ARTICLE ON VAGUS NERVE STIMULATION

Abstract

Introduction: The vagus nerve, often known as the "vagary," is engaged in a variety of activities throughout the body. Vagus Nerve Stimulation (VNS) has the potential to influence many of these functions. The US Food and Drug Administration (FDA) has approved clinical applications of VNS Therapy, as well as information regarding ongoing trials and preclinical research to broaden the use of VNS to new applications. VNS is currently licensed by the FDA for therapeutic use in patients over the age of 12 with drug-resistant epilepsy and depression. This broad capability has sparked considerable interest across a variety of fields, culminating in a number of clinical trials and studies into the foundation of Vagus Nerve Stimulation.

Conclusion: Vagus Nerve Stimulation is an effective therapy that has previously been approved by the FDA for the treatment of seizures. Preclinical and clinical experiments have revealed a possible benefit in a growing number of diseases. Finally, otogenetics has significant promise for assisting mechanistic studies of VNS**.**

Keywords: Vagus nerve stimulation, Otogenetics, Neurotransmitters

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I. INTRODUCTION

The name is derived from the Latin word "vagary," which means "wandering." The Wandering Nerve is another name for vagus nerve. The vagus nerve arises from the brainstem's lateral medulla. It connects the skull to the glossopharyngeal and accessory neve (CN IX and XI, respectively) via the jugular foramen.

The vagus nerve is the longest Xth cranial nerve. It is made up of motor and sensory fibers and has the most widespread distribution in the body due to its transit through the neck and chest to the abdomen. It consists of somatic and visceral afferent fibers, as well as general and specific visceral efferent fibers. One vagus nerve extends from the brainstem through the neck to the chest and abdomen on each side of the body..

II. DEFINITION

Vagus Nerve Stimulation (VNS) is a medical technique that delivers electrical impulses to the vagus nerve. It is frequently referred to as a "Pacemaker for the brain."

1. Indications: The FDA has approved Vagus nerve stimulation for people who:

- Are 12 years or older
- Have partial seizures that aren't adequately managed with pharmaceuticals
- Have uncontrolled epilepsy with anticonvulsant medications
- Furthermore, the FDA has approved vagus nerve stimulation for the treatment of depression in adults who:
- Have chronic, difficult-to-treat depression (Treatment resistant depression)
- Have not improved after trying four or more medications, ECT, or both
- Continue standard depression treatments in addition to vagus nerve stimulation

2. Contraindications

- One vagus nerve
- Receiving various forms of concurrent brain stimulation, such as deep brain stimulation
- Heart arrhythmias or other cardiac problems
- Dysautonomia
- Lung illnesses, such as SOB or asthma
- Active gastric or duodenal ulcers
- Previous hoarseness
- Vasovagal syncope;
- Insulin-dependent diabetes mellitus
- A history of past neck surgery.
- Pregnancy

III. AIMS OF VNS THERAPY

The goal of VNS Therapy is to reduce the amount, duration, and severity of seizures. Seizures become significantly less prevalent in some people, marginally less common in others, and have no effect on others. With VNS therapy, seizures can be lessened in length or intensity. It could also shorten the time needed for seizure recovery.

VNS therapy may not have an immediate effect; it takes up to 2 years to reduce someone's seizures. It is used in addition to, not instead of, AEDs; however, if VNS therapy works, a person's AEDs may be gradually reduced.

1. **Placement of Vegus Nerve Stimulator:** A Vegus nerve stimulator can be implanted in an outpatient setting. This procedure is carried out by otolaryngologists. The surgery is often performed under general anesthesia. The Surgeon begins by making an incision on the patient's left side of the chest. It is typically located over the breast, along the outside side of the chest, or beneath the left arm. The generator is then implanted beneath the skin.

   The generator is a flat, thin device. The size of the generator is determined by the model. The latest variants are slimmer and lighter. A second incision is performed on the left side of the neck, typically in the skin folds. As a result, the scar is not visible later. The stimulator's electrode wire is wrapped around the vagus nerve on the left side of the neck. Once the electrode is in position, it is threaded or inserted beneath the skin and connected to the generator.

   The procedure normally takes 60-90 minutes, and the patient is usually discharged later that day. A person may need to spend the night in the hospital for observation on occasion.

2. **Mechanism of Vegus Nerve Stimulator:** Normally, the stimulator is triggered four weeks after it is placed. The amount (intensity and duration) of electrical stimulation provided will be determined by the neurologist or nurse.

   The level of stimulation varies from person to person, but it is usually started low and gradually increased to the level that is optimal for each individual.During the day and night, it is typically set to 30 seconds of stimulation every 5 minutes.

   The stimulator contains a battery that can last up to ten years. When the battery dies, the stimulator must be replaced using the same procedure used to insert it.

   According to study, Vagus Nerve Stimulation may help reduce seizures by increasing blood flow in key brain areas and increasing levels of specific brain substances called neurotransmitters, which are important in seizure management.

3. **Standard Models:** A rapid increase in heart rate can be detected in the latest VNS types (Aspite SR & Sen Tiva™).This causes an additional burst of stimulation to assist halt the seizures.

These models may be especially useful for persons who are unaware of when seizures occur, who are not present when seizures occur, or who have seizures at night.

4. **Positive effects of VNS Therapy:** Some people believe that VNS therapy enhances their mood, memory, or alertness, and that it may help alleviate depression or improve their quality of life.

VNS therapy is not suitable for everyone. If the seizures do not improve after two years the patient and neurologist may decide to turn off or remove the stimulator**.**

5. **Side Effects of VNS:** VNS therapy can have negative effects, although usually just when the nerve is being stimulated. Side effects may not happen for everyone but can include;

- Throat discomfort
- Cough
- Swallowing difficulty
- A horsevoice
- Headache
- Vocal cord paralysis
- Malfunction of the pulse generator

IV. CONCLUSION

Vagus Nerve Stimulation is an effective therapy that has previously been approved by the FDA for the treatment of seizures. Preclinical and clinical experiments have revealed a possible benefit in a growing number of diseases. Finally, otogenetics has significant promise for assisting mechanistic studies of VNS**.**

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