Radiation exposure reduction during catheter ablation by changing the setting of fluoroscopic system

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Introduction: Reduction of ionized radiation dose during catheter ablation procedure is of benefit both for patients and staff in a catheterization laboratory. Currently, radiation exposure is reduced with various protective gears and by decreasing the amount of fluoroscopic time during ablation procedure utilizing an electro-anatomical mapping system. Here, we attempted to reduce the radiation exposure by rearranging the setting of fluoroscopic system.

Methods: We enrolled 699 patients who underwent catheter ablation and examined the effect of 2 attempts on the reduction in the radiation exposure; the removal of secondary radiation grid and the reduction in fluoroscopic pulse rate. The study subjects were divided into 3 groups. In group 1, 229 patients underwent catheter ablation with grid and fluoroscopic rate of 7.5 frame/sec. We performed ablation in 255 patients without grid and with fluoroscopic rate of 6 frame/sec (group 2), and in 215 patients without grid and with fluoroscopic rate of 4 frame/sec (group 3).

Result: Although the ratio of complex ablation (atrial fibrillation or ventricular tachyarrhythmia with structural heart disease, which needs the atrio/ventriculography during procedure) increased from group 1 through group 3 (37% vs. 51% vs. 53% in groups 1, 2 and 3, respectively, \( P=0.0008 \)), these attempts reduced the total radiation exposure (1323±1112 vs. 498±449 vs. 379±349 mGy, \( P<0.0001 \)). These attempts also reduced the radiation dose (23.1±15.3 vs. 10.7±9.2 vs. 9.0±8.0 mGy/min, \( P<0.0001 \)). To assess the pure effect of the grid removal, we compared the radiation dose per 100 fluoroscopic frames between grid (+) group (= group 1) and grid (–) group (= group 2+3). The radiation dose was significantly lower in grid (–) group than in grid (+) group (3.3±3.0 vs. 5.2±3.4 mGy/100 frames, \( P<0.0001 \)).

Conclusion: We could successfully reduce the radiation exposure during catheter ablation by removing secondary radiation grid and reducing fluoroscopic pulse rate. Rearranging the setting of fluoroscopic system may be alternative ways to further reduce radiation exposure in a catheterization laboratory.