Noninvasive identification of anthracycline cardiotoxicity: Comparison of $^{123}$I-MIBG and $^{125}$I-BMIPP imaging

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To test the feasibility of myocardial $^{123}$I-MIBG and $^{125}$I-BMIPP imaging for the early detection of anthracycline cardiotoxicity, 13 patients who had received anthracycline antinecancer chemotherapeutic agents were studied. Two-dimensional echocardiography and myocardial imaging with both $^{123}$I-MIBG and $^{125}$I-BMIPP were performed in 13 patients treated with anthracycline (group A) and 10 normal control subjects (group C). Anterior myocardial images were obtained 15 minutes and 3 hours after the injection of isotopes. The heart-to-mediastinum ratio (H/M ratio) was used to quantify cardiac $^{123}$I-MIBG and $^{125}$I-BMIPP uptake. The left ventricular shortening fraction (%SF) and the ratio of peak mitral flow velocity in early diastole to that at the time of atrial systole (E/A ratio) were measured by echocardiography. The H/M ratio of $^{123}$I-MIBG was lower in group A than in group C (1.5 ± 0.2 vs. 1.9 ± 0.2, p < 0.01). The patients in group A had faster clearance of $^{123}$I-MIBG from the myocardium than those in group C (27 ± 10% vs. 22 ± 4%, p < 0.05). However, the H/M ratio and clearance of $^{125}$I-BMIPP were similar between the two groups (H/M ratio: 2.1 ± 0.2 vs. 2.0 ± 0.2, clearance: 24 ± 6% vs. 26 ± 6%). The %SF (37 ± 8% vs. 36 ± 7%) and E/A ratio (1.4 ± 0.4 vs. 1.6 ± 0.3) were comparable in groups A and C.

The present findings indicated that myocardial imaging with $^{125}$I-MIBG could detect myocardial damage in patients treated with anthracycline in the early stage when cardiac systolic and diastolic function was still preserved. Early detection of anthracycline cardiotoxicity by $^{123}$I-MIBG would reduce the incidence and severity of heart failure.

Key words: $^{123}$I-MIBG, $^{125}$I-BMIPP, doxorubicin cardiotoxicity