Vagus nerve stimulation complications

The most common side effects associated with Vagus nerve stimulation are hoarseness, throat pain and coughing. Cardiac arrhythmia has been reported during lead tests performed during implantation of the device, but few cases during regular treatment.

After implanting vagus nerve electrodes to the cervical vagus nerve, side effects such as voice alterations and dyspnea or missing therapeutic effects are observed at different frequencies. Cervical vagus nerve branching might partly be responsible for these effects.

Adverse events (AEs) are generally associated with implantation or continuous on-off stimulation. Infection is the most serious implantation-associated AE. Bradycardia and asystole have also been described during implantation, as has vocal cord paresis, which can last up to 6 months and depends on surgical skill and experience. The most frequent stimulation-associated AEs include voice alteration, paresthesia, cough, headache, dyspnea, pharyngitis and pain, which may require a decrease in stimulation strength or intermittent or permanent device deactivation. Newer noninvasive VNS delivery systems do not require surgery and permit patient-administered stimulation on demand. These non-invasive VNS systems improve the safety and tolerability of VNS, making it more accessible and facilitating further investigations across a wider range of uses.

VNS battery replacement, revisions, and removals account for almost one-half of all VNS procedures. The findings suggest important long-term expectations for VNS including expected complications, battery life, and other surgical issues. Review of the literature suggests that the first large review of VNS revisions by a single center was done by Couch et al. The findings are important to better characterize long-term surgical expectations of VNS therapy. A significant portion of patients undergoing VNS therapy will eventually require revision ¹⁾.

In a retrospective study over an 8-year period, 13 patients underwent revision surgery due to lead failure. Lead failure was classified as either lead intrinsic damage or lead pin disengagement from the generator header. In the X-ray image, Zhou et al., defined an RC ratio that represented the portion of rear lead connector in the header receptacle. It was used to quantitatively evaluate the mechanical failure of the lead-header interface. Optimal procedures to identify and manage lead failure were established.

All 13 patients presented with high lead impedance \geq 9 kOhms at the time of revision. Seven of ten patients with lead damage presented with increased seizure frequency after a period of seizure remission. In contrast to lead damages occurring relatively late (> 15 months), lead pin disengagement was usually found within the early months after device implantation. A significant association was found between an elevated RC ratio (\geq 35%) and lead pin disengagement. The microsurgical technique permitted the removal or replacement of the lead without adverse effects.

The method of measuring the RC ratio developed in this study is feasible for identifying lead disengagement at the generator level. Lead revision was an effective and safe procedure for patients experiencing lead failure ²⁾.

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Vocal cord paralysis

Main risk of surgery is transient or permanent vocal cord paralysis.

Endotracheal Tube Electrode Neuromonitoring represents a safe adjunctive tool that can help localize the vagus nerve, particularly in the setting of varying anatomy or hazardous dissections. It may help reduce the potential for vagal trunk damage or electrode misplacement and potentially improve clinical outcomes ³⁾.

1)

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