Commentary: Similar Philosophy Does Not Always Synchronize

Epilepsy is a chronic neurological disorder affecting about 70 million people worldwide. About one-third epilepsy patients are refractory to multiple antiepileptic drugs (AEDs), and they are the real challenge for the neurologist. To combat the morbidity of patients with refractory epilepsy, various neuro-cybernetic prosthesis and neurosurgical procedures have emerged in the past few decades. Vagal nerve stimulation (VNS) is a nonpharmacological device for the treatment of refractory epilepsy. The effect of VNS in epilepsy was suggested by a neurophysiologist in 1985 in Philadelphia when he observed desynchronization of EEG activity during VNS. In 1988, VNS was placed in a patient with intractable epilepsy. In 1997, the FDA approved VNS for refractory epilepsy and later for depression. Since then, about 40,000 VNS were implanted in the patients with refractory epilepsy. It is an externally programmable device in terms of its frequency, current strength, pulse width, and on time. In general, VNS delivers a pulse electrical current of 1–2 mA at 20–30 Hz for 0.5 ms which repeats every 5 min during the day. At night, the device is usually put off. The mechanism of antiseizurogenic activity of VNS is not well understood but attributed to desynchronization of cortical activity, norepinephrine release, and increase in gamma-aminobutyric acid. About one-third patients have >50% reduction in seizure frequency following high VNS.[1] Children also have shown similar efficacy. Complete remission of seizure, however, is rare. In a study on 143 patients undergoing VNS implant, 16.8% had surgery-related complications (infection 3.5%, deep infection needing explanation 3.5%, vocal cord palsy 5.6%, and others 5.6%) and hard wire-related complication in 17.5% (lead fracture 11.9%, disconnection 2.8%, spontaneous turn off 1.4%, and stimulator malfunction 1.4%).[2] The stimulation-related side effects are cough, chest pain, and feeling of chest compression, hoarseness of voice, salivation and facial weakness. Right-side VNS results in heart block and arrhythmia; therefore, left vagal nerve is stimulated. The patients on VNS needing surgery or during VNS implantation need special attention. The patients undergoing VNS implant should receive AEDs in the morning and should resume once the procedure is over. The first-line AEDs may affect cytochrome P_{450}, and hence, it may affect the drug metabolism such as neuromuscular blockade and opioid. Post-VNS placement may have worsening in obstructive sleep apnea symptoms. Patient on VNS implant needs a special attention during MRI study, lithotripsy, electrocautery, radiofrequency ablation, external defibrillation, and during intensive care monitoring systems. During MRI study, heat generation in VNS may damage the device or results in vagal nerve dysfunction. VNS device may be damaged in lithotripsy, electrocautery, radiofrequency ablation, and defibrillation. In such situation, cardioversion may be done using lowest effective current and placing the paddles away from VNS implant. During electrocautery, ground pad placement may prevent current flow through VNS generator.

In this issue, Jain *et al*. have described a patient who underwent pericardiectomy who had VNS implant.[3] They have used bipolar cautery instead of monopolar to prevent disturbance in VNS stimulation and placed the probe as far as possible from the implant. The device is stopped before surgery and reprogrammed after completion of surgery. They nicely reviewed the mechanism of antiseizure activity, side effects, anesthetic complications, and precaution needs for the VNS implant. The philosophy is although similar to a cardiac pacemaker, but one is uncomfortable in the presence of others.

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