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Editorial Article

Radiofrequency Catheter Ablation for Frequent Neurally Mediated Reflex Syncope

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Editorial

Neurally Mediated Syncope (NMS) is the most common cause of transient loss of consciousness; it is a clinical condition that reduces the quality of life [1]. Vasodilatation and bradycardia induced by neuroreflex may cause hypotension and global cerebral hypo perfusion. The mechanism of pathogenesis of NMS is extremely complicated and is not clearly known at present. It is clinically classified into three types: cardioinhibitory type, vasodepressor type, and mixed type. In particular cardioinhibition with asystole or a transitory atrioventricular block induced by a massive vagal reflex is commonly observed in severe cases [2,3], and recurrent NMS may cause serious injury. In such patients, NMS is an important problem for which there is no easy solution. Therapy for its severe reflex syncope involves two conventional methods-pharmacotherapy and dual-chamber permanent pacing. No pharmacotherapy (disopyramide, beta blockers, fluid cortisone, or midodrine) with proven efficacy exists for the prevention of NMS [4]. Dual-chamber permanent pacing is effective in reducing the occurrence of syncope but involves permanent device placement [5]. Radiofrequency catheter ablation is a relatively novel and non-conventional technique that targets the cardiac Ganglionic Plexi (GP) in the epicardial areas through the endocardia. This novel technique could be effective, but there is only a small number of published studies. Pachon et al. first reported on the treatment of NMS with endocardial catheter ablation, which showed excellent long-term outcomes in well-selected patients who had functional bradycardia that comprised NMS, sinus node dysfunction, and intermittent atrioventricular block [6]. The cardiac GP are a collection of autonomic nervous pathways comprising both afferent and efferent as well as sympathetic and parasympathetic fibers [7,8]. Radiofrequency catheter ablation eliminates the most elementary level of vagal innervation by destroying the visceral efferent limb of the parasympathetic system, thereby attenuating neural reflexes. In contrast to the parasympathetic neuron, the postganglionic sympathetic neuron is preserved as its neural body is located far from the heart in the paravertebral sympathetic chain and its axon usually recovers [6]. Moreover, spectral mapping-guided ablation has been undertaken in three anatomical areas: between the aorta and Superior Vena Cava (SVC), between the right pulmonary veins and the right atrium, and in the inferoposterior interatrial septum. However, endocardial ablation of all GP areas is not necessarily needed. We reported a case of successful ablation for sinus arrest by cardioinhibition only for the SVC–aorta GP located between the aorta and the SVC with an approach through the SVC [9]. After ablation, the patient did not experience syncope more than three years. Especially, vagal postganglionic neurons to the sinus node is located in a fat pad adjacent to the right pulmonary vein–atrial junction. These most efferent vagal fibers to the atria appear to travel through the SVC-Ao fat pad [10]. Recently, Aksu et al. [11] reported a selective and stepwise ablation approach for sinus node dysfunction or NMS. However, it remains to be controverted that we could achieve the similar effectiveness of ablation for vagal efferent fiber at any fat pad as the distribution of neuron fibers depends on individual variations. Successful ablation is considered to fulfill three electrophysiological properties: disappearance of fibrillar potential in this area, increased heart rates during ablation, and stabilization of heart-rate fluctuation, suggesting that ablation from the approach may be sufficient in these patients. Mapping guided by high-frequency stimulation may have allowed a vagal response to be elicited more efficiently from the GP embedded in the epicardial fat pads.

Even now, this ablation procedure and its effectiveness still leave some questions. We do not know whether it is sufficient to avoid syncope in the long term. Pachon et al. reported on the treatment of NMS that syncope-free rate was 93.1% in patients during a mean follow-up of 45.1±22 months. It is not clear whether the effectiveness of the ablation procedure is semi-permanent, similar to an effective pacemaker. Moreover, appropriate patient selection is important as well. Their study included all patients with NMS-those with a cardioinhibitory response to the head-up tilt test, and those with a normal response to the atropine test [6]. Aksu et al. demonstrated patients with mixed type (bradycardia and hypotension) and situational syncope. In their study as well, good results were reported and 21 patients, with one exception. For appropriate patient selection, they recommended the implantable loop recorder because of increased potential useful effects of cardioneuroablation[11]. In some studies, there were no major complications related to the ablation procedure. In particular, if endocardial ablation only for the SVC or the right atrium is conducted, it is clearly safer than ablation involving both atriums.

In conclusion, ablation of vagal ganglia is feasible and effective for decreased heart rates and heart-rate fluctuation induced by autonomic nerves, but may not guarantee to improve reflex syncope in all patients with NMS. A permanent pacemaker is generally the standard treatment if the medical treatment options for recurrent severe syncope are insufficient. Currently, this ablation procedure should be selected for patients with recurrent syncope who refuse pacemaker implantation. In the future, large-scale, randomized controlled studies for standardization of case selection and the procedure for catheter ablation will be required.

Conflict of interest: The authors have no conflict of interest to disclose.

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