Korean Circ J. 2020 Jan;50(1):50-51
https://doi.org/10.4070/kcj.2019.0361
pISSN 1738-5520·eISSN 1738-5555

kcj Korean Circulation Journal

Editorial

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Is Renal Denervation Using Radiofrequency a Treatment Option for the Ventricular Arrhythmia Following Acute Myocardial Infarction?

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▸ See the article "Effect of Renal Denervation on Suppression of PVC and QT Prolongation in a Porcine Model of Acute Myocardial Infarction" in volume 50 on page 38.

Received: Nov 7, 2019
Accepted: Nov 20, 2019

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Conflict of Interest
The author has no financial conflicts of interest.

The contents of the report are the author's own views and do not necessarily reflect the views of the *Korean Circulation Journal*.

Ventricular arrhythmia (VA) after myocardial infarction is the most important risk factor for sudden cardiac death. Sympathetic nerve overactivation and regional cardiac hyperinnervation plays an important role in the pathogenesis of ventricular tachyarrhythmias (VT).[1)] So, the decreased sympathetic activity may prevent and treat the VAs as a target of multiple drugs including β-blockers. The evidence for a major role of the sympathetic nervous system in triggering cardiac tachyarrhythmias provided the rationale for anti-adrenergic interventions such as left cardiac sympathetic denervation (LCSD)[2)] to treat the patients with long-QT syndrome and catecholaminergic polymorphic VTs. Similar to LCSD or percutaneous suppression of stellate ganglion, renal denervation (RDN) could reduce a body norepinephrine spillover by 42% and efferent muscle sympathetic nerve activity by 66%.[3)] Ukena et al.[4)] reported that RDN could reduce the arrhythmia burden in patients with heart failure with refractory VT. Also, Hoffmann et al.[5)] reported the effect of RDN following VT ablation in the VT patient after acute myocardial infarction (AMI).

In the issue of the *Korean Circulation Journal*, Kim et al.[6)] reports that RDN might reduce the incidence of premature ventricular complex (PVC), prolongation of the QT interval, and VA during acute phase in the porcine AMI model. Even though authors describe the efficacy of RDN using radiofrequency through increased serum norepinephrine level and histology (hematoxylin and eosin staining) around renal artery, tyrosine hydroxylase staining for cholinergic nerve is needed for achieving the successful RDN. Authors demonstrated that successful RDN is achieved by catheter-based RDN using radiofrequency ablation. However, unsolved issues are still remained in the technical and procedural aspects. In terms of technical points, the renal nerve anatomy has played an important role in the development of the RDN technique. The most RDN studies poorly described the site of energy delivery. The efficacy of RDN could be dependent on the nerve abundance near the ablation sites and the renal nerve anatomy in each individual.[7)] Steigerwald et al.[8)] demonstrated that the renal nerve are homogenously distributed throughout the renal artery and renal artery nerves are mostly found in the proximal segment of the renal artery and decreased gradually distally in the animal studies. In the part of procedural point, complete RDN with radiofrequency may be difficult to cause irreversible nerve damage due to inconsistent circumferential denervation and inadequate depth for energy delivery.[9)] Recently, some physicians tried to overcome these limitations. They investigated other catheter-based approaches such as ultrasound, cryogenic balloon or chemical RDN. The peri-adventitial injection of ethanol has been studied to perform a chemical RDN. In addition, electrical high frequency renal nerve stimulation (RNS) has been developed for a more physiological and electrophysiological approach to RDN. The RNS is used to map the sympathetic nerve tissue around renal artery by causing an electrical stimulation-induced blood pressure response to localize sympathetic nerves as ablation target sites.

Although catheter-based RDN have limitations such as less uniform ablation technique and no definite procedural end-point, modulation of the renal nerve activity by RDN could be a reasonable therapeutic option in cardiovascular disease caused by increased sympathetic activity such as drug-resistant hypertension, atrial or VAs and heart failure.

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