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Case Report

# A Case Report: Stellate Ganglion Blocks can help Alleviate Symptoms of Long COVID-19

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## Abstract

Stellate Ganglion blocks have been used to alleviate a wide range of medical conditions due to an overactive sympathetic nervous system. There have been multiple case reports of patients who have undergone a stellate ganglion block after suffering from symptoms of Long COVID-19. Our case report demonstrates that a stellate ganglion block can be used as a treatment modality for symptoms of Long COVID-19. Future research should focus on optimizing the techniques behind the procedure including medication selection and laterality choice.

## Introduction

According to the World Health Organization, there have been over 650 million COVID-19 cases and over 6 million deaths [1]. Patients can either experience no symptoms at the time of infection to symptoms so severe requiring hospitalization. Unfortunately, up to 30% of patients can experience long COVID symptoms ranging from fatigue, orthostatic intolerance, elevated resting heart rate, shortness of breath, brain fog, sleep disturbance, fevers, gastrointestinal symptoms, anosmia, dysgeusia, anxiety, and depression [2-4]. Huang et al. found that greater than 70% of patients had at least one symptom six months after their initial infection, with muscle weakness and sleeping issues being the most common [3]. Other researchers have found that anosmia and dysgeusia can last up to 12 months post COVID 19 infection. All of these symptoms can lead to countless doctor visits, decreased work productivity, and poor quality of life. Luckily, preliminary research has shown that stellate ganglion blocks can help improve and even alleviate anosmia caused by COVID 19 [5-7].

Stellate ganglion blocks have been used for a wide variety of medical conditions including complex regional pain syndrome, post-traumatic stress disorder, migraines, facial pain, post-mastectomy, and ventricular arrhythmias [8-13]. The cervical sympathetic chain comprises the superior, middle, and inferior cervical ganglion and first thoracic ganglion. The cervical sympathetic chain provides sympathetic innervation to many structures within the head, neck, upper limbs, and thorax. In about 80% of the population, the inferior cervical and first thoracic ganglion are fused into an irregular star-shaped structure that is known as the stellate ganglion. This structure is usually located anterior to the neck of the first rib and can extend toaround the transverse process of C7 [14-16]. Due to the proximity of the cervical pleura and vertebral artery, the procedure is usually performed around the level of C6. The procedure can be performed using anatomical landmarks, ultrasound, or fluoroscopic guidance. The needle is placed on the anterior tubercle of the C6 transverse process, also known as the Chassaignac's tubercle. The incidence of severe complications is approximately 1.7 per 1000 blocks making this a relatively safe procedure in the hands of an experienced provider. Common side effects include causing Horner's Syndrome, which consists of ipsilateralmiosis, anhidrosis, ptosis, and conjunctival hyperemia [17-20]. Stellate ganglion blocks cause a decrease in adrenal hormone concentrations, improve blood supply within the region, and reduce sympathetic activation by blocking neuronal signal transmission [21].




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## Case

Our patient is a 35 year old female who initially suffered from a COVID-19 infection in July 2020. She started noticing symptoms of fatigue, headaches, "brain fog" forgetfulness and word confusion), tachycardia, dysgeusia, and anosmia around December 2020. This prompted multiple specialty visits including primary care, PM&R, gastroenterology, pain management, and her dentist. She was referred to a Smell and Taste center, physical therapy, and cognitive behavioral therapy. The patient did her own personal research and discovered that stellate ganglion blocks were being performed on others who had been experiencing similar symptoms. She presented to our pain clinic and after a thorough history and physical examination, the clinical decision was made to proceed with a right sided Stellate Ganglion Block under fluoroscopic guidance She underwent this procedure two times: once in 6/2022 followed by a repeat in 09/2022. She reported 75-85% relief of pain, 95% return of taste, 70% return of smell along with a significant reduction of headaches and symptoms of "brain fog." She reported improvements in Activities of Daily Living (ADLs), having less difficulty with her occupations a school teacher, and overall improvement in her quality of life.

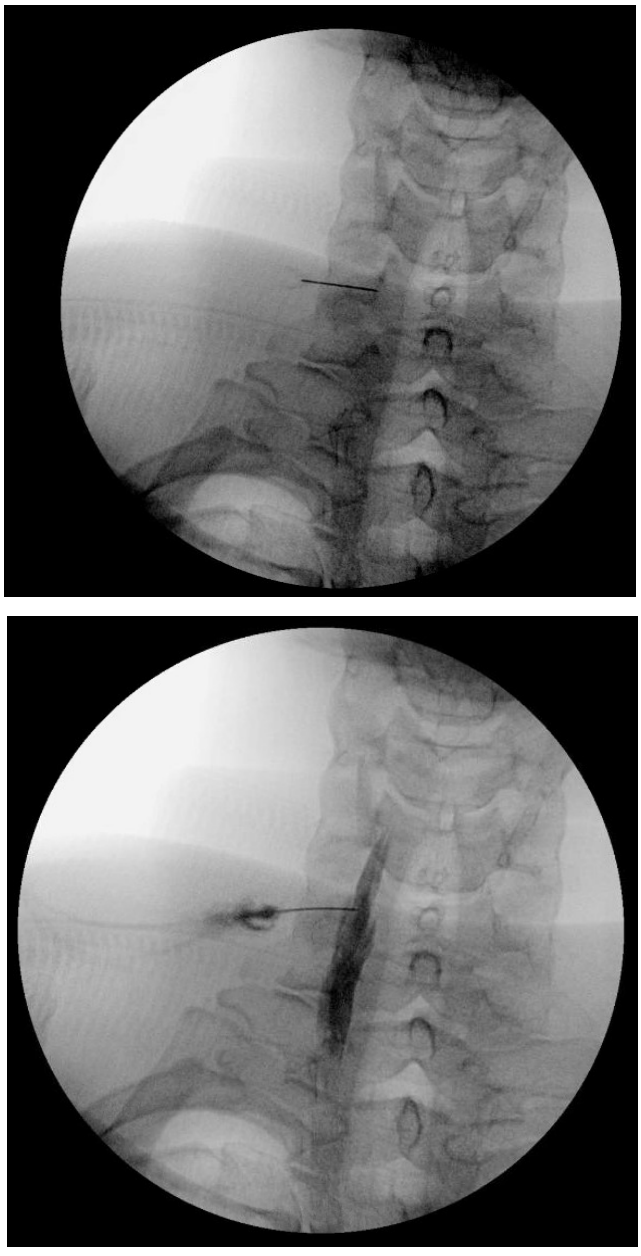

**Figure 1:** Contrast spread along the longus colli muscle.

## Discussion

Current case reports within the literature show that stellate ganglion blocks are effective for a multitude of Post COVID-19 symptoms. Most authors performed bilateral stellate ganglion blocks with varying time intervals to avoid bilateral recurrent laryngeal or phrenic nerve palsy. These case reports describe a variety of local anesthetics, steroids, and volumes being administered [14,22-24].

Stellate ganglion blocks disrupt the pathologic positive feedback loops of the immune and autonomic nervous system that are created when a patient has an exaggerated immune response to COVID-19. This leads to an increased inflammatory state from excessive cytokine production. When the sympathetic nervous system is in overdrive, it usually causes a proinflammatory state. Neuropeptides secreted by nerve fibers can lead to immune cells to produce cytokines, and the nerve endings them self can create their own cytokines. The procedure not only affects the peripheral nerve fibers but also reaches the central structures such as the hypothalamus, pituitary gland, and rostral ventrolateral medulla. Other ways this block helps regulate hyperinflammation is by reducing natural killer cell activity, increasing anti-inflammatory cytokines, as well asregulating microcirculation, coagulopathy, and endothelial dysfunction [25-32]. When patients experience an immediate difference in their sense of taste and smell post procedure, it could either be due to increased blood flow in the central brain structures, or increase in blood flow by the peripheral nerve receptors [5-7]. The effects of the block lasting longer than the local anesthetic duration of actionshows there are other unknown mechanisms at play which may be related to disruption of the windup mechanisms and blocking the afferent feedback loop. It appears the immune and sympathetic nervous system continues to reorganize itself even after the medication is metabolized [25-33].

Future research should focus on optimizing the techniques behind the procedure, and discovering the underlying mechanisms that lead to a decreased proinflammatory state. Studies should also focus on whether medication and/or laterality of the procedure have any effects on the success of the block.

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