Irradiated Lesion Formation Analysis by Laser Balloon Ablation for Paroxysmal Atrial Fibrillation With Intracardiac Echocardiography

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Introduction: Recently visually guided laser balloon ablation (VGLB) system has been approved for ablation for paroxysmal atrial fibrillation (PAF) in Japan. This system is equipped with endoscope for visualization of pulmonary vein (PV) inner wall but the scope cannot reliably determine lesion formation by ablation.

Methods: This study consisted of 24 PAF patients (66±6y/o, male n=18) undergoing VGLB for PV isolation (PVI). An intracardiac echocardiography (ICE) was performed for determining the lesion formation both before and after LGVB. Among all the PVs, right superior PVs (RSPV) were chosen for evaluation of the lesion formation because of clear acquisition of longitudinal plane of view for the PV wall and its adjacent antrum.

Result: All the PVs except for 44 left-sided PVs and 45 right-sided PVs could be isolated by VGLB (92.7%). For all the PVs for which VGLB could not obtain PVI, the touch-up radiofrequency catheter ablation could achieve PVI. Application time for right- and left-sided PVs was 1186±287 and 1069±295 seconds, respectively (NS). One right inferior PV demonstrated dormant conduction by isoproterenol and ATP injection after one-revolution VGLB application and needed additional VGLB. Lesion formation in RSPVs could be recognized as high echoic lesion by ICE and its mutual thickness was significantly increased after VGLB (4.0±0.7 vs. 5.8±1.3 mm p<0.05) although that at the adjacent area apart from the irradiated area by 3-5 mm which VGLB did not deliver did not differ (3.8±0.4 vs. 4±0.3 mm NS). CPK level from peripheral blood samples on the next day of VGLB did not significantly increase (63±17 vs. 81±27 NS).

Conclusion: This study could confirm that VGLB could provide the strict lesion formation encircling PV orifice with less minimum influence on non-targeted adjacent PV region and neighboring tissues compared to cryoballoon ablation that has been known to have some injuries to adjacent tissues resulting in elevation of CPK.