Cleveland Clinic Innovations

Glossopharyngeal Nerve Stimulation for Treatment of OSA

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PRODUCT

A surgical method for accessing and coupling a neurostimulator to the glossopharyngeal nerve for treatment of obstructive sleep apnea (OSA).

INDICATIONS

Airway disease, obstructive sleep apnea, nerve stimulation

VALUE PROPOSITION

- Neurostimulation of the pharyngeal musculature in addition to the genioglossus muscle
- Treatment for patients who cannot tolerate positive airway pressure therapy
- An option for patients who are not suitable or do not respond to hypoglossal nerve stimulation (HNS)

DEVELOPMENT STAGE

Design

PARTNERING OPPORTUNITY

Development and commercialization partnership

CONTACT INFORMATION

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OPPORTUNITY

Pharyngeal tone loss is the primary cause of obstructive sleep apnea (OSA), as the pharyngeal musculature receives neuronal input from several nerves. Accordingly, airway anatomy and neuromotor control can both contribute to airway obstruction. Hypoglossal nerve stimulation (HNS) has been established in treating OSA patients who cannot tolerate positive airway pressure therapy. However, HNS has showed variable results. Some patients still experience airway collapse after HNS, while others do not have favorable anatomy for the placement of an HNS device. These variable results could also occur from activation of retractor muscles of the tongue, leading to airway obstruction. Therefore, an activation system that stimulates other nerves of the lingual system and pharyngeal airway could be helpful in opening the airway and can address an unmet need.

SOLUTION

Selective stimulation of the genioglossus muscle can stabilize the upper airway and prevent or mitigate OSA. Neural inputs to this muscle include the glossopharyngeal (GPG), hypoglossal, and superior laryngeal nerves. The GPG nerve also provides innervation to the stylopharyngeus muscle, pharyngeal constrictors, levator veli palatini, and cricopharyngeus muscles. When the stylopharyngeal muscle is activated, it moves the pharyngeal wall laterally. In addition, stimulation of the GPG nerve, in coordination with the GPG and vagus plexus, can induce oral pharyngeal partial closure and velopharyngeal competence through contraction of the posterior oral pharyngeal musculature. Therefore, efferent fibers of the GPG nerve may be a target for neuromodulation to improve airway obstruction in OSA patients.

In this invention, a neurostimulator is operatively coupled to the GPG nerve, providing stimulation to the airway and helping it open. Access is obtained through an incision around an earlobe of a patient, with the incision extending inferiorly along a posterior border of a sternocleidomastoid muscle, dissecting and retracting a posterior belly of digastric and stylohyoid muscles, and performing a blunt dissection of a styloid process.