Vagal Nerve Stimulation (VNS) White Paper

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Vagal nerve stimulation for treatment resistant epilepsy has been available in the United States since 1997, and improved mood noted in epilepsy patients led to studies examining the use of VNS for treatment resistant depression. VNS implantation consists of placement of the stimulator in the chest wall that is attached by wires tunneled through the skin to the left vagus nerve in the carotid sheath. Potential side effects include voice alteration, hoarseness, coughing, paresthesia, dyspnea and rarely vocal cord paralysis and infection[1].

In an initial open trial of 30 treatment resistant depressed out-patients, response rates of 40-50% were noted with VNS therapy over 12 weeks[2]. After a further 9 months of therapy the response rate was maintained and the remission rate significantly improved from 17% to 29%[3].

In a randomized controlled trial of 235 patients with treatment resistant depression comparing active versus sham VNS over 10 weeks, no significant difference in response was found using HRSD-24 ratings (active 15.2%, sham-10.0%). However using the self-report IDS there was a significant response for active (17.0%) versus sham (7.3%) VNS[4]. Both groups were followed over time and provided active open label VNS. After one year of active VNS the response rate was 27.2% and the remission rate was 15.8% using the HRSD-24[5]. When compared to treatment as usual (TAU), patients receiving VNS + TAU had a significantly improved response rate (27%) versus TAU only (13%)[6]. In a two year outcome study of open VNS treatment, response rates were 31% at three months, 44% at one year and 42% at two years. Remission rates were 15% at three months, 27% at one year and 22% at two years[7].

These findings support the potential for VNS to provide a long-term benefit in treatment resistant depression.

Indications for VNS

VNS has been approved by the FDA for use in treatment resistant depression since 2005.

The FDA labeling of VNS specifies that it is approved for the adjunctive long-term treatment of chronic (lasting more than 2 years) or recurrent depression in patients 18 years or older who are experiencing a major depressive episode (MDE) and have not had an adequate response to 4 or more adequate antidepressant treatments. As adjunctive therapy, VNS should not be used as a stand-alone treatment.

Contraindications: VNS is contraindicated in the presence of bilateral or left cervical vagotomy. The use of short-wave diathermy, microwave diathermy, or therapeutic US diathermy is contraindicated in the presence of VNS. Patients with VNS implanted are advised not to receive whole body MRIs, and can only receive a brain MRI through the use of a special send-receive coil.

Appropriate use of VNS: Where does VNS fit in the treatment algorithm for depression?

VNS is a treatment option for patients with treatment resistant depression, however it is not a first line therapy. In addition to meeting the FDA-labeling requirements for VNS, it is recommended that patients have a trial of antidepressant medications representing different pharmacological classes and augmentation agents. The psychiatrist prescribing VNS should verify evidence that appropriate dosages of each medication trial were prescribed and ensure that patients complied with the prescribed dosages before declaring a failed trial.

Other treatment options:

Psychotherapies (e.g., CBT), medications and electroconvulsive therapy (ECT).

Should patients undergo a trial of ECT before considering VNS?

Given that acute-ECT has been shown to be the most effective treatment available for treatment resistant depression, patients should be fully informed of the risk-benefit ratio for ECT. Patients need to be informed that ECT is less invasive and is a highly effective treatment for depression. For example, ECT is rapidly effective for acutely suicidal patients and is very effective in treatment resistant depression.

VNS should not be considered an acute treatment for severely depressed patients. Acutely ill patients may be more appropriately treated with ECT considering its rapid onset of action. The appropriateness of ECT should be considered prior to VNS implantation. However, it would be reasonable to consider use of VNS in patients who refuse ECT, have failed ECT in the past or have medical contraindications for the use of ECT (e.g. are not able to undergo repeated exposure to anesthesia).

Training for VNS providers

VNS should be prescribed and monitored by a psychiatrist trained in the diagnosis and management of treatment resistant depression. VNS dosage adjustment should be performed under the supervision of a psychiatrist trained in VNS dosage adjustment, and the detection and management of side effects related to VNS stimulation.

VNS implantation

VNS should be implanted by a surgeon trained in VNS implantation.

Informed Consent

Patients should give written informed consent for VNS implantation. The consent process should include a thorough discussion of the risks, benefits, side effects and alternative treatment strategies. Specifically, patients should be advised of the efficacy and side effects of ECT as an alternative. Furthermore, they should be advised of the contraindications to MRI scanning post VNS implantation.

Concluding Statement

VNS has been shown to be effective for some patients with significant treatment resistant depression and is approved by the FDA in this patient population. For individuals with treatment resistant depression ECT has a much higher efficacy, thus ECT should be strongly considered as a treatment option prior to the use of VNS.

References

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