Impact of yoga in a case of vocal cord dysfunction with dysautonomia

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INTRODUCTION

Autonomic dysfunction presents with heterogeneous clinical features and is a multi-system condition affecting nervous, cardiac, gastrointestinal, musculoskeletal and vocal cord function. Autonomic dysfunction is often a result of an imbalance in the sympathetic and parasympathetic nervous system. Yoga practice with breathing and isometric exercises helps modulate autonomic function.

The role of yoga in autonomic dysfunction is not widely studied. This case study demonstrates the association of vocal cord disorders in autonomic dysfunction and the role of yoga to modulate autonomic balance.

CASE REPORT

A 23-year-old female with a past medical history of gastroesophageal reflux disease presented with shortness of breath induced by exercise and certain odors. She reported the symptoms of autonomic dysfunction including fatigue, chest pain, lightheadedness, headaches, numbness/tingling in the arms and legs, and exercise intolerance. Vital signs were significant for orthostatic intolerance. Volume flow loop in the pulmonary function tests showed a flattening of the inspiratory portion characteristic of vocal cord dysfunction. Laryngoscopy showed dyskinesia of the left vocal cord, especially after exercise. Multifactorial approach was used including increased fluid intake and breathing exercises. After 6 weeks of breathing and isometric exercises, the patient reported improvement in dyspnea after exercise. This case report demonstrates the therapeutic role of breathing and isometric exercises in the management of vocal cord and autonomic dysfunction.

Key words: Autonomic dysfunction; breathing exercises; isometric exercises; vocal cord dysfunction; yoga.
with compensatory metabolic acidosis both before and after exercise. Pulmonary function tests showed hy perventilation and flattening of the inspiratory portion of the volume flow loop. Exercise stress test showed an exercise capacity of 59% of normal [Figure 2]. She was referred to an otolaryngologist for laryngoscopy. Laryngoscopy showed the left vocal cord dys kinesia, especially after exercise. It was also positive for throat irritation and hyperemic mucosa after exercise. She was restarted on omeprazole. She was counseled to increase fluid intake and referred to speech therapy for breathing exercises.

On follow-up, her shortness of breath improved after 6 weeks of a yoga training program including isometric and diaphragmatic breathing exercises. Lightheadedness and autonomic symptoms improved with an increased fluid intake. Initially, she used to have daily symptoms; after the yoga program, she had symptoms only a couple of times a week. At times, when she did have shortness of breath, she took deep breaths with her mouth open (pursed lip inspiration), and her shortness of breath improved.

**DISCUSSION**

Not often recognized is the role of vocal cord disorders in autonomic dysfunction. This case report demonstrates the association of vocal cord dysfunction with dysautonomia and the central role of an imbalanced autonomic system in the pathophysiology of both, where yoga may provide a therapeutic role in their management.

Autonomic dysfunction was demonstrated by positive orthostatic vitals and a complex of autonomic symptoms, including headaches, lightheadedness, “brain fog,” chest pain, gastroesophageal reflux, and numbness/tingling. Vocal cord dysfunction was demonstrated by flattening of the inspiratory portion of the flow volume loop and dyskinesia of the vocal cords by laryngoscopy. A multifactorial approach including increased fluid intake, breathing, and isometric exercises resulted in the improvement of symptoms.

Vocal cord dysfunction is associated with autonomic disorders, including Shy-Drager syndrome and multiple system atrophy (MSA). Upper airway obstruction due to vocal cord dysfunction has been observed via laryngoscope in 8 of 10 patients with progressive pan-autonomic failure of Shy-Drager syndrome.\(^1\) Laryngeal abductor palsy is a common manifestation in the advanced stages of MSA.\(^2\) The mechanism of the selective involvement of abductor muscle (posterior muscle) of the vocal cord in autonomic dysfunction is unknown. However, autonomic dysfunction generally precedes or follows vocal cord dysfunction. The close relationship between autonomic and vocal cord dysfunction deserves further investigation.

The key to the pathophysiology of both autonomic and vocal cord dysfunction is the role of the vagus nerve in interfacing homeostasis. Vocal cord dysfunction, abnormal adduction of vocal cords, and laryngeal hyper-responsiveness are suggested to be the functions of altered autonomic balance. Both true and false vocal cords are innervated by the vagus nerve. The vagus nerve influences autonomic functions - respiratory, cardiac cycles, and gut motility. An inflammatory insult can disrupt the normal functioning of the vagus nerve resulting in an altered autonomic function with paroxysmal movement of the vocal cords.\(^3\) Stimuli such as exercise or odors induce parasympathetic reflexes causing airway narrowing at the glottis level. Given the central role of the vagus nerve, breathing and isometric exercises may be therapeutic in the management of autonomic dysfunction.

Inspiratory muscle training (IMT) is therapeutic for both vocal cord and autonomic dysfunction. In a case report of a patient with exercise-induced paradoxical vocal fold motion (PVFM), IMT for 5 weeks resulted in no PVFM symptoms at the end of the study. The results showed...
increased inspiratory muscle strength, improved maximal exercise capacity, and reduced exercise-induced dyspnea.\[4\]

Respiratory maneuvers and isometric exercises are also beneficial in autonomic failure. In a study measuring mean arterial pressure, isometric exercises such as leg muscle tensing reduced orthostatic hypotension. Respiratory maneuvers including inspiratory-pursed lips breathing and inspiratory sniffing reduced orthostatic hypotension in autonomic failure via activation of the respiratory pump.\[5\]

The inter-relationship between vocal cord and autonomic dysfunction may have profound implication in the diagnosis and management of autonomic disorders. More correlative data studying the relationship between vocal cord dysfunction and autonomic disorders need to be analyzed. Given breathing and isometric exercises are therapeutic to both vocal cord and autonomic dysfunction, there is a need for well-designed clinical trials investigating the role of breathing and isometric exercises in the role of autonomic dysfunction.

**CONCLUSION**

Vocal cord dysfunction is often associated with dysautonomia. Given the central role of the vagus nerve in autonomic and vocal cord dysfunction, breathing and isometric exercises aid in the regulation of physiologic responses and provide a therapeutic role in the management of vocal cord and autonomic dysfunction.

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**Conflicts of interest**

There are no conflicts of interest.

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