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AUTONOMIC DYSFUNCTION IN COVID-19 PATIENTS

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ABSTRACT

Post-COVID-19 syndrome is a poorly understood aspect of the covid pandemic, with clinical features that overlap with symptoms of autonomic/small fiber dysfunction. An analysis of autonomic dysfunction following COVID-19 was lacking. Various studies have reported and encountered patients with debilitating symptoms following viral infections who were subsequently found to have orthostatic intolerance syndromes. Orthostatic intolerance syndromes include orthostatic hypotension (OH), vasovagal syncope (VVS) and postural orthostatic tachycardia syndrome (POTS). The pathophysiology hinges on an abnormal autonomic response to orthostasis (standing up). It was also observed that a strong association between post-COVID-19 fatigue and anxiety existed. This is of particular note. Here, we audit and conducted a review of the studies and patients with confirmed history of COVID-19 infection that presented or were referred for autonomic testing for symptoms concerning for para or postinfectious autonomic dysfunction.

Keywords: *Corona virus; Autonomic Dysfunction; POTS; Neuropathy*

INTRODUCTION

Post-COVID-19 syndrome is a poorly understood aspect of the covid pandemic, with clinical features that overlap with symptoms of autonomic/small fiber dysfunction. An analysis of autonomic dysfunction following COVID-19 was lacking. This may provide initial insights into the spectrum of this condition. [1] Covid infection been associated with multiple para-infectious neurological and autonomic abnormalities [2-3]. Not only this but the postinfectious continuation or emergence of these autonomic derangements have plagued many of the affected patients. This is a phenomenon known as "long COVID" [4] or referred to as the post-COVID syndrome.

This term has attracted a lot of interest due to the signifcant functional limitations experienced by sufferers and has garnered the attention of providers interested in autonomic medicine due to the associated symptoms of orthostatic and exercise intolerance. There have been published Case reports on the postural tachycardia syndrome as known as POTS, as a postinfectious manifestation of covid 19 infection [5-6]. There have also been reports of post-COVID-19 POTS associated with other signs of autonomic dysfunction such as hyperhidrosis [7]. Cases of autonomic dysfunction beyond POTS have also been reported, including phenomena such as small fiber neuropathy with orthostatic cerebral hypoperfusion syndrome [8] and post-COVID-19 exacerbation of paroxysmal hypothermia and hyperhidrosis.

With this background in mind, we conducted a review of the studies and patients with confirmed history of COVID-19 infection that presented or were referred for autonomic testing for symptoms concerning for para or postinfectious autonomic dysfunction.

REVIEW

Long COVID & Orthostatic Intolerance Syndromes

Various studies have reported and encountered patients with debilitating symptoms following viral infections who were subsequently found to have orthostatic intolerance syndromes. A study found out that all of the individuals were female and were between the ages of 26 and 50 years old. They all had orthostatic intolerance with either resting or postural hypotension and/or tachycardia. Orthostatic intolerance syndromes include orthostatic hypotension (OH), vasovagal syncope (VVS) and postural orthostatic tachycardia syndrome (POTS). The pathophysiology hinges on an abnormal autonomic response to orthostasis (standing up). When a healthy person stands, blood pools in the pelvis and legs, reducing venous return to the heart. This is detected by baroreceptors in the heart and aorta, which respond by increasing sympathetic neural and adrenergic tone (mediated by norepinephrine and epinephrine respectively). This results in tachycardia (thus compensating for reduced stroke volume). This is then followed by vasoconstriction in the splanchnic vascular bed, which increases venous return to the heart. [9-10]

In orthostatic intolerance, the release of epinephrine and norepinephrine causes pronounced tachycardia, which is experienced as palpitations, breathlessness and chest pain (common symptoms of 'long COVID'). Very high catecholamine levels can lead to paradoxical vasodilatation, sympathetic activity withdrawal and activation of the vagus nerve resulting in hypotension, dizziness and ultimately syncope. [11]

Covid 19 & Autonomic Nervous System

Any individuals presenting with breathlessness, palpitations, fatigue, chest pain, presyncope or syncope should be evaluated carefully. Cardiovascular, respiratory and neurological examination with vital signs and pulse oximetry are essential. Electrocardiogram, blood tests and imaging should be considered to identify other important diagnoses such as organising pneumonia, pulmonary embolism and myocarditis. An active stand test should be undertaken, measuring blood pressure and heart rate after 5 minutes lying supine, and then 3 minutes after standing. Orthostatic hypotension is defined as a fall of >20 mmHg systolic and >10 mmHg diastolic after standing for 3 minutes. [12]

Post Covid Infection Fatigue and Autonomic Dysfunction

We do however see a strong association between post-COVID-19 fatigue and anxiety. This is of particular note. The association between chronic fatigue and anxiety is well-described. [13-14] The aetiology of anxiety in the setting of chronic fatigue appears to be multi-factorial, with both genetic and autonomic causes proposed. [15-16] Socioeconomic factors such as loss of income due to discontinuation of employment have also been linked with the development of anxiety in fatigue syndromes. [17] This suggests that patients with post-COVID fatigue should be investigated for concurrent anxiety and managed accordingly.

CONCLUSION

Several months on from the declaration of the COVID-19 pandemic, new symptom patterns and syndromes such as 'long COVID' are emerging. Studies found out the abnormalities of autonomic dysfunction. Most common finding was orthostatic intolerance. Clinicians must be aware that prompt and correct diagnosis with careful management are essential for recovery.

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