Respiratory cycle-dependent atrial tachycardia originated from the right atrial posteroseptum

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Introduction: The heart rate is regulated by the autonomic tone and the fluctuation of which directly affects the RR interval. The heart rate variability is known as one of the indexes of the autonomic function which signifies the RR interval change with the respiratory cycle. It is captivating such subtle change in the autonomic tone can instantly change the RR interval. The autonomic tone is also associated with the occurrence of the arrhythmias, such as exercise induce ventricular tachycardia or swallowing induce atrial tachycardia. The respiratory cycle-dependent AT (RCAT) has been reported as a rare exhibition of arrhythmias and the mechanisms of which have not been certified yet. Here we describe a patient with RCAT coexisting with atrial fibrillation (Af).

Methods: A 52-year-old man without organic heart disease was referred for treatment of palpitations. Holter electrocardiography revealed paroxysmal Af and frequent atrial premature contractions (APCs). The 20.8% of total daily beats, 1380 beats were APCs. The electrophysiologic study was performed under sedation using propofol. An oral airway and facial mask were used for the auto servo ventilation (ASV) to stabilize the respirations. Intermittent AT of short duration appeared spontaneously. The P morphology was positive in I, negative in II and biphasic (positive to negative) in V1. The earliest site of the AT was coronary sinus ostium on an intracardiac electrocardiogram. Careful observation of the electrogram monitor revealed the development of atrial burst was correlated with the respiratory cycle (Figure). The onset of the atrial burst coincided with that of inspiration. AT appeared regardless of the sedation depth, administration of isoproterenol or atrial pacing, but AT did not appear when we ask him to breathe deeply after waking up from sedation.

Result: 3-Demtional (3D) electro-anatomical mapping using Ensite NavX system was performed in both the right and the left atrium by selecting the APCs manually. Automapping of the APCs was not helpful, because the coupling intervals of APCs were not constant. The created activation maps showed the centrifugal conduction patterns and the earliest site of activation was located at the posterior septum of the right atrium. After the radiofrequency application at this site, RCAT was immediately eliminated. As APCs from pulmonary veins were also detected, we conducted pulmonary veins isolation using the cryoballoon. After the procedures, no atrial arrhythmia was induced by the atrial burst pacing with or without isoproterenol administration.

Conclusion: According to the previous reports, the left atrium and superior vena cava
were well known as foci for the RCAT. The 3D mapping system was able to provide accurate location of the atypical focus for the RCAT. We report a rare case of RCAT coexisting with Af which was successfully treated with catheter ablation.