Pulmonary Artery Denervation Reduces Ventricular Tachycardias

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Introduction: Electrical stimulation of the left stellate ganglion (LSG) can elicit ventricular arrhythmias (VAs) originating from the right ventricular outflow tract (RVOT). Previous studies indicated that nerve from the LSG and middle cervical ganglion pass through the pulmonary artery before reaching the right ventricle. The purpose of this study is to investigate the effects of selective pulmonary artery denervation (PADN) on blood pressure (BP), sympathetic activity, ventricular effective refractory period (ERP) and incidence of VAs induced by LSG stimulation.

Methods: In Protocol 1, heart rate variability (HRV) and serum norepinephrine (NE) were compared before and after PADN. Changes of BP and ventricular ERP induced by stimulating LSG before and after PADN in 11 canines were observed. In Protocol 2, His bundle was ablated to construct complete atrioventricular block in 8 anesthetized canines. PADN was performed by radiofrequency energy and confirmed by high-frequency stimulation. Incidence of VAs induced by LSG stimulation were compared before and after PADN. Immunostaining examinations for pulmonary artery were performed in another two canines.

Result: In Protocol 1, the low-frequency component of HRV and serum NE were significantly reduced by PADN. Changes of BP induced by LSG stimulation were not significant after PADN. Changes in ventricular ERP induced by LSG stimulation were significantly attenuated by PADN only on the sites of RVOT. In Protocol 2, the numbers of PVC, episodes, and duration of sustained VT induced by LSG stimulation were significantly reduced after PADN. Abundant sympathetic nerve bundles were observed in pulmonary artery especially in the anterior epicardium.

Conclusion: PADN could attenuate the cardiac sympathetic activity, prolong the ventricular ERP and reduce the prevalence and duration of VT induced by LSG stimulation, more selectively on the sites of RVOT.