The manifestation of the accessory pathway by inhibiting the conduction of atrioventricular node using an ultra-short-acting intravenous beta-1 adrenergic blocker

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Introduction: When mapping the atrial insertion site of an accessory pathway (AP) is performed during ventricular pacing, a fusion of atrial activation caused by retrograde conduction of both atrioventricular node (AVN) and AP should be differentiated. In order to map atrial insertion site during ventricular pacing, dissociation of retrograde conduction of AP from that of AVN is required and may be achieved with ventricular extrastimulus or pharmacologic block. We hypothesized that differentiation of retrograde conduction of AP from that of AVN can be achieved by using the ultra-short-acting intravenous beta-1 adrenergic blocker, landiolol.

Methods: This study was a prospective, single-center, interventional, non-randomized study. In this study, we enrolled 15 years old or older patients who admitted to Hirosaki University Hospital between October 2017 and July 2019 for radiofrequency catheter ablation (RFCA) of paroxysmal supraventricular tachycardia (PSVT). After the electrophysiology study, patients who diagnosed as orthodromic atrioventricular reciprocating tachycardia (ORT) using an accessory pathway were included in this study.

Result: We enrolled 18 patients who underwent RFCA for ORT. Retrograde conduction over AVN was not detected in 12 patients after landiolol administration. In the remaining 6 patients, effective refractory period (ERP) and retrograde conduction time of AP and AVN were measured both at baseline and after landiolol administration (10 μg/kg/min). ERP of AP was unchanged after landiolol administration (273±30 vs 273±23 ms, p=0.99), whereas that of AVN tended to prolonged (366±120 vs 438±191 ms, p=0.08). Conduction time of AP was not affected by landiolol (138±40 vs 137±37 ms, p=0.75), whereas that of AVN was significantly prolonged after landiolol (168±64 vs 189±65 ms, p=0.008). In 3 patients, the fusion of atrial activation caused by retrograde conduction of both AVN and AP was observed during ventricular pacing. In these patients, ventricular pacing rate manifesting the conduction over AP was 30 ppm lower after landiolol administration, whereas it was unchanged in the other patients. RFCA of AP under landiolol administration was successfully done in all patients. During a follow-up of 14.6±6.2 months, no recurrence was detected.

Conclusion: Our preliminary data showed that landiolol prolonged conduction time of AVN without affecting AP, and may be useful in the manifestation of the AP conduction.