

METHODS

COVID-19 targets lower medulla oblongata *via* vagus nerve

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COVID-19 virus selects the vagus nerve to kill a person by slowing and stopping the heart, lungs, or larynx. The virus catches vagus nerve terminals at submucous plexus in the intestine, bronchi, and larynx. Colchicine can be a drug to stop retrograde transmission of infection.

Keywords: COVID-19, vagus nerve, medulla oblongata, retrograde transmission, Colchicine

Introduction

Myriad of symptoms is appearing in the infection of COVID-19, and before being analyzed and ascertained, patients die by breathlessness or stoppage of the heart. Attempts have been made to connect all symptoms into anatomical/physiological structures in a plausible way to simplify the problem and eventually effective management.

Vagus nerve

As the diagram depicts, the lower medulla contains the nuclei of the vagus nerve, i.e., dorsal nuclei of vagus, nucleus of tractus solitaries, and contribution from nucleus ambiguus.

Out of all nerves originating from the medulla oblongata, the vagus is the longest and leaves the neck to enter the thorax to supply the heart and lungs and then enters the abdomen through the esophageal inlet. It travels via the wall of the gut to the left colic flexure. It is the great parasympathetic nerve that controls the heart, lungs, and gastrointestinal systems. It inhibits the heart and lungs and slows their rate, while in the case of the gastrointestinal system, it increases their rate of contraction. When the nerve is stimulated, it slows the heart rate and slows respiration which forces the person to go to the toilet multiple times. These features are quite evident in COVID-19 patients.

Many observed loss of taste sensation because the vagus nerve has a good contribution from the nucleus of tractus

solitarius. A damaged vagus nerve induces damage to the nucleus of tractus solitarius so the patient feels a loss of taste.

When the nerve is in the process of destruction, it has wild activity on the heart, lungs, and gastrointestinal systems. COVID-19 killed mostly aged persons but not all. Only those persons died who had pre-existing diseases in the heart and lungs. Pathological heart and lungs could not fight back with the slowing effect of the vagus nerve. Attempts had been made to artificial respiration but simultaneously artificial pacemaker in the heart was overlooked and patients died.

If Intubation and artificial respiration is delayed, patients may die of laryngeal cause. The vagus nerve gives origin to recurrent laryngeal nerves that supply muscles of the larynx. When the nerve is destroyed, there may be a state of partial paralysis, which instantly paralyzes the posterior cricoarytenoid first. This muscle is the only abductor of vocal cords. It has been noted that abduction paralysis may cause overlapping of vocal cords and stoppage of airflow to the lungs. However, intubation can restore airflow, but that requires the alertness of hospital staff.

So vagus nerve is an individual entity that can kill a person by stopping the heart, stopping respiration in the lungs or at the larynx, and by fluid loss with Na/K imbalance by making profuse diarrhea.

Hypoglossal nerve

The virus when managed to reach the medulla oblongata, the diagram shows that it may damage other neural structures

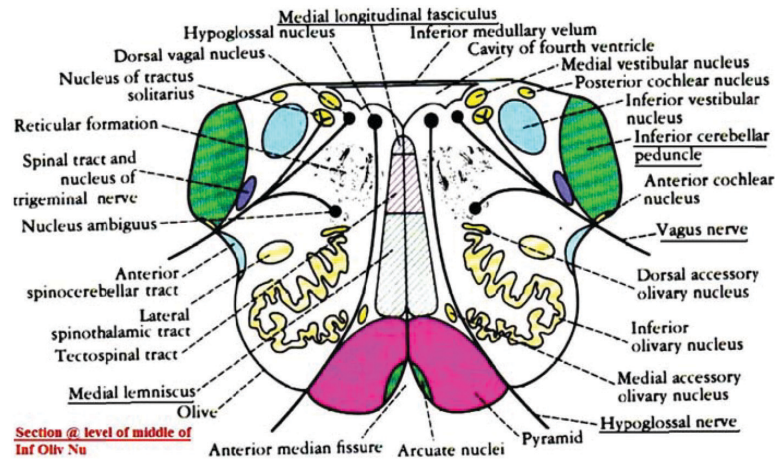


FIGURE 1 | Section of medulla oblongata depicting nuclei of vagus and hypoglossal nerves.

as well. One of them is the hypoglossal nerve. It supplies tongue muscles. The most important muscle in the tongue is the genioglossus. It pushes the tongue out of the mouth cavity. This is not all. By its ability to push forward, it prevents continued attempts to fall back of the tongue towards the opening of the laryngeal inlet. This is the danger. Paralyzed genioglossus can kill the person by choking its laryngeal inlet. A moribund patient lying in a supine position in the hospital bed may be killed of suffocation by falling back of tongue without anybody's knowledge. The remedy to this catastrophe is intubation.

Hanging mechanism

This is the mechanism by which a sure shot death can be ensured. It is practiced as a means of capital punishment. The medulla oblongata is targeted by a hanging mechanism where suspending body weight breaks the odontoid process which in turn presses on the lower medulla to press on the vagus and hypoglossal triangles to stop the heart and cease respiration and die instantly. This is a mechanical and sudden death, while in COVID-19, a viral strain targets the vagus nerve to reach the same medulla oblongata and causes death but slowly and surely.

How virus damages a nerve?

As per the histology of a nerve, it manufactures secretion which propagates to the distal end by its axon. The axon is equipped with many neurofilaments which help in the forward transmission of nerve secretion in the form of a railroad. In the case of forward transmission, a motor Kinesin guides the axonal transport. The axonal transport is bidirectional. There are many axo-axonic synapses where retrograde transport takes place. Here with the same neurofilament railroad, the dynein motor makes a reverse transport and other neural secretory materials are brought to the cell body of the nerve. This latter mechanism is exploited

by the virus to infect a nerve and its eventual damage and thereafter spread to its surroundings. This is how COVID-19 infects the vagus nerve either in the intestinal mucosa or respiratory tract and reaches the medulla oblongata.

How to stop reverse transmission?

This can be done by paralyzing the neurofilament railroad structure. Colchicine is a very popular drug used to paralyze these neurofilaments, so there will not be any reverse transmission. If the virus is prevented to reach the medulla oblongata, the patient will be saved.

Conclusion

Although vaccines have emerged with success against COVID-19 but elucidation of the whole pathophysiology of the disease is still lacking, many attempts would be made to explain the *modus operandi*. Here I proposed my view of explanation for understanding the disease. Patients were killed mainly by breathlessness but those who had preexisting cardiac pathology died by heart stoppage and vagal bradycardia. In the advanced case, where the virus manages to access the medulla oblongata, it damages the cardiorespiratory centers over there, and death is assured as in the case of hanging.

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