PAIN MEDICINE CASE REPORTS

ISSN 2768-5152

Volume 7, Number 3, pp.101-104

Alleviation of COVID-19 Parosmia with Stellate Ganglion Block: A Case Report

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Background: An estimated 23 million people in the United States are affected with Long COVID, formally called Post-acute Sequelae SARS-CoV-2 infection (PASC). Disturbances of taste and smell are common symptoms. There is limited evidence for effective treatment.

Case Report: A 68-year-old woman contracted COVID-19 in January 2021. She had worsening parosmia and dysgeusia, described as "rancid" smells with a variety of foods and objects. She underwent successful right stellate ganglion block in April 2022. Immediately after the procedure, she was able to comfortably eat food previously intolerable. Benefits persisted at 5- and 30-day follow-up.

Conclusions: An ever-expanding patient population and lack of treatment options emphasize the importance of continued research into the pathogenesis and treatment of PASC. A nascent body of evidence suggests stellate ganglion block may provide durable relief.

Key words: COVID-19, PASC, Long COVID, parosmia, stellate ganglion block, case report

BACKGROUND

The SARS-CoV-2 virus and the global COVID-19 pandemic has infected more than 519 million people to date (1). While most patients survive infection, many develop symptoms of Long COVID, also known as Long-haul COVID, and formally defined as Postacute Sequelae SARS-CoV-2 infection (PASC). The World Health Organization has defined PASC to include symptoms such as cognitive dysfunction, fatigue, shortness of breath, headaches, and chemosensory changes (taste and smell) that last for at least 2 months beyond initial infection (2). A US General Accountability Office report suggests that between 7.7 and 23 million people in the United States have developed PASC (3); a recent meta-analysis estimates the global prevalence of PASC at 43% of those infected (4). A study of health care workers in Sweden found that 8 months after mild COVID-19, one in 10 patients still had at least one moderate to severe symptom that was perceived as having a deleterious effect on work, social life, or home life. The most common long-term symptoms were loss of taste and smell (5).

While quantitative loss of olfactory function is frequent, and regarded as a leading symptom of infection, there has been less attention given to qualitative disturbances such as phantosmia and parosmia (6). A recent study looked at survey results from 727 patients with COVID-19-related olfactory disorders, including both loss of smell and alterations. This study found that the most frequently used descriptors of parosmia include "rotten, chemical, and burnt." Furthermore, many respondents reported other physical and psychological effects, such as weight loss and less desire to socialize (7).

Unfortunately, treatment options for olfactory dis-

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Disclaimer: There was no external funding in the preparation of this manuscript.
Conflict of interest: Each author certifies that he or she, or a member of his or her immediate family, has no commercial association (i.e., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted manuscript.
Patient consent for publication: Written and signed informed consent was not obtained as per the Medical University of South Carolina Institutional Review Board policy regarding anonymous case report scholarly activity. Verbal consent for publishing and data collection was obtained with the patient prior to data collection.
Authors adhere to the CARE Guidelines for writing case reports and have provided the CARE Checklist to the journal editor.
Accepted: 2023-01-11, Published: 2023-05-31

turbance, due to COVID-19 or otherwise, are limited and have poor efficacy (8). There are previous reports of utilizing a stellate ganglion block (SGB) in the treatment of olfactory dysfunction, as described by Moon et al in 2013 (9). We present a new case, with findings similar to a recent case series by Liu and Duricka (10), that this treatment may provide sustained relief in PASC and specifically COVID-19-related olfactory dysfunction. In this report, we present the case of an adult woman suffering from COVID-19-induced olfactory dysfunction who received durable symptomatic improvement of her parosmia following a stellate ganglion block.

CASE PRESENTATION

Our patient is a 68-year-old woman with a past medical history notable for recurrent low grade follicular lymphoma stage III, with recurrence confirmed by nasopharyngeal biopsy in 2018. She was treated with a course of rituximab and finished 24 months of maintenance rituximab in January 2021. The patient reports an intact sensorium prior to contracting COVID-19 in late January 2021, shortly after completing rituximab.

Since late January 2021, she has experienced worsening parosmia and dysgeusia of "rancid" smells with a broad array of substances such as "produce, plants, cheese, chocolate, alcohol, and yogurt." Her parosmia was further described as the smell of rotten meat or garbage. This was associated with a similar unpleasant taste while eating offending foods. These symptoms severely affected the patient's life, limiting her to a few tolerable bland foods, and avoidance of fragrant public places such as social events, supermarkets, and restaurants. After viewing media reports of treating PASC anosmia with a stellate ganglion block, the patient was referred to our interventional pain clinic for consideration by her primary physician in April 2022.

No intervention had been offered up to this point. After a review of available literature and extensive discussion of typical indications and risks with the patient, both the patient and attending physician agreed to proceed. A right-sided stellate ganglion block was performed in the usual fashion with the assistance of fluoroscopic imaging. Six mL of a local anesthetic mixture (1% lidocaine with 1:200,000 epinephrine and 0.25% bupivacaine) and 10 mg of dexamethasone were slowly injected; accurate delivery was confirmed with contrast medium prior to injection.

The patient tolerated the procedure well. Approximately 20 minutes after completion, she was provided with strawberry yogurt, which had been particularly intolerable. She was able to smell, taste, and eat the yogurt without difficulty. There was a return of strawberry taste, however she did report a slight residual rancid disturbance in taste and smell. Upon follow-up at 5 days and 30 days, the patient reported the return of mostly normal olfaction with minor residual rancid smells, far diminished from prior to the procedure. She was able to tolerate walking the produce aisle and the scent of celery, alcohol, and yogurt, all of which had been intolerable and actively avoided prior.

DISCUSSION

The cervical sympathetic chain, consisting of a series of autonomic fibers running anterolaterally to the vertebral column, provides sympathetic innervation to the head, neck, chest, and upper limbs. In 80% of the population, the inferior cervical ganglion and first thoracic ganglion fuse anterior to the neck of the first rib, forming the stellate ganglion (11).

SGB has been used for almost 100 years (12) to treat a variety of upper body autonomic nervous system disease states, including complex regional pain syndrome of the upper limb, ventricular arrhythmias, as well as exciting new work in the treatment of posttraumatic stress disorder (13,14). As evidenced by the case series by Liu and Duricka (10), as well as non-peer reviewed news sources, SGB has been used successfully to treat COVID-19 induced anosmia, parosmia, and other PASC symptoms (15,16).

While a growing body of evidence suggests an SGB may be an effective treatment for the sequalae of COVID-19 infection, we are early in our understanding of PASC pathogenesis and how SGB might alter its course. It is well documented that acute SARS-CoV-2 infection can result in immune overactivation and cytokine storm, which can cause inflammatory organ damage via multiple mechanisms (17). A review from February 2021 (18) found more than 6 articles suggesting PASC pathogenesis may at least be in part due to persistent immune generated inflammation. Multiple authors have postulated that an autonomic dysregulation, triggered by inflammatory processes via COVID-19 infection, may contribute to anosmia, ageusia, and other PASC phenomena (19,20). There is a strong body of evidence linking the autonomic nervous system to immunity in a complex web of feedback. In 2002, Tracey (21) presented the landmark concept of "The Inflammatory Reflex," with evidence most notable for

cholinergic neurons of the autonomic system inducing macrophage deactivation and decreased inflammatory cytokines. Bassi et al (22) supported these findings with work showing cholinergic neurons of the vagal system inhibit inflammatory cytokine production in the spleen. While much work has been done on the effects of vagal stimulation to modulate immune response, Martelli et al (23) provided strong evidence suggesting it was the sympathetic innervation that was responsible for dampening immune response to lipopolysaccharide in rats.

Sympathetic neurotransmitters are known not only to deactivate, but also to modulate macrophage activity, and immune tissues such as the thymus and spleen are richly innervated by sympathetic nerves (24). In addition to fundamental molecular research, there is clear evidence of the benefit of SGB in acute inflammation and cytokine storm. A randomized trial in 30 patients with severe trauma showed significantly decreased levels of inflammatory cytokines interleukin(IL)-1β, IL-6, and tumor necrosis factor-α after SGB (25).

In targeting the sympathetic nervous system with an SGB, rabbits with acute pneumonia had lower measures of inflammation and better lung function (26). There is also clinical evidence suggesting disruption of the cervical sympathetic ganglia can affect chronic inflammatory disease states. For example, a randomized controlled trial of 160 patients found a significant benefit to ulcerative colitis symptoms and complications after SGB (27). Finally, there is also evidence, prior to COVID-19, of SGB to be an effective treatment for sensorineural anosmia. As previously mentioned, Moon et al (9) published an observational study of 40 patients, with 15 responding significantly to SGB administered for treatment of sensorineural olfactory dysfunction.

CONCLUSIONS

PASC symptoms such as cognitive dysfunction, fatigue, shortness of breath, headaches, and in our patient, parosmia and dysgeusia, are both common and poorly understood sequelae of SARS-CoV-2 infection. The morbidity associated with these symptoms will continue to place a substantial burden on millions of lives and health care systems in the foreseeable future. SGB has been observed as a potentially effective treatment for PASC symptoms. In our patient with over 12 months of worsening parosmia, SGB was associated with an immediate improvement in parosmia with ongoing benefit at 30 days. The authors note that there have been multiple news articles of patients finding relief from PASC symptoms via SGB, with little peer-reviewed evidence of the procedure's efficacy for this condition. As with any intervention, SGB does carry risk of complications, including airway compromise and death. Fundamental bench research regarding the pathogenesis of PASC, and controlled trials of the potential therapy offered by an SGB are urgently needed. The need is underscored given the growing number of patients affected by PASC and the lack of proven therapies.

Contributions

RU: This author contributed to direct patient care, drafting, editing, and final approval of this case report.

CT: This author contributed to drafting, editing, and final approval of this case report.

HT: This author contributed to background research and drafting of this case report.

MM: This author contributed to background research, drafting, and editing of this case report.

MDB: This author contributed to direct patient care, editing, and final approval of this case report.

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