (+); 18 with SMD (−) AN (−), and 10 controls were studied. Both planar and SPECT images were taken at 30 minutes (early) and 3 hours (delayed) after 123I-MIBG injection. The heart to mediastinum uptake ratio (H/M) and washout ratio of 123I-MIBG (WR) were obtained from both planar images. On SPECT images, the total uptake score (TUS) was obtained by the 5 point score method by dividing the myocardium into 20 segments on visual analysis. Similarly, the difference between the 201TI image and the 123I-MIBG image in TUS was taken as the difference in the total uptake score (ΔTUS) representing cardiac sympathetic denervation without SMD.

Results: On both early and delayed planar images, the mean H/M value in the subgroups of diabetic patients was significantly lower in the SMD (+) AN (+) group than in the control group, but among those subgroups, there was statistically significant difference between the SMD (+) AN (+) and SMD (−) AN (−) groups only on the delayed images. Regarding the WR value, there was no statistically significant difference among subjects. On SPECT image analysis, the diabetic sub-group with AN or SMD had statistically significant lower values for TUS than those of the control group. Among diabetics, there was a statistically significant differences between SMD [+] AN [+\] and SMD [−] AN [−] on both early and delayed images. Similarly, the SMD [+\] AN [−\] group also had significantly lower values than those of SMD [−\] AN [−\] on early images. Regarding TUS, there was a statistically significant differences between AN [+\] subgroups and controls. Similarly, the mean value for ΔTUS was much higher in AN [+\] subgroups than in AN [−\] subgroups with or without SMD in diabetes mellitus.

Conclusion: 123I-MIBG myocardial uptake is affected by both SMD and cardiac autonomic neuropathy. Based on the finding that ΔTUS was much higher in AN [+\] subgroups and there was no statistically significant difference between SMD [+\] AN [+\] and SMD [−\] AN [+\] subgroups, a decrease in myocardial 123I-MIBG uptake might progress independently of SMD.

Key words: 123I-MIBG myocardial scintigraphy, NIDDM, diabetic myocardial damage, cardiac autonomic neuropathy